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Arctic 2030:
Planning For an Uncertain Future

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ARCTIC 2030
PLANNING FOR AN UNCERTAIN FUTURE

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About The Department For Crisis Prevention, Stabilization, And Resolution, German Foreign Ministry

In February 2015, the German Foreign Minister, Frank-Walter Steinmeier, unveiled the results of the Review 2014 process in Berlin. The Review 2014 process evaluated steps the German Foreign Ministry would need to undertake to advance German interests in the 21st century. One of the recommendations made was the establishment of a Department for Crisis Prevention, Stabilization, and Resolution (Department S).

The new directorate aims to mobilize the Foreign Ministry's resources more effectively and increase strategic planning. This will involve re-defining priorities and secondary goals more precisely on all levels, and making the Foreign Ministry more interconnected. Crises will increasingly occur within the next decade or two. As a result, the German Foreign Ministry aims to aggregate the skills required to respond more effectively to an entire spectrum of crises, and not merely specific conflict events. It builds upon the experience of the Foreign Ministry's Crisis Response Centre.

About The Authors

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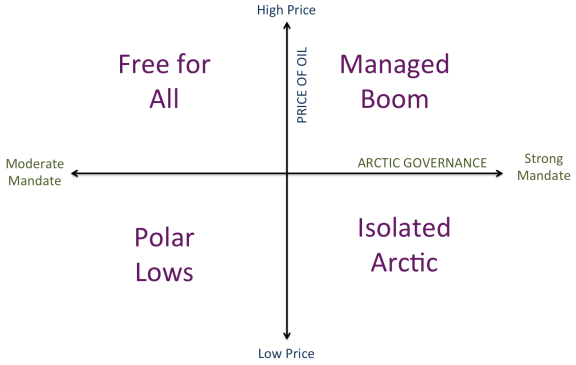
EXECUTIVE SUMMARY

Rapid and unprecedented changes in the Arctic bring both opportunities and risks to Germany. Opportunities include increased access to abundant natural resources resulting from the melting of the polar ice cap and land-based ice sheets. Additionally, the opening of new shipping lanes through the Arctic reduces the transit time substantially from Germany to Asia. Conversely, developments in the Arctic could endanger human health, wildlife, lead to regional instability and destroy fragile ecosystems. These opportunities and risks impact Germany and necessitate its involvement, given Germany's role as a political leader for climate change within Europe.

This project predicts four possible scenarios in the Arctic in 2030 that Germany might face: Managed Boom, Isolated Arctic, Polar Lows, and Free for All.

The scenarios are derived from two critical uncertainties, global oil price and Arctic governance, as well as global driving trends including globalization and optimization of trade, melting ice and warmer temperatures, and increased security concerns.



Two-Axis Analysis Yields Four Scenarios 1

POTENTIAL WORLDS	
MANAGED BOOM	Activity in the Arctic is high with limited security concerns. Under this scenario, there are strong incentives for investment in all sectors. Sustainable development norms are enacted and regulated. Germany will be well-positioned to benefit from economic opportunities including increased maritime activity, increased tourism, and strengthened bilateral trade relationships, and should take advantage of these.
ISOLATED ARCTIC	Arctic governance is strong but has consolidated around the Arctic states, so outside nations have little influence. While oil prices are low, both security concerns and environmental damage in the Arctic are limited. Ecotourism dominates economic growth. Under this scenario, Germany could increase its scientific expertise despite limited economic activities.
POLAR LOWS	An attempt to make the Arctic Council a treaty organization failed, so regional governance resembles the present day's. International law regulates interactions between states. State-sponsored investment drives development, and Russia continues to lead the region. Economic opportunities in the Arctic are limited for Germany, while security concerns linger. Under this scenario, Germany should play a leading role in environmental protection in the Arctic.

FREE FOR ALL	Economic activity in the Arctic is high, alongside the possibility for conflict. Environmental damage is also a concern. This scenario has the lowest level of environmental protection, although it varies across the region. Germany should take advantage of the strong economic opportunities, while positioning itself as a mediator for potential conflict.

In November 2013, Germany published "Guidelines of the Germany Arctic Policy," in which Germany acknowledges the region's strategic importance. From this document, the authors extracted six Strategic Goals. Germany's six Strategic Goals, together with the four future scenarios derived from a two-axis analysis, form the foundation for policy analysis. Policy options are developed to achieve Strategic Goals, and then evaluated for robust effectiveness across all scenarios. Next, the policies that are deemed most robustly effective are evaluated along political and operational considerations, resulting in 18 final recommendations.

POLICY RECOMMENDATIONS

STRATEGIC GOAL 1. SEIZE ECONOMIC OPPORTUNITIES	Strengthen "Germany Trade & Invest" capabilities on the Arctic region by funding one full-time position in Berlin.
	Create Arctic desk in the Deutsche Rohstoffagentur (DERA) including two full-time positions in Berlin.
	Increase political risk insurance and export credits (Hermes-Deckung) for German businesses for Arctic projects.
STRATEGIC GOAL 2. SET EXEMPLARY ENVIRONMENTAL STANDARDS	Support the efforts of the Arctic Council Working Groups: Conservation of Arctic Flora and Fauna, the Protection of the Arctic Marine Environment, and the Arctic Contaminants Action Program.
	Enhance public awareness and appreciation of the Arctic marine environment and rich maritime history and culture.
	Pursue global environmental standards through non-Arctic Council organizations like the U.N. and the EU.
STRATEGIC GOAL 3. FREEDOM OF NAVIGATION	Support Polar Code implementation and further safety development.
	Create Center of Excellence on maritime surveillance to develop technology and policy to support its expansion.
	Push for EU's Emergency Response Coordination Centre (ERCC) and NATO's Euro-Atlantic Disaster Response Coordination Centre (EADRCC) to conduct exercises for disaster responses in the Arctic.
STRATEGIC GOAL 4. FREEDOM OF SCIENTIFIC RESEARCH	Further develop expertise within Germany on relevant scientific topics, to increase Germany's involvement in the region.
	Seek out bilateral scientific agreements between Germany and Arctic states.
	Promote a North Pole treaty.

Strategic Goal 5. Security and Stability	Promote indigenous groups' participation in the Arctic Council by providing funding to the Indigenous Peoples Secretariat for travel to Arctic Council meetings or other events.
	Build bilateral commercial and technological cooperation along the Northern Sea Route. Pursue transfer of domestic technologies to Russia for development of NSR.
	Support Organization for Security and Co-operation in Europe (OSCE) Special Representative for Arctic Issues to promote Arctic issues within OSCE Parliamentary Assembly.
Strategic Goal 6. Active EU Arctic Policy	Strengthen information sharing mechanisms between individual EU Arctic Council members (Finland, Sweden, and Denmark) and the European Commission.
	Improve German standing and relations with Greenland.
	Strengthen EU maritime capabilities in the Arctic by giving specific mandate to European Defense Agency.

The recommendations resulting from our analysis are specific policies Germany can undertake to achieve its Strategic Goals, regardless of the scenario that unfolds in 2030. Combined, these recommendations will increase awareness of the region's importance and focus policy in a cohesive German strategy. The recommendations range in their ease of implementation.

Robust policy recommendations will not only help manage uncertainty about the future character of the Arctic, but also prepare Germany to prevent and respond to possible crises. Therefore, the policy recommendations are further assessed against a variety of Wild Card Events which characterize the types of crises that might occur in the Arctic. The findings demonstrate that the policy recommendations will assist in preventing and responding to potential crises. This broad application highlights the strength of the recommendations in an uncertain future.

Germany's involvement in the Arctic has previously been limited to scientific research in support of the Arctic Council. However, this work is isolated from efforts on sustainable development and shipping infrastructure. A more coordinated national strategy combining scientific, security, and economic efforts will enable Germany to better meet its Strategic Goals. This memorandum seeks to identify policies to enable this end state.

Germany's traditional approach to foreign policy has been to exercise leadership within multilateral institutions. [The role of multilateral institutions can be found in Appendix II]. Thus, the Arctic strategy is focused on the Arctic Council and the EU. However, our analysis suggests that interaction with these institutions may be insufficient to secure Germany's Strategic Goals in all future scenarios. While Germany should continue exercising leadership and advocating for Arctic policies within these institutions, Germany should also be prepared to leverage bilateral relationships and their economic potential to secure its goals.

INTRODUCTION

In 2016, the Arctic is changing more rapidly than any other region. The Arctic has already witnessed a two-degree Celsius rise in temperature,[1] the maximum threshold agreed-upon by scientists in the international debate on climate change.[2] In 2007, the Northwest Passage through the Canadian Arctic opened for the first time in human memory. [3] In 2012, the summer ice coverage was at record lows. And in January 2016, the winter ice coverage also reached historic lows. [4]

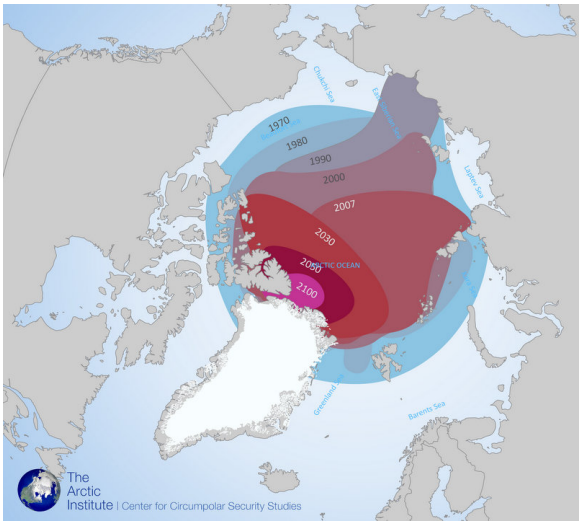


Figure 1
GFDL Climate Model results for predicted sea ice annual minimums

These rapid and unprecedented changes bring both opportunities and risks, including for Germany. The first opportunity is increased access to resources resulting from the melting of the polar ice cap and land-based ice sheets. These resources include up to 30 percent of the world's undiscovered oil and gas, as well as an abundance of rare earth minerals.[5] For instance, on the Russian Kola Peninsula, there are 200 deposits of 40 different types of minerals, including nickel, aluminum and semi-precious stones.[6] The German economy depends on imports of such natural resources for energy and raw materials. Germany imports 90 percent of its oil and gas. Even while the German energy sector is diversifying and renewable energy sources are growing, Germany's use of natural gas is expected to rise through the year 2030.[7] Germany's export-oriented manufacturing sector requires the import of raw materials and minerals, such as those potentially beneath the Arctic ice and permafrost. Minerals, metals, and wood products account for $315 billion of German imports. [8]

A second opportunity is the opening of new shipping lanes through the Arctic. The Northern Sea Route (NSR) reduces transit time from Hamburg to Shanghai by 30 percent compared with the southern route through the Suez Canal.[9] As navigation seasons become longer due to diminishing ice cover, this route is expected to experience more local and circumpolar maritime traffic. Since Germany's port of Hamburg is the second largest in Europe, Germany is likely to capture gains in trade to Asian markets across the Arctic. Also, Germany's large shipbuilding industry remains viable because of it builds specialized vehicles such as cruise ships and service vessels for offshore energy platforms.[10] Ships and service vessels in the Arctic are likely to have unique requirements due to the Polar Code or specialized work, and Germany is poised to capture this new market.

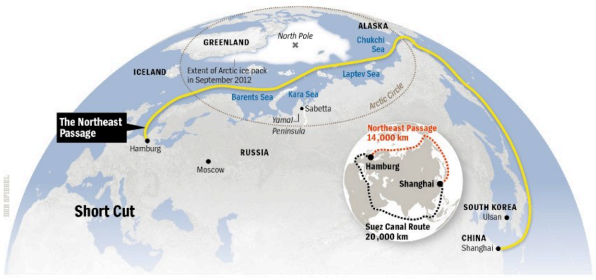


Figure 2
The Northern Sea Route (NSR) reduces transit time from Germany to Shanghai by up to 30%.

However, there are risks. Developments in the Arctic could endanger human health and wildlife, lead to regional instability, and destroy fragile ecosystems. For example, increased emissions from shipping could present a "black carbon" problem that negatively impacts the health of local populations and accelerates the melting of ice.[11] These risks impact Germany and require action. Germany is a political leader for climate change within Europe as well as internationally, and Germany benefits from a peaceful world order built on human rights and the rule of law.[12]

In November 2013, Germany published "Guidelines of the Germany Arctic Policy," in which Germany acknowledges the region's strategic importance and defines both "opportunities and risks."[13] From this document, the authors of this memorandum have extracted six interests, which they define as Strategic Goals: seize economic opportunities, set exemplary environmental standards, ensure freedom of navigation, ensure freedom of scientific research, promote security and stability, and promote an active EU Arctic policy. A further elaboration of these Strategic Goals can be found in Appendix I.

To prepare for an uncertain future, Germany's strategy toward the Arctic must be robust across a range of plausible scenarios. Policy options should not assume a best-case scenario for the Arctic, but instead must achieve Strategic Goals, incorporating regional trends and potential disruptive events.

This memorandum answers the question: What range of scenarios are possible in the Arctic region in 2030, and what policies should the German Foreign Ministry undertake to achieve its interests given these possible futures? This memorandum is written for the Early Crisis Detection and Scenario Planning Unit, a sub-division of the Department S, under the guidance of Ambassador Schwake. This memorandum uses scenario planning for the Arctic region to recommend the policies that the German Foreign Ministry should undertake.

This memorandum approaches the question as follows: First, this memorandum analyzes current Arctic trends. Second, it proposes four distinct Arctic scenarios in the year 2030. Third, it analyzes Wild Card Events. Fourth, it recommends specific policies that will enable Germany to achieve its interests in the Arctic, given a particular future scenario in the region. Last, the policy recommendations are assessed against the Wild Card Events to demonstrate their applicability in preventing and responding to crises in the Arctic. The policy recommendations focus on the interests and Strategic Goals Germany articulated in "Guidelines of the Germany Arctic Policy."

METHODOLOGY

Thinking through stories, and talking in depth about their implications, brings each person's unspoken assumptions about the future to the surface. Scenarios are thus the most powerful vehicles I know for challenging our "mental models" about the world and lifting the "blinders" that limit our creativity and resourcefulness.

Peter Schwartz, The Art of the Long View: Planning for the Future in an Uncertain World

Businesses and governments use scenario planning to challenge assumptions and think creatively about the future. Scenarios are not about what *will* happen ("Forecasting"), or what *should* happen ("Wishful Thinking"), but rather what *could* happen. Scenario planners do not attribute probability to any specific future, but rather focus on expanding notions of plausibility.

Businesses often use scenario planning to understand the global trends impacting their commercial activities and develop indicators to track those trends. Governments evaluate national strategies and policy options against a range of scenarios, allowing them to identify risks to their strategies and determine the robustness of policy options. One prominent example of scenario planning is the Mont Fleur Scenarios. This scenario exercise, conducted in post-Apartheid South Africa, led the Pan-Africanist Congress to abandon its armed struggle and join the election process.[14] A more recent example is the Horizon Scanning Programme in the UK[15] and the Risk Assessment and Horizon Scanning in Singapore.[16] On a regional level, the Arctic Marine Shipping Assessment chartered and published by the Arctic Council employs the scenario planning methodology.[17]

Robust scenario planning includes participation from a wide variety of stakeholders. This report incorporates interviews conducted in four Arctic Council member states (the Kingdom of Denmark and its Greenland territory, the Russian Federation, the United States, and the Republic of Iceland), as well as in Germany. Interview partners included government officials, academics, industry leaders, indigenous groups, and scientists. A full list of interviews can be found in Appendix IV.

This memorandum conducts scenario planning as follows:

METHODOLOGY

1. Stakeholder Analysis
2. Driving Trends
3. Two-Axis Analysis
4. Scenarios
5. Wild Card Events
6. Applying Germany's Strategic Goals to Scenarios
7. Policy Options and Analysis
8. Policy Recommendations
9. Assessing Policy Recommendations Against Wild Card Events

STEP 1: Stakeholder Analysis

The Stakeholder Analysis identifies relevant players for the Arctic scenarios including federal governments, private companies, and the academic community. The memorandum describes each stakeholders' major interests.

STEP 2: Driving Trends

The driving trends are important regional and global forces shaping the future with relative certainty. These include increased security concerns and continued research.

STEP 3: Two-Axis Analysis

The Two-Axis Analysis maps the critical uncertainties, the factors with the largest impact on the future, on horizontal and vertical axes yielding four distinct scenarios. The critical uncertainties are global oil price (an indication of regional growth) and Arctic governance.

STEP 4: Scenarios

The Two-Axis construction yields four distinct scenarios: Managed Boom, Isolated Arctic, Polar Lows, and Free for All. The scenarios tell plausible stories of the region's future in the year 2030.

STEP 5: Wild Card Events

The six Wild Card Events would require a response from the Foreign Ministry, and could shift the region's trajectory toward certain scenarios. The examined events include: a catastrophic oil spill, terrorists infiltrating an unguarded Arctic border and attacking Toronto, geopolitical tension spillover because of the Belarus Purple Revolution, the advent of new technologies, the spread of a mosquito-borne disease among Arctic indigenous populations, and the sinking of a Hapag-Lloyd cruise ship during an Arctic expedition.

STEP 6: Applying Germany's Strategic Goals to Scenarios

This section assesses how Germany would fare under the four future scenarios, given the Strategic Goals outlined in its "Guidelines of the Germany Arctic Policy" from November 2013. These goals are seizing economic opportunities, setting exemplary environmental standards, achieving freedom of navigation,[18] enabling scientific research, maintaining security and stability, as well as promoting an active EU Arctic policy. It is assumed that Germany is placing an equal weight on achieving each objective.

STEP 7: Policy Options and Analysis

A two-step analysis assesses a range of possible policies under each Strategic Goal. To determine which policy options are robust, this section first evaluates options against the scenarios. Then, the robust policy options are further evaluated for political and operational feasibility to yield policy recommendations. The analysis is weighted towards robustness across scenarios.

STEP 8: Policy Recommendations

This section examines policy alternatives for each of Germany's six Strategic Goals in the context of the scenarios. The effectiveness of each policy option in meeting Germany's objective is evaluated for each scenario. Policy options that are effective across all scenarios are determined to be robust.

STEP 9: Assessing Recommendations Against Wild Card Events

This section assesses the 18 policy recommendations against the Wild Card Events to demonstrate their applicability in preventing and responding to crises in the Arctic region.

DRIVING TRENDS

Melting Ice And Warmer Temperatures

The Arctic region is warming at an accelerated rate relative to lower latitudes. The Arctic has already witnessed a two-degree Celsius rise in temperature,[19] and the Intergovernmental Panel on Climate Change predicts an increase in temperatures of about 0.2 degrees Celsius per decade for the next two decades.[20] The changing Arctic environment will have contrasting results. While less ice will yield greater marine navigability, icebergs and extreme weather will decrease it. On land, the melting permafrost will yield greater access to resources, but will challenge transportation as ice roads melt and swamp conditions hinder infrastructure development. The changing environment will require adaptation on behalf of the Arctic's inhabitants. Traditional food sources are already endangered or migrating, creating a food security challenge for indigenous groups. Also, ice loss prevents traditional activities, resulting in a loss of indigenous culture. In our analysis, this trend is predicted to yield an increase in temperature of 0.35 degrees Celsius by the year 2030.

Continued Research

Given the importance of the Arctic to climate change, the region will continue to see an influx of international researchers. Facilitated by the Arctic Council and multilateral agreements such at the Spitsbergen Treaty, collaboration on environmental research will continue in the region. Additionally, the nature of the research may become more commercially-driven. Last, concerns about proprietary scientific knowledge to support resource development may prompt nations to restrict research access within their territory and exclusive economic zones (EEZs).

Increased global demand for Food, Water, and Energy

As a warmer climate makes the Arctic region more accessible and as the global population grows, there will be increased interest in its food, water, and energy resources, both by state and non-state actors, including businesses, the government, non-governmental organizations, academia, and multilateral organizations. Additionally, there will be increased interest regarding mineral extraction.

Global Population Growth And Migration

The global population is increasing, but not uniformly. Populations in developed countries are increasing at a slower rate than in developing countries. While the global population centers are shifting south and east, economic inequality pushes migrants to the north and west. More people are moving to cities, with the majority of the world's population expected to live in urban areas by 2030. With most cities located near coastlines, the combination of climate change and urbanization may have dire consequences for human security. In general, the Arctic is experiences the opposite trend. Populations are declining and aging, due to both emigration and low birth rates.

Globalization And Optimization Of Trade

Transportation companies seek lower costs. Shorter sea routes, particularly those through the Arctic,

could lead to significant cost reductions. However, the Arctic's winter ice and undeveloped infrastructure have historically challenged these routes. Advancements in maritime technologies, as well as shipping and navigation-related infrastructure, could yield the required safety and predictability. Furthermore, economic development in the Arctic will enhance the exploration of new shipping routes.

Increased Mobility And Interconnectivity

The mobility of ideas and people will connect previously isolated Arctic communities to the rest of the world, and motivate tourists globally to explore the Arctic. This movement of ideas and people will create new cultural networks and the ideal conditions for innovation, creative disruption, and globalization.

Increased Security Concerns

In general, an increase in the strategic importance of a location often leads to an increase in actors' willingness to secure access. The strategic importance of the Arctic, given its resources and plausible new shipping routes, is increasing. As a result, it possesses growing economic significance and corresponding security concerns. Threats from both non-state actors and increased human activity also contribute to defense planners' unease. First, non-state actors like ISIS pose an increasing security threat to all nations. One particular concern in the Arctic is the existing porous borders, which allow non-state actors to more easily infiltrate Arctic countries. Second, growing economic activities contribute to increased tourism, but the limited search and rescue capabilities of the Arctic nations undermine their security.

TWO-AXIS ANALYSIS

The global price of oil and the level of Arctic governance are the critical uncertainties in the future 2030 Arctic.

A high oil price is defined as one above $100/bbl., in 2016 dollars accounting for inflation; a low oil price is defined as one below $40/bbl., in 2016 dollars accounting for inflation. Our analysis assumes that global oil prices will determine the levels of economic development in the Arctic. Large investments in resource exploration and extraction projects, driven by high oil prices, will result in infrastructure development such as port facilities and communication networks. The building of infrastructure facilitates other commercial activities, thereby increasing overall development in the region. Since the Arctic countries have strong political systems, it is unlikely that the resource curse will occur. [21]

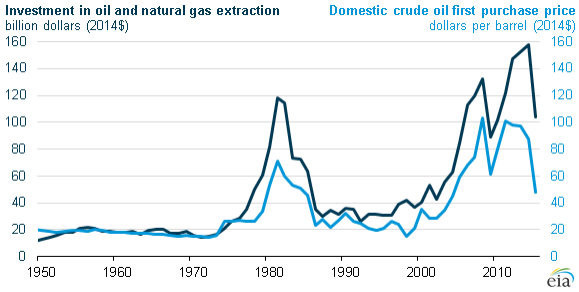


Figure 3
Investment cycle correlates with crude oil price changes

The second critical uncertainty, the level of Arctic governance, is defined as the existence and nature of multiple, cooperative international institutions that cover scientific, economic, and security concerns. The status quo is defined as a moderate mandate of Arctic governance.

In 2016, there are multiple, overlapping governance structures without comprehensive mandates or enforceable treaties. Arctic governance organizations include the Arctic Council, Barents Euro-Arctic Council, European Union, Organization for Security and Co-operation in Europe (OSCE), International Maritime Organization (IMO), United Nations Convention on the Law of the Sea (UNCLOS), Northern Chiefs of Defense, Arctic Security Forces Roundtable Discussions, North Atlantic Coast Guard Forum, Arctic Coast Guard Forum, and Pacific Coast Guard Forum. A strong mandate would involve a more robust governance structure either through an expanded role of the Arctic Council, additional regional governance and treaty structures, or international governance with specific applicability to the Arctic. A stronger Arctic governance mandate yields a more robust governance structure, additional regional and treaty structures, increased transnational cooperation, and a more coordinated and efficient response to issues arising in the Arctic.

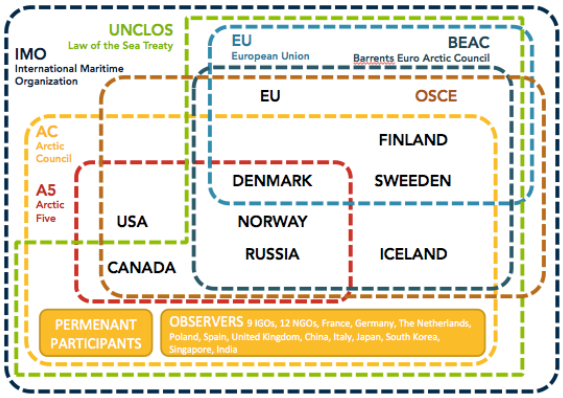


Figure 4
Overlapping governance bodies of the Arctic

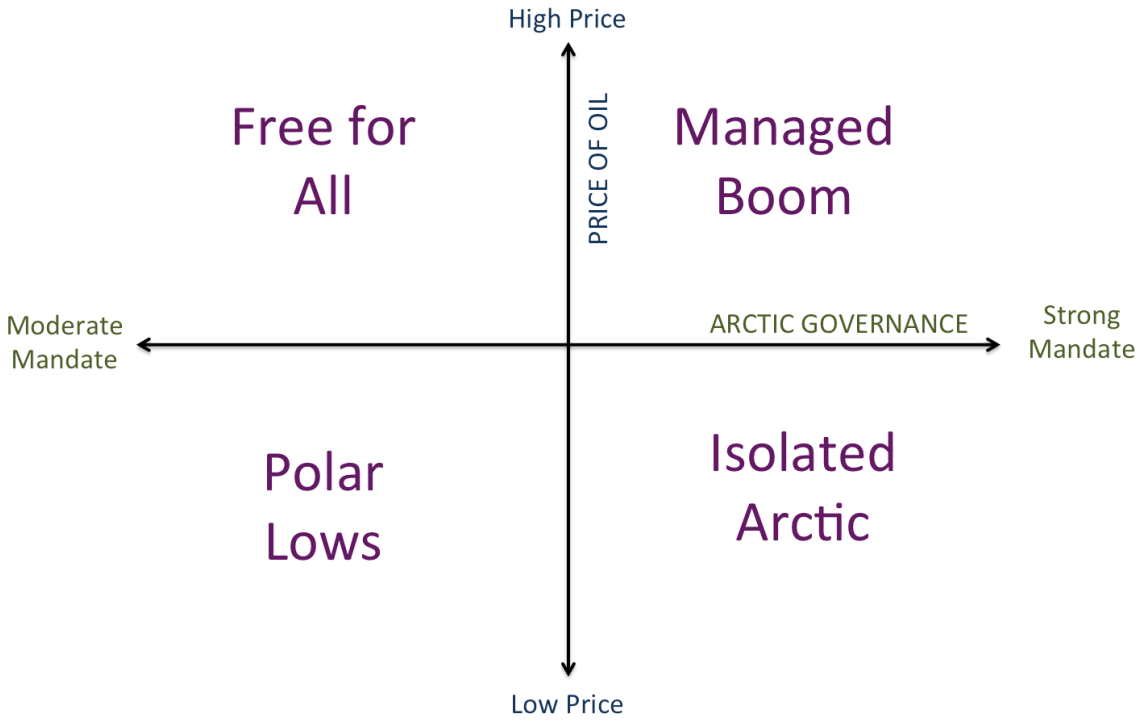


Figure 5
Two Axis Analysis

The price of oil and Arctic governance are exogenous to Germany. Germany has limited ability to influence the international market alone given its share of oil consumption relative to overall demand; rather, international markets determine the price. For Arctic governance, Germany is only an observer in the Arctic Council and therefore cannot vote on resolution. The EU and NATO offer an avenue for German influence, but neither have strong Arctic policies and remain consensus-based, limiting Germany's influence [see Appendix II]. Therefore, Germany has limited ability to shape the governance of the region.

Constructing a two-by-two matrix, with the level of Arctic governance on the horizontal axis, and the price of oil on the vertical axis, yields four scenarios. These scenarios capture four different and plausible futures for the region, discussed in detail in the next section.

Each of the four scenarios assumes a baseline 2030 Arctic warming of 0.35 degrees Celsius and a corresponding 22.5 percent decrease in the extent of annually averaged Arctic sea ice and a 37.5 percent decrease in the area covered by Arctic sea ice at the end of summer (September). Additionally, Arctic glaciers and the coastal ice sheets in 2030 will have partially melted, contributing to a measurable but not catastrophic sea level rise.[22]

SCENARIOS

Scenario I: Managed Boom

Under a scenario characterized by both a high price of oil and strong Arctic governance, the region witnesses growth in both economic activity and international cooperation.

Military activity has increased commensurate with economic activity, led by Russia's military revitalization. Tepid cooperation characterizes this military presence, as the Arctic Council's mandate has expanded to address security concerns.

The high price of oil and the heavily governed environment have created a fruitful environment for development, spurring strong economic growth. The Northern Sea Route is a functional trade artery, moving resources from the Russian Arctic into European and Asian markets. Cross-Arctic trade has not replaced alternate routes, but has added to global trade by creating new trade patterns. The Northwest Passage through the Canadian archipelago is growing, but lags behind the Northern Sea Route because of delayed investment in shipping infrastructure and persistent ice conditions. In the northern Pacific, the preferred route from Asia to North America has moved northward to match the great circle route, conserving time and money.

Previously isolated communities have become more vibrant and diversified, as they have integrated into regional and global economies through developed transport networks. High quantities of shipping, in combination with high levels of tourism and mineral exploration, have increased global trade and economic activity for previously isolated island communities.

Indigenous populations play a greater role in the governance and economic affairs of the Arctic, empowered by the Arctic Council. Businesses share the sustainable development goals of the indigenous populations, and financially empowered communities are able to adapt to the rapidly changing climate. Increased access to and the significance of the Arctic have encouraged research, facilitated by the Arctic Council Working Groups.

How Relevant Powers Fare in Managed Boom Scenario	
Germany	Germany benefits from the shortened trade routes, increased economic activity, and international cooperation with substantial cost savings. Germany and Arctic states collaborate on a range of issues, broadening global cooperation on all issues surrounding the Arctic.
European Union	The EU benefits from the shortened trade routes, increased economic activity, and international cooperation with substantial cost savings. European players collaborate on a range of issues, broadening global cooperation on all issues surrounding the Arctic.
Russia	Alongside the rest of Europe, Russia benefits from the increased economic activity on its northern border. Russia sees substantial domestic economic growth and increased tourism in previously isolated northern communities. Russia increasingly collaborates with other Arctic players on a range of issues, broadening global cooperation on all issues surrounding the Arctic.
China	China benefits from faster and cheaper trade routes with European communities and now exports its products with greater ease.
Maritime Powers (South Korea, Singapore, Japan)	South Korea, Singapore, and Japan benefit from increased trade with Europe and now export and import products more easily.
United States	The United States benefits from increased economic activity. In particular, the state of Alaska witnesses a sustained economic boom.
Other Arctic Nations	Other Arctic nations benefit from the increased economic activity and international cooperation. Tourism, trade, and global interconnectedness have all increased. There is increased collaboration between Arctic players on a range of issues, broadening global cooperation on all issues surrounding the Arctic.
Poor Developing States in Africa, Asia and Latin America, and Pacific	Poor developing states benefit from the heightened economic environment with increased imports and exports, though not to the same extent that countries closer to the Arctic experience.

Scenario II: Isolated Arctic

Under a scenario characterized by a low price of oil and strong Arctic governance, the region remains at the fringes of the global economy and independent from other international institutions. Military investment in the region is focused on search and rescue missions.

With the low price of oil, ecotourism dominates economic activity in the Arctic. The allure of the Arctic frontier lifestyle contributes to immigration. Development occurs on a regional scale. Strong governance ensures a stable investment environment, but the low price of oil discourages major resource extraction or transportation development. The United States is without a deep-water port in the Arctic, although mid-size cruise ships dock across the circumpolar Arctic.

The Arctic Council became a treaty organization under Finland's chairmanship in 2018 and has strengthened powers under each successive chairmanship. As the body grows, the other regional and international bodies lose prominence. The Euro-Barents Council remains, but is focused on micro-issues, such as managing reindeer herds and connecting existing road networks. The Arctic Council has become the model for genuine indigenous involvement in decision-making due to their permanent participation and steady funding for travel.

The evolving Arctic Council excludes countries outside of the Arctic. In the last moments of the U.S. Chairmanship, the Council capped the number of observer states at 12 and instituted rotating observer status. This structural change limited the voice of rising powers such as China, India, and Brazil, and maritime nations such as Singapore and South Korea. These states have responded by increasing bilateral ties, especially with Russia. The Arctic Council never admitted the EU; however, the EU exerts influence through EU Arctic Council members.

Despite the limited influence of non-Arctic states in Arctic politics, citizens from those states have continued to shape the Arctic through scientific research and tourism. The recognition of the Arctic as the "canary in the coal mine" for global climate motivates researchers to study the Arctic's climate and impact. Scientists do not yet understand the interaction between the polar ice cap and its surrounding elements, nor the fragile ecosystems of permafrost and boreal forests.

Tourism also shapes the environment. As both global incomes and accessibility to the region rise, more people can afford to visit the region, drawn by its natural beauty. After the Great Barrier Reef began to shrink at an alarming rate in 2020, tourists grew concerned about missing the world's wonders. This eco-tourism has unintentionally motivated governments to preserve greater sections of the Arctic for touristic activities. All resource extraction-related activities are strictly contained to areas with limited environmental damage potential.

How Relevant Powers Fare in Isolated Arctic Scenario	
Germany	Germany gains little from the Arctic. Although its nationals still conduct research, more conservative Arctic Council observer policies limit its influence. Lack of resource development and few shipping lanes yield little economic gain. An increase in Arctic cruises benefits some German ship builders.
European Union	Despite the never gaining observer status, the EU has a coherent and organized Arctic policy, incorporating economic and security interests.
Russia	Under pressure due to low oil prices, Russia capitalizes on the exclusion of China as an Arctic player by negotiating exclusive resource development projects for Chinese import. Russia simultaneously separated its enormous northern frontier into areas for development, scientific research, and tourism, capturing economic and diplomatic gains in each area. Russia abides by internationally agreed upon Arctic governance rules, recognizing it has nothing to gain and everything to lose by stepping out of line.
China	China has made Iceland and Russia its main Arctic trading partners and assertively participates when allowed a rotating observer seat in the Arctic Council.
Maritime Powers (South Korea, Singapore, Japan)	South Korea, Singapore, and Japan increase regional shipping efforts with Russia, but they do not benefit as much as expected from the cross-Arctic shipping lane.
United States	The United States remains a reluctant Arctic power. President Obama remains the only U.S. President to have ever visited the Arctic. Regulatory restrictions hamper resource development, although federal efforts to combat climate change and subsidies for indigenous adaptation to changing surroundings have improved the conditions of threatened Arctic communities.
Other Arctic Nations	Small Arctic nations experience an increase in power as the Arctic Council strengthened the voice of its permanent members. Tourism boosts their economies.
Poor Developing States in Africa, Asia and Latin America, and Pacific	Poor developing states do not experience any significant impact, because the Arctic remains isolated from them.

Scenario III: Polar Lows

Finland made a dramatic push toward making the Arctic Council a treaty organization during its 2017-2019 chairmanship, but the effort failed. A resurgent Russia and introverted United States opposed the move. No subsequent chair has pushed for expanding the Council's powers. The Council's work is limited to environmental research and achieving sustainable development.

International law defines all maritime borders. However, the Seabed Authority has not yet resolved the seabed claim submitted by the United States after they finally acceded to the Convention on the Law of the Sea, alongside those claims from Russia, Kingdom of Denmark, and Canada.

Militarization has increased. Russia's military expansion in 2017 was followed by moderate increases by Canada and the United States. NATO began conducting annual Arctic exercises in 2020, thereby expanding its seasonal military presence. Despite the reinstatement of the NATO-Russia Council after the stabilization of the Ukraine crisis, Russian nationalism and skepticism of NATO remains high. While conflict is unlikely due to an international effort to isolate the Arctic from other geopolitical concerns, tensions between Russia and other Arctic nations persist.

Economic activity in the Arctic is disappointingly low for residents, governments, and multinational developers. The low price of oil has diminished the prospects of a fossil fuel extraction boom. While Russia has proceeded with offshore oil and onshore gas developments, North America has witnessed a repetition of the Shell pullout of 2015.

Government-supported development has occurred locally. However, it remains at the fringes of the global economy because of poor infrastructure.

The Northern Sea Route witnesses steady, incremental increases in circumpolar traffic. However, Canada's legal claim over the Northwest Passage means the waterway is used mainly for tourism and not trade. A northward shift of major shipping lines never materialized, largely because of the persistent lack of infrastructure and dangerous ice conditions. Even with decreased year-round ice coverage, rogue icebergs and severe storms threaten navigability.

The Arctic remains the gold standard for indigenous inclusion into governmental affairs. However, political participation fails to secure financing for indigenous peoples to adapt to climate change.

How Relevant Powers Fare in Polar Lows Scenario	
Germany	Germany's good relations with Russia permits them to export more maritime technologies and natural resources than other western countries, although demand is limited given the low oil price. Their desire for an empowered Arctic Council and regional confidence-building efforts has not been met.
European Union	While still a player in Arctic politics through its northern members, the EU strategic vision towards the Arctic has little operational impact. Differing opinions between European nations impede a truly cohesive policy both towards Russia and the Arctic.
Russia	Russia benefits marginally from oil and gas production and trade with Europe and Asia, however the low price of oil puts pressure on its economy.
China	Through bilateral agreements, China imports some materials from the Arctic, and sends researchers and tourists, supplying more Arctic tourists every year than any other country.
Maritime Powers (South Korea, Singapore, Japan)	Limited regional trade between South Korea, Singapore, Japan, and Russia exist due to the absence of economic growth.
United States	The United States prioritizes environmental protection. Limited economic opportunities hamper bigger economic engagement by U.S. companies in the region.
Other Arctic Nations	Nations focus their efforts internally, thereby failing to utilize potential synergies that would exist were cooperation between Arctic nations stronger.
Poor Developing States in Africa, Asia and Latin America, and Pacific	Poor states experience no significant impact, because the Arctic economy remains distanced from the global economy.

Scenario IV: Free for All

Under a scenario characterized by a high price of oil and weak Arctic Council governance, there will be heightened activity in the Arctic. First, there is an increase in militarization in the region. High oil prices contribute to increasing military activity, as the increased activity in the region causes security concerns for states. Russia faces strong incentives to grow its military presence in order to secure valuable resources. Heightened Russian military presence further encourages western military activity to counterbalance Russian presence. Most importantly, NATO and the United States have increased their Arctic presence. This military activity in the Arctic has heightened geostrategic tensions, exacerbated by the lack of Arctic Council governance.

The high price of oil has incentivized oil and mining companies to invest in Arctic projects previously deemed unprofitable, causing economic growth. The Northern Sea Route is a functional trade artery, moving resources from the Russian Arctic into European and Asian markets. The cross-Arctic trade has not replaced alternate routes, but has added to global trade by creating new trade patterns. The Northwest Passage through the Canadian archipelago is also growing, but lags behind the Northern Sea Route because of delayed investment in shipping infrastructure and persistent ice conditions. In the northern Pacific, the preferred route from Asia to North America has moved northward altering the great circle route, with significant cost savings.

Previously isolated communities have become more vibrant and diversified, as they have integrated into regional and global economies through better-developed transport networks. High quantities of shipping, tourism, and mineral exploration have increased global trade and economic activity for previously isolated island communities, furthering global interconnectedness. Ecotourism does not play a significant role as extractive industry dominates economic activity.

High quantities of shipping and significant mineral exploration may yield disastrous environmental consequences, especially given weak Arctic governance. Consequently, Arctic Council members with strong environmental regulations are increasingly concerned that these economic activities will seriously damage the Arctic environment. An environmental disaster such as a catastrophic oil spill in this scenario could spill over into international conflict.

Indigenous people play a small role in this scenario, as high oil prices incentivize governments to marginalize indigenous people in the development of the region and its resources. This unequal share of economic gains has angered indigenous leaders. The weak Arctic Council governance has fueled feelings of helplessness among indigenous groups.

Lastly, the Arctic's heightened global significance has incentivized further scientific research.

How Relevant Powers Fare in Free For All Scenario	
Germany	This scenario is challenging for Germany. Politically, Germany has limited influence on Arctic-related developments. The current Arctic Council governance structure is an inadequate venue for Germany to alter the economic and military activities in the region. Germany is concerned with environmental degradation associated with heightened economic activity as well as the possibility of a military conflict.
European Union	The EU is uncomfortable with increasing militarization in the Arctic. Economically, the EU benefits from the increased interconnectivity created by the economic boom in the Arctic.
Russia	The strength of existing military capabilities serves as a platform for further militarization. Since Russia controls enormous amounts of Arctic resources, Russia is well positioned to benefit from high oil prices and the increased interest in exploring Arctic resources among private companies.
China	Chinese companies such as Sinopec and CNPC are exploiting Arctic resources in collaboration with Russian firms such as Gazprom and Rosneft. The increased economic activity in the region also opens up opportunities for shorter trade routes between Chinese export markets and their import destinations in Europe.
Maritime Powers (South Korea, Singapore, Japan)	Increased military activity in the Arctic concerns the maritime powers of South Korea, Singapore, and Japan. The states may increase military spending in response to the increased militarization in the region.
United States	The United States is very concerned about increased militarization, especially by Russia, and consequently has increased its own military capabilities. The resource boom in the Arctic pressures politicians to loosen environmental restrictions on drilling in the Arctic.
Other Arctic Nations	Other Arctic states take advantage of the economic boom in the region while simultaneously battling concerns from environmental groups about possible adverse environmental impacts. Militarily, they are concerned with the ongoing militarization of the Arctic and consequently support NATO's increased involvement.
Poor Developing States in Africa, Asia and Latin America, and Pacific	The Arctic's economic boom directs more resources from oil and mining companies from poor developing states to the Arctic. Consequently, less lucrative oil and mining projects in other regions in the world witness falling investment, which especially hurts poor developing states that are dependent on oil and mining.

WILD CARD EVENTS

Catastrophic Oil Spill

As the Arctic experiences increased activity, how would countries respond to a catastrophic oil spill? Would governments and institutions be able to adapt fast enough to respond adequately to change instead of being overwhelmed by it? Massive oil spills can have potentially irreversible effects on living organisms and on the physical environment by affecting water-related processes and climate. Even when the uptake and bioaccumulation of chemical pollution is at sub-lethal levels for organisms, the effects of oil pollution on fertility and the potential of permanent genetic damage can have severe effects on ecosystems far removed from the source of the pollution. There are ranges of negative effects associated with this pollution, ranging from genetic damage of marine life to large-scale disruption of food chains, with clear impacts for human societies that depend on the sea as a source of protein.

How Wild Card Event Shape Scenarios	
Managed Boom	The international community, through both individual governments and multilateral institutions, respond quickly to the oil spill and minimize its negative effects quickly.
Isolated Arctic	Since the region remains isolated, international response is slow. However, because Arctic council governance is strong, the response is ultimately well coordinated, and the spill is cleaned.
Polar Lows	Because of limited economic development and weak governance, international response is both slow and uncoordinated.
Free for All	Individual responsibility is unclear and chains of communication are weak or nonexistent, making the cleanup of the oil spill fragmented and slow.

Opportunity for Germany: Increase Environmental Protection, Active EU Arctic Policy

In accordance with the heightened regulatory environment following the Exxon Valdez incident, a catastrophic oil spill will encourage Arctic nations to increase regulation around oil and gas exploration. This could be an opportunity for Germany to exercise leadership in the Arctic region or in the EU to push for increased environmental protection laws and a more cohesive EU Arctic policy.

Terrorists Infiltrate Unguarded Arctic Border and Attack Toronto

As human activity outpaces border security, how would countries react if a terrorist passed through their Arctic border undetected? Were a terrorist group to mount an attack on a northern city like Toronto by smuggling people and materials through Arctic borders into population centers, there would be heightened awareness of insecurity and vulnerability. This would cause heightened nationalism, increased investment in security apparatus, and controversial public surveillance policies. The urgency to establish security infrastructure may drown out minority perspectives, with adverse effects on the environment and livelihood of Arctic peoples. Simultaneously, a strengthening of the security apparatus could benefit commercial interests; security infrastructure development, such as communications and transport systems, is a public good that can be utilized by development companies working on other projects.

How Wild Card Event Shape Scenarios	
Managed Boom	Nationalism slows the growth of governance structures, and nations look inward to secure their borders and protect their populations. Cooperation is greatest between public and private entities within countries rather than between countries.
Isolated Arctic	Nationalism slows the growth of governance structures, and nations look inward to secure their borders and protect their populations. Security infrastructure investment is rapid, but designed with minimal environmental impact so as not to impact eco-tourism activities and the heighten security around tourist activities.
Polar Lows	Nationalism further retards the growth of governance structures. Without the strong lobby of an active commercial sector, national policies are fragmented and accelerate the "security dilemma"[23] between Arctic nations.
Free for All	Nationalism further retards the growth of governance structures. Commercial interests lobby for security infrastructure investments that have dual use in supporting commercial endeavors, allowing for some interoperability between nations where commercial activities overlap.

Opportunity for Germany: Seize Economic Opportunities, Active EU Arctic Policy
Nationalistic trends will undermine cooperation between nations, challenging efforts to build security and stability in the region. Should security infrastructure have dual use in creating a more robust shipping infrastructure, growth in the region's maritime industry could meet Germany's economic interests. For Germany, the greatest gains can be made by crafting strong EU policies that advance the security of individual EU Arctic states, thereby strengthening the role of the EU in the Arctic.

Geopolitical Tension Spillover from Belarus Purple Revolution

How would Arctic nations respond to a spillover of geopolitical instability in the Arctic? Will Arctic governance be strong enough for cooperation despite rising tensions among various actors? Will geopolitical tensions lead to a rapid militarization of the Arctic? A Purple Revolution in Belarus would ignite tension between Russia and NATO members of the Arctic Council, similar to the Orange Revolution in Ukraine in 2003 and the Rose Revolution in Georgia in 2004. Russia would view the Purple Revolution as a Western-financed attack on its sphere of influence. As a result, the Russian President would recall its ambassadors from Washington, London, and Paris. This complete breakdown of communication may threaten global stability.

How Wild Card Event Shape Scenarios	
Managed Boom	The high economic activity in the Arctic combined with strong governance give all actors incentives for restraint. While Russia is disgruntled with the Western Arctic Council members, it is careful not to jeopardize its economic benefits in the Arctic.
Isolated Arctic	Strong governance mechanisms in the Arctic reduce the probability of misunderstandings between actors. This is particularly beneficial, as further tensions are therefore avoided. As a result, the events in Belarus minimally affect Arctic governance.
Polar Lows	Arctic cooperation between Russia and Arctic NATO members completely breaks down. Russia withdraws from all governance bodies, and there is serious concern about a rapid increase in the militarization of the Arctic.
Free for All	Russia claims significant portions of overlapping continental shelf claims, especially mineral-rich ones. International organizations demand that Russia respect UNCLOS and other internationally agreed-upon treaties. Russia is convinced that its actions are legal, given the West's "meddling" in Belarus.

Opportunity for Germany: Security and Stability

Germany is uniquely positioned to be a mediator between Russia and NATO Arctic Council Members, restoring stability after the geopolitical spillover. If Germany accepts the mediator role, they can play a pivotal role in strengthening stability in the Arctic and Eastern Europe.

Advent of New Technologies

Will new technologies like deep-sea mining transform the Arctic for better or for worse? Will the extraction of rare minerals from the deep sea floor lead nations to settle disputes over extended seabed claims? Or will a new "gold rush" for deep-sea materials spark conflict over disputed territory? Deep-sea mining could become operational by 2025, or perhaps earlier if demand for rare earth minerals increases.[24] But there are concerns about the environmental impact of the technologies. This new technology could open up new frontiers for resource extraction, sparking either cooperation or competition.

How Wild Card Events Shape Scenarios	
Managed Boom	The mining activities are welcomed as they result in needed infrastructure development. Militarization and unresolved seabed claims spark regional tension, but not conflict.
Isolated Arctic	Because the region remains isolated, the international community is slow to react to the advent of new technologies. However, because Arctic council governance is strong, they ultimately coordinate usage of these technologies to improve conditions in the Arctic.
Polar Lows	Militarization and unresolved seabed claims spark regional tension. However these tensions may be resolved and the mining activities welcomed if mining efforts lead to needed infrastructure development across the region.
Free for All	Due to other economic activity and infrastructure, deep-sea mining takes hold faster than in other scenarios. Powerful profit making companies silence environmental concerns.

Opportunity for Germany: Security and Stability
Germany will benefit from a new supply of raw materials as well as a demand for maritime technologies. Early engagement with governments and private companies on technology development and trade deals will benefit Germany's economy.

Mosquito-borne Disease among Arctic Indigenous Populations

How would international bodies respond to the outbreak of disease in the Arctic indigenous populations? Currently, warmer weather in the Arctic is increasing the total mosquito population dramatically as well as the size of each mosquito. As temperatures increase, the problem escalates. Every one degree Celsius increase in temperature shortens the average time spent in larval and pupal stages by approximately 10 percent. Consequently, mosquitoes would have a 50 percent greater likelihood of surviving to adulthood if temperatures raised by just two degrees Celsius.[25] As the mosquito population grows, they increasingly threaten other animals like caribou, upon which Arctic indigenous peoples rely for nourishment. Additionally, mosquitoes are known to carry several infectious diseases, including viruses and parasites. Mosquito-borne illnesses include malaria, West Nile virus, elephantiasis, dengue fever, yellow fever. A mosquito-borne disease outbreak among the Arctic indigenous populations that kills or incapacitates much of the population is disruptive and destabilizing. Such an outbreak could result in the suffering of hundreds of people.

How Wild Card Events Shape Scenarios	
Managed Boom	The international community, through both individual governments and multilateral institutions, responds quickly to the outbreak of disease and minimizes its negative effects quickly.
Isolated Arctic	Because the region remains isolated, international response is slow. However, because Arctic council governance is strong, the response is ultimately well coordinated, and the effects of the outbreak are resolved.
Polar Lows	Because of limited economic development and weak governance, international response is both slow and uncoordinated.
Free for All	Individual responsibility is unclear and chains of communication are weak or nonexistent, making the response to the outbreak of disease fragmented and slow.

Opportunity for Germany: Freedom Of Scientific Research

The outbreak of disease in among the Arctic indigenous population will encourage Arctic nations to increase scientific research on the sensitive and changing Arctic ecosystem, especially with regard to human health and food security. This could be an opportunity for Germany to exercise leadership in the Arctic region or in the EU through its scientific expertise.

Sinking of Hapag-Lloyd Cruise Ship During Arctic Expedition

As the Arctic experiences increased tourism, how would countries respond to the sinking of a large passenger vessel? With insufficient rescue planes and boats to safely retrieve all the passengers, which coastal states will respond? If the ship were operated by a non-Arctic state and filled with international passengers, how would the international community respond? Were a ship carrying 2,000-3,000 people to begin sinking, Arctic member states would need to coordinate an international search and rescue operation. Arctic member states are currently improving their air, sea, and land search and rescue capabilities through coordinated efforts like the Arctic Response Force and the Arctic Coast Guard Forum. However, they have yet to demonstrate the capacity to respond adequately to a large cruise ship in distress.

How Wild Card Events Shape Scenarios	
Managed Boom	Due to increased presence of commercial activities and strengthened governance, nations have adequately invested in search and rescue capabilities, enabling them to respond to cruise ship-related crises.
Isolated Arctic	Strong international cooperation and investments in search and rescue capabilities facilitate coordinated disaster response. The absence of an economic boom has resulted in minimal communication and transport infrastructure. While all passengers are rescued, there are insufficient proximate medical facilities, and many passengers perish from inadequate care.
Polar Lows	International response is both slow and uncoordinated, because of limited economic development and weak governance. Military vessels are sortied to respond, but due to territorial disputes, are unable to quickly transfer injured passengers ashore and many perish.
Free for All	Individual responsibility is unclear and chains of communication are weak or nonexistent, making the incident response fragmented and slow. Commercial vessels in the area render aid in accordance with SOLAS, but are not able to airlift the most injured to receive medical care, and so they perish.

Opportunity for Germany: Freedom of Navigation

The sinking of a major cruise liner would encourage the Arctic nations to invest more heavily in search and rescue capability and increase shipping regulations, especially for passenger vessels. This could be an opportunity for Germany to advocate for its goals: implementing high safety and environmental standards for shipping, developing binding disaster response mechanism for region, and investing in maritime surveillance and infrastructure.

APPLYING GERMANY'S STRATEGIC GOALS TO SCENARIOS

The November 2013 "Guidelines of the Germany Arctic Policy" highlights opportunities and risks for Germany in the Arctic, and outlines Germany's Strategic Goals in the region. A summary of the document can be found in Appendix I.

This section assesses the six Strategic Goals outlined by Germany's "Guidelines of the Germany Arctic Policy" against the four future scenarios. This memorandum answers the question: "Are Germany's Strategic Goals met in the scenarios?" by evaluating whether the Strategic Goals are met in each scenario under the current policies.

TABLE 1: EVALUATING GERMAN ARCTIC STRATEGY

Scenarios / Strategic Goals	Managed Boom	Isolated Arctic	Polar Lows	Free for All
1. Seize Economic Opportunities	GREEN	YELLOW	RED	GREEN
2. Set Exemplary Environmental Standards	GREEN	GREEN	GREEN	YELLOW
3. Freedom of Navigation	GREEN	YELLOW	RED	YELLOW
4. Freedom of Scientific Research	GREEN	GREEN	YELLOW	YELLOW
5. Security and Stability	GREEN	GREEN	RED	YELLOW
6. Active EU Arctic policy	YELLOW	YELLOW	YELLOW	YELLOW

KEY:

GREEN	Strategic Goals are met in this scenario by continuing current policies.
YELLOW	Strategic Goals may not be met in this scenario by continuing current policies.
RED	Strategic Goals are not met in this scenario by continuing current policies.

Scenario I: Managed Boom

The Managed Boom scenario would satisfy most of Germany's Strategic Goals. It will allow Germany to seize economic opportunities in the Arctic, including accessing raw materials and fish resources. German maritime technology will be in high demand. Germany can play a leading role in setting environmental standards, while cooperating with Arctic governance bodies. Germany will likely be able to support efforts to identify ecologically unique areas, and to establish a coherent network of Marine Protected Areas (MPAs), with a view to safeguarding biological diversity in the Arctic. With increased economic incentives for developing shipping lanes and intergovernmental cooperation, countries will be more receptive to freedom of navigation measures. The Arctic governance bodies will be an ideal place to encourage the implementation of high safety and environmental standards for shipping, to develop binding disaster response mechanisms for the region, and to invest in maritime surveillance infrastructure. Interest in scientific research in the Arctic will increase in importance as economic opportunities expand. Germany should take advantage of this opportunity. A strong governance framework will foster security and stability in the Arctic. Actions to avoid conflict through confidence-building measures are thus likely. The EU will attempt to play an active role in shaping the governance process in the Arctic. It will renew its efforts to become an observer to the Arctic Council. The Kingdom of Denmark, Sweden, and Finland will likely act in agreement with the European Commission.

Scenario II: Isolated Arctic

An Isolated Arctic is a mixed blessing for Germany. Economic activity will be limited in the Arctic, making access to raw materials for German companies less likely. German maritime technology will also face low demand as economic activity is restricted. However, Germany can play an important role in setting exemplary environmental standards in the Arctic. The strong governance of Arctic bodies makes it easier to push for legislation that supports MPAs. While low economic activity in the region will hamper freedom of navigation, the strong governance is an opportunity to coordinate high safety and environmental standards for shipping and develop binding disaster response mechanisms for the region ahead of infrastructure investment. Arctic organizations will more strongly govern freedom of scientific research. The low oil price and the strong governance make the region stable and secure. Germany should use this environment to promote confidence-building measures, cooperation, and coordination. The EU will attempt to play an active role in shaping the governance process in the Arctic. It will renew its efforts to become an observer to the Arctic Council. Denmark, Sweden, and Finland will likely act in agreement with the European Commission.

Scenario III: Polar Lows

Low resource prices make economic opportunities in the Arctic less feasible, and especially for German companies with average higher costs than competitors from other regions, notably China. Creating MPAs will be feasible in the context of low economic activity. Moderate Arctic governance creates opportunities for Germany to encourage cooperation among Arctic members. Limited economic activities in the Arctic adversely affect freedom of navigation, thereby hampering maritime surveillance, infrastructure expansion, and rescue capabilities. Scientific research will most likely not be restricted; on the contrary, Germany will have the opportunity to increase its leadership in the arena of scientific research. Security and stability issues are a major concern. Preventative action aiming to avoid conflict, via confidence-building measures, cooperation, and coordination, is crucial. The EU will struggle to be relevant in the Arctic governance process. Its attempt to gain a seat as an observer in the Arctic Council is likely to be unsuccessful. The Kingdom of Denmark, Finland, and Sweden will pursue their foreign policy interests without coordinating with the European Commission.

Scenario IV: Free for All

German companies are well positioned to compete for access to economic resources, especially in Russia, given the long history of cooperation between German and Russian energy firms. German maritime technology will be highly demanded. To ensure German companies can compete successfully in this environment, the German government should lobby aggressively on their behalf. Germany will also have to use its leading role in setting environmental protection standards to remind countries about its importance. It will be considerably harder for Germany to establish a representative and coherent network of MPAs. While the economic boom will lead to increased shipping traffic, and therefore shipping infrastructure, it is uncertain whether freedom of navigation can be achieved. Without strong governance, regional safety and disaster response mechanisms may not be adopted. Arctic governance is moderate, making confidence-building measures, cooperation, and coordination more challenging. Thus, Germany can play an important role in settling conflicts given its relationships with multiple stakeholders, including Russia. The EU can play an important role as mediator to resolve disputes. The EU will also provide important support for EU Arctic Council members seeking to advance their interests. The European Defense Agency can play a role in strengthening security in the Arctic.

POLICY OPTIONS AND ANALYSIS

Table 1 shows that Germany's Strategic Goals would be best met under the Managed Boom scenario, given its current strategy. However, as Germany has little control over the price of oil or the strength of Arctic governance, other scenarios may unfold in 2030. The authors propose policy options that facilitate the Strategic Goals delineated in 2013 policy document, irrespective of the scenario in which Germany finds itself in 2030. These policy options are then assessed against each scenario to determine the likelihood that the policy, if successfully implemented, would enable the Strategic Goal to be met.

This process of analyzing policy options allows us to evaluate the robustness, political feasibility, and operational feasibility of the policy. A robust policy is one that is effective at meeting the Strategic Goal in all or most of the scenarios. A politically feasible policy is one that can be implemented given the surrounding political climate. An operationally feasible policy is one that can be implemented logistically, given its associated cost and technical requirements.

The policy analysis consists of two steps: First, the policies are assessed against the four scenarios to determine robustness within each scenario, with the following key:

Score of 1: The individual policy, if successfully implemented, is likely to lead to achievement of the Strategic Goal.

Score of 2: The individual policy, if successfully implemented, may or may not lead to achievement of the Strategic Goal.

Score of 3: The individual policy, if successfully implemented, is not likely to lead to achievement of the Strategic Goal.

The robustness assessments in each scenario are combined to yield a Combined Resilience Score for each policy option. The policies with the lowest Combined Resilience Scores are selected within each of the six German Strategic Goals for the Arctic, provided that their Scores are below six.

Second, the policies with the lowest Combined Resilience Scores are assigned two values corresponding to political and operational feasibility, with the following key:

Score of 1: The implementation of this individual policy is politically/operationally feasible.

Score of 2: The implementation of this individual policy may or may not be politically/operationally feasible.

Score of 3: The implementation of this individual policy is not politically/operationally feasible.

The Combined Resilience Score, Political Feasibility, and Operational Feasibility rankings are combined to yield a total score. The three policies with the lowest total score are selected within each of the six German Strategic Goals for the Arctic and result in our final 18 Policy Recommendations.

Lastly, the final policy recommendations are assessed against the Wild Card Events to demonstrate their applicability in preventing and responding to crises.

The following policy options were formulated after extensive primary and secondary research across a variety of stakeholders. While there is value in having outside entities brainstorm policy options to broaden the perception of what is feasible, the list is not exhaustive and can be expanded on by policy experts within the German government. Furthermore, public information was used to assess political and operational feasibility; incorporating government officials' assessments would enhance the analysis.

Table 2: Evaluating Policy Robustness

Policies \ Scenarios	Managed Boom	Isolated Arctic	Polar Lows	Free for All	Combined Resilience Score
Seize Economic Opportunities					
Strengthen Germany Trade & Invest capabilities on the Arctic region.	**1**	**2**	**2**	**1**	**6**
Streamline Deutsche Auslandshandelskammer responsibility for Arctic region.	**1**	**2**	**3**	**2**	**8**
Create Arctic desk in the Deutsche Rohstoffagentur (DERA).	**1**	**2**	**2**	**1**	**6**
Hold annual Arctic investment summit in cooperation with German industry.	**1**	**2**	**3**	**1**	**7**
Increase political risk insurance and export credits (Hermes-Deckung) for German businesses for Arctic projects.	**1**	**2**	**2**	**1**	**6**
Set Exemplary Environmental Standards					
Support the efforts of the Arctic Council Working Groups: CAFF, PAME, and ACAP.	**1**	**1**	**2**	**2**	**6**
Enhance public awareness and appreciation of the Arctic marine environment and rich maritime history and culture by working with "Bundeszentrale fuer Politische Bildung" and others.	**1**	**1**	**1**	**2**	**5**
Establish mechanisms for intergovernmental coordination and cooperation for pan-Arctic MPA network management and planning.	**1**	**1**	**1**	**2**	**5**
Promote the active involvement of indigenous peoples in the management and sustainable use of environmentally sensitive areas.	**1**	**1**	**1**	**2**	**5**
Pursue global environmental standards through non-Arctic Council organizations like the U.N. and the EU	**1**	**1**	**1**	**2**	**5**

Policies \ Scenarios	Managed Boom	Isolated Arctic	Polar Lows	Free for All	Combined Resilience Score
Freedom of Navigation					
Support Polar Code implementation and further safety development.	1	1	1	2	5
Create COE to study maritime surveillance (develop technology and policy to support its expansion).	1	1	2	1	5
Push for EU's Emergency Response Coordination Centre (ERCC) and NATO's Euro-Atlantic Disaster Response Coordination Centre (EADRCC) to conduct exercises for disaster responses in the Arctic.	1	1	2	2	6
Invest national resources in development of disaster response technologies.	2	2	2	2	8
Create disaster relief fund for Arctic region with international donors.	1	1	2	2	6
Promote development of norms for sustainable shipping and maritime activities.	2	2	2	2	8
Freedom of Scientific Research					
Support the efforts of the Arctic Council working group, Arctic Monitoring and Assessment Programme (AMAP).	1	2	2	2	7
Further develop expertise within Germany on relevant scientific topics, to increase Germany's involvement in the region.	1	1	2	2	6
Seek out bilateral scientific agreements between Germany and Arctic states.	1	1	2	2	6
Collaborate with non-Arctic nations to promote freedom of scientific research.	1	2	2	2	7
Promote a North Pole treaty.	1	1	1	1	4

Policies \ Scenarios	Managed Boom	Isolated Arctic	Polar Lows	Free for All	Combined Resilience Score
Security and Stability					
Promote indigenous groups' participation in the Arctic Council and fund Indigenous Peoples Secretariat.	**1**	**1**	**2**	**2**	**6**
Build bilateral commercial and technological cooperation along the Northern Sea Route.	**1**	**1**	**1**	**1**	**4**
Support OSCE Special Representative for Arctic Issues to promote Arctic issues within OSCE Parliamentary Assembly.	**2**	**2**	**1**	**1**	**6**
Enhance military cooperation via the Arctic Chiefs of Defense, Arctic Security Forces Roundtable, and Arctic Coast Guard Forum.	**2**	**2**	**2**	**2**	**8**
Active EU Arctic Policy					
Strengthen information sharing mechanisms between individual EU Arctic Council members and European Commission.	**1**	**1**	**1**	**1**	**4**
Lobby for the EU to become an observer at Arctic Council.	**1**	**1**	**2**	**2**	**6**
Portray the EU as a soft power mediator with no territorial interests that can resolve disputes between Arctic Council members.	**3**	**2**	**2**	**2**	**9**
Improve standing with Greenland.	**1**	**1**	**1**	**1**	**4**
Strengthen EU maritime capabilities in the Arctic by giving specific mandate to European Defense Agency.	**1**	**1**	**1**	**1**	**4**
Improve cooperative ties and joint projects between the EU and Russia.	**1**	**2**	**2**	**1**	**6**

Key:

1	**The individual policy, if successfully implemented, is likely to lead to achievement of the Strategic Goal.**
2	**The individual policy, if successfully implemented, may or may not lead to achievement of the Strategic Goal.**
3	**The individual policy, if successfully implemented, is not likely to lead to achievement of the Strategic Goal.**

Table 3: Evaluating Robustness, Political Feasibility, And Operational Feasibility

Policies \ Scenarios	Combined Resilience Score	Political Feasibility	Operational Feasibility	Total
Seize Economic Opportunities				
Strengthen Germany Trade & Invest capabilities on the Arctic region.	**6**	**1**	**1**	**8**
Create Arctic desk in the Deutsche Rohstoffagentur (DERA).	**6**	**1**	**1**	**8**
Increase political risk insurance and export credits (Hermes-Deckung) for German businesses for Arctic projects.	**6**	**2**	**2**	**10**
Set Exemplary Environmental Standards				
Support the efforts of the Arctic Council Working Groups: Conservation of Arctic Flora and Fauna, the Protection of the Arctic Marine Environment, and the Arctic Contaminants Action Program (CAFF, PAME, and ACAP, respectively).	**6**	**1**	**1**	**8**
Enhance public awareness and appreciation of the Arctic marine environment and rich maritime history and culture by working with "Bundeszentrale fuer Politische Bildung" and others.	**5**	**1**	**2**	**8**
Establish mechanisms for intergovernmental coordination and cooperation for pan-Arctic MPA network management and planning.	**5**	**3**	**2**	**10**
Promote the active involvement of indigenous peoples in the management and sustainable use of environmentally sensitive areas.	**5**	**3**	**2**	**10**
Pursue global environmental standards through non-Arctic Council organizations like the U.N. and the EU.	**5**	**2**	**2**	**9**

Policies / Scenarios	Combined Resilience Score	Political Feasibility	Operational Feasibility	Total
Freedom of Navigation				
Support Polar Code implementation and further safety development	**5**	**1**	**2**	**8**
Create COE to study maritime surveillance (develop technology and policy to support its expansion).	**5**	**1**	**2**	**8**
Push for EU's Emergency Response Coordination Centre (ERCC) and NATO's Euro-Atlantic Disaster Response Coordination Centre (EADRCC) to conduct exercises for disaster responses in the Arctic.	**6**	**2**	**2**	**10**
Create disaster relief fund for Arctic region with international donors.	**6**	**3**	**2**	**11**
Freedom of Scientific Research				
Further develop expertise within Germany on relevant scientific topics, to increase Germany's involvement in the region.	**6**	**1**	**2**	**9**
Seek out bilateral scientific agreements between Germany and Arctic states.	**6**	**1**	**2**	**9**
Promote a North Pole treaty.	**4**			
Security and Stability				
Financially support indigenous groups' participation in the Arctic Council.	**6**	**1**	**2**	**9**
Build bilateral commercial and technological cooperation along the Northern Sea Route.	**4**	**2**	**2**	**8**
Support OSCE Special Representative for Arctic Issues to promote Arctic issues within OSCE Parliamentary Assembly.	**6**	**1**	**1**	**10**

Policies \ Scenarios	Combined Resilience Score	Political Feasibility	Operational Feasibility	Total
Active EU Arctic Policy				
Increase information sharing between individual EU Arctic Council members and Brussels.	**4**	**2**	**2**	**8**
Lobby for the EU to become an observer at Arctic Council.	**6**	**3**	**1**	**10**
Improve standing with Greenland.	**4**	**2**	**2**	**8**
Strengthen EU maritime capabilities in the Arctic by giving specific mandate to European Defense Agency.	**4**	**3**	**2**	**9**
Improve cooperative ties and joint projects between the EU and Russia.	**6**	**2**	**3**	**11**

Key:

1	**The implementation of this individual policy is politically/operationally feasible.**
2	**The implementation of this individual policy may or may not be politically/operationally feasible .**
3	**The implementation of this individual policy is not politically/operationally feasible.**

The result of this analysis is three recommendations for every Strategic Goal. These 18 total recommendations are robust across all four scenarios as well as operationally and politically feasible to implement. These recommendations are discussed in detail, including implementation steps, in the next section.

POLICY RECOMMENDATIONS

The recommendations resulting from our analysis are specific policies Germany can undertake to achieve its Strategic Goals, regardless of the scenario that unfolds in 2030. Germany's involvement in the Arctic has previously been limited to scientific research in support of the Arctic Council. However, this work is isolated from efforts on sustainable development and shipping infrastructure. A more coordinated national strategy combining scientific, security, and economic efforts will enable Germany to better meet its Strategic Goals.

The following 18 recommendations improve Germany's ability to employ a wide range of tools to respond to various crises internationally. The recommendations range in their ease of implementation, according to their political or operational feasibility.

Strategic Goal 1. Seize Economic Opportunities

Policy Recommendation 1.1. Strengthen Germany Trade & Invest capabilities on the Arctic region by funding one full-time position in Berlin.

> Implementation: Recommend to German Ministry for Economic Affairs and Energy to get approval for additional hiring.

Policy Recommendation 1.2. Create Arctic desk in the Deutsche Rohstoffagentur (DERA) including two full-time positions in Berlin.

> Implementation: Recommend to German Ministry for Economic Affairs and Energy to get approval for additional hiring.

Policy Recommendation 1.3. Increase political risk insurance and export credits (Hermes-Deckung) for German businesses for Arctic projects.

> Implementation: Share recommendation with German Ministry for Economic Affairs and Energy, the German Ministry of Finance and German Ministry for Economic Cooperation and Development to enable an increase through the "Interministerieller Ausschuss fuer Exportkreditgarantien " (IMA). Share recommendation with Euler Hermes as well.

Strategic Goal 2. Set Exemplary Environmental Standards

Policy Recommendation 2.1. Support the efforts of the Arctic Council Working Groups: Conservation of Arctic Flora and Fauna, the Protection of the Arctic Marine Environment, and the Arctic Contaminants Action Program (CAFF, PAME, and ACAP, respectively).

> Implementation: Continue and increase involvement in CAFF, PAME, and ACAP by including German experts in the Working Groups, hosting Working Group meetings, and assisting with funding.

Policy Recommendation 2.2. Enhance public awareness and appreciation of the Arctic marine environment and rich maritime history and culture.

Implementation: Conduct education and outreach activities to demonstrate and share the ecological, social, and economic values of pan-Arctic MPAs and MPA networks with indigenous peoples and local communities as well as members of the general public and business communities who benefit from functioning Arctic ecosystems but may never visit these remote areas. Help conserve and manage areas that provide compatible and sustainable opportunities for recreation and ecotourism.[26] Fund development of Arctic-oriented museums and exhibits.

Policy Recommendation 2.3. Pursue global environmental standards through non-Arctic Council organizations like the U.N. and the EU.

Implementation: Building on the success of the COP21 agreement and the global movement to combat adverse climate change, foster global environmental standards through international organizations. These environmental standards would be applied in the Arctic region.

Strategic Goal 3. Freedom of Navigation

Policy Recommendation 3.1. Support Polar Code implementation and further safety development. Polar Code, beginning in January 2017, will mandate support for enforcement of standards and continued work on resolving other Arctic maritime challenges such as charting, ice and weather forecasting, communications, and maritime domain awareness.

Implementation: Through IMO involvement and bilateral relationships, Germany should advocate for strong enforcement of the Polar Code by both flag and port states.

Policy Recommendation 3.2. Create a Center of Excellence (COE) on maritime surveillance to develop technology and policy to support its expansion. Consolidate current work across German institutions into one location and expand work through government grants in order to achieve long-term incorporation of German technologies into Arctic maritime development. The COE should seek partnerships with Arctic Council working groups, directly with Arctic states, and with other Arctic research centers.

Implementation: Use the Excellence Initiative conducted by the German Research Foundation (DFG) together with the German Council of Science and Humanities (WR) to develop and fund a research center focused on maritime surveillance research.

Policy Recommendation 3.3. Push for EU's Emergency Response Coordination Centre (ERCC) and NATO's Euro-Atlantic Disaster Response Coordination Centre (EADRCC) to conduct exercises for disaster responses in the Arctic.

Implementation: Build on success of 2015 exercises Barents Rescue (Finland) and Arctic Zephyr (U.S.) to lobby for Arctic exercises hosted by EU and NATO. Special attention will be required to convince partners of the need for additional exercise; the upcoming 2016 voyage of the Crystal Serenity through the Northwest Passage can provide context and framing for the increasing human activity that makes this a prudent policy option.

Strategic Goal 4. Freedom of Scientific Research

Policy Recommendation 4.1. Further develop expertise within Germany on relevant scientific topics, to increase Germany's involvement in the region.

Implementation: Fund students to study Arctic-relevant science topics, including stratigraphy, geology, botany, and zoology. Encourage the formation of Arctic science research centers at universities.

Policy Recommendation 4.2. Seek out bilateral scientific agreements between Germany and Arctic states.

Implementation: Build bilateral cooperation on research cooperation with research centers at universities in Arctic states. Establish Innovation Centers in leading science, innovation, and business clusters in the Arctic states. Establish partnership agreements regarding visiting scientists.

Policy Recommendation 4.3. Promote a North Pole treaty.

Implementation: Replicate the principles of a global commons embraced in the Antarctic Treaty by promoting the immediate area proximate to the North Pole as a global commons for research and tourism. While academics have promoted such ideas, Russia, the Kingdom of Denmark, and Canada's overlapping extended seabed claims have created political obstacles. However, the establishment of a North Pole global commons would benefit both scientists and tourists, prompt negotiations to resolve other overlapping Arctic claims, and expand freedom of research.

Strategic Goal 5. Security and Stability

Policy Recommendation 5.1. Promote indigenous groups' participation in the Arctic Council by providing funding to the Indigenous Peoples Secretariat for travel to Arctic Council meetings or other events. This would build goodwill with indigenous groups, and elevate the role of indigenous people who advocate for cooperation.

Implementation: Work with Indigenous Peoples Secretariat to provide funding as needed.

Policy Recommendation 5.2. Build bilateral commercial and technological cooperation along the Northern Sea Route. Pursue transfer of domestic technologies to Russia for development of NSR.

Implementation: Focus German Agency for International Cooperation (GIZ) Programme on Risk Assessment and Management for Adaptation to Climate Change on the Arctic region.

Policy Recommendation 5.3. Support Organization for Security and Co-operation in Europe (OSCE) Special Representative for Arctic Issues to promote Arctic issues within OSCE Parliamentary Assembly.

Implementation: In December 2015, a Special Representative for Arctic Issues was named. Especially during Germany's chairmanship in 2016, this role can be developed to a position of strength so that that OSCE is well positioned to broker between disputing parties should regional tensions soar.

Strategic Goal 6. Active EU Arctic Policy

Policy Recommendation 6.1. Strengthen information sharing mechanisms between individual EU Arctic Council members (Finland, Sweden, and the Kingdom of Denmark) and the European Commission.

> Implementation: Hold meeting with Finnish, Swedish, and Danish representatives to discuss information sharing initiative as well as relevant EU agencies in the European Commission. Secure funding for setting up information sharing.

Policy Recommendation 6.2. Improve German standing and relations with Greenland.

> Implementation: Engage Danish officials, specifically those involved in the Arctic Council and representatives to the EU, to discuss initiatives for strengthening ties between Germany and Greenland.

Policy Recommendation 6.3. Strengthen EU maritime capabilities in the Arctic by giving specific mandate to European Defense Agency.

> Implementation: Initiative talks with the European Commission to prepare actions to give specific mandate to European Defense Agency. Lobby other EU member states to have a joint-motion to adopt this policy proposal.

ASSESSING POLICY RECOMMENDATIONS AGAINST WILD CARD EVENTS

Robust policy recommendations will not only manage uncertainty about the future character of the Arctic, but also prepare Germany to prevent and respond to crises that could occur in the region. Especially for Department S, which aims to mobilize government resources to increase strategic capability, these Wild Card Events demonstrate how policies aligned with Germany's Strategic Goals can help Germany respond adequately to a broad spectrum of crises. These crises apply to the broad mandate of Department S, as they encompass security, environmental, and humanitarian concerns.

After identifying the 18 most robust policy recommendations, the authors assessed the specific policy recommendations from the 18 that would best facilitate an effective German response to each individual Wild Card Event. These policy recommendations, listed below, help prepare Germany for a range of crises. This broad applicability highlights the strength of the recommendations in an uncertain future.

CATASTROPHIC OIL SPILL

In addition to preventing an oil spill, policies that facilitate environmental standards and create stringent shipping regulations will establish the cooperation mechanisms needed to ensure a coordinated response to a catastrophic oil spill. Additionally, research efforts to support shipping technology can create relevant tools to respond to an oil spill in this fragile environment. In particular, the following policy recommendations would be of use under this Wild Card Event:

Policy Recommendation 2.1. Support the efforts of the Arctic Council Working Group, Protection of the Arctic Marine Environment.

Policy Recommendation 2.3. Pursue global environmental standards through non-Arctic Council organizations like the U.N. and the EU.

Policy Recommendation 3.1. Support Polar Code implementation and further safety development.

Policy Recommendation 3.2. Create a Center of Excellence on maritime surveillance to develop technology and policy to support its expansion.

Policy Recommendation 3.3. Push for EU's Emergency Response Coordination Centre and NATO's Euro-Atlantic Disaster Response Coordination Centre to conduct exercises for disaster responses in the Arctic.

Policy Recommendation 5.2. Build bilateral commercial and technological cooperation along the Northern Sea Route. Pursue transfer of domestic technologies to Russia for development of NSR.

Policy Recommendation 6.1. Strengthen information sharing mechanisms between individual EU Arctic Council members (Finland, Sweden, and the Kingdom of Denmark) and the European Commission.

TERRORISTS INFILTRATING AN UNGUARDED ARCTIC BORDER AND ATTACKING TORONTO

Policies that enable Germany to provide valuable information, human, and material resources to Arctic cities suffering from terrorism are most valuable here. Additionally, policies that facilitate confidence-building and information-sharing measures could reduce the nationalistic trends that

might result from such an event. In particular, the following policy recommendations would be of use under this Wild Card Event:

Policy Recommendation 3.3. Push for EU's Emergency Response Coordination Centre and NATO's Euro-Atlantic Disaster Response Coordination Centre to conduct exercises for disaster responses in the Arctic.

Policy Recommendation 5.3. Support OSCE Special Representative for Arctic Issues to promote Arctic issues within OSCE Parliamentary Assembly.

Policy Recommendation 6.1. Strengthen information sharing mechanisms between individual EU Arctic Council members (Finland, Sweden, and the Kingdom of Denmark) and the European Commission.

Policy Recommendation 6.3. Strengthen EU maritime capabilities in the Arctic by giving specific mandate to European Defense Agency.

Geopolitical tension spillover because of the Belarus Purple Revolution

Policies that facilitate confidence-building, information-sharing, and strong economic ties between Germany and Russia could reduce the geopolitical tensions arising from the Belarus Purple Revolution. In particular, the following policy recommendations, if directed at Russia and Belarus, would be of use under this Wild Card Event:

Policy Recommendation 1.1. Strengthen "Germany Trade & Invest" capabilities in the Arctic region by funding one full-time position in Berlin.

Policy Recommendation 1.2. Create Arctic desk in the Deutsche Rohstoffagentur (DERA), including two full-time positions in Berlin.

Policy Recommendation 1.3. Increase political risk insurance and export credits (Hermes-Deckung) for German businesses for Arctic projects.

Policy Recommendation 5.2. Build bilateral commercial and technological cooperation along the Northern Sea Route. Pursue transfer of domestic technologies to Russia for development of NSR.

Policy Recommendation 5.3. Support OSCE Special Representative for Arctic Issues to promote Arctic issues within OSCE Parliamentary Assembly.

Policy Recommendation 6.1. Strengthen information sharing mechanisms between individual EU Arctic Council members (Finland, Sweden, and the Kingdom of Denmark) and the European Commission.

Advent of new technologies

Policies that facilitate the resolution of disputes through international fora will ensure that any technological developments do not spark tensions over disputed territories. Additionally, policies that facilitate environmental protection will promote the sustainable development of new technologies. If the advent of new technologies allows for peaceful resource development, Germany can benefit from the increased exchange of raw materials. In particular, the following policy recommendations would be of use under this Wild Card Event:

Policy Recommendation 1.1. Strengthen "Germany Trade & Invest" capabilities in the Arctic region by funding one full-time position in Berlin.

Policy Recommendation 1.2. Create Arctic desk in the Deutsche Rohstoffagentur (DERA), including two full-time positions in Berlin.

Policy Recommendation 2.3. Pursue global environmental standards through non-Arctic Council organizations like the U.N. and the EU.

Policy Recommendation 5.2. Build bilateral commercial and technological cooperation along the Northern Sea Route. Pursue transfer of domestic technologies to Russia for development of NSR.

Policy Recommendation 5.3. Support OSCE in Europe Special Representative for Arctic Issues to promote Arctic issues within OSCE Parliamentary Assembly.

Policy Recommendation 6.2. Improve German standing and relations with Greenland.

Spread of a mosquito-borne disease among Arctic indigenous populations

Policies that facilitate information-sharing and research could assist in resolving such a crisis. In particular, the following policy recommendations would be of use under this Wild Card Event:

Policy Recommendation 2.1. Support the efforts of the Arctic Council Working Groups: Conservation of Arctic Flora and Fauna, the Protection of the Arctic Marine Environment, and the Arctic Contaminants Action Program.

Policy Recommendation 4.1. Further develop expertise within Germany on relevant scientific topics, to increase Germany's involvement in the region.

Policy Recommendation 4.2. Seek out bilateral scientific agreements between Germany and Arctic states.

Policy Recommendation 5.1. Promote indigenous groups' participation in the Arctic Council by providing funding to the Indigenous Peoples Secretariat for travel to Arctic Council meetings or other events.

The sinking of a Hapag-Lloyd cruise ship in the Arctic

Policies that facilitate safe shipping standards will help prevent such an event and establish the cooperation mechanisms needed to ensure a coordinated response should such an event arise. Additionally, research efforts to support shipping technology can create new tools to prevent and respond to a crisis. In particular, the following policy recommendations would be of use under this Wild Card Event:

Policy Recommendation 3.1. Support Polar Code implementation and further safety development.

Policy Recommendation 3.2. Create a Center of Excellence on maritime surveillance to develop technology and policy to support its expansion.

Policy Recommendation 3.3. Push for EU's Emergency Response Coordination Centre and NATO's Euro-Atlantic Disaster Response Coordination Centre to conduct exercises for disaster responses in the Arctic.

Policy Recommendation 5.2. Build bilateral commercial and technological cooperation along the Northern Sea Route.

Policy Recommendation 6.1. Strengthen information sharing mechanisms between individual EU Arctic Council members (Finland, Sweden, and the Kingdom of Denmark) and the European Commission.

CONCLUSION

This policy memorandum employs the scenario planning methodology to yield four possible scenarios in the Arctic in 2030: Managed Boom, Isolated Arctic, Polar Lows, and Free for All. The four scenarios imply various policies Germany should adopt to best achieve its Strategic Goals. Germany's current policy toward the Arctic is unlikely to be successful in each of the scenarios. Therefore, the authors recommended 18 policies that Germany should adopt to achieve its Strategic Goals, irrespective of which scenario will unfold by 2030. These policies are relatively feasible to implement, both operationally and politically.

The policy recommendations proposed in this report, if implemented, will prepare Germany for an uncertain future in the Arctic, and facilitate the achievement of its Strategic Goals. The combined recommendations across the separate Strategic Goals increase awareness about the region's importance within the German government and streamline its Arctic strategy.

Germany's traditional approach to foreign policy has been to exercise leadership within multilateral institutions. Thus, their current Arctic strategy is focused on the Arctic Council and the EU. However, our analysis suggests that interaction with these institutions may be insufficient to secure Germany's Strategic Goals in all future scenarios. While Germany should continue exercising leadership and advocating for Arctic policies within these institutions, Germany should also be prepared to leverage bilateral relationships and their economic potential to secure its goals.

This memorandum demonstrates the value of scenario planning and validates the Review 2014 process that resulted in the creation of Department S. The process of scenario planning is especially valuable in circumstances of uncertain futures. These volatile regions are prone to crises, making the methodology a powerful tool that Department S can use to prevent, prepare for, and respond to worldwide crises. Furthermore, the recommendations that resulted from the analysis indicate the need for interconnected foreign policy for regions of strategic significance like the Arctic. The recommendations create awareness and focus within the German government.

A similar analysis for other strategic regions could identify strengths and weaknesses of the German Foreign Ministry towards critical regions. The authors recommend that the German Foreign Ministry's Department for Crisis Prevention, Stabilization, and Resolution employ scenario planning when evaluating preparation policies for a wide range of crises, including humanitarian crises in the Middle East, widespread flooding in Southeast Asia, and earthquakes in Latin America.

Notes

1. 2005 was an exceptionally warm year (>2°C in relation to the 1951–90 mean) and was warmer than 1938, the warmest year in the 20th century. Citation: Przybylak, Rajmund. *Recent Air-Temperature Changes in the Arctic*. (Annals of Glaciology 46, 2007). <http://www.ingentaconnect.com/content/igsoc/agl/2007/00000046/00000001/art00047?token=00531d2227f1dddd3973d437a63736a6f5e47414c7a70342550236e6f644a467c79675d7c4e7247703b>, pages 316–324.

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18. "Freedom of navigation," as defined by the German Foreign Ministry, refers to implementing high safety and environmental standards for shipping, developing binding disaster response mechanisms, and investing in maritime surveillance and infrastructure.

19. 2005 was an exceptionally warm year (>2°C in relation to the 1951–90 mean) and was warmer than 1938, the warmest year in the 20th century. Citation: Przybylak, Rajmund. *Recent Air-Temperature Changes in the Arctic*. (Annals of Glaciology 46, 2007). <http://www.ingentaconnect.com/content/igsoc/agl/2007/00000046/00000001/art00047?token=00531d2227f1dddd3973d437a63736a6f5e47414c7a70342550236e6f644a467c79675d7c4e7247703b>, pages 316–324.

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22. In general, warming temperatures contribute to sea level rise by: expanding ocean water; melting mountain glaciers and ice caps; and causing portions of the Greenland and Antarctic ice sheets to melt or flow into the ocean. The contribution of thermal expansion, ice caps, and small glaciers to sea level rise is relatively well studied, but the impacts of climate change on ice sheets in Greenland and Antarctica are less understood and represent an active area of research. Changes in ice sheets are currently expected to account for 1.2 to 8

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APPENDIX I: GERMANY'S ARCTIC POLICY GUIDELINES

Assume Responsibility, Seize Opportunities

German Foreign Ministry

I. The Arctic – a region in transition

As the effects of climate change will be incredibly pronounced in the Arctic, the region is becoming more important for Germany, the European Union, and the international community. An agreed-upon international political and legal framework is needed to promote high environmental safety standards, protect the unique environment, and limit global greenhouse gas emissions. Given Germany's recognized involvement in polar research and participation in international discussions of sustainable future development of the Arctic, the Arctic is a region of key significance to Germany.

II. The Arctic from a German perspective: opportunities and risks

Strategic Goal 1: Seize Economic Opportunities

The economic opportunities for Germany's include accessing the region's supply of valuable raw materials, fostering German maritime technologies given the need for specialized technology in Arctic environment, and accessing the region's fish resources. Ultimately, Germany describes the Arctic as a key future market of great strategic importance.

Strategic Goal 2: Set Exemplary Environmental Standards

Germany aims to safeguard the unique environment and living conditions of the Arctic as well as protect the region's biodiversity. Germany's Arctic policy emphasizes the importance of developing Arctic resources in a sustainable way, by guaranteeing that the highest environmental standards are met, and by respecting the interests of the indigenous populations. Germany supports the establishment of a representative and coherent network of marine protected area, to protect biological diversity in the Arctic.

Strategic Goal 3: Freedom of Navigation

Germany supports high safety and environmental standards for shipping, such as those created by the IMO, and their universal application. Germany also supports the development of binding disaster response mechanisms for the Arctic Ocean that create capabilities for early warning, prevention, and response. Germany aims to invest in maritime surveillance, infrastructure, and Arctic search and rescue capabilities. Germany supports the infrastructure and legal framework creation around new Arctic shipping routes.

Strategic Goal 4: Freedom of Scientific Research

Germany aims to improve the conditions for research, promote the sharing of research findings related to the sensitive Arctic ecosystem, and encourage responsible polar research that meets high environmental standards. Germany expects that this issue will become increasingly prominent with

regard to the Arctic Ocean, because countries bordering the Arctic Ocean are seeking to expand their respective continental shelves, which would reduce easily-accessible international maritime areas.

Strategic Goal 5: Security and Stability

Germany seeks to take preventive actions to avoid conflict in the Arctic. These actions would consist in confidence-building measures, cooperation and coordination, and efforts to resolve disagreements through consensus based on existing legal structures.

III. Germany's Arctic policy: engagement at the European and international level

Strategic Goal 6: Active EU Arctic Policy

Germany aims to promote the Arctic dimension within the EU Common Foreign and Security Policy, and make Arctic policy part of long-term strategic planning with the EU. Germany also aims to protect the claims and rights of indigenous peoples through international laws, and to strengthen Germany's observer status in the Arctic Council.

APPENDIX II: ROLE OF MULTILATERAL INSTITUTIONS

A consistent theme throughout this memorandum is the role of multilateral relationships. However, the weak presence of both NATO and the EU in the Arctic demonstrates the limits of multilateral diplomacy for Germany in the region.

The Arctic Council has repeatedly denied the EU's request to join the organization as an observer state. The U.S. decided against voting on the issue during its chairmanship, opting instead to permit an EU envoy who was a hybrid between an unofficial guest and an official observer. With Greenland's opposition to greater EU involvement in the Arctic (Greenland is not an EU member), and heightened tension between Russia (a Arctic Council member state) and the EU, the acceptance of the EU as an Arctic Council observer state is unlikely in the foreseeable future. However, the EU can play a more proactive role in the region through internal policies such as the ones described in this memorandum. If effective in building a cohesive European Arctic policy, the EU will be well-positioned for acceptance as an observer when current political tensions ease.

Similarly, NATO suffers from internal disagreements about appropriate Arctic policies, as well as external pressure from Russia to remain removed from the region. Norway has long advocated for a larger role for NATO in the Arctic. However, since 2010, Arctic states like Canada, who prefer sovereignty over a coordinated Arctic policy, have instructed NATO to stay distant. Even if the internal divisions could be overcome, the declaration of NATO as the military threat in Russia's military doctrine means increased NATO activity in the Arctic could have drastic geopolitical consequences for the region's stability.

Thus, to achieve greater prominence in the Arctic, Germany should pursue bilateral diplomatic efforts and employ other multilateral fora such as the Arctic Council and the OSCE, with the eventual goal of increasing multilateral diplomatic efforts if internal divisions within the EU and NATO are overcome.

APPENDIX III: STAKEHOLDER ANALYSIS

STAKEHOLDERS		
FEDERAL GOVERNMENTS	Canada China Finland France Germany Greenland (Kingdom of Denmark) Iceland	Japan Norway Russia Singapore South Korea Sweden United States
INTERGOVERNMENTAL ORGANIZATIONS	Arctic Council European Union North Atlantic Treaty Organization Organization of Petroleum Exporting Countries United Nations World Trade Organization	
ARCTIC-SPECIFIC ORGANIZATIONS	Arctic multilateral organizations Arctic tribal governments Regional and national NGOs	
PRIVATE COMPANIES	Fishing companies Oil and gas companies (BP, Exxon, Gazprom, Rosneft, and Royal Dutch Shell) Shipbuilding companies Shipping companies Tourism companies	
ACADEMIC ORGANIZATIONS	Research organizations	

INTERESTS		
Cooperation	Influence	Resilience
Cultural conservation	International law	Scientific research
Economic development	Justice	Shipping
Energy (all sources)	Military advantage	Territorial rights
Environmental protection	Minerals	Tourism
Fishing	Peace and stability	Trade
Food security	Prestige	

Federal governments

Federal governments such as those of those of Germany, Canada, China, Finland, France, Germany, Greenland (Denmark), Iceland, Japan, Norway, Russia, Singapore, South Korea, Sweden, and the United States, are heavily invested in Arctic-related developments and play an active role in resource management, scientific research, emergency preparedness and response, maritime and aeronautical safety, and support to native Arctic communities.

Canada

Cultural conservation: Primarily through the Arctic Council, Canada supports the human development of its northern citizens. One example is support for language preservation for the Inuit population.

Economic development: Canada sees Arctic economic development as necessary for a sustainable economy and increased well-being of its northern populations. Exploring natural resources in the north is an integral part of the national strategy for development.

Environmental protection: One of Canada's four priorities in the Arctic is protecting its environmental heritage. Canada has strict pollution control regulations for the shipping industry, helping enforce its sovereignty, and has created large marine conservation areas in the Arctic. The stated national policy balances conservation, sustainable use and economic development.

Military advantage: Canada has pledged to increase its military presence in the Arctic. New patrol ships are planned, plus investments in Nanisivik as a berthing and refueling port. Canadian Rangers are expanding in the northern indigenous communities and a new Canadian Arctic Training Centre is planned for Resolute Bay.

Scientific research: Canada aims to remain a global leader in Arctic science and has invested in a new research station in the Arctic.

Shipping: Canada's northwest passage is not predicted to be a viable transit passage in the near term due to navigational hazards and persistent ice coverage. However, Canada has voiced commitment to improving the navigational and safety systems of the region.

Territorial rights: Exercising Arctic sovereignty is Canada's first Arctic foreign policy priority according to its national strategy. Canada considers the waters of the Arctic archipelago to be internal waters, a claim disputed by the U.S. who considers the waters to be international waters. Canada also has two border disputes with neighbors: a land dispute with the Kingdom of Denmark, and a maritime border dispute with the U.S. Neither are seen as threats to stability. Canada has submitted extended Arctic shelf claims to the UN and continues to collect data to support those claims.

Trade: Even without the openness of the Northern Sea Route, Canada sees the Northwest Passage as an avenue for increased regional trade.

China

Energy: China's growing population and economy are driving its energy demand, to include oil and gas resources. China consumed 43 percent of the world's petroleum and other liquid fluids in 2014. China has two oil-for-loan deals with Russia as well as a joint business development project in Russia's East Siberian oil fields. These agreements signal China's interest in accessing more Russian oil.

Minerals: In a 'Go Global' strategy, China has increasingly pursued raw materials globally. China has pursued investment in mining operations in both Greenland and Canada, but due to high costs and low commodity prices, development has stalled.

Fishing: China may have a growing interest in Arctic fishing. A conference on Arctic fishing was held in Shanghai in January of 2015, showing Chinese interest in the topic. While China is the world's largest producer of fish, it has a growing domestic demand for fish as its vast population broaches the middle class.

Shipping: In 2013, a Chinese-owned COSCO ship traversed the Northern Sea Route, proving time-distance savings on trips to Europe. The new shipping lanes in the north will allow for regional trade from the Arctic to China. China's trade growth occurs mostly in Asia and Africa, while trade with Europe will likely decline. China's heavy investment in port infrastructure in the Arctic, especially in Russia, shows their expectations for regional shipping increases as well as resource-laden vessels bound for China.

Territorial rights: China has no territorial claims in the Arctic. However, it has emphasized the rights of non-Arctic nations in the region under the Convention on the Law of the Sea. China is a party to the Svalbard Treaty, granting them research and commercial rights on land in the Svalbard archipelago. They have exercised the rights for research since 2003.

International law: China is interested in advancing international laws and norms, as they advance China's access to resources.

Tourism: Among China's most affluent, visiting the South or North Pole is viewed as a dream vacation for luxury travelers. As more Chinese afford vacations and tourism in the Arctic becomes more accessible, the number of tourists is expected to increase. China's largest shipping line, COSCO, has suggested opening an Arctic tourism line.

Prestige: As a growing regional power, China seeks to be present in the region. However, its role has thus far been limited to simply being part of the conversation without pressing a specific agenda. As an Arctic Council Observation State, China offers opinions when questioned as well as scientific resources.

Peace and stability: Arctic conflict would halt China's economic growth, and its development of resources in other Arctic countries.

Scientific research: While explained as responsible interest in environmental science, China's growing research in the high north could also be perceived as laying the foundation for increased shipping and economic activity in the region. China has built a Polar Research Institute in Shanghai, a research station on Svalbard, and a research icebreaker the Xue Long ("snow dragon").

Finland

Background: Finland's national strategy, published in 2013, consists in four pillars: An Arctic country, Arctic expertise, sustainable development and environmental consideration, and international cooperation. As a member of the EU, Finland's Arctic policy is closely tied to the EU Arctic policy.

Cooperation: Finland helped create the Arctic Council has been involved in the Barents Euro-Arctic Council since its creation in 1993, showing its commitment to cooperation through both institutions. Finland will hold the Arctic Council chairmanship after the U.S., beginning in 2017, and has already voiced planned to strengthen the institutions even to the point of transition to a treaty-based organization.

Cultural conservation: Finland supports improving the living conditions of their indigenous populations, the Sami, and promoting sustainable development in the Arctic. The role of reindeer husbandry is of particular importance to Finland.

Economic development: Finland is not only interested in being the subject of economic development, but also exporting its "know-how" in cold weather operations to develop other parts of the Arctic. Finland's extensive Arctic expertise creates an excellent foundation for generating new business.

Energy (all sources): Finland hopes to aid in the energy development of other parts of the Arctic by exporting its expertise in cold weather infrastructure as well as energy efficiency of the built environment. Russia is the main importer of Finnish energy technologies.

Environmental protection: Finland's Arctic policy aims to understand the adverse effects of climate change and trans-boundary pollutants, the sustainable use of Arctic natural resources, the constraints imposed by the environment, and environmental protection for all activities.

International law: Increasing global interest in the Arctic Region contributes to the role of international law. Pending issues and disputes must be settled in accordance with international law using various dispute settlement procedures.

Minerals: Finland participates in NordMin, a Nordic network of expertise for a sustainable mining and mineral industry in the Nordic region. Finland's aims to become a global pioneer in an eco-efficient mineral industry by 2020, an objective supported by the 2011–2016 Green Mining Programme launched by Tekes, the Finnish Funding Agency for Technology and Innovation.

Peace and stability: A stable and secure Arctic region is crucial to efforts to develop the Arctic economy. A safe living environment is instrumental in improving the welfare of the local populations.

Resilience: Climate change will create new opportunities in other areas of life. Finland's adaptation policy focuses on identifying and assessing both the opportunities and the risks associated with these changes. Finland will support actions that facilitate adaptation by livelihoods based on renewable natural

resources. Further, the use and management of water resources must be regulated.

Scientific research: Finland has several advanced research efforts including: biological research stations in Lapland; the Arctic Centre affiliated to the University of Lapland; and the University of Oulu center for arctic medical sciences. Arctic-related issues can be found also in the teaching and research programs of many other institutions of higher education in Finland. Finland has also stated its intention to shape the priorities of the EU's research and development programs in the Arctic.

Shipping: Even though Finland does not have coastline in the Arctic, it stands to benefit from exporting shipping expertise to cold-weather ports. Finland builds 60 percent of the world's icebreakers and invests in innovation in ice management technologies.

Tourism: While not an internationally renowned tourist destination, Finland claims to be an Arctic superpower in tourism. Finland has an interest in increased tourism, but is unlikely to see the drastic increases in tourism that Arctic coastal states will gain from cruises. Like Iceland, Finland is likely to see growth in tourists interested in nature.

Forestry: The government controls a considerable amount of the forest area in the Lapland region, Finland's northern region. The forestry sector accounts for 8-17 percent of Lapland's economic activity.

France

Energy/Minerals: Many French companies are already conducting research in the Arctic, such as Total, GDF Suez and Areva. France is recognized globally for its expertise in sustainable development and precautions relative to the extractive industry. Relevant fields of activity are transport and logistics, natural gas exploration and drilling, infrastructures, and space observation.

Sustainable development: As a leader in combating global climate change, as demonstrated in the 2015 UN Climate Change Conference in Paris, France is an advocate for environmentally sustainable development.

Peace and stability: France is urging the EU to seize influence on the Arctic Council.

Scientific research: France has a long-standing scientific involvement in the Arctic, first in polar exploration and later in polar research, through figures like Jules Dumont d'Urville, Jean Charcot, Paul-Emile Victor, Jean Malaurie, Jean-Louis Etienne and the permanent French-German Arctic Research Base on Spitsbergen. The French National Centre for Scientific Research (CNRS) recently created the French Arctic Initiative, whose objective is to coordinate all scientific activities undertaken by French universities and laboratories. Although France mostly conducts research in the Antarctic, it also has research teams in the Arctic.

Germany

Minerals/Energy/Fishing: As a highly industrialized nation that relies on importing commodities for the manufacturing industries, Germany has resource interests in the Arctic. More accessible Arctic lands and waters offer the potential for new developments of natural resources – both mineral or living. Although yet to be regulated by the Arctic states holding jurisdiction over the relevant areas, German companies will be interested in investing in the mining sector and are can provide expertise and technology. The sustainable development of new fisheries is also in Germany's interest.

Peace and Stability/Cooperation: As one of the largest member states of the European Union, Germany is also strongly involved in the ongoing development of a European Union policy for the Arctic.

Shipping/Trade: Germany is one of the major shipping nations of the world. Thus, the prospects of new sea routes from Europe to Asia are particularly interesting. In summer 2009, two German merchant ships were the first non-Russian commercial vessels to sail the Northern Sea Route (via Russia) in one season. Using the Northwest Passage or eventually a polar route, would significantly cut travel time, avoid increasingly pirate-infested waters in the Indian Ocean and result therefore in economical savings. Fewer days at sea requires less fuel, which has positive environmental effects.

Environmental protection: Germany emphasizes ecologically sustainable solutions that incorporate the rights and interests of indigenous populations in the North. The need for environmental protection and sustainable development is a common ground in German society and politics. This generates a keen interest in developments caused by climate change. Though most emissions causing climate change are generated elsewhere, the polar regions are greatly affected. German researchers at the Potsdam Institute for Climate Impact Research, are, therefore, part of the international scientific community addressing crucial questions of global change, climate impact and sustainable solutions.

Greenland (Denmark)

Background: Greenland is of strategic importance to Denmark, because the island increases its territory far to the north and grants access and prestige to Denmark in regional governance forums. However, Greenland citizens have continued to seek greater autonomy from Denmark. Currently, Greenland cannot support itself financially but the trend towards greater autonomy for the island continues.

Cooperation: The security of Greenland is a burden on Denmark's limited security resources. Therefore, Greenland has depended on joint security measures with neighboring Arctic nations.

Economic development: The development supported by Greenland centers on its natural resources. See energy, fishing, and mineral sections for details.

Energy (all sources): There has been consistent exploration for oil/gas deposits in and around Greenland. Although, no significant extraction

has taken place despite the high potential for hydrocarbon resources and political support for development. If the environment were to become less hostile, rapid development could be expected. Greenland has also invested in the development of renewable energy which now makes up 60 percent of the public energy supply, mostly through hydroelectric power.

Environmental protection: National policies advocate for high standards of environmental protection in resource development. Although, the balance between environment and development appears to tip towards development.

Fishing: Fishing is the number one export industry in Greenland, accounting for 85 percent of exported goods. Greenland is in the process of adjusting to the need for greater regulation and enforcement of fishing as well as changes in fish stocks due to climate change.

International law: Denmark spearheaded the Ilulissat Declaration, signed by the Arctic coastal states that reaffirms international law as the basis for cooperation and conflict resolution in the region.

Minerals: Greenland is believed to have vast mineral resources, but global market prices and harsh climate have prevented the wide development desired by Greenland government. Greenland makes independent decisions on resource development, but revenues to Greenland decrease the block grants the island receives from Denmark. Kai Holm Andersen, Greenland's deputy foreign minister, has announced that Greenland will be an important mining nation in the future.

Scientific research: According to the Kingdom of Denmark's strategy for the Arctic, Arctic research will be a focus, and research and training efforts will support the development of industry and society in the Arctic. Greenland is increasingly the location for research in many of the natural sciences, but most of that research is not funded or conducted domestically.

Shipping: Greenland has already seen an increase in shipping, both commercial and tourism. Denmark supports high standards for shipping practices in the north, to include the IMO Polar Code, and has implemented port state controls for ships docking in Greenland.

Territorial rights: Denmark and Canada both claim Hans Island, but the maritime borders are delimited. Denmark has led seabed mapping explorations in order to support its extended continental shelf claims along the Lomonosov Ridge.

Tourism: Greenland has seen a marked rise in tourism, especially through cruise visits. Between 2005 and 2010, the number of cruise passengers visiting Greenland doubled and is expected to rise. Tourism is the second largest export industry in Greenland.

Trade: The government of Greenland has set targets for foreign investments that will lead to revenues for local populations based on abundant natural resources. Greenland is also investing in the infrastructure that will be necessary to support growing trade with both Europe and North America.

Iceland

Cooperation: Iceland views the Arctic Council as the most important regional governance body. However, Iceland also supports other regional forums such as the Arctic Circle Assembly founded by Iceland's President and held in Iceland annually. Iceland protests any militarization of the region and opposes A5 meetings and agreements that exclude other states like Iceland.

Cultural conservation: Iceland has no indigenous population, but supports their active involvement in regional decision making.

Energy (all sources): Nearly all of Iceland's energy comes from renewable resources including hydropower and geothermal. Its geothermal technology is world renown and Iceland is exploring ways to export energy along with geothermal technology.

Environmental protection: Iceland has policies to support both mitigation and adaptation to climate change and supports development only when it is environmentally sustainable.

Fishing: The fishing industry is of historical, cultural, and economic significance to Iceland. It is the largest economic sector in Iceland contributing to GDP and the job market.

Prestige: Iceland's land mass does not fall above the Arctic Circle, but a great amount of its maritime space does. Thus, Iceland sees itself as an Arctic state, even though it is sometime excluded from events restricted to the A5. One of Iceland's policy goals is securing its position as a coastal state in the Arctic region.

Scientific research: Iceland and its universities are interested in a broad range of scientific research from climate to shipping technology. The government focus is on integrating Iceland's schools and researchers into the international research community.

Shipping: As an island nation, Iceland is dependent on shipping and has a vibrant shipping industry. In anticipation of increased trade in the north Atlantic, Iceland and Germany are building a deep water port in northeastern Iceland.

Territorial rights: Iceland is interested in territorial rights with with regard to fishing and acceptance as an Arctic nation. Iceland has no boundary disputes.

Tourism: Tourism in Iceland has increased drastically in the past 5 years and in 2014 surpassed fishing and aluminum production for foreign exchange income. The increase comes both through cruise ship visits and tourists entering through Iceland's international airport. Icelandic nature is the most common reason for tourists to visit Iceland, and so the country has a stake in preserving its pristine landscape.

Trade: As an island nation, trade is an important part of the economy. In general, Iceland has liberal trade policies and Iceland was the first European country to sign a free trade agreement with China. Iceland stands to benefit from any increase in regional trade, and is attempting to position itself to be central to any theoretical or geographic trade regimes.

Japan

Cooperation: Japan's Arctic Strategy focuses, in part, on international cooperation on the Arctic. Japan is committed to being an involved observer on the Arctic Council and has stated support for an expanded observer role. Japan also advocates for close cooperation on scientific and technical cooperation through international forums.

Economic development and environmental protection: Japan aims for sustainable development in the Arctic including in tourism, shipping, fishing, and energy extraction.

Energy: The Japan Oil, Gas, and Metals National Corporation (JOGMEC) is working with Greenland Petroleum Exploration Co., Ltd, in ocean exploration.

Scientific research: One of Japan's stated interests is Arctic research from a global perspective. Japan has had an Arctic observation station in the Arctic since 1991. Japan advocates efforts for both mitigation and adaptation to climate change and aims to contribute its research on the environment to address issues in the Arctic and the global climate impacts. Japan's strategy points out that its domestic weather patterns have been influenced by changes in the Arctic environment.

Shipping: Due to its northern location, Japan and its shipping lines stand to gain from increases in regional and cross-polar trade as Arctic shipping lines become more accessible. Japan is interested in development of navigational systems and shipping codes for increased safety of shipping in the Arctic.

Norway

Cooperation: As the only coastal border state with Russia, Norway has a high stake in cooperation between NATO and Russia. Norway is committed to actively participate in the Arctic Council and the Barents Euro-Arctic Council as well as other existing forums for cooperation in the Arctic. Norway's desired end state from its multi-layered cooperation is to promote predictable, peaceful, and sustainable development through people-to-people, regional, and intergovernmental cooperation. International cooperation is one of Norway's five areas of concentration, alongside the development of a knowledge-based business sector, knowledge development, infrastructure, and emergency preparedness and environmental protection.

Cultural conservation: While the Sami nation is spread across Norway, Sweden and Finland, the largest portion of the Sami people live in Norway.

Economic development: Norway is spending federal money to promote business development in the high north. From 2014-2019, Norway has allocated NOK 150 million (approximately 17 million USD) for innovative business development in the north.

Energy (all sources): Oil and gas are the largest part of Norway's economy, and it intends to continue to explore resource extraction. While investment in oil/gas was down in 2015 due to low prices, investment in the extraction and transport of oil/gas have been steady and are predicted to remain so in the near future.

Environmental protection: While Norway has stated that it will pursue resource extraction in the Arctic, it maintains a high standard for environmental protection. Norway supports the creation and enforcement of international standards for oil and gas exploration and exploitation in the Arctic.

Minerals: Mining and quarrying has been an industry in northern Norway and Svalbard for a long time, but is experiencing drastic declines. Current government policies point to investment in mineral mapping that could support future mining efforts, but mining activity is predicted to continue declining.

Fishing: Norway is the world's second largest exporter of seafood in the world, exporting to over 140 countries. In addition to at-sea fishing, Norway has invested in aquaculture. In 2014, 33% of exports came from fisheries and 67% came from aquaculture. In 2015, Norway supported the ban on fishing in the Central Arctic Ocean (CAO) as a measure to combat IUU fishing and delay regulated fishing until sustainable limits can be set.

International law: Norway's interest in international law is to support cooperation in the region and maintain access to resources that Norway currently holds.

Military advantage: Norway is the only country with a defense ministry headquartered above the Arctic Circle. Its cold weather training facilities serve NATO and it hosts an annual military exercise for cold weather training.

Resilience: Norway employs the term, 'emergency preparedness' and places this interest next to environmental protection as one of the five pillars of its Arctic strategy. Norway has increased search and rescue capability on Svalbard.

Scientific research: Norway is investing in research and education centers in the Arctic and in Arctic-related topics. Norway, in its Arctic Policy, identifies its aim to lead knowledge of the Arctic. Research is not restricted to climate research; the national policy supports long-term industry-oriented research to support resource exploration in northern Norway.

Shipping: According to Norway's own data, 80% of shipping in the Arctic passes through Norway's waters. Norway is investing in the infrastructure of Arctic shipping by launching AIS satellites and developing satellite communications above 75-degrees north. Norway also leads the IMO Polar Code working group and strongly supports the adoption and implementation of the Polar Code.

Territorial rights: Norway has no border disputes, but has a unique position in administering Svalbard. While Norway has positioned itself to exercise national rights in the waters around Svalbard, there remains a possibility for different interpretation of the Svalbard Treaty and UNCLOS in order to allow treaty nations access to maritime resources around the island. Norway's interest is in maintaining sovereignty over these resources and Norway continues to position itself in the international community and in international law to accomplish this.

Tourism: Tourism increased by 10% in 2014 and is expected to continue to grow. This growth is supported by government marketing activities.

Russia

Background: Nearly one-fifth of Russia's landmass is north of the Arctic Circle and its Arctic coastline is approximately 40,000 km long. Of the approximately four million inhabitants of the Arctic, roughly two million live in Russia's North.

Cooperation: Russia has remained cooperative in the Arctic even when relations are strained in other geographic areas.

Economic development: Development of the Arctic has historically been a state-sponsored activity in Russia and remains so today. While much of the Arctic infrastructure fell into disrepair after the collapse of the Soviet Union, Russia has voiced a commitment to revitalizing the built infrastructure in the region. While the low price of oil precludes the desired level of state resources allocated to undertake massive infrastructure project, Russia has an economic interest in developing its northern region regardless of the commodity prices.

Energy (all sources): Russia is a net energy exporter and is interested in exploring additional oil and gas resources. This has driven exploration in the Arctic at a rate higher than other Arctic nations.

Environmental protection: Russia has a stated goal of environmental protection and suffers from infrastructure degradation as climate change melts permafrost. Historically, the Arctic was not a priority for environmental protection as evidenced by the nuclear waste disposed in the region during Soviet times. While the environmental clean-up as a result of those policies has motivated an interest in sound environmental policies, Russia lags behind other nations in its regulation of economic activities to protect the environment.

Fishing: Since Russia's main coastline is in the Arctic, so too is their fishing industry. The industry suffers from declining fish stocks and shifts in the maritime environment driven by climate change. According to interviews conducted in Russia, the extractive industries are prioritized over fishing and offshore development interferes with fish stocks.

Military advantage: Russia has allocated more resources to its northern front in recent years than other Arctic nations. There has been increased investment in icebreakers and ice hardened vessels, as well as the refurbishment of northern bases built during the Soviet area and redeployment of troops to the region. Russia claims these measures are purely defensive, but other Arctic states are concerned about militarization of the region.

Minerals: Mining is a longstanding industry in Russia. MMC Norilsk Nickel is the largest nickel producer in the world and also produces palladium and platinum, mostly from the Norilsk region. Russia also extracts and exports phosphates, bauxite and iron ore. Russian mines have a poor safety record and experienced tragic mine disasters in 2007, 2010 and 2016.

Scientific research: Russia conducts field research on drift stations and developed research stations, as well as conducting extensive research in its academic institutions. Research spans a variety of topics, but also includes research to back up its territorial claims such as the 2007 expedition to collect

sediment samples, which included the planting of a Russian flag on the North Pole seabed.

Shipping: Other than natural resources, maritime transport is Russia's other main economic interest. Russia has invested heavily in the NSR development of infrastructure and administration. The Northern Sea Route Administration manages transport along the route. While declared to support and regulate shipping through the region to maintain safety standards, the permit application and mandatory lease of Russian icebreakers is seen as restrictive under international law and an income generation tool for the Russian state.

Territorial rights: Russia has no territorial boundary disputes, but the legal status of the Northern Sea Route is debated. While it is currently ice covered for the majority of the year, allowing for the regulations imposed by the Northern Sea Route Administration to conform to UNCLOS, if the route becomes ice free for longer periods of time then the legal status would change to an international strait which precludes extensive regulations. Russia has declined to state what their policy would be once the sea route no longer falls under the UNCLOS ice clause.

Singapore

Shipping: While Singapore could be a net loser if shipping lanes shift to the high north, they are also positioning themselves to export shipping technology for polar class ships. Since polar shipping is unlikely to replace the Strait of Malacca transit route, Singapore can maintain its physical place in trade routes in addition to increasing business of shipping technology, design, and manufacturing.

Scientific research: Singapore is already seeing an impact of climate change on migratory bird species. And the implications of sea level rise are catastrophic for the island nation. So, scientific research, mostly on climate, is being conducted.

South Korea

Shipping: South Korea is the world's largest shipping manufacturer. Busan is also the 5th largest container port in the world by volume. But there are fears about a downturn in demand for South Korean ships, so dominating the market for polar shipping classes is of high value for the national shipbuilding industry.

Trade: Due to its northern geography, South Korea stands to gain from regional trade increase expected as polar trade routes become navigable for longer periods of the year. The polar route also offers time-distance savings with Europe along the Northern Sea Route.

Sweden

Cooperation: Sweden advocates for a stronger role for the Arctic Council in developing regional policies and projects; Sweden sees the Arctic Council as the central multilateral body of the region. Sweden also supports the work of the BEAC and the development of an EU Arctic policy.

Cultural conservation: Sweden advocates for cultural preservation and human security of its Sami indigenous population through national decision-making process and within international bodies.

Economic development: Sweden supports sustainable development of the Arctic region and has interest in contributing its environmental technology expertise and maritime technologies for its own economic development. Tourism is seen as an area of economic growth as well.

Energy (all sources): The majority of Sweden's energy comes from renewals, and promotes the increased use of renewable energy in the Arctic.

Environmental protection: Sweden supports global mitigation policies as well as regional adaptation policies, especially efforts focuses on reducing pollutants that adversely affect Arctic communities. MPAs should be established and environmental impact assessments should be prioritized.

International law: Sweden promotes the preeminence of international law for national activities and interactions in the Arctic with special emphasis on the role for UNCLOS.

Peace and stability: A priority is placed on reducing tensions in the region. Sweden advocates for policies of free trade, human rights, and diplomatic ties to promote peace and stability.

Scientific research: Sweden contributes to Arctic research through its national research stations and expeditions. Much of the research is focused on the environment and maritime technology. The Swedish Polar Research Secretariat organized maritime research expeditions with the ice-breaker Oden.

Shipping: Sweden does not have an Arctic coastline, but develops and exports ice-breaking technologies to support commercial shipping and scientific expeditions.

United States

Cooperation: The U.S. commitment to multilateral forums on the Arctic is heightened since taking over chairmanship of the Arctic Council in 2015. The U.S. State Department has taken the lead on ensuring that disputes in other areas such as Ukraine do not impede cooperative progress in the Arctic.

Cultural conservation: The U.S. is committed to preserving the unique natural habitats of the Arctic.

Economic development: Development of the Arctic is a higher priority for Arctic residents than for the U.S. Federal Government. Alaska's northern regions remain far less developed than areas of the same latitude in Europe. While there is interest in development, the interest of environmental sustainability has precluded large industrial development projects on and off-shore.

Energy (all sources): The U.S. is less interested in oil/gas exploration today than five years ago because of the shale oil boom. While the current regulatory environment is harsh for oil/gas exploration in the Arctic, there remains a high interest from energy companies to explore for resources in the future.

Environmental protection: The formal policy of the U.S. places environmental protection ahead of development.

Fishing: While the U.S. has a vibrant fishing industry in southern Alaska, the U.S. has consistently supported bans or moratoriums on Arctic fishing. All U.S. Arctic waters are closed to commercial fishing from the Bering Strait northward. The U.S. strongly supported the ban on fishing in the CAO signed by the Arctic coastal states in 2015.

International law: While not formally party to UNCLOS, the U.S. exercises rights in accordance with the treaty and supports enforcement of its restrictions.

Military advantage: The U.S. cannot currently meet its stated national security interests in the Arctic due to a lack of physical infrastructure to support the missions. This is true for the Coast Guard search and rescue capability as well as hard security tools such as Navy presence. While there is discussion about increased funding for Arctic security platforms, which has yet to be allocated. The increased military presence by other Arctic nations, specifically Russia, is likely to motivate the U.S. to increase presence in the mid- to long-term.

Minerals: Mining in Alaska benefits local populations through high paying jobs, and also pays large dividends for local and state governments through tax revenues. Red Dog Mine in northern Alaska is the world's largest zinc producer. Other minerals mined in Alaska include gold, copper, silver, zinc and rare earth minerals.

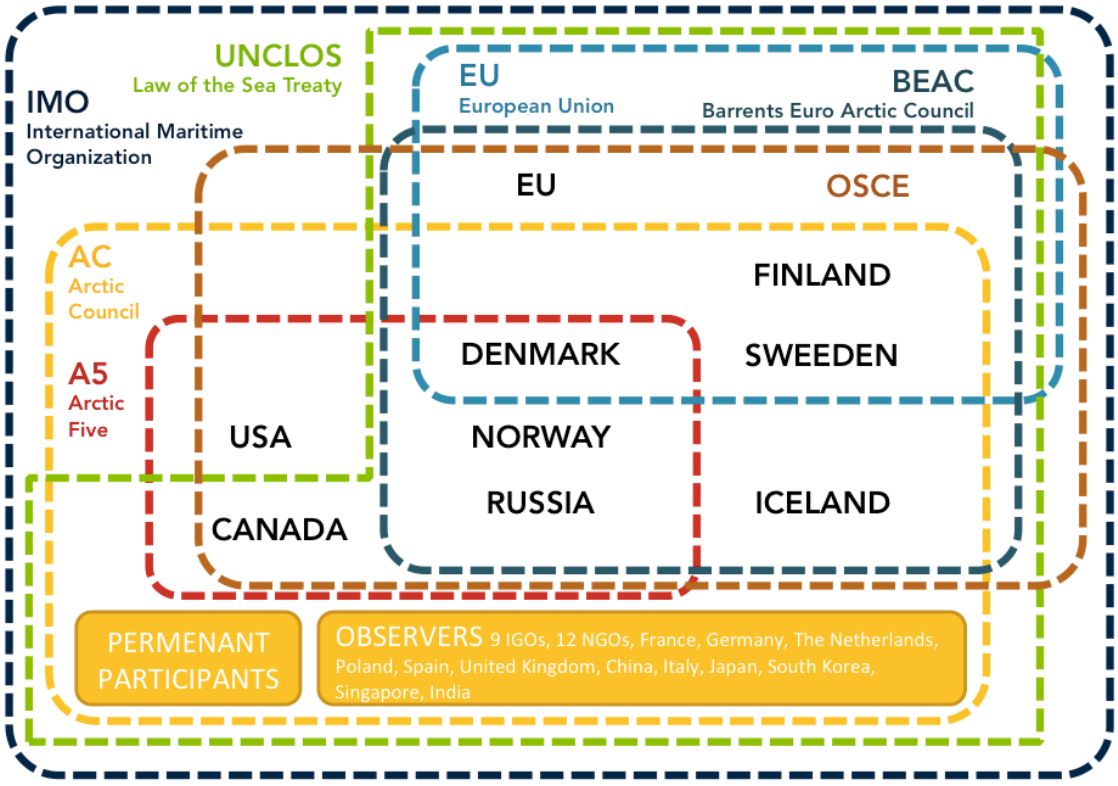
Scientific research: The U.S. research agenda is formally determined and implemented through the Interagency Arctic Research Policy Committee (IARPC) and informed by the research goals proposed by the United States Arctic Research Commission (USARC). These goals have focused on environmental observation and conservation as well as on human health, security and culture.

Shipping: The U.S. does not have a deep-water port in the Arctic. Developing one has been proposed as a research goal for the U.S. by the USARC, but funding has yet to be allocated. The U.S. stands to benefit from increased shipping in the Arctic, especially for local development through regional trade, but the infrastructure investment lags behind other Arctic nations and could impede capitalizing on the increased maritime traffic in the region.

Territorial rights: The U.S. has not ratified UNCLOS and therefore is unable to submit extended continental shelf claims. The U.S. resolved its maritime border with Russia in 1990, however the delimitation has not been ratified by the Russian Duma. The U.S. has a long-standing maritime border dispute with Canada. As resources in the disputed territory become more accessible and desirable for commercial gain, the U.S. interest in resolving the border dispute will rise.

INTERGOVERNMENTAL ORGANIZATIONS (IGOS)

IGOs such as the Arctic Council, the European Union, the North Atlantic Treaty Organization, the Organization for Security and Co-operation in Europe, the United Nations, and the World Trade Organization, share several interests.



Cultural Conservation: Development that guarantees food security, fresh water, and access to clean, affordable energy for communities throughout the Arctic is important to IGOs. Also, IGOs are concerned with the preservation of important archeological and historical Arctic resources.

Economic development: IGOs advocate for infrastructure investments such as airports, roads, communication systems, utilities, maritime transportation systems, navigation data and aids, aircraft and shipping traffic separation protocols, and ports.

Energy: IGOs share the goal of ensuring that offshore oil and gas development is undertaken safely and in an environmentally responsible manner. In particular, the EU may lead efforts in developing Arctic offshore regulations and standards.

Environmental protection: The development of natural resources and infrastructure must be undertaken in a safe and environmentally sound manner, without harming vulnerable or sensitive plant and animal populations, habitats, or ecological processes is of key importance to IGOs.

International law: IGOs insist on a sufficient Arctic presence to monitor, safeguard, and regulate maritime operations, necessitating greater collection and sharing of maritime data and analyses of real-time information. The U.S. outlines useful preparedness measures in its National Strategy for Maritime Security and the National Plan to Achieve Maritime Domain Awareness.

Resilience: IGOs must maintain a minimally sufficient presence in the Arctic to monitor, safeguard, and regulate activities, and to respond effectively to emergency threats and hazards arising from domestic natural resource development efforts and from increased international vessel traffic.

Scientific research: IGOs maintain a vested interest in collecting data to facilitate well-informed policy and management decisions concerning environmental, economic, and cultural aspects of the Arctic. Research programs will require the development and maintenance of technologies, research platforms, and observing systems that can withstand harsh Arctic conditions.

Tourism: IGOs share concerns that increasing tourism to the Arctic's outstanding natural areas not interfere with the protection of its wilderness.

Arctic-specific Organizations

Various Arctic-specific organizations, such as the Circumpolar Inuit Council, Arctic tribal governments, and regional and national non-governmental organizations, all have a stake in Arctic affairs.

Arctic tribal governments and organizations

These groups represent the interests of the indigenous peoples throughout the Arctic. Tribal governments operate both locally within individual communities as well as regionally. For example, the Inupiat Community of the Arctic Slope is the regional tribal government for all North Slope Borough villages. Additional groups that have been tribally authorized to represent their interests in the co-management of natural resources include the Alaska Eskimo Whaling Commission, Alaska Beluga Whale Committee, Ice Seal Committee, Eskimo Walrus Commission, and Alaska Nanuuq Commission.

Cultural Conservation: Maintaining the strength of the subsistence way of life is vitally important to indigenous peoples, both from food security and cultural conservation perspectives.

Economic development: Many indigenous Arctic communities lack adequate housing, water, sewer service, roads, and access to affordable energy, which pose dangerous health and safety issues to residents. If not planned carefully, industrial development and population growth will dramatically amplify these problems. Thus, economic development while protecting the environment and preserving the subsistence way of life are vitally important objectives for indigenous communities. Last, indigenous peoples desire that the local economies benefit from increased foreign resource development and industrial activities.

Environmental protection: Tribal governments are concerned that pollution and the cumulative impacts from shipping, industrial development, and other sources could make marine mammals less available to hunters and unsafe for human consumption. The U.N. Declaration on the Rights of Indigenous Peoples states that environmental degradation can violate the human rights of indigenous people and that it is the responsibility of governments to prevent environmental harm that threatens traditional food use. As industrial activity increases throughout the Arctic, governments and industry must prevent, mitigate, and respond to accidents and spills that could have catastrophic impacts on the Arctic and the people who live there.

Food security: Ensuring food security is a high priority for indigenous communities, where there are concerns about the impacts of noise pollution, chemical pollution, habitat loss, and other forms of disturbance on fish and wildlife populations and subsistence foods.

Influence: Indigenous peoples want representation and input when important decisions are being considered that impact their land, their resources, and their way of life.

Resilience: Tribal governments desire the capacity to respond effectively to environmental emergencies such as offshore oil spills or ship accidents. Currently, with the

environmental changes accompanying changing climate, the Arctic is experiencing an increase in severe weather, flooding, and coastal erosion.

Scientific research: Sound science that adopts a long-term perspective can best inform natural resource management decisions.

Shipping: The growing diversity and presence of fuel barges, oil and gas support vessels, bulk carriers, research ships, cruise ships, fishing vessels, and marine freight vessels imposes new demands on the coastal communities in the Arctic.

Conservation and environmental non-governmental organizations (NGOs)

These groups are concerned about industrial expansion into the Arctic, particularly regarding offshore oil and gas development and shipping. The 2010 Deepwater Horizon disaster in the Gulf of Mexico and by the lack of capacity and infrastructure to respond to such a disaster in the Arctic exacerbates these concerns. Also, disturbance of marine mammals from drilling, vessel traffic, and seismic surveying in Arctic waters worries NGOs. NGO stakeholders are primarily interested in the permanent protection of important onshore ecological and subsistence areas in the Arctic. Their interests also include:

Cultural conservation: NGOs demand assessments of the food and health security necessary to ensure the continuation of communities indigenous to the Arctic, as well as a governance framework that consults tribal leaders, elders, and hunters.

Economic development: NGOs favor only development activities that do not contribute substantially to climate change, ocean acidification, and industrial stresses on terrestrial and marine environments in the Arctic.

Environmental protection: NGOs support the long-term monitoring of activities to measure their impacts and interactions with climate change, as well as restrictions on certain activities and development to protect important ecological areas.

Resilience: NGOs call for the implementation of Arctic-specific safety and oil spill response standards and regulations.

Scientific research: NGOs request comprehensive scientific information to guide decision-making regarding development in the Arctic.

Private Companies

Private companies include fishing, oil and gas, shipbuilding, shipping, and tourism companies, are heavily invested in Arctic affairs.

Fishing companies

Environmental protection: Environmental changes will have unknown and uneven impacts on fish populations. Ocean acidification as well as ice loss will impact fish stocks in the Arctic by causing migration or adaptation of traditional fish resources. Depending on the target fish product, fishing companies may wish to impress strict environmental protections to protect traditional fish stocks, or embrace the environmental changes in order to exploit new or different fish stocks.

Scientific research: Research is needed to understand ongoing changes in the fish industries in the Arctic as well as developing sustainable practices to ensure that fish stocks are not depleted. Additionally, technical research on ship building practices can make fishing in ice-infested waters safer or more predictable. However, for those fishing fleets that depend on IUU fishing to meet high demands at low costs, research backed by enforcement will be a detriment.

Shipping: The development of shipping in the high north has advantages and disadvantages for fishing. Increased shipping traffic could disrupt fishing grounds, while, the increased infrastructure in ports and navigational systems accompanying an increase in shipping traffic will benefit fishing vessels.

Territorial rights: The national fishing fleets of coastal states have a huge stake in enforcing territorial claims and extending EEZ claims through the UNCLOS provisions. Fishing vessels from countries outside of the A5 coastal states have an interest in fishing in the Arctic and will engage in fishing as allowed by: 1) fishing permits by coastal states; 2) IUU fishing allowed by lackadaisical enforcement; 3) IUU fishing outside of national jurisdiction.

Oil and gas companies

Oil and gas companies are interested in becoming increasingly involved in the Arctic, with an interest in exploring the extraction of various energy sources and minerals.

BP: BP's offshore Arctic interests are currently limited to exploration, though it has operated in the U.S. Arctic for several decades. It operates nine onshore fields on Alaska's North Slope. In the offshore Arctic, BP has not yet explored its leases. Investments include the Canadian Beaufort, the Barents Sea and Greenland. BP holds a 19.75% share in Rosneft, Russia's largest oil company, but it does not currently have operations in the Russian Arctic or directly partner with Rosneft on any of its Arctic licenses.

ExxonMobil: ExxonMobil is invested in exploring and extracting various Arctic energies and minerals.

Gazprom: Gazprom, a large Russian company, produces oil from Russia's Prirazlomnoye field. This is the first Russian project for developing the Arctic shelf and the commencement of Gazprom's large-scale activities aimed at creating a large hydrocarbon production center in the region.

Rosneft: Rosneft launched projects in the Kara and Barents Seas in 2010 after obtaining four licenses to explore Russia's Arctic shelf. Three of the licenses relate to blocks in the Kara Sea, while the fourth is for the South-Russky block in the Pechora Sea. The blocks are estimated to hold 21.5 billion tons of oil equivalent.

Royal Dutch Shell: While Royal Dutch Shell has invested billions of dollars in oil and gas exploration off the coast of Alaska, lowered oil prices have led Shell to cease its activities in Alaska for the foreseeable future.

Shipbuilding companies

Trade: There has been an increase in demand for special vessels, such as icebreakers and ice-hardened ships, since the beginning of the new era of Arctic resource development and the opening of the Arctic sea routes. South Korean shipbuilders such as Hyundai Heavy Industries, Samsung Heavy Industries, and Daewoo Shipbuilding and Marine Engineering are among the most competitive companies in the world for production of these high-value-added ships. In March 2014, DSME won a $300 million order from Russia's state-owned shipping company Sovcomflot to construct an icebreaking liquefied natural gas carrier.

Shipping companies

Economic development and Trade: As economies develop, the demand for trade and the supply of export products will increase alongside demand for shipping services.

Environmental protection: Strict emission standards will have adverse economic impact on shipping lines, which are heavy polluters.

Peace and stability: Local or regional disruptions are bad for any economic activity and can severely interrupt transport lines.

Scientific research: Technical advances for polar ship classes will benefit trade in the high north. Additionally, climate research to predict weather patterns and adverse weather events will decrease risk for polar shipping.

Tourism companies

Peace and stability: When conflicts arise, trade is immediately impacted.

Shipping: Well-developed shipping technologies, navigational systems, and enhanced safety systems all support increased cruise tourism in the high north.

Tourism: The growth of the Arctic in global conversations has also increased tourism interest. Currently, tourism is restricted to the wealthy adventure tourists, but the changing environment and increased development in the region will lead to increased tourist access.

Academic Community

The academic community, which is comprised of research-based institutions and individuals, is primarily concerned with scientific research.

Scientific research: The academic community promotes science-based decision-making that mandates the collection of on-the-ground data.

Influence: The academic community seeks to influence the policy and management decisions of IGOs, federal governments, and private sector companies.

APPENDIX IV: REFERENCES

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