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Adequacy of the Polar Code

Goal - based requirements of the Polar Code and Survival

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List of Abbreviations:

CDEM	Construction, Design, Equipment and Manning
GAIRAS	Generally accepted international rules and standards
HFO	Heavy fuel oil
IMO	International Maritime Organisation
MEPC	Marine Environment Protection Committee
MPA	Marine Protected Area
MSC	Maritime Safety Committee
PSC	Polar Ship Certificate
PSSA	Particularly Sensitive Sea Areas
PWOM	Polar Waters Operational Manual
SSE	Ship Service and Equipment

1- Introduction

1.1 Background

Opening of the navigational routes in the Arctic region, is an outcome of vanishing the multi-year ice. Significant reduction in the sea- ice has raised the number of vessels operating in the Arctic region. The peculiar environment of the Arctic, poses great risks threatening safety of navigation of vessels operating in these waters.[1]

Due to the specific environment of the Arctic and difficulty in operational conditions, shipping in the Arctic waters is drastically different from the shipping in other areas in the world. These differences are rooted in the harsh environment, remoteness, lack of infrastructure and required navigational aids in the Arctic waters.[2] These conditions put special requirements on ship systems, including navigation communications, life- saving appliances, machinery, and damage control. Besides, there is a need to ensure the functionality and effectiveness of all equipment and machinery of the vessel under the conditions in the Arctic and provide adequate levels of safety and survival in accident and emergency situations.[3] In response to the additional risk of navigation in the Polar waters and its inherent need for specific and tailor-made regulations for these areas Polar Code as adopted and became effective in 2017.[4]

The Polar Code supplements existing IMO instruments to provide for safe ship operations by addressing the 'additional demands on ships' for operation in remote and harsh environment of the Arctic.[5] It goes without saying that the great standing of Polar Code in international shipping is recognized by all stake holders and it is widely accepted as one of the most important legislative instruments making a significant effort to address issues related to shipping and operation in Polar waters, in order to provide safety and environmental protection within these

[1] Bai, Jiayu. "The IMO Polar Code: The emerging rules of Arctic shipping governance." *The International Journal of Marine and Coastal Law* 30, no. 4 (2015): 674-699. p.678

[2] Chircop, Aldo. "The growth of international shipping in the Arctic: Is a regulatory review timely?." *The International Journal of Marine and Coastal Law* 24, no. 2 (2009): 355-380.

[3] Scott, Karen N. "Protecting the Commons in the Polar South: Progress and Prospects for Marine Protected Areas in the Antarctic" in " Global Commons and the Law of the Sea". ed. Keyuan Zou.(Boston ; Leiden : Brill, 2018) p. 311-314

[4] Polar Code, preamble1

[5] Polar Code, preamble2

areas. However, the Polar Code could not be regarded as a sufficiently adequate and transparent set of rules and requirements for Arctic shipping.[1]
Besides, due to the Goal- based approach of the part I-A, safety measures, of the Code it is more complicated to understand, and sometimes interpret, its performance- based requirements.[2]

1.2 Objective

The purpose of this paper is to submit an assessment of the adequacy and clarity of the functional requirements and regulation of the Code. The focus is put on the goal- based performance and/or test criteria for life saving appliances and arrangements for vessels operating in Arctic waters.
In fact, specific hazards and risks of navigation in Arctic waters, in addition to the new strains that the Code put on the safety and survival equipment and arrangement to keep their functionality for the maximum expected time of rescue and under the Arctic conditions, call for the evaluation whether these objectives can be met through the existing performance and/or test criteria or there is a need for development of those criteria to fill the current gaps and support the harmonized implementation of the Code.[3]

In this regard, a number of legal questions arise

1- What are the applicable legal instruments in Polar waters?
2- How could the need for harmonization and sufficient standards be satisfied?
3- Could national legislation compensate the deficiencies in the Polar Code?
4- What are the regulatory measures and legislative bodies in an effort through harmonization?

[1] Lawrence P. Hildebrand and Lawson W. Brigham. " Navigating the Future: Towards Sustainable Arctic Marine Operations and Shipping in a Changing Arctic″. in ″ Sustainable Shipping in a Changing Arctic″. ed. Lawrence P. Hildebrand. Lawson W. Brigham. Tafsir M. Johansson (Cham; Switzerland: Springer International Publishing AG, part of Springer Nature, 2018) p. 430

2 Raaen, Bjørnar. ″ Regulations applying performance-based requirements and the importance of their guidelines. in ″ SARex3, ″Evacuation to shore, survival and rescue″, ed. Knut Espen Solberg and Ove Tobias Gudmestad, (Stavanger, University of Stavanger, 2018). P.224

[3] Polar Code, Part I(A),1.4, 8.2.2

1.3 Method and material

The primary focus of this research is on the assessment of the legal documents and all legal instruments relevant to the scope, by use of the interpretations put forward by legal experts.
In fact, since the scope of the research is partially technical different approaches from several stakeholders, such as Classification societies, insurance companies, Flag states authorities coast guards, international organizations and legal experts, will be taken into account when assessing these legal instruments. This holistic approach aims at being accurate and empirical.

The narrow scope of the subject, in addition to its specific nature which has not been touched that much, has made it rather difficult to find a wide range of literature discussing the scope. Since the legal works on the matter is ongoing, the thesis will thus include both ***de lege lata*** assessments as well as ***de lege ferenda*** analyses. The objective of the thesis is to analyze aspects of the relatively new subject arose after the adoption and enforcement of Polar Code. In fact the proper recognition of the issues written in the thesis and application of the legal solutions could result in an important legal step towards promoting safety of life at sea in Arctic waters.

1.4 Scope and structure

The dissertation is presented in six chapters. Chapter I is introductory, in which a necessity of work on Arctic, as well as the objectives and methodology of the study, is addressed. In Chapter II, the different legal measures based on different governing interests has been analyzed to illuminate the evolutionary way of adoption and enforcement of the Polar Code. Regarding the key features and structure of the Polar Code, specifically the safety measure, a brief overview on its goal- based/ risk- based safety standards have been presented. The next chapter represents a discussion on the shortcoming and gaps in the Polar Code standards as the first-generation instrument and the need for compensatory measures to satisfy those gaps.

AS the main focus of this study is about the Polar Code requirements and test standards for life-saving appliances and arrangements the next chapters are concentrated on identifying the gaps in the Code's performance and/ or test criteria calling for harmonization and/ or additional development or amendment. Since all the aforementioned areas need for the competent organization to take adequate and sufficient measures to achieve those objectives, the role of the IMO and its committees are also studied. Besides the regulatory measures which have been taken so far or must be taken in the future. At the end of the study, the author suggests her view

on the most efficient way to fill the gaps, achieve the harmonization and comply with Code and its requirement.

2. Instruments Applicable in the Arctic Waters

The specific nature of international navigation and shipping in the Arctic should be attributed to its different and unique characteristics and environment. This fact has also considerable impacts on other areas relevant to Arctic and navigation in its harsh environment. The predominant factor in this regard is the applicability and enforcement of international rules and regulations in the Arctic. In fact, because of all those significant differences, the international measures which are applicable and enforced in this area are based on the different governing interests involved in Arctic waters.[1]

2.1. General categories

The measures adopted for navigation in the Arctic while safeguarding its environment can be categorized into two separate groups:

1. Global measures adopted through international cooperation
2. Individual measures adopted by Arctic states

2.1.1 Individual measures

UNCLOS, Article 234 explicitly gives coastal States the right to adopt and enforce non-discriminatory laws and regulations for the prevention, reduction and control of marine pollution from vessels in ice- covered areas within the limits of the exclusive economic zone. Therefore, the individual measures constitute of relevant domestic regulation adopted by Arctic coastal states. A group of these states have specific regulation regarding navigation in the Arctic, like Canada and Russian Federation, which could be considered as unilateral measures even though most of domestic regulations of Arctic states cover all their country and do not solely relate to the Arctic.[2]

[1] Chircop, Aldo. "Regulatory challenges for international Arctic navigation and shipping in an evolving governance environment." Ocean Yearbook 28 (2014).p. 2

[2] Bartenstein, Kristin. "The “Arctic exception” in the Law of the Sea Convention: A contribution to safer navigation in the Northwest Passage?." Ocean Development & International Law 42, no. 1-2 (2011). p.23

2.1.2 Global measures

International community protect its common interests through globally uniform rules and standards that setting the minimums for shipping. This common interest and supremacy of international actions for shipping are ensured also in the Arctic by UNCLOS. In fact, the defined legal and institutional framework in UNCLOS can be considered as generally accepted since that is almost an international convention without any objection from non- parties. The rights and duties of states based on UNCLOS frameworks, are referred to in international maritime rules, standards and procedures.[1]

International Maritime Organization (IMO), is the most prominent global body which conducting regulatory measures of global shipping. In fact, UNCLOS has referred to the competent international organization, which is interpreted to mean IMO, as the most important body to deal with shipping issues and take proper measures2. Different legal instruments with global scope, including legally binding conventions apply to shipping in the Arctic, and guidelines providing recommendatory provisions are the main forms of measures taken by IMO to regulate navigation in the Arctic.[3]

2.2 IMO instruments for the Arctic

The global regulatory framework for shipping in the Arctic is based on the regime for international shipping. However, since the navigation in the Arctic is different from other marine regions due to its peculiar environment and its inherent risks and hazards, IMO regulatory measures have specific focus to mitigate these additional risks and provide for safe and environmentally friendly navigation through the Arctic waters.[4]

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[1]Bartenstein, Kristin, p, 32

2 Chircop, A. ″The IMO and its role under UNCLOS″, ″Canada Research Chair In Maritime Law And Policy″, (Dalhousie University, Halifax, Canada), p.8-11

[3] Molenaar, Erik J, ″ The Arctic, the Arctic Council, and the Law of the Sea″. in ″ Governance of Arctic Shipping Balancing Rights and Interests of Arctic States and User States″. Ed, Tore Henriksen, Kristine. Kraabel, Molenaar, Erik Jaap, editor and Ashley J, Roach, (Leiden ; Boston : Brill Nijhoff, 2017)p.34

4 Chircop, Aldo, ″The IMO, Its Role under UNCLOS and Its Polar, Shipping Regulation″. in ″″ The Arctic, the Arctic Council, and the Law of the Sea″. in ″ Governance of Arctic Shipping Balancing Rights and Interests of Arctic States and User States″. Ed, Tore Henriksen, Kristine. Kraabel, Molenaar, Erik Jaap, editor and Ashley J, Roach, (Leiden ; Boston : Brill Nijhoff, 2017)p. 133-134

2.2.1 Arctic shipping guidelines

Exxon Valdez disaster, in 1990, triggered the significant initiatives for regulating ship construction, equipping and operations in Arctic waters conducted by IMO.[1] The considerable existing disparity in national regulations regarding technical requirements for navigation within the EEZ of Arctic coastal states put Flag States in a complicated position to comply with all of those different regulations in a same voyage. Therefore, IMO initiated its efforts in 1991 based on Germany proposal to consider suitable ice strengthening requirements for ships intended to operate in Arctic waters.[2]

The "Guidelines for ships operating in Arctic ice- covered waters" developed as the one including Antarctica as well in 2009.[3]Arctic Marine Shipping Assessment (AMSA) report in 2009 focused on marine safety and marine environmental protection consistently with the Arctic Council's objectives of environmental protection and sustainable development. AMSA report highlighted the undergoing transformations in the Arctic and increase in maritime transportation in this region including operation of cruise ships not specifically designed and built for shipping in the Arctic[4]. Safety and environmental concerns were highlighted by AMSA as the most important issues for Arctic navigation. As a consequence of emerging need for a more effective and harmonized set of standards dealt with construction, equipment, operation, training and manning, development of a legally binding code for navigation, drawn on instruments available within the International Maritime Organization (IMO) was proposed by AMSA.[5]

1 Exxon Valdez oil spill occurred in Prince William Sound, Alaska, March 24, 1989

2 Johansson, Tafsir, and Patrick Donner. The shipping industry, ocean governance and environmental law in the paradigm shift: In Search of a pragmatic balance for the Arctic. Springer, 2014. p. 12

3 MSC/Circ.1056, MEPC/Circ.399 23 December 2002, Resolution A.1024(26)
4 https://www.pmel.noaa.gov/arcticzone/detect/documents/AMSA_2009_Report_2nd_print.pdf, p.68.
5 Ibid. p.6

2.2.2 Polar Code

2.2.2.1 Formation of the mandatory Polar Code

The increased marine operations and shipping in the Arctic was the prominent driver for greater international cooperation regionally among Arctic States (in the Arctic Council) and globally through IMO and other relevant bodies.[1]
Arctic search and rescue (2011)[2], and Arctic oil spill preparedness and response (2013)[3] indicate regional efforts for harmonization regarding critical matters.

AMSA report indicated a need for higher level of efficiency and harmonization for rules and standards of shipping in the Arctic which could be achieved through a binding legal and regulatory structure. Hence, IMO agreed to develop a mandatory Code for ships operating in polar waters. Polar Code and its harmonized non- discriminatory standards illustrate the new regulatory regime in the Arctic.[4]
Various subcommittees progressed the work during 2010–2014, and the Maritime Safety Committee (MSC) and Marine Environment Protection Committee (MEPC) considered and adopted the draft Code in 2014 and 2015. However, the Polar Code is not a new IMO convention, but is a set of amendments to three IMO established instruments: The International Convention for the Safety of Life at Sea (SOLAS); The International Convention for the Prevention of Pollution from Ships (MARPOL); and, the International Convention on Standards of Training, Certification and Watchkeeping for Mariners (STCW). The mandatory Code became effective on 1 January 2017 by tacit amendments to SOLAS and four of the MARPOL annexes.[5]

[1] Lawrence P. Hildebrand and Lawson W. Brigham. " Introduction to the New Maritime Arctic″. in ″ Sustainable Shipping in a Changing Arctic″. ed. Lawrence P. Hildebrand. Lawson W. Brigham. Tafsir M. Johansson (Cham; Switzerland: Springer International Publishing AG, part of Springer Nature, 2018) p. 6

[2] Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic

3 Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic,

4 H. Lawrence, L.Brigham, p6-7

[5] http://www.imo.org/en/MediaCentre/HotTopics/polar/Pages/default.aspx

2.2.2.2 Polar Code structure and features

Polar code as a first- generation instrument, supplementing other IMO's instruments, has provided a high point in regulatory frame work for Arctic shipping to ensure the safe navigation of vessels operating in harsh polar conditions with the least negative impacts on its peculiar environment.[1]

In fact, the Code aims at founding a harmonized and integrated legal system to ensure safety of navigation in the Arctic waters while protecting its vulnerable environment. Achieving this objective, Polar Code intends to address all challenging issues not being addressed before the emergence of Code in other international instruments.[2]

The Code is divided into two parts, the first on maritime safety (Part I) and the second on marine environment protection (Part II). The introduction to the Code contains mandatory provisions which apply to Parts I and II. Each part has separate sections of mandatory rules (Part IA and Part IB) and recommendations (Part IB and Part IIB). The rules in Part I cover a wide range of matters including design, construction, and equipment, operations, manning. Part II rules consist of amendments to MARPOL annexes I (oil pollution), II (harmful substances carried in bulk), IV (sewage) and V (garbage).

1 Chircop, Aldo. "Sustainable Arctic Shipping: Are Current International Rules for Polar Shipping Sufficient?." The Journal of Ocean Technology 11, no. 3 (2016).

2 Polar Code, preamble(1)

3. IMO Polar Shipping Standards

3.1 Gaps in the Polar Code standards

As it is mentioned earlier the Arctic region is experiencing fast and significant changes that call for reshaping of its regulatory framework.[1] However, this is mostly done by the Polar Code, there is still a need for assessment of whether this international legal frame work is inclusive enough to address all the concerns relevant to the Arctic shipping.[2]
Since the Code entered into force, the necessity for changes regarding certain aspects of the Code has called for more attention because during the negotiations of the Code, those issues and some other deficiencies were noticed and the need for new measures to deal with them was considered for the next phase of the Code, after the first phase Code adopted and enforced.[3]
However, these issues are mainly focused on environmental part of the Code, but this chapter gives a brief study on them to indicate that the Polar Code as the first-generation legal instruments have specific gaps and deficiencies that need for further developments and amendments.

3.1.1 Heavy fuel oil

The Polar Code fails to include prohibition on HFOs for navigation in the Arctic and ships are only recommended not to use or carry heavy fuel oil during their voyages through Arctic, the prohibition which is currently in place for Antarctica. regulation 43 of MARPOL Annex 1.

The MEPC approved a new output on risk mitigation of HFO in the Arctic waters, to be completed by 2018-2019 and will further decide on the proper frame work for these measures, which means it could be incorporated into a binding or non- binding frame works.[4]

1 Chircop, Aldo, 355-380
2 Molenaar, Erik Jaap., Oude Elferink, A. G., & Rothwell.″ The Regional Implementation of the Law of the Sea and the Polar Regions″in ″The Law of the Sea and the Polar Regions″. Ed, Molenaar, Erik Jaap., Oude Elferink, A. G., & Rothwell,(Leiden, The Netherlands: Brill, 2013)p230.
3 Roach, J. Ashley. "The Polar Code and Its Adequacy." In Governance of Arctic Shipping, pp. 144-169. Brill Nijhoff, 2017. p. 145

4 MEPC 71/17, Report of The Marine Environment Protection Committee on Its Seventy-First Session, (15/08/2017) Development of measures to reduce risks of use and carriage of heavy fuel oil as fuel by Ships in the Arctic waters para, 14.13.1, 14.13.3

However, the proposition on a mandatory ban on HFOs for operation in the Arctic waters was put forward by a number of States.[1] The Proposal focused on the devastating effects that a HFO spill could have on the pristine environment of the Arctic.[2]

While there exists broad agreement among IMO members for banning the use of HFO in the Arctic, the region's two largest countries, Russia and Canada, have not committed to the mandatory ban yet.[3]

In spite of the fact that the Polar Code entered into force in 2017 for the protection of the Polar waters it only incorporates a recommendation for not using heavy fuel oil in the Arctic. Reducing the risks linked to use and carriage of HFOs is vital so the IMO has been trying to mitigate these additional risks until 2021.[4]

3.1.2 Non-SOLAS Vessels

The Polar Code is applicable for all Convention vessels, which means vessels that are covered by SOLAS Convention, including passenger and cargo ships.[5] In fact, the Polar Code do not apply to fishing vessels, pleasure craft, and vessels below 500 gross tones.[6]

Fishing vessels are not covered by the Polar Code even though their presence in the Arctic will be growing since sea ice declines their presence in the Arctic waters will face no formidable hurdle. So, the possibility of incidents resulting from their increased navigation in the Arctic could significantly threaten the Arctic marine environment.[7]

Therefore, the initiation of the second phase of the Polar Code seems more like an obligation for the international community, to cover non-convention vessels, including fishing vessels and yachts.[8]

However, the MSC is working on the possible regulations applicable on vessels not covered by the Code and asked the members to voluntarily apply the Code on vessels not covered,[9]since the mandatory regulatory actions on these vessels would increase the commitments of member states, this process might be too lengthy.

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[1] MEPC 72/11/1
[2] Ibid, para 3-4
[3] MEPC 72/11/3, (MEPC 72/11/1), MEPC 72/11/4,
[4] https://nunatsiaq.com/stories/article/push-to-phase-out-heavy-fuel-oil-in-the-arctic-continues/
[5] Polar Code, Introduction, para. 3.2, SOLAS Regulations 2(d) and 3
[6] IMO DE 55/22, DE Report to the MSC, (15/04/2011), para. 12.7.1
[7] Byers, Michael. *International law and the Arctic*. Vol. 103. Cambridge University Press, 2013.p.7

[8] IMO DE 55/22, DE Report to the MSC, (15/04/2011), para. 12.7.1.
[9] Meeting summaries, IMO assembly, 30th session 27 November to 6 December 2017

3.1.3 Protected Areas

Since the Antarctica marine environment is protected through the MARPOL special areas, the Polar Code provisions for special areas only apply to the Arctic and try to give the both poles same standing regarding this issue.[1]
Furthermore, there is no designation of PPSA in the Polar Code. Since PSSAs as areas in need for special protection through the IMO due to their scientific, ecological, and socio-economic criteria and as at risk from international shipping activities this could be recognized as an important shortcoming in IMO global shipping standards. [2]

3.1.4 Ice Navigation

One of the hazards that threaten the safe operation of vessels in Polar waters is the lack of crew experience and required qualification to operate the vessel in Arctic peculiar environment.[3] Crew training requirements on ships operating in polar waters are not sufficient to mitigate this risk and it can be considered as a gap in the Code that must be bridged.4 Part I-A/12 of the Polar Code, the Manning and Training Chapter, lacks provision for an experienced ice navigator on the bridge for navigation in Polar waters; as was sought by Russia and Canada. [5]
The requirement for appropriate training for a navigation watch in polar waters, under Part 1-A/12.2 is diminished in Part 1-A/12.3, stating that basic or advanced training is only required for those in charge of a navigation watch with no inclusion of the crew.[6]

3.2 Compensatory jurisdiction of the Arctic Coastal States

The current gaps in the code and the presence of art 234 lead to increased likelihood of coastal states' involvement in Arctic governance through their national or regional measures to bridge these gaps left out by the Code and protect Arctic marine environment.

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[1] MARPOL 73/78, Annex I Chapter 1, Art. 11, Annex II, Annex IV and Annex V, Regulation 5. MARPOL 73/78, Annex I, Chapter 1, Reg. 1, Art. 11(g), Annex V, Reg. 5 Art. 1 (g).

[2] IMO Res. A.927 (22), Annex 2 (4.4).

3 Polar Code, Part I-A, 3-1. 7

4 Polar Code, Part I-A/12

5 Roach, J.A. p.149

6 Ibid

In fact, the aplicability of UNCLOS Art 234 is deemed for environmental actions of the Coastal States in Ice- covered areas while in this paper the focus is on safety measures which puting the main emphasis on safety of life at sea. However, the last section clarifies the shortcomings of the Code, including environmental ones, besides, the wording in the Preamble of the Code, and the fact that the Code contains provisions both relating to safety and to the environment, could be seen as supporting the interpretation of Article 234 as allowing pollution prevention measures as well as safety measures. Therefore, it is worth to briefly discuss the applicability of Art234 in spite of the adoption of the mandatory Polar Code, entered into force in 2017.

3.2.1 Interplay between Polar Code and UNCLOS Art 234

In analyzing the relationship between Poalar code and national legislations of arctic coastal states, the critical point is to clarify whether national jurisdiction of the Coastal states conferred to them by UNCLOS Art 234 can provide them with the freedom to regulate and set standards for the issues which are not currently covered by the Code.

3.2.1.1 Art234 and its content

Article 234 of the United Nations Convention on the Law of the Sea (LOSC) governs Ice-Covered Areas and allows the coastal states to legislate on environmental marine protection in their Exclusive Economic Zones in, e.g., Arctic waters (note that the LOSC does not specify Arctic waters as such in Article 234)

According to 234 Coastal states have the capability to take domestic actions as long as those actions are taken to address at least minimum level of harm arisen out potential risks or threats whose occurrence and environmental impacts cannot be foreseen. In fact, the prescriptive and enforcement jurisdiction conferred to the Arctic Coastal states provide them with the large area of discretionary power to regulate this region.

In other words, Art234 has taken a special measures regime which depends on neither international review nor approval for national jurisdictions of the coastal States in ice- covered areas. But Coastal States need to have due regard to navigation and the protection and preservation of the marine environment based on the best scientific evidence.1

According to Art 211, states regulations and measures shall have due regard to generally accepted international rules and standards. However, Article 234, does not contain any

[1] UNCLOS, ART 234

reference to ‘generally accepted international rules or standards’ and the only limitation on Coastal states jurisdiction is having due regard to the freedom of navigation. This could bring about two different perspectives on the applicability of Art 234 and national jurisdictions of the Arctic Coastal states in setting higher standards or different than the Polar Code, as the generally accepted set of rules and standards.

According to the first group opinion, Polar Code could not affect the freedom of states to adopt measures in accordance with article 234. In fact, as it is obvious from the Article, the only situation that may raise the necessity of international review is the occurrence of any dispute on those unilateral measures between Flag states and Coastal states, which would put the burden of proof on the coastal state to substantiate the need for the applicability of its jurisdiction.
UNCLOS 234 as a ***lex specialis*** is designed to override a general principle of limited jurisdiction of the Coastal States. Moreover, if UNCLOS negotiators were intended to limit coastal states unilateral powers given to them by 234 to GAIRAS, they should have made explicit references in this Art as they did so in several Articles of UNCLOS.1

Furthermore, as it is mentioned in the previous section, the Polar Code could not be successful to cover all matters relevant to Arctic navigation. Therefore, the presence and applicability of Art 234 for these areas can compensate these weaknesses of the Code and promote the safety and environmental protection in the Arctic and this effect could clearly justify the need for applicability of Art 234 regardless of the presence of the mandatory Polar Code.[2]

On the other hand, it can be argued that such an argument would be contrary to the general approach of UNCLOS. For areas beyond the internal waters of states, the general approach of UNCLOS is to limit coastal state jurisdiction so that navigation in accordance with generally accepted international rules or standards. Coastal states freedom to adopt stricter standards than the Polar Code for areas covered by article 234, will raise the question about the Codes effects in making an international harmonized set of rules and standards to ensure safety of navigation and environmental protection in Polar waters.[3]

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[1] Scassola, Andrea. "An International Polar Code of Navigation: Consequences and Opportunities for the Arctic." *The Yearbook of Polar Law Online* 5, no. 1 (2013): 286-287.

[2] Jensen, Øystein Hønsi. "The international code for ships operating in polar waters: finalization, adoption and law of the sea implications." (2016).p.70-71

[3] Fauchald, Ole K. "Regulatory frameworks for maritime transport in the Arctic: Will a polar code contribute to resolve conflicting interests." *Marine transport in the high north* (2011): 82-83.

According to Fauchald view applicability of 234 after adoption of a binding polar code will put a burden of proof on coastal states willing to apply stricter standards than GAIRAS that GAIRAS cannot satisfy their needs for protection of those areas and their standard setting is still a necessity. Besides this approach will not be a hamper for free navigation of vessels however, there is an inevitable need for harmonization in certain aspects including construction, equipment and manning, otherwise navigation through two diverging legal systems would be impossible.[1]

[1] Ibid

4. Safety measures in Polar Code

As a matter of fact, Cold climate, remoteness, huge distances, shifting weather conditions, few available rescue resources and capacities, and communication challenges are risks for navigation in Arctic waters. These additional risks can only be reduced with certain ship, equipment, and standards set for shipping for polar waters.1

Safety measures in Polar code can be divided into two categories;
First, for the seaworthiness of the vessel, including its structure, stability, machinery and equipment. These conditions must be met before the voyage and maintained in the course of that.
The second category is connected to the preparations that must be made before the voyage, like the certificate and documents. These measures are based on the ones which should be taken as additional safety measures according to SOLAS XI.1/1. PWOM and PSC. PWOM is a procedure for ship operation in Arctic waters which must be complied with in all stages of the voyage including emergency response maintenance of equipment and risk- based procedures. In fact, it is supposed to clarify the ship's capabilities and limitations regarding safety aspects and the plan for encountering conditions exceed the ship's capabilities.2

4.1. Goal-based approach of the Polar Code

The use of a goal-based approach, s goal-based standards, was introduced by the IMO and the Maritime Safety Committee specifically in the 1990s. There is an increasing tendency to adopt a goal-based approach for regulations in general, and MSC is also willing to promote and develop the GBS of the IMO.[3]
Therefore, this part briefly describes the meaning of "goal-based" regulations in general and looks at its application to the safety measure of the Polar Code.

[1] Kruke , Bjørn Ivar. ″ Training and crisis response in cold climate conditions. in ″ SARex3, ″Evacuation to shore, survival and rescue″, ed. Knut Espen Solberg and Ove Tobias Gudmestad, (Stavanger, University of Stavanger, 2018). P.166-167

[2] Bai,J. p.681-682
[3] http://www.imo.org/en/MediaCentre/IMOMediaAccreditation/Pages/MSC99preview.aspx

4.1.1 Goal- based regime

A goal- based regime is an effort in order to give more discretionary power to adopt and apply details or specific requirements ensuring conformity with the goals.1 In other words, this regime tries to convey that there is no widely appropriate single way, and compliance can be achieved through all the recognized best practices, including domestic standards, regulations of the classification societies, and standards of the international Organization.2

Goal-based standards might be referred to as a top-down approach. In this approach higher level tiers, including goals and functional requirements, govern the lower levels, and the lower levels support the higher levels. In fact, the goal must be surely achieved through fulfilment of all functional requirements which are performance -based, and the lower level tiers can be prescriptive in order to meet the targets set by the goal-based requirements.3

4.1.2.Implementation and Development

Performance- based requirements give broader room for actions comparing to prescriptive rules, this would result in that the prescriptive requirements are often more detailed and specify the solutions, necessary to assure compliance.4 However, performance-based requirements, due to their general and non-specific nature are often challenging to understand, and hard to meet. Therefore, inflexibility of prescriptive requirements could be satisfying, as it facilitates enforcement of the regulation and ensures that an established goal is achieved.5
This effect is further enhanced if those trying to comply are not familiar with the challenges posed by polar waters. In other words, in order to adopt the solution that best fits their needs or the needs of their vessel, they must be aware of the strengths and weaknesses of different existing solutions.[6]

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[1] Braathen, Victoria. "A legal assessment of the International Code for Ships Operating in Polar Waters (the Polar Code)." Master's thesis, UiT Norges arktiske universitet, 2016.p.23

[2] Yue, Peng. "An analysis of the implementation and future development of IMO goal-based standards." (2011).p.6-7

[3] Hoppe, H. "Goal-Based Standards-A New Approach to the International Regulation of Ship Construction, Maritime Safety Division." *International Maritime Organization*.p.174-175

[4] Raaen, b, p.222
[5] Ibid
[6] Ibid

4.1.3 Polar Code Goal- based/ risk- based requirements

The Polar Code in Part I-A, safety measures, has taken a functional risk-based/ goal- based approach. In its initial step, the Code enumerated the potential hazards endangering ships operation within the area of its domination and then tried to mitigate those risks through its goal-based/ performance- based requirements.[1]

Goal- oriented nature of the requirements have put the emphasis on determining the desired level of safety rather than indicating the methods for meeting that goal. Therefore, compliance is only achievable by reaching to that level.

However, the interpretative approach of the Code does not give absoloute freedom of interpretation, and it has been limited by the defined goals of each chapter. In other words, the goals and functional requirements of the Code provide a setting for interpretation of its regulations. Functional requirements shall provide the criteria to be satisfied to meet the goals.2

This predominant focus of this approach is the goal in each chapter and therefore it is not that strict regarding regulations and technical standards. In fact, alternative measures must comply with the goal and functional requirements.3

Structural arrangements, machinery and electrical installation, fire safety design and arrangement measures and as well as life-saving appliances and arrangements may deviate from the prescriptive requirements provided that the alternative design and arrangements meet the intent of the goal and functional requirements concerned and provide an equivalent level of safety.4

Therefore, the main challenge posed by this approach of the code, for the scope of this study, is to assess whether the Code's objective could be attained through its requirements and standards or there are still gaps which must be filled, considering the fact that to comply with the Polar Code, the whole adopted solutions, as a one entire system, must ensure the required level of safety.5

[1] Polar Code, Part I(A), 3
[2] Focus on IMO, International Maritime Organization, 4 Albert Embankment, London SE1 7SR, United Kingdom, January 2015, p. 1-3

[3] Peng, Y, p.17
[4] SOLAS, chapter XIV, regulation 4
[5] Raaen, b, p.224

4.2 Life- svaing Appliances and arrangements

Safe operation in Polar waters has such a significant importance that the Polar Code as a legislative framework and its contained measures shall be adequate and clear to ensure high levels of safety and environmental protection in the Arctic.1

The Code is based on the applicability of general safety regulations and standards in the polar shipping. However, the code has made some necessary amplifications to the existing instruments to make them suited for the specific Polar conditions.[2]

Maritime safety is traditionally defined as 'the material state resulting from the absence of exposure to maritime dangers, as well as the organizational and administrative factors designed to create or perpetuate such a situation.3 So, it could be argued that the primary objective of safety of navigation is protection of lives. Therefore, regulations management, technologies and equipment must be in line with this objective.4

Achieving this objective in the peculiar and harsh environment of the Arctic, the Polar Code puts additional conditions for vessels and equipment intended for Arctic voyages.

4.2.1 Conditional clauses and key criteria

In fact, measures to mitigate potential risks in Arctic waters can only be evaluated by understanding the risks involved in such operations.5 Elevated levels of risk in Arctic waters are ascribed to the specific hazards that probably occur and may have serious consequences.6

The particular hazards of polar waters including cold climate, remoteness, huge distances, shifting weather conditions, fewer available of rescue resources and capacities, and communication challenges are issues making survival significantly important and challenging.7

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[1] Deggim, Heike. " The International Code for Ships Operating in Polar Waters (Polar Code) ″. in ″ Sustainable Shipping in a Changing Arctic″. ed. Lawrence P. Hildebrand. Lawson W. Brigham. Tafsir M. Johansson (Cham; Switzerland: Springer International Publishing AG, part of Springer Nature, 2018) p. 34-36

[2] Chircop, A.p.46

[3] Boisson, Philippe. "Classification societies and safety at sea: Back to basics to prepare for the future." *Marine Policy* 18, no. 5 (1994): 363-377.

[4] Jensen, Øystein. "The IMO guidelines for ships operating in Arctic ice-covered waters." (2007),p.3-4

[5] Erik Mostert and Ronald Schartner , ″ The lifeboat's capabilities and capacity during the Phase I exercise ″in ″ SARex Spitzbergen″ed. Knut Espen Solberg, Ove Tobias Gudmestad and Bjarte Odin Kvamme, (Stavanger, University of Stavanger, 2016), p.113

[6] Polar Code, Part I-A (3)

[7] Ibid

The Polar Code provides regulations for lifesaving appliances and arrangements which aim to ensure safe escape, evacuation, and survival.1 All vessels to be allowed for operation in Polar waters must satisfy performance standards for systems and equipment, minimum requirements referred to in SOLAS and other relevant instruments, because as we said before Polar Code is a supplementary instrument on the existing ones. However, these international regulations are not specifically tailored to the harsh environment of the polar oceans.[2]

Therefore, to assess whether additional performance or test standards for life-saving appliances and arrangements in relation to the Polar Code are necessary, first we have to consider the main criteria required by the Code for all measures and equipment for ships intended to operate in Arctic waters.

First, in accordance with paragraph 1.4.2 of part I-A of the Polar Code, systems and equipment required by the Code shall be fully functional at the polar service temperature. Besides for ships operating in low air temperature, a polar service temperature shall be specified and at least 10 C below the lowest MDLT3 for the intended area and season of operation in polar waters.
As a result, for some life-saving appliances on board ships intended to operate in polar waters, additional tests will be necessary when the PST is lower than the minimum temperature for which those appliances were tested.[4]

Furthermore, chapter 8 of part I-A of the Polar Code requires that resources shall be provided to support survival following abandonment of the ship, for the maximum expected time of rescue, including evacuation onto land or ice when needed. Maximum expected time of rescue means the time adopted for the design of equipment and system that provide survival support. It shall never be less than five days.5
This indicates that not only adequate equipment and appliances must be provided for survival during this period, but they need to keep their practicality under additional hazards of the Arctic waters.

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[1] Polar Code, Part I-A, Chapter 8
[2] Boone, Laura, ″ International Regulation of Polar Shipping″, in ″ *The law of the sea and polar region*″ed, Molenaar, E. J., Oude Elferink, A. G., & Rothwell, D. R (Leiden, The Netherlands: Brill, 2013)p. 196
[3] Mean Daily Low Temperature

[4] SSE 3/15/4 para 7.
[5] Polar Code, Introduction 1-2-7.

The additional risks of navigation in the Arctic, including sea ice, icing high latitude, darkness, remoteness from infrastructure, inadequate functioning of navigation and communication systems, navigational aids, lack of data (charts), lack of experienced crew and the sensitivity of the environment must be taken into consideration in the assessment of performance and/or test standards for life-saving appliances and arrangements.

4.2.2 Assessment of functionality

The main task of the Polar Code is to ensure the ship construction design, equipment and manning, provide for safe operation in Arctic waters, taking into account the specific conditions for functionality in Arctic environment, the requirements must be assessed to clarify whether they are suited to comply with this intended functionality.[1]

The experience of previous incidents in Arctic waters2, clearly shows that navigating in ice-covered waters, evacuation and survival in the event of incident, is something very different and involves higher risks than shipping operations in most other marine areas.3

Appliances and arrangements specifically designed for survival are considerably influenced by Arctic harsh environment and weather conditions that requires prompt survival of human body on the other hand long duration of survival in the Arctic due to the lack of sufficient infrastructure in that environment, and the aforementioned conditions cause major challenges for survival in the area where the code is applicable.4

Compliance with the IMO Polar Code requirements regarding survival until rescue or for a minimum of five days has proved to be a hard and complicated endeavor since the survival defined by the code is so restricted that no error can be born. Multiple mechanisms are at play and interact. As a result, survival includes providing the correct equipment with the right functionality.[5]

[1] Polar Code, Part I-A, 1.4.2, SSE3/15/4
[2] Maxim Gorkiy' and Le Boréal and FV Saputi
[3] ″ SARex Spitzbergen″ed. Knut Espen Solberg, Ove Tobias Gudmestad and Bjarte Odin Kvamme, (Stavanger, University of Stavanger, 2016), p.5-6
[4] Ibid, SSE 4/15, para 6
[5] Ibid

In order achieve this target there is a need for more detailed analysis to assess the practicality of available safety and survival equipment and procedures in the Arctic conditions to comply with the Code's requirements.1 For this purpose in this section the practical experience of functionality of Life-saving appliances and arrangement, is discussed.

4.2.2.1 Practical experience:

The first exercise took place on the west coast of Svalbard in 2016 utilizing SOLAS approved lifesaving appliances (LSA) equipment, and followed up by two other exercise in May 2017, using upgraded equipment than comparing to first phase.
The objective of all exercises was to determine the ability and effectiveness of the state-of-the-art life-saving appliances, SOLAS approved, under specific conditions of the Arctic and with due regard to the conditional clauses, maximum expected time of rescue and low temperature, of the Polar Code. The study indicated significant gaps between the functionality provided by the LSA equipment and the one required for compliance with the Polar Code.[2]

In what follows we give a brief study of the outcomes of exercises to clarify whether there is a need for additional performance or test standards for life-saving appliances and arrangements for vessels operating in Polar waters to comply with the requirements of the Code.

From a lifesaving perspective, Exposure to low air and water temperatures represents a major challenge for the human body and have significant impacts on probability of survival in the Arctic waters.

Survival for the expected time to rescue, a minimum of 5 days needs the body core temperature to remain around 37 degrees Celsius to maintain essential functionalities required for survival. Maintaining an adequate body temperature is essential to mitigate the effects of hypothermia.

[1] Ibid, p.69
[2] SSE 5/INF.3 para 1-3

Therefore, the main goal of chapter 8 of the code can be defined as:

To provide functionality that enables the casualty to safeguard individual safety, which means to maintain cognitive abilities, body control and fine motor skills for the maximum expected time of rescue.1

This can be achieved by reducing heat loss. Maintaining a sustainable heat loss is a result of both the habitable environment provided by the rescue craft and the insulation provided by the personal protective equipment.

- **Personal life-saving appliances**

Adequate thermal protection shall be provided for all persons on board, taking into account the intended voyage, the anticipated weather conditions (cold and wind), and the potential for immersion in polar water, where applicable.2

This requirement lacks enough clarity and can give rise to different interpretations, since implies that a vessel can either supply standard life vests, naval life vests, uninsulated and insulated one-size-fits-all survival suits, … for thermal protection.[3]

In spite of the fact that each of this equipment have a different level of functionality and protection, it is claimed that none of these types of equipment could sustain survival in the Arctic condition for the period of minimum five days.[4]

Life-saving appliances and associated equipment shall take to the account the potential of operation in long periods of darkness, taking into consideration the intended voyage conditions and period.

Being visible to rescue crews is very important, and can be challenging in polar waters during periods of darkness. There are many issues to pay attention to regarding the use of the survival suits. Some instructions on these issues should be communicated or should accompany the suit.5 Immersion suits should have lights and other arrangements for making them visible.

[1] SSE 4/15, para 6, SAReX1,2 and3
[2] Polar Code, Part I-A, 8.2.3.1
[3] ″ SARex2 ,Surviving a maritime incident in cold climate conditions″, ed. Knut Espen Solberg, Ove Tobias Gudmestad and Eivinn Skjærseth, (Stavanger, University of Stavanger, 2017), p. 72
[4] Polar Code, Part I-A, 8.2.3.2
[5] Ibid, p.45

Requirements with regard to water and food rations do not seem to be adequate for a five-day survival scenario, the calorie intake from the rations was not adequate to compensate for the energy required to counter balance the heat loss. All exercise participants lost about 2 kg of body mass during the first 24 hours in the rescue craft. This was mostly due to small water rations. The effect of dehydration will result in reduced blood circulation, causing freezing of extremities and loss of motivation and cognitive abilities.

Survival Craft

The Polar Code requires1

1- a habitable environment;
2- protection of persons from the effects of cold, wind and sun;
3- space to accommodate persons equipped with thermal protection adequate for the Environment;
4- means to provide sustenance;
5- safe access and exit points; and
6- means to communicate with rescue assets

The great concerns regarding this requirement are connected to the following elements:

Survival Craft capacity

considering the additional requirement of the Code to accommodate PSK for every person, in addition to the overall weight and shoulder breadth of all survivors and the Polar clothing, and the need for sufficient space for movements necessary to keep blood circulation and body heat, if a rescue craft is filled to its full capacity, the desired space will not be available.

Survival craft facilities

The LSA Code does not sufficiently consider the human element, especially when they are packed together on uncomfortable seating in an enclosed survival craft for at least five days.

[1] Polar Code, Part I-A 8.2.3.3.

seating comfortability shall be promoted. Improvements like backrests seems necessary, besides, seats should be as deep as possible and covered with insulating material. Moreover, other matters like toilet facilities must also be taken into consideration.
The requirements for personal and group life saving appliances recommended by the Code lacks certain equipment deemed necessary for survival for at least five days, like the necessary medicines for patients and elderly people or anti- seasickness.

Ventilation of Survival craft

Air quality is the other primary factor in survivability of a totally enclosed lifeboat. Extra ventilation is an important issue when it comes to air quality inside a lifeboat. With the lifeboat filled to its full capacity, it is highly likely that the air quality problem would become exacerbated to the point where having hatched closed even for short periods of time would be problematic.
The air quality problem is not easy to solve. In recognition of a habitable environment, maximum oxygen and dioxide level must be specified. In fact, the CO2 threshold of 5000 ppm is the relevant expected performance for the ventilation of a survival Craft. However, this desired rate might not be achievable. But co2 monitor would be an efficient measure to warn the survival craft occupants of co2 accumulation.1

launching, operating, and heating appliances

The Polar Code requires all life-saving appliances to be functional under the possible adverse environmental conditions during the maximum expected time of rescue.
To achieve this survival craft and its engine must be winterized to avoid problems in engine running, since the engine fluids might become frozen because of Arctic low temperature.
The need for means to avoid icing or dew on the windows of the life boat steering position are necessary to provide for proper look out.2
Besides, if the craft is intended to operate on Ice, its propeller, rudder and other external fittings should be capable of operating in such condition.3 It is also important for a survival Craft to have search lights because of the extended periods of darkness in Arctic waters.

[1] SSE 6/WP.3, para 15
[2] SSE 6/WP.3, annex 3, 4.6
[3] SSE 6/WP.3, annex 3, 5.4

Furthermore, the ability to stay warm is one of the major challenges of people in survival craft. This ability is highly correlated with human heat loss. Internal temperature of the survival craft is a decisive factor in this regard. Diesel heaters requiring a minimal amount of fuel to keep the lifeboat warm and could be a better option comparing to the heaters depend on battery power.

Evacuation by helicopter

The utilization of helicopters in the evacuation of survivors could be an effective factor shortening rescue time. Rescue directly from the lifeboat was considered to be difficult and risky, due to the motions of the lifeboat and the narrow hatch opening on the side of the lifeboat. Most personnel were transferred to the roof of the lifeboat and lifted on to the helicopter. If the life raft were designed to be lifted by a single hookup point and the pressure inside the tubes were sufficient to prevent the life raft from collapsing, the whole life raft could have been lifted ashore or on to the deck of a SAR vessel. This would save considerable time, as it would only require one lifting operation instead of one lifting operation for every two survivors**.**

Communication and navigation

Communication is a key element for safety at sea, especially if an emergency occur. A recent gap analysis performed as a part of a project1 revealed that the available radio links and satellite communication in the Arctic lacks in reliability, and therefore presents a safety hazard in major accident scenarios. This demands for appropriate communication equipment for Arctic waters that can keep their functionality for the minimum period. This equipment would take more place and add extra weight to survival crafts, resulting in more power consumption. To address this problem, it should become clear whether all communication equipment must remain functional for the maximum time of rescue.

All said leave little doubt that survival for five days in a cold climate would be an extremely challenging endeavor.

Remoteness, available SAR infrastructure, performance of communication equipment, providing and maintaining body heat of survivors through insulating and heating of the survival craft and use of insulating properties in PPE, number of passengers and their physical conditions, cumulative weight of all group and personal survival equipment, capacity of

[1] (SARiNOR)

survival craft, survival strategies and survival craft managements are the conditions, are the parameters that must be considered when assessing the probability of survival.1The aforementioned scientific and practical findings can contribute to achieve a harmonized interpretation for additional regulatory measures relating to performance or test requirements for life saving appliances and arrangements in the Code.

4.3 Harmonized interpretation and implementation

The need for widely- accepted requirements for life saving appliances and arrangements is well established. Uncertainty arising out of contradictory requirements, as it has been revealed by the exercises may lead to inconsistency, in addition to the practical and serious issues.

In addition to the practical exercises, the short-term experience of the classification societies with the application of the Code indicates visible gaps that should be bridged through adoption of amendments and modifications to performance or/ and test standards for life saving appliances and arrangements.2

Based on the experience of Classification Societies with the Code, and all technical and scientific findings from exercises conducted in Arctic waters, the structure of the functional requirements should be brought under consideration.

The code's provisions are mainly designed to promote the safe escape evacuation and survival.3 The lack of adequate and properly drafted provisions in the Polar Code, would probably result in the requirements failing to achieve the intended goal.[4]

Besides, where the requirements are not sufficiently specific and rules and regulations fail to keep up with specific requirements, the operators will have the opportunity to look for the cheapest available measures to fulfil those requirements.5 In other words, the other stake holders, in their interpretation of the requirements, will probably give the priority to their own concerns rather than providing the intended safety for operation in Arctic waters.

[1] ″ SARex Spitzbergen″, p.5
[2] https://seafarersrights.org/polar-code-guideline-presents-challenges/
[3] Polar code, Part I-A, chapter 8
[4] Hoppe, H, p.170
[5] ″ SARex Spitzbergen″, p. 124

The driving force behind all IMO initiatives for the Polar Code is making an international harmonized regime for navigation in Arctic waters to deal with the problems arising out of extensive national jurisdictions, different technical requirements, and develop the standards required for vessels exposed to additional risks in those waters.[1]

Furthermore, the level of details of the regulations can provide for certain degree of discretion in regulating Arctic shipping for the Flag states as the addressees of these regulations and may lead to involvement of prescriptive regulations of national jurisdictions, resulting in either stricter or more lenient standards than the generally accepted ones.[2]
The Polar Code has specified sources of hazards and briefly indicated risk acceptance criteria, without specification of identifying mitigation measures give rise to different interpretations of the Code.[3]

In other words, a quantitative approach, instead of the Code's risk-based/ goal- based approach, for the expected performance criteria would seem more suited for life saving appliances and arrangements for navigation in Arctic waters.[4]

Moreover, based on scientific evidence, standard life saving appliances approved by SOLAS do not provide adequate protection along the lines defined in the Polar Code. It is difficult to implement requirements that is impossible to fulfill by utilizing standard technology. Further work is required to develop technology that enables a minimum of 5 days survival time.

There are many challenges ahead related to design and optimization of life saving equipment and de-icing arrangements. The regulatory measures could be based on the results of exercises to further develop adequate and accurate requirements for life- saving appliances and

[1] Jensen, Ø, "The IMO guidelines for ships operating in Arctic ice-covered waters.", Fridtjof Nansens Institutt, (2007) 5-6
[2] Henriksen, T. "Protecting polar environments: Coherency in regulating Arctic shipping." *Research handbook on international marine environmental law* (2015), 370

[3] ″ SARex Spitzbergen″, p. 5

[4] SSE 6th meeting report available at http://www.lsansimon.com/imo-sub-committee-on-ship-systems-and-equipment-sse-6-4-8-march-2019/

arrangements to achieve the ones better suited for operation in Arctic waters and support the international harmonized implementation of the Code standards.[1]

[1] SARex Spitzbergen″,206-209

5. Post Polar Code

Polar code should be reviewed and revised as needed. In fact, since the code is performance based and technical it must be updated with the new technological advancements. [1]Besides, some issues that were discussed in the Code negotiations were not materialized and now, the sub committees are working on them2.

Polar code is a 'first generation' regulation that will be further developed in response to new proposals, implementation experience, scientific findings and technological development. All of these outstanding issues demonstrate that more actions needed to be taken by IMO to ensure the implementation of unique and harmonized Polar Code.[3]

Therefore, in this chapter first we briefly review IMO purpose and its procedures, then we discuss the regulatory works conducted by the Organization to assist ship designers and shipowners/operators, as well as Administrations, in the uniform implementation of part I-A chapters 8 of the Code.

5.1 International Maritime Organization

According to the IMO convention, the main objective of the Organization is:

″ To provide machinery for co-operation among Governments in the field of governmental regulation and practices relating to technical matters of all kinds affecting shipping engaged in international trade; to encourage and facilitate the general adoption of the highest practicable standards in matters concerning the maritime safety, efficiency of navigation and prevention and control of marine pollution from ships; and to deal with administrative and legal matters related to set purposes of this article″[4]

[1] Aldo, chircop. Peter, G,Pamel and Miriam CZarski, Canada's implementation of the Polar Code, (2018) 24 JIML, p.449- 450

[2] Deggim, H, p.18

[3] Aldo, chircop. Peter, G,Pamel and Miriam CZarski, 49-50

[4] IMO Convention, Art 1(a)

5.2 Work of IMO committees

To achieve the aforementioned objective, IMO provide for the drafting of conventions agreements, or other suitable instruments consolidating international rules, standards, procedures and practices for shipping.1

The IMO draft regulations, conventions, guidelines and codes issued through the resolutions by the Organization. Drafts of these resolutions are primarily based on the works conducted by its specialized committees.2

Committees have to respond successfully to the needs for enhanced maritime safety, maritime security and protection of the marine environment, thus try to provide an efficient mechanism towards achieving the desired goals of the Organization.

Members and delegations in the meetings of subsidiary bodies of the Committees can cover the full range of IMO activities relevant to their work and thus provide for their effective participation in the rule-making process of the Organization. The Committees should function as policy-making bodies and their subsidiary bodies as technical bodies.[3]

The Maritime safety committee as one of the IMO's main committees undertake required technical amendments and development of new rules contained in the convention, including navigational aids, construction and equipment of ships, dangerous cargoes, maritime safety procedures and requirements, hydrographical matters, navigational records, marine casualty investigations, salvage, search and rescue

[1] Chircop, Aldo, ″ The IMO, Its Role under UNCLOS and Its Polar Shipping Regulation″. in ″ Governance of Arctic Shipping Balancing Rights and Interests of Arctic States and User States″. Ed, Tore Henriksen, Kristine. Kraabel, Molenaar, Erik Jaap, editor and Ashley J, Roach, (Leiden ; Boston : Brill Nijhoff, 2017)p.112-114

[2] IMO convention, art. 2; 15(i) - (l).

[3] MSC-MEPC.1/Circ.5/Rev.1

5.3 IMO measures

IMO initiatives could be in form of binding or non- binding regulations and standards. A resolution laying down rules for IMO members, is generally considered as being non-binding on a member State, although they can later be codified in an IMO Convention.1
When the IMO identifies its own weaknesses, it would be easier for the organization to adopt changes or make some developments to achieve the harmonized rules and full implementation of its own instruments. Therefore, satisfying a need for more detailed standards and regulations, the IMO can adopt Codes and other non-binding instruments to supplement its Conventions and then IMO Conventions could give binding effect to those codes in themselves.[2]

The regulations laid down in resolutions, guidelines, unified interpretations and circulars, are important instruments in spite of non-binding nature. In fact, these regulations can reflect standards agreed internationally, by consensus of many different members, and are based on the latest technological data or practical experience. It is worth mentioning that the ultimate practical impact of the regulations depends national acceptance, actual application, and implementation, so not merely which legal status they acquire upon adoption in an international Organization.3
Adoption of the Polar Code by the International Maritime Organization (IMO) is a significant step towards establishing common and harmonized global rules and standards to promote the safety of navigation in the Arctic waters.
However, The Polar Code is a good step forward, but it does not mean that the job is done. In fact, the Polar Code provisions merely display commonly accepted global measures, regardless of issues compromised through the negotiations.
As concluded in the last chapter, the regulatory initiatives in the polar Code for life saving appliances and arrangements are not adequate and sufficiently clear. Therefore, IMO as the competent international organization should continue its work to support a smooth and unified implementation of the Polar Code through its complementary and consequential instruments.[4]

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[1] Fresen, Elise. "IMO's mandatory Audit Scheme: an analysis of IMO's enforcement power." Master's thesis, UiT Norges arktiske universitet, 2015., p.6-8

[2] Chircop, Aldo, ″ The IMO, Its Role under UNCLOS and Its Polar Shipping Regulation″, p.112-114
[3] Jensen, Ø, "The IMO guidelines for ships operating in Arctic ice-covered waters.", Fridtjof Nansens Institutt, (2007), p.23-24
[4] Robert C Beckman, Tore Henriksen, Kristine Dalaker Kraabel, Erik J Molenaar and J Ashley Roach, ″ Enhanced Cooperation on the Governance of Arctic Shipping ″. in ″ Governance of Arctic Shipping Balancing

6. IMO's Regulatory measures for life- saving appliances and arrangements

6.1 Need for development

The flexible nature of performance-based requirements often increases the knowledge and competence needed to ensure compliance. This might prove challenging for those who are not familiar with the hazards and risks associated with polar waters. It is therefore important that States, Class societies and Operators fully understand what the Polar Code requires.[1]

Furthermore, performance-based requirements might come across as vague and nonspecific. It is therefore argued that guidelines will further assist those trying to meet the requirements put forward by the Polar Code. The guidelines will provide an opportunity for the regulators to elaborate and explain the requirements, as well as offer suggestions as to how compliance can be achieved. In fact, a more effective legislative framework promoting safe operations is required. It should be noted that the Polar Code does provide some additional guidance to the requirements it puts forward. This is, however, limited to certain chapters. Developing guidelines to the Polar Code has several advantages. It gives the regulator the possibility to recommend existing solutions to comply with the requirements. It also contributes to ensuring that those subjected to the Polar Code know what the requirements entail and how compliance is achieved.[2]

There is currently no recognized interpretation of the Polar Code requirements. Only SOLAS has prescriptive requirements concerning lifesaving appliances, and it provides no indications of functionality under Arctic condition or survival time.

Further work will be required to assess and to fill the gap between regular SOLAS approved life-saving equipment & appliances and the functional requirements defined in the Polar Code. This work would incorporate the following topics:[3]

- Identifying key parameters critical for human survival.

Rights and Interests of Arctic States and User States″. Ed, Tore Henriksen, Kristine. Kraabel, Molenaar, Erik Jaap, editor and Ashley J, Roach, (Leiden ; Boston : Brill Nijhoff, 2017)p.431-433

[1] Rean,b,p.227
[2] Ibid
[3] Ibid,p.229, SSE 6/5

- Developing methodology for assessment of the safety chain through a holistic approach, which means focusing on cumulative effects of all components

The potential need for additional performance and test standards for Life-saving appliances and arrangements of the Polar Code was discussed before the adoption of the Code, however, the specific and detailed discussion on this matter was postponed to the adoption of the Polar Code.[1]

Subsequent to adoption of the Polar Code, MSC instructed its subcommittee on system and equipment, to consider whether additional performance or test standards for life-saving appliances and arrangements in relation to the Polar Code are necessary, and to advise the MSC on the best way to proceed on this consequential work.[2]

The Code is based on the applicability of general regulations on life saving appliances and arrangements however, as the potential hazards of navigating through Arctic waters would change the normal functionality of ship's machinery and equipment, a coalition of states proposed SSE Sub- Committee for further revision of International Life Saving appliances Code3, to ensure the consistent implementation of the Polar Code.

Their proposal put forward the revision of LSA Code to fulfil the required functionality of life saving appliances and measures under conditional clauses of the polar Code, meaning that working in Polar Service Temperature and maximum expected time of rescue.

These considerations might necessitate adoption of additional performance or/ and test standards/criteria.4

The need for development of additional performance and test standards for the equipment and systems on board ships operating in polar waters was endorsed by SSE subcommittee and then the MSC was invited to approve this decision and take appropriate actions. Besides, Sub-Committee also invited interested Member Governments and international organizations to

[1] SSE 3/15/4, 15 December 2015, para. 1
[2] MSC 95/22, paragraph 3.93
[3] Resolution 48(66)
[4] SSE 3/15/4, 15 December 2015, para. 9

submit comments and proposals on the scope of work, type of equipment, etc for consideration at MSC 97 International Maritime Organization.[1]

6.2 Scope of the work

In response of that invitation, proposals and comments for consideration in MSC were made by Argentina, the Marshall Islands, New Zealand, Norway and Vanuatu, and the other one put forward by ICS and CLIA, aiming at revision of the LSA Code and the relevant IMO resolutions to adapt current testing and performance standards to the Polar Code provisions or to develop additional requirements, if necessary for personal life-saving appliances, survival craft, fire safety, communication, navigation.

The clarification of the scope of work and type of equipment for the development of additional performance/test standards was recommended. In fact, since not all ships to which Polar Code is applicable are intended to operate in Arctic conditions, like low air temperature the Polar Ship Certificate may indicate that a ship is not intended to operate in low air temperature and therefore Polar Service Temperature would not be applicable.

Besides, for each additional performance/test standard to be developed, SSE should undertake to clearly and consistently identify the relevant provision of the Polar Code, including one or more of the relevant conditional clauses.[2]

MSC had decided that additional performance and test standards for the equipment and systems on board ships operating in polar waters should be developed in order to support the implementation of the Polar Code and had agreed to restore Consequential work related to the new Polar Code in the 2016-2017 biennial agenda of the Sub-Committee and the provisional agenda for SSE 4, with a target completion year of 2017.[3]

[1] Report of the Sub-Committee on Ship Systems and Equipment on its 3rd session, SSE 3/16, p. 50, paras. 15.15–15.16.

[2] Additional performance and/or test standards in support of the implementation of the Polar Code, MSC 97/21/3 (18 August 2016) Argentina,the Marshall Islands, New Zealand, Norway and Vanuatu & Comments on document MSC 97/21/3 MSC 97/21/12 , (30 September 2016) (ICS and CLIA

[3] , MSC 97/22 & Ibid

6.3 Regulatory options to address new test and performance criteria

As we mentioned before, IMO regulatory initiatives could be in form of binding and non-binding measures. In fact, suitable regulatory options to address new or developed requirements for implementation of the Polar Code can be as follows;

6.3.1. Categorization of the requirements in mandatory and non-mandatory instruments, e.g. through amendments to the LSA Code and amendments to Revised Recommendation on Testing of Life-Saving Appliances.[1]

The idea was that the new or developed requirements should be in form of add- on parts to the existing and relevant IMO instruments. Therefore, operation in non- Polar waters would not be affected by additional requirements for equipment and/ or test regimes. This approach is the same as the adoption of the Code itself.[2]

In fact, this add- on part could be a new chapter to LSA Code or Polar Code addressing additional requirements for equipment on ships operating in polar areas.

There are some other works which is currently ongoing in MSC, SSE sub- committee which could be mentioned in this regard;

- draft amendments to the Guidelines on alternative design and arrangements for SOLAS chapter III (MSC.1/Circ.1212) list of functional requirements and expected performance criteria, particularly with regard to supporting the LSA Code, in fact, The SSE subcommittee completed its work to develop functional requirements for SOLAS Chapter III on life-saving appliances and arrangements. It agreed that the goals, functional requirements and expected performance criteria for SOLAS chapter III be included as a new appendix 5 to the Guidelines on alternative design and arrangements for SOLAS chapter III,3

[1] Resolution MSC.81(70), as amended
[2] SSE 5/6 December 4, 2017. Para3-5

[3] MSC.1/Circ.1212

- draft amendments to the LSA Code for totally enclosed lifeboats, like new ventilation requirements for totally enclosed SOLAS approved survival crafts,1
- proposing amendments to resolution on Testing of Life-Saving Appliances (Resolution MSC.81(70)) as amended (MSC.81(70)) contained in annex 3 to document SSE 6/3; to address future new test and performance criteria and how to address new guidelines for testing and evaluation of life-saving appliances and arrangements for ships operating in polar waters.

These amendments of instruments would take too much time to enter into force and it is estimated that it could not be finished before 2020 and entered into force before 2024, at the earliest.2 However, Since the Polar Code entered into force in 2017 and it is currently implemented the urgent nature of the issue calls for an interim solution that must be taken into account.3
Therefore, it was agreed that the regulatory options to address new test and performance criteria should be decided after the finalization of the specific conditions and test and performance criteria and the draft interim guidelines.4

6.3.2 Interim Solution

The final outcome with non-mandatory nature, a consolidated set of performance standards, could be in form of a standalone resolution, circular with an eye on the ongoing activities at other bodies outside the IMO like using ISO standards for such test and performance criteria.
In fact, the urgency of the matter, as expressed by several delegations at SSE, developed the idea of the draft interim guidelines with a view towards finalization at SSE 6 July 2019.

The Interim guidelines, like other IMO's non-mandatory instruments which incorporate recommendations on the implementation of technical rules and standards not included in mandatory instruments, can outline possible mitigating means in order to comply with International Code for Ships Operating in Polar Waters (Polar Code), and is intended, once

[1] annex 1 to document SSE 5/WP.3,
[2] SSE 5/6 December 4, 2017, para.5
[3] Ibid, MSC 97/22, SSE 5/6 December 4, 2017. Para6-7,
[4] SSE 5/Wp.3. para 37-39

approved by the MSC, to assist ship designers and ship owners/operators as well as administrations, in a uniform implementation of the Polar Code.[1]

Due to the goal- based approach of the Polar code, some of the most prescriptive guidance were removed from the draft interim guidelines while still keeping an adequate level of detail in order to actually provide guidance that can be used by designers, operators and administrations.[2] However, as it has been noted by SSE working groups on several occasions, the document is indeed an interim guidance and it would be necessary to further develop the guidance on some items.[3]

compliance with the Interim guidelines does not necessarily mean that the ship complies with the Polar Code. There might be other hazards conditions and mitigating means to consider in the operational assessment required in section 1.5 of the Code. The complexity of a prolonged survival time, in the harsh environment, should not be underestimated. [4]

6.4 Legislative approach

The key criteria for operational assessment for drafting the interim guidelines include operation in low air temperature, operation during extended periods of darkness, the expected time of rescue, operation in ice and icing of life- saving appliances, high latitudes, abandonment onto ice or land. In fact, even unimportant conditions could become critical, if specific consideration needed for operation in Arctic waters are taken into account.[5]

As a matter of fact, any amendments and development on a regulatory instrument needs a prior identification of the areas on which the works should be conducted. In the sub- committee works, the performance criteria for which the corresponding amendments aimed to be prepared, should be established. So, in the first step, any additional testing and performance standards

[1] LEG/MISC.8 , p.10
[2] SSE 6/5 para 4-5
[3] Ibid
[4] SSE 5/6 para, 1-1 & 1-2

[5] MSC 97/22 (8-27-8-32), SSE 5/WP.3, para 26, SSE 5/WP.3, para 26

related to life-saving appliances and arrangements on board ships operating in polar waters should be addressed. This identification also includes consideration of how any additional requirements should be included in the existing instruments which means the legal framework for these new standards e.g. a new chapter in the LSA Code and a new section in resolution MSC.81(70);[1]

Reports on the main findings from SARex exercises with the aim to identify any gaps between the standard provided by SOLAS for life-saving appliances and the functional requirements defined in chapter 8. of part I-A of the Polar Code could be regarded as the foundations based on which performance criteria for life-saving appliances complying to the Arctic conditions were outlined.2
In addition to the technical and scientific findings achieved through Different exercises, the considerations and works done outside the IMO could also assist to identification of the areas in need for change or development.3

Considering the cumulative effect of the involved elements, which means to provide for a functional system rather than focusing on them individually, in addition to definition of key values would keep the flexibility of the code still in place and intact, like acceptable CO2 consecrations and adequate water rations.
This approach would generate a regime for Flag states and Classification societies, facilitating the verification of the fulfilment of the Polar Code requirements. Consequently, that will ensure that the goals and the functional requirements defined in the IMO Polar Code could be satisfied.4

[1] SSE 4/15/2 , SSE 4/15
[2] SSE 4/15/1 Corr.1 (Norway).
[3] SSE 4/INF.4 (Japan)
[4] ″ SARex Spitzbergen″, p. 56-58

6.4.1 Ongoing work

The working group on Life- Saving Appliances met in March 2019 and among other agenda items, worked on the finalization of the draft interim guidelines on life-saving appliances and arrangements for ships operating in polar waters, based on the proposal put forward by Norway.[1]

Apart from the amendments that the working group made on the proposed interim guideline regarding food rations and seating arrangements, the delegation of Canada stated that the addition of CO2 and CO monitors for ventilation problem in the draft interim guidelines on life-saving appliances and arrangements for ships operating in polar waters should be considered.[2]

Besides, although the type and amount of survival equipment related to the maximum expected time of rescue is provided in the interim guidelines but there is still no guidance on how to determine this time.

Considering the interim nature of this non-mandatory guidance, and the fact that the Interim guidelines contain certain provisions that could be applied prescriptively to existing arrangements of life-saving appliances, the MSC could provide clear guidance on how to apply the Interim guidelines to ships on which the Polar Code is applicable, such that constructional modifications to existing survival craft, launching appliances for existing ships based on ship-specific results of the operational assessment required by section[3]

Besides, some industry observers also expressed concerns that some of the life-saving equipment's provisions proposed in the draft interim guidelines may not be commercially available, and thus a thorough assessment of equipment availability should be conducted prior to the finalization of these guidelines. Notwithstanding that certain equipment may not be commercially available, some members expressed the view that the draft interim guidelines should not be limited by the commercial availability of the equipment.This draft interim guideline will be presented for approval at MSC 101[4] and could, if approved by the Committee, become effective in June 2019.

[1] annex SSE 6/5
[2] (annex 3, section 3.5), para 22-29- SSE SSE 6/WP.3.
[3] MSC 101/14/9, (SSE 6/18, annex 2) e.g. section 3.2, section 3.7,
[4] MSC 101/14/9, SSE 6/18

6.5 Best Solution through National Jurisdiction

International harmonized and binding measures are the most important ones to promote safety. As the international rules, discussed about, may not be sufficient to cover all relevant and significant aspects the need for assistance or compensatory measures is brought into attention. Therefore, in this section the potential alternatives and compensatory measures are considered that could bridge the gaps left in the Polar Code requirements.

6.5.1 Mandatory measures through international Organization

These measures include amendments on the existing binding instruments. In fact, as the same happened through the whole process of adoption and enforcement of the Polar Code. But an international binding instrument has its pros and cons for the States.
In other word, in spite of the harmonized regime that they would provide, the additional commitments and obligation would also be imposed on the States that could make the whole process of adoption and enforcement too lengthy and subject to a number of international compromises.

Nonetheless, these measures, as discussed in the last section, are currently considered and on the agenda of the international Organization, Like the amendments on existing Convention (SOLAS), or the development of new phase for Polar Code with coverage for areas and scope have not been covered properly.

6.5.2 Recommendatory measures and guidelines

As mentioned before, the enforcement of prescriptive requirements is considered to be less complicated, compared to enforcing performance-based requirements. As performance-based requirements are goal- oriented regulators must be able to assess the attained level of safety by using a holistic approach.
In fact, performance-based requirements demand that the regulators assess the performance of the solutions adopted. These solutions must be considered in relation to each other, in order to assess the level of safety for the entire system. The safety of each component of the system individually cannot ensure the safety of the whole system.

IMO Member States are entitled to propose their comments which can be incorporated in the final guidelines or resolutions. These guidelines are normally adopted by consensus and

accordingly reflect global agreement by all IMO Members. Therefore, technical codes and guidelines are frequently made mandatory by incorporation into national legislation. Despite the lack of formal commitment or legal obligation, there is nevertheless an implied obligation on States not to act contrary to the spirit and terms of such instruments, and this obligation is usually complied with.

6.5.3 National Legislation

Flag States have the primary responsibility to have in place an adequate and effective system to exercise control over ships entitled to fly their flag, and to ensure that they comply with relevant international rules and regulations. Recalling the requirement under the United Nations Convention on the Law of the Sea.[1]
Ratification of the IMO instruments is considered as the one aspect of the flag State duties. The IMO member states undertake to promulgate all laws, decrees, orders and regulation and to take all other steps which may be necessary to give the present Convention full and complete effect.[2]

Every State shall assume jurisdiction under its internal law.[3] It is required that if any IMO instruments entered into force, the State must take initial actions to implement and enforce its provisions and also give complete effect through the adoption into its national legislation.
The Flag State in every case, shall fully guarantee the completeness and efficiency of the inspection and survey, and shall undertake to ensure the necessary arrangements to satisfy this obligation.[4]

By developing the guidelines based on recognized standards ensuring compliance with the regulation, operators may prove their compliance by referring to different certifications obtained. This is common practice in several industries, such as the Norwegian petroleum industry. This will reduce the workload of the regulators.[5]

All said, this approach could promote the implementation of guidelines and compliance with the necessary requirements of the Code.

1 UNCLOS, Art 94, 217
2 SOLAS Article I(b),
3 UNCLOS Article 94(2)(b), Resolution A.1070(28)
4 SOLAS regulation I/6(d)
5 ″ SARex3, ″Evacuation to shore, survival and rescue″, p. 225-226

Conclusion

Problems regarding the performance- based requirements of the Polar Code could be attributable to:
1- lack of transparency
2- deficiency in appliances and arrangements

Because the lack of consistency, transparency and reliability in functional requirement can pose serious challenges for ship owners/ operators taking action toward harmonization has significant importance.

Different interpretation of functional requirements results in disparity between flag states and classification societies in their ways towards conformity, and this could largely be attributed to the Lack of common understanding and harmonization in implementation of the code.
This "harmonization" will inform flag states and operators how to develop risk assessments and Polar water operational manuals. Besides, the development of standards for life- saving appliances and equipment for vessels intended to navigate in the Arctic will make it easier for operators and flag states to determine what equipment is acceptable for use in low temperature, high latitude, and besides, capable of keeping its function for the maximum expected time of rescue.

There is currently no international consensus with regards to interpretation of the IMO Polar Code requirements. Only SOLAS has prescriptive requirements concerning lifesaving appliances, and provides no indications of functionality in Arctic temperature or maximum expected time of rescue.

Further work will be required to assess and to close the gap between regular SOLAS approved life-saving equipment & appliances and the functional requirements defined in the Polar Code. This work would involve identifying key parameters critical for human survival and developing methodology for assessment of the safety chain through a holistic approach.

"Consequential Work Related to the Polar Code for Ships Operating in Polar Waters" Include output to better define standards for lifeboat habitability, communications, firefighting equipment, and the review of existing guidance for assessing operational capabilities in ice.

There are also numerous efforts outside the IMO that aim to develop the Polar Code and advance implementation. The ISO, for example, is developing standards for deck heating

systems and is considering additional specifications for life-saving appliances and fire safety systems aboard vessels subject to the Polar Code.

These issues are trying to be addressed through the amendments that will be made on SOLAS chapter III and LSA code and other IMO instruments. However, this lengthy process calls for an interim solution, and this interim solution needs the States cooperation to make to deal with the aforementioned issues and support international harmonized implementation of the Code which entered into force in 2017.

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