HCSS SECURITY

Geopolitics and Maritime Security

A broad perspective on the future capability portfolio of the Royal Netherlands Navy

HCSS helps governments, non-governmental organizations and the private sector to understand the fast-changing environment and seeks to anticipate the challenges of the future with practical policy solutions and advice.

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Table of contents

List of abbreviations

A2AD = Anti-Access/Area Denial
ABC Islands = Aruba, Bonaire, Curaçao
AI = Artificial Intelligence
ASEAN = Association of Southeast Asian Nations
ASuW = Anti-surface warfare
ASW = Anti-submarine warfare
AWW(S) = Above water warfare (system)
BMD = Ballistic missile defense
BRI = Belt and Road Initiative
C2 = Command and control
C4ISR = Command, control, communications, computers, intelligence, surveillance, and reconnaissance
CD&E = Concept Development & Experimentation
COSCO = China Ocean Shipping Company
DIS = 2018 *Defence Industry Strategy*
EEZ = Exclusive economic zone
EU NAVFOR = European Union Naval Force (Somalia; Operation Atalanta)
HCSS = *The Hague* Centre for Strategic Studies
IPR = Intellectual property rights
LCC = Life cycle costs
LCF = *Luchtverdedigings- en commandofregat* (air defense and command frigate)
MENA = Middle East and North Africa
MSO = Maritime security operations
MSRI = Maritime Silk Road Initiative
NASOC = National Air & Space Operations Center
NBC = Nuclear, biological, chemical
NEP = Northeast Passage
NFH = NATO frigate helicopter
NL-DTIB = Netherlands Defence Technological and Industrial Base
NMOC = National Maritime Operations Center
NSM = Naval strike missile
NSOC = National Security Operations Center
PLA = People's Liberation Army
PLAN = People's Liberation Army Navy
R&D = Research and development

RNLAF = Royal Netherlands Air Force
RNLN = Royal Netherlands Navy
SA/SU = Situational awareness and situational understanding
SCO = Shanghai Cooperation Organization
SOF = Special Operations Forces
SLBM = Submarine-launched ballistic missile
SLOC = Sea Line of Communication
(T)BMD = (Theater) Ballistic Missile Defense
TNFH = Tactical Nato Frigate Helicopter
UAV = Unmanned aerial vehicles
UK = United Kingdom
UN = United Nations
UNCLOS = UN Convention on the Law of the Sea
US = United States
UxV = Unmanned Aerial/Surface/Underwater Vehicle
UWW = Underwater warfare

Management summary

This study, conducted for the Royal Netherlands Navy (RNLN), in essence analyzes the 'why', 'what' and 'how' of (the dynamics within) the missions, tasks and capabilities of the RNLN for the period up to 2030-35. Chapter 2 explores where and how geopolitical trends and other systemic developments determine the maritime security environment in this period. Chapter 3 analyzes the impact of these general trends and developments for the missions and tasks, general force profile and the major capability portfolio design parameters of the RNLN. Chapter 4 describes in more detail the future capability portfolio of the RNLN, in particular the areas where current 'ends, ways and means' of the RNLN are expected to become inadequate and where innovative solutions are required. Chapter 5 gives some overarching final considerations.

General trends

Three larger trends should be seen as increasingly woven into the fabric of the security challenges facing the RNLN.

First is the decline of the West and the rise of the East. In particular the continued rise of China will play a large role in fundamentally changing the present rules-based international order over the next decades. One of the main instruments in this is the Belt and Road Initiative (BRI), of which country membership is steadily increasing. With membership spreading in Europe and to NATO members, consequences will be significant in terms of China's global economic influence and military footprint, as well as coherence within NATO.

The second trend builds further on this question of internal coherence, as it concerns the weakening of alliances. Over the past decade, throughout the West the social contracts between the people and the state have been weakened. As a result, in most EU and NATO Member States nationalism, protectionism and sovereignty have become powerful forces against international cooperation and multilateral agreements and institutions.

The third trend is that of technological dependency. Armed forces and defense organizations in general have increasingly become dependent on enabling technologies and standards that are developed in and enforced by global civil markets. Underlying supply chains at the lower tiers are almost invariably dependent on the international

market and/or are not fully transparent. This dependency of military supply chains on various actors, in particular China, leads to major vulnerabilities as well as to new players in global standard-setting and high-tech developments.

Operating theaters

Five (potential) operating theaters have been marked out for the RNLN that are not only geographically distinct, but are also characterized by particular types of threats, challenges and issues. The issues discussed are not necessarily unique for particular operating theaters, but are best illustrated by and play out most prominently in certain theaters. This section lays out these five operating theaters and the most important maritime military implications tied to them.

North Atlantic and North Sea

In this region the main issues are the security of flows and the approach routes to northwestern Europe, the protection of (under)sea infrastructure, and the naval offense–defense balance.

First, in relation to flow security, the major change to account for in the coming years is the return of credible military threats to the Sea Lines of Communication (SLOCs) to and from Europe. A related risk is the possible use of sea mines, which are widely available and can shape the naval battlespace and the approaches to it. Third, although largely a matter for civil authorities, countering criminal activity in SLOCs does consume considerable naval assets in supportive roles.

Furthermore, when it comes to the protection of (under)sea infrastructure, the main implications are related to the fact that maritime areas increasingly have inherent economic value associated with offshore installations, natural resources and undersea cables and pipelines. Monitoring and safeguarding of offshore installations and undersea cables is required, but is generally more difficult than the protection of land-based vital infrastructure.

Lastly, in the coming decade, technological developments will further impact the naval offense–defense balance, with the offensive side more and more prevailing in most elements of the engagement cycle. This will have significant consequences for both naval strategies and for the investment priorities in the naval capability portfolio.

Caribbean

In this region the main issues for the RNLN are defending the Kingdom, regional order and stability, and offering humanitarian aid. These issues are pertinent, as the

Charter for the Kingdom of the Netherlands states that maintaining the independence and defense of the Kingdom are Kingdom affairs.

First, in defending the Kingdom among geopolitical turbulence, the most pressing security issue for the Netherlands Antilles is Venezuela's instability, which has been feeding into regional economic unrest, physical unsafety, criminality and environmental issues in the region. It also has larger geopolitical angles, as the increasing dependency of Venezuela on outside sponsoring by both China and Russia has enhanced these two countries' influence in the region. Other regional border disputes could in the (near) future also come to lead to escalation.

Furthermore, the Dutch military presence in the Caribbean part of the Kingdom of the Netherlands is mainly geared towards support of local authorities in fighting organized crime, most of which drugs-related. Ensuring solid cooperation with likewise partners with interests in the region, such as the US, the UK and France, is vital.

Lastly, the—soon possibly existential—environmental threat will likely intensify the demand for disaster relief, crisis management and post-disaster reconstruction, in which the RNLN may play its part.

Mediterranean

In the Mediterranean and Black Sea region, the main points of Dutch concern are the integrity of Europe's blue borders, political–economic security and the politics of energy from and through the sea.

First and foremost, the Mediterranean is of great significance to Europe, in part because European security is increasingly tied to that of the Middle East and North Africa. The operational role of the military can often be substantial in supporting civil authorities. Concerns for Europe's blue borders will remain, and might indeed intensify, but it is unsure to what extent Europe's armed forces will be (t)asked to provide capabilities in the period up to 2030-35, or whether more non-military solutions will be developed.

Furthermore, in this region China equally combines long-term strategic economic and political motives in its BRI. Strategic investments in ports in the Mediterranean basin hold the possibility of an increased Chinese military presence in the region. Although direct military confrontation with China in Europe's back garden is unlikely in the foreseeable future, more hybrid confrontations might develop.

The region's geopolitical significance is the result of three factors: its location at the junction of Europe, Asia and Africa, its significant international sea routes and straits,

and its potential as a source of oil and natural gas. As the energy potential of the Eastern Mediterranean grows as well as international interest therein, so does the potential for conflict.

Baltic and Arctic

In this region, the main issues relevant to Dutch security include developments in hybrid warfare and gray zone confrontations, new SLOCs with the melting of ice, and asymmetric sea control through more advanced A2AD capabilities.

First, hybrid strategies have rapidly gained traction, turning (latent) conflicts into a multi-dimensional problem. Vulnerabilities to hybrid maritime security threats can lie in many different domains, and the military—as well as other instruments of state power—have come to face rapid shifts from low- to high-intensity conflicts and multi-domain confrontations with varying levels of intensity. This is relevant for all operating theaters, but certainly in this region where Russia directly challenges NATO by using hybrid threats (also known as sub-threshold or gray zone conflict) and the threat thereof in pursuit of its aims.

Furthermore, although it is unlikely that the Arctic will become a vital maritime highway or a prospect for direct conflict in the period up to 2030-35, it is important to monitor the developments. As maritime traffic develops, a strategic challenge lies in the classification of the waterways as well as of the maritime terrain as a whole, with questions of area sovereignty strongly linked to Russia's military prioritization of the Arctic and to China's claims on the natural resources the Arctic holds.

Lastly, the increased ability to engage targets across long distances is leading the offense-defense balance to shift in favor of offensive measures. Given A2AD's multi-domain nature, it is a game that can be played on two sides. This means that an essential part of a counter-A2AD strategy is the ability to create and maintain A2AD bubbles oneself. An A2AD competition thus raises the cost of victory and make conflict less desirable for either side.

Indo-Pacific

In this region, the main concerns that may involve Dutch security interests are the ever-increasing role for China's Maritime Silk Road Initiative (MSRI), the mounting pressure on the global commons and rules-based order (e.g. the contesting of UNCLOS and EEZs), and the militarization of the Indian Ocean.

First, China's MSRI strategy continues, with many indications that the collection of ports can and will be used for military purposes. China's port projects in the context of

the MSRI are all located along vital sea lanes, maritime choke points and energy intake points, and there is the dual long-term goal to reduce dependence on the US Navy for securing important SLOCs and to create alternatives throughout the BRI and MRSI.

Furthermore, the increasing importance of the ocean and the 'blue economy' would indicate that those actors supporting a rules-based order should also promote equitable use of the ocean's resources. However, especially as China's navy grows stronger and the country's international interests become more diversified, regional actors and littoral states have seen China increasingly go against the country's self-proclaimed international commitments, such as UNCLOS, with little effective opposition by any of the other regional actors such as Japan, the US or India.

Lastly, with the Indian Ocean region already home to over half the world's armed conflicts, increased militarization poses a threat to the region's long-term security and economic stability. European navies are unlikely to take up large-scale exercises in this area, but will, as part of a coalition of the willing, take part in Freedom of Navigation exercises as may be organized by the US.

Broad implications for the RNLN's force profile

In our assessment, a 'regional power projection' navy continues to be the force profile of choice for the RNLN in the period up to 2030-35, because it:

- best fits the (maritime) interests of the Netherlands with its strong dependence on maritime trade routes;
- is in line with what our allies may expect as a valid contribution to our common security and defense, while remaining feasible within a (growing) defense budget;
- is the most robust 'no regret' option for the RNLN in a dynamic and volatile maritime security environment; and
- builds upon the knowledge, experience and (industrial) capabilities embedded in the RNLN and its ecosystem.

The North Sea and the north Atlantic (SLOCs with North America), augmented with the other European seas such as the Baltic Sea and Mediterranean, are the main operating theatres that primarily drive the (future) portfolio design considerations for the RNLN. A second priority is the security of the Kingdom in the Caribbean, which is a constitutional obligation under the Charter for the Kingdom of the Netherlands, in particular aimed at security operations and maritime assistance. This does not exclude naval operations in e.g. the Arctic Sea and the Indo-Pacific, even if for force planning purposes the focus is on the European theaters and the Caribbean.

In these operating theatres, the current set of maritime operations remains applicable with some minor changes. For example, the protection of sea infrastructure, in particular seabed cables, should receive more attention; and the 'above water' (air) domain should explicitly be augmented with space (mainly ballistic missile defense).

Based upon the above considerations, the future RNLN should consist of a mix of surface and sub-surface combatants, ship-borne helicopters and UxVs (various unmanned vessels) for intelligence purposes and extended force projection, amphibious capacity to conduct operations from the sea to influence situations on land and long-range land attack capabilities to counter A2AD threats. Auxiliary ship capacity for logistical purposes—quite possibly increasingly acquired 'as a service'—would augment the future mix.

Creative thinking is required to find solutions for the reduced, or even sub-critical, number of main platforms, as well as to accommodate for rapid technological progress. Modularity by design, in combination with software-centered functionality, seems the way forward to guarantee flexibility and adaptability. Task-specific configurations of manned platforms that operate as 'mother ships' for a range of unmanned UxV 'satellites' hold high promises, but other forms of modularity by design should be practiced as well. The amount and the role of technology will increase and smart man–machine teaming will likely lead to a further reduction of personnel at sea.

Multi-domain and multi-level operations, based on shared situational awareness and understanding, will become the new normal. Continuous connectedness through physical and digital security is key in creating effects in this emerging operational future. These networked operations are joint, combined and interagency, putting emphasis on technical, procedural, doctrinal and cultural interoperability within the armed forces, between (ad hoc) coalition partners and with other security providers, and is essential to create and maintain effective military solutions. The interoperability requirements can and should be attained through training, doctrines and procedures.

Design considerations for the future RNLN's capability portfolio

Because of their low observability and high strategic value, in warfighting scenarios, submarines will more and more become the platform of choice for forward offensive operations, including intelligence tasks, anti-surface and underwater warfare, naval mine warfare, land attack and launching special forces. Within its niche of ocean-going, non-nuclear powered submarines, the RNLN should continue to offer a highly valued contribution to the protection of SLOCs to and from Europe. Long-range attack

capabilities, such as ballistic and cruise missiles, render it possible to achieve effects while avoiding A2AD environments, for sub-surface as well as surface combatants. Naval land attack capabilities are required in a multi-domain approach to counter advanced A2AD capabilities. Amphibious and special operations (partially merging) launched from the sea also feature in this integrated approach. Counter-A2AD capabilities in effect create one's own A2AD bubble. UxVs will increasingly be deployed for intelligence gathering and force projection, in particular in contested areas.

For the next generation naval combatants, new weapon types such as energy weapons, railguns, hyper-velocity missiles and intelligent torpedoes should be contemplated, but quite possibly not initially acquired. Modularity by design / provisions for—e.g. multifunctional launch containers—should make it easier and less costly to introduce new technology on board of the new frigates. The deployment of military modules on non-naval vessels is an option to consider. Highly autonomous active self-defense systems are required to counter some of the new types of weapons as deployed by possible opponents.

(Counter-)mine capabilities will increasingly merge. Sea mines, as a cheap means for area denial, play an important role in e.g. various terrorist and (escalating) gray zone conflict scenarios. After the commissioning of the projected Belgian–Dutch counter-mine capability, a continuous development capacity is required to keep the RNLN ahead of the operational developments in this terrain.

In security operations, surface ships are required, again increasingly aided by embarked helicopters and UxVs that provide a considerable range extension and flexibility. In particular, protection of infrastructure at sea is of increasing concern. UxV threats against sea infrastructures, including seabed cables, need to be countered, quite possibly largely by own UxVs—with a debate on the role of the RNLN vis a vis other public and private security providers possible. In the period up to 2030-35, escalation dominance becomes more important in security operations.

Evacuation, disaster response and humanitarian relief operations require surface ships that have the (amphibious) capacity to pass people and goods to and from shore under difficult circumstances. Where auxiliary ships for replenishment at sea and other logistical purposes could increasingly be acquired 'as a service', it is in these kinds of operations that in-house capable ships are required most.

In the period up to 2030-35, operations will increasingly be multi-domain and multi-level. High-quality and timely situational awareness/situational understanding (SA/SU) is key, shared across domain and levels on the basis of 24/7 connectedness. Using AI and big data analysis techniques, better tools to produce actionable intelligence are vital as the foundation for successful joint and multi-actor missions.

Final observations

So how to assess the big picture, in terms of crucial lines of development for the RNLN in the period up to 2030-35? With the type of naval operations and tasks for the period up to 2030-35 largely enduring, we envisage the core of the future naval force to remain a versatile mix of surface vessels, sub-surface vessels and amphibious units. These, however, will be augmented by unmanned systems in space, the air and on and below the sea; UxVs that will increasingly take over the operational functionality of the manned 'mother ships' (which, for the period up to 2030-35, remain the central command hubs at sea). All main vessels should be ocean-going, able to navigate the main operating theaters for the RNLN under all conditions.

'Navies-only' operations are a thing of the past: next to combined, joint and interagency cooperation will be the norm. High-quality and timely maritime SA/SU requires multi-domain sensors and information exchange with a host of military and non-military actors. Big data and artificial intelligence will play an increasing role in processing information into actionable intelligence. In warfighting scenarios, resilient defense concepts should consider ever-tightening Observe-Orient-Decide-Act (OODA) loops that are highly automated; all the more so given the development of smart, supersonic and hypersonic weapons and swarm tactics. In an increasingly transparent security environment, the elements of concentration of force and of surprise likewise require rapid and integrated multi-domain action. Such developments could radically change the face of war, but by most estimations not yet within the 2030-35 time horizon.

The diverse technology areas expected to change warfare most significantly in the period up to 2030-35 are neither inherently military nor civilian. They have low barriers for entry, which means they can be proliferated relatively easily. This issue is not merely one of hardware, but also of the spread of ideas, which is more and more decentralized and therefore hard to control. One important corollary is the urgent need for tight cooperation in capability portfolio development between industry, knowledge institutes and government in order to speed up (continuous) innovation cycles. The Defence Industry Strategy of 2018 provides a framework for operationalizing this need.

The bottom line is that even while we expect that the *why* and the *what* for naval operations and tasks will evolve within reasonable brackets for the period up to 2030-35, the *how* of the RNLN (its personnel, materiel, doctrines and processes, organization and structures) must substantially innovate—but not beyond recognition. All details aside, now more than ever, the overarching requirement for a robust, flexible and adaptive (future) naval capability portfolio requires the knowledge, experience and capabilities embedded in an expanding ecosystem of partners of the RNLN.

This is possibly, in an abstract sense, the most daunting challenge for the RNLN in the period to come. Opening up to embrace innovative influences from and dependencies on such an ecosystem on the one hand; while remaining responsible for and capable of producing high-quality, guaranteed military effects in and from the sea on the other. It is in the reconciliation of these two, at times (seemingly) conflicting, perspectives and mindsets that the RNLN is likely to find the strength to successfully face a rapidly evolving, increasingly volatile security environment.

1. General introduction

1.1 The security environment is changing, armed forces must keep pace

The geopolitical situation and the global security environment have changed considerably in recent years. We have seen a significant increase in instability in the periphery of Europe and far beyond. Our societies face adversaries that use a wide range of crisis and conflict instruments to attain their political objectives, in a variety of ways (including in the gray zones between war and peace, so-called hybrid conflicts). Military, Anti-Access/Area Denial (A2AD) capabilities deployed by Russia, China and Iran and exported to others (such as Venezuela),[1] can cause serious limitations to the freedom of navigation and movement of Western armed forces (as well as merchant traffic). The proliferation of weapons of mass destruction continues, and advanced technology that can effectively be used in military applications is readily available on the world market. China has become a global economic competitor for Europe, and is translating its economic prowess into military power, including global naval power projection. After the information domain, space and the seabed will become the next battlegrounds, while the use of Artificial Intelligence (AI) and autonomous weapon systems may herald a new and ominous step in the global arms race. Meanwhile, the formerly firm transatlantic relationship has become strained. The US has put pressure on its European NATO partners to increase their defense expenditures considerably, and its full commitment to European military security is no longer a given.

These developments happen in the context of a changing character of armed conflict. Technological, economic, social, cultural and political developments spur a cascade of military–strategic innovations. Although this process is mostly evolutionary rather than revolutionary in nature, it is likely to feature pockets of rapid change along the way. Accelerating technological development in particular may cause the frequency of these spikes to increase. In the period up to 2030-35, the time frame considered in this document, it is likely that some of these spikes play out and affect some of the fundamental design principles for effective navies, as well as the political, social, ethical and judicial frameworks (and mindsets) in which military naval assets are deployed.

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1   See e.g. Militaire Inlichtingen- en Veiligheidsdienst, "Vooruitziend Vermogen Voor Vrede & Veiligheid. MIVD Openbaar Jaarverslag 2018" p13 (Russia), p20 (China) and p32 (Venezuela).

In light of these global developments, the Netherlands—as well as many other European countries—is gauging its defense policy in terms of budget and capabilities, as well as the roles and missions of the armed forces. In its Defense White Paper of 2018,[2] the restoration and renewal of existing capabilities was announced. Amongst others, in the coming 10 to 15 years €6.4 billion will be invested in naval projects. The 2018 White Paper, however, had little to say about new or innovative capabilities that need to be developed in order to remain relevant in the rapidly changing security environment. However, a reassessment of the capability portfolio was announced for 2020, focusing on the long lines of innovation of the armed forces.

1.2 Study objective

In the run-up to the new Defense White Paper, expected to be published in the first quarter of 2020, the Royal Netherlands Navy (RNLN) has commissioned HCSS to explore the geopolitical trends and other systemic developments that affect the military maritime domain for the period up to 2030-35; and suggest strategic policy options for the RNLN's capability portfolio in anticipation of these trends and developments. In the current debate, a considerable gap may be observed between discussions on the major global trends and developments on the one hand, and the change agenda and investment plans of the RNLN on the other. This study aims to help bridge that gap. Looking some 15 years ahead offers the possibility to move beyond incremental improvements of the current force with its legacy of assets, organizational structures, processes and procedures, mindset etc. Within this longer-term perspective, radically new force elements, but also quite different roles and missions, operational concepts and partnership configurations for the future naval force may be contemplated.

1.3 This document

This report is structured as follows. In chapter 2, the geopolitical trends seen as the main drivers for augmenting, adapting and innovating the RNLN's capability portfolio are described. Five geographically distinct operating theaters for the RNLN are marked out, each characterized by particular types of threats, challenges and issues. The latter are not necessarily unique for the particular operating theater, but are best illustrated by and play out most prominently in that theater. In essence, this chapter deals with the 'why' of the missions, tasks and capabilities of the RNLN for the period up to 2030-35. Chapter 3 then proceeds with addressing the 'what' of the (future) missions, tasks and capabilities for the RNLN, leading to the consideration of

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2   "Defence White Paper 2018: Investing in Our People, Capabilities and Visibility."

the elementary design choices for the RNLN capability portfolio. Several 'balancing' design questions are discussed, such as the mix of surface and sub-surface assets and manned versus unmanned platforms. The focus of chapter 4 is on the 'how' as we describe the design drivers for the capability portfolio of the RNLN structured along a taxonomy of maritime military tasks. Finally, Chapter 5 offers some final observations highlighting the central lines of thought and where they point to in terms of the layout of the future capability portfolio of the RNLN and the processes that might lead there.

2. Geopolitical trends and developments

2.1 Five distinct operating theaters

For analytical purposes, this chapter aims to unravel a variety of current and anticipated trends and developments, even if in a connected world they interact and intertwine. Our analysis is organized through the combination of a geographic and a thematic focus. We mark out five (potential) operating theaters for the RNLN that are not only geographically distinct, but are also characterized by particular types of threats, challenges, and issues. The latter are not necessarily unique for the particular operating theater, but are best illustrated by and play out most prominently in that theater.

Figure 1: Overview of the illustrative operating theaters in this study

1. Maritime security issues for the **North Sea** and its ports and for the Sea Lines of Communication (SLOCs) between North America and Europe in the **North Atlantic**:
   - **Flow security:** protecting the approach routes, or SLOCs, to the North Sea main ports**.** This includes securing supplies and reinforcements along the transatlantic lifeline in times of crisis and conflict.
   - **Protecting sea infrastructure**: safeguarding (under)sea resources, offshore platforms, pipelines and cables that constitute increasingly high economic value.
   - **The naval offense–defense balance**: how technological developments affect the maritime engagement cycle and the balance between offense and defense at sea.

2. Maritime security issues in the **Caribbean**:
   - **Defending the Kingdom**: together with our preferred partners in the region, France, the UK and the US.
   - **Regional order and stability**: military support of civil authorities in the fight against criminal networks, drugs and human trafficking and emerging piracy.
   - **Humanitarian aid**: military support of civil authorities in disaster relief and crisis management scenarios in a region that is often struck by natural disasters.

3. Maritime security issues in the **Mediterranean** (and Black Sea):
   - **Protecting Europe's blue borders**: in the context of large migration flows and the import of instability from the Middle East and North Africa region.
   - **Security where economics and politics merge**: the maritime Belt and Road Initiative and Chinese control over maritime infrastructure.
   - **The geopolitics of energy from and through the sea**: the transport of oil and gas from the wider Middle East and oil and gas fields in the Eastern Mediterranean.

4. Maritime security issues in the **Baltic Sea** and **Arctic Sea**:
   - **Gray zone confrontations**: operating below the threshold of open conflict in hybrid confrontations.
   - **New SLOCs** melting into existence in increasingly ice-free northern passages, possibly feeding competition and tensions between great powers.
   - **Asymmetric sea control**: the access to and presence in large sea territories is being challenged by advanced A2AD capabilities.

5. Maritime security issues in the **Indo-Pacific** ('beyond Suez'):
   - **Rising China:** development of the Maritime Silk Road Initiative.
   - **Global Commons under pressure**: UNCLOS and Exclusive Economic Zones are being contested.
   - **Militarization of the Indian Ocean**: how may this affect maritime trade routes?

Before these more detailed issues are elaborated on in §2.2 through §2.6, however, we first look at the dynamic security environment from a holistic viewpoint: what are crucial systemic trends and developments that affect maritime security in a general sense in the period up to 2030-35?

2.2 General trends and developments affecting maritime security

In very broad strokes, defense and security in the current era are fundamentally affected by the following three mega-trends, which are connected to developments in geopolitics, society and technology respectively. In two of the three, the upcoming world power China features prominently.

2.2.1 Decline of the West, rise of the East

In 2005, US Deputy Secretary of State Robert Zoellick stated that after decades of integrating China into the international system, "we now need to encourage China to become a responsible stakeholder in the international system. As a responsible stakeholder, China would be more than just a member—it would work with us to sustain the international system that has enabled its success."[3] After its admittance to the World Trade Organization (WTO) in 2001, it was expected that China would do just so. Instead, however, over the last two decades China has become more assertive in terms of trade practices and military show of force. In its 2019 EU–China Strategic Outlook, the European Commission acknowledged that most attempts to engage China as a responsible stakeholder have failed. China should still be considered a strategic partner, but a strategic competitor as well.[4]

It is now generally recognized that China will remain a country with a different political and strategic culture, a competitor in pursuit of technological, economic, and military leadership, and a rival promoting alternative political models of governance. The rise of China will fundamentally change the present rules-based international order that is built on Western ideas of international law, international institutions, and values. These foundations of the current order are likely to change dramatically over the next decades.

The Belt and Road Initiative (BRI) is instrumental to this fundamental change (see §2.5.2 and §2.7.1). Started as a project of economic cooperation, under the patronage of Xi Jinping it has developed into an instrument for exercising both economic and political influence. Much of the cooperation with the over seventy countries that have joined the initiative involves relatively cheap loans by China. If those loans cannot be repaid, China will demand compensation: the so-called debt trap policy. In this way, China has obtained naval facilities in Vanuatu in the Pacific, as well as in Sri Lanka in the Indian Ocean.[5] Another worry is Montenegro, which became a NATO member in 2017. Due to structural overcapacity, it is unlikely that a new highway built by Chinese constructors will be profitable.[6] If Montenegro cannot repay its debts, it is obliged to hand over part of its territory or some of its assets to China.[7] In return for investments and relief of its state debt to China, NATO member Greece also agreed to a lease of the port of Piraeus. In early 2019, EU founding members Italy and Luxembourg also signed an agreement with China to cooperate on the initiative.

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3   Zoellick, "Whither China: From Membership to Responsibility?"
4   European Commission, "EU-China – A Strategic Outlook."
5   Due to the debt trap, the government of Sri Lanka was force to accept a 99-year lease for the port of Hambantota, see e.g. Abi-Habib, "How China Got Sri Lanka to Cough Up a Port."
6   See Barkin and Vasovic, "Chinese 'highway to Nowhere' Haunts Montenegro."
7   Hurley, Morris, and Portelance, "Examining the Debt Implications of the Belt and Road Initiative from a Policy Perspective."

The consequences for NATO are significant. First, by virtue of the BRI and its debt trap policy, China could expand its military footprint relatively cheaply and rapidly across the globe. This will affect the global power distribution as well as freedom of navigation. Second, since 2015, the Chinese Navy (PLAN) has taken part in Russian naval exercises in the Mediterranean and the Baltic Sea. Exercises in 'NATO waters' are a way to communicate China's seriousness and commitment to its rise as a global power. At the same time, in 2018 the EU NAVFOR completed a combined exercise with the PLAN, indicating an unprecedented level of coordination between European and Chinese naval forces. It is unlikely, however, that this will continue in the long run. Third, as most eastern and southern EU and NATO member states are BRI members, China's political influence is growing rapidly. With increased economic cooperation, China's soft power is increasing as well, thus undermining both NATO and the EU as communities with shared values and interests. The consequences are already visible in the voting behavior of some member states. For example, the EU has experienced difficulties issuing a statement questioning China's behavior in the South China Sea. Members such as Greece and Hungary, which are dependent on China's investments or are drawn in by China's soft power, do not want to offend the leadership in Beijing.[8] Fourth, when NATO member states start procuring weapons from China, solidarity will be undermined further. Turkey's procurement of Russian S-400 anti-aircraft systems is already weakening NATO's cohesion. If Turkey's decision constitutes a trend, it will be increasingly difficult for NATO members to achieve interoperability or fight against an adversary that provides them with weapons.

2.2.2 Weakening alliances

During the Cold War, foreign and defense policy was considered 'high politics' and the realm of a foreign affairs and defense elite. With the disappearance of a major threat, this changed during the 1990s. The 'democratization' of foreign and defense policies led to unprecedented budget cuts and consequently to reduced size, readiness and deployability of armed forces of most NATO Member States.

Over the past decade, throughout the West the social contracts between the people and the state were weakened In response to geopolitical shifts, financial and economic crises, immigration and terrorist attacks. Large groups within society resist adaptation to the new realities. They no longer trust traditional political parties, but turn to populists that promise protection. As a result, in most EU and NATO Member States nationalism, protectionism and sovereignism have become powerful forces against international cooperation and multilateral agreements and institutions. The value of the EU and even of NATO are being questioned by considerable parts of society.

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8   Emmott, "EU's Statement on South China Sea Reflects Divisions."

Although President Trump's demand of the European allies to increase defense spending were generally met with sympathy, his ambiguous support for the Alliance and its Article 5 commitment caused much uneasiness and a feeling that NATO could erode.

The Brexit process is also hurting the West, both politically and militarily. Too preoccupied with domestic politics, the UK is no longer the leading partner it once was. Weakening of the EU could have important implications for NATO as well. Moreover, the weakening of the EU could put the credibility of its mutual defense (Article 42(7) of the Treaty on European Union) at risk. Political worries about the unity of NATO and the EU, as well as their collective defense commitments, will shift the emphasis to coalitions of the willing with like-minded countries.

2.2.3 Technological dependency

Armed forces and defense organizations in general have increasingly become dependent on enabling technologies and standards that are developed in and enforced by global civil markets. This applies to (underlying technologies for) computers, communication networks, information systems, decision support systems, all kinds of sensors, energy supply, mobility and logistics solutions and much more. Defense organizations are becoming increasingly dependent on those companies that create and 'own' these technologies and standards (through IPR, by de facto defining the standards through monopolies or market dominance, etc.). It is no longer the case that the vast majority of these companies are encapsulated in the well-known, closely monitored and regulated defense technological and industrial base. Even when doing business with familiar system integrators, the underlying supply chains at the lower tiers are almost invariably dependent on the international market and/or are not fully transparent. In particular, the dependency of military supply chains on China is large and worrisome, as a recent report by the US government shows.[9] By evaluating seven tiers deep into the supply chain, the report has documented more than 280 major supply chain vulnerabilities and an alarming dependency on foreign nations, especially China.

In particular, using the economy as an instrument of power, China seeks to dominate 5G standard-setting and patent rights as part of a broader strategy of technology (and consequently world) dominance, as the Brits did in 19th century and the Americans in the 20th century. Standards can be used to promote China's interest, e.g. by demanding specific encryption standards. This explains why the American government bans certain Chinese firms from its new 5G network. In addition, China is leading in the

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9   U.S. Department of Defense, "Assessing and Strengthening the Manufacturing and Defense Industrial Base and Supply Chain Resiliency of the United States."

field of Artificial Intelligence (AI). AI will have important consequences for military decision-making, especially if humans are removed from the loop.[10] The strategic and political culture in China is more tolerant to an early adaptation to AI-powered autonomous decision-making. This could greatly enhance the effectiveness of, for example, its A2AD systems. Other autocracies, including Russia, tend to have a similar position on this issue. China and Russia, with other autocracies following suit, are building their own segment of the internet—a kind of digital A2AD environment— thereby reducing their vulnerability.

2.3 Maritime security issues in the North Atlantic and North Sea

The chief military issues at stake in these waters are securing the Sea Lines of Communication (SLOCs) and flow security, and protecting offshore platforms, vital underwater energy and communication cables and other infrastructure in the Exclusive Economic Zone (EEZ) and beyond. This is done in an era of renewed geopolitical rivalry, in which naval confrontations with highly capable opponents— mainly Russia—must be taken seriously and in which deterrence is (therefore) back on the agenda. Taken together, these issues pose arguably the biggest complex of challenges to the RNLN and many of its European partners in the coming years, if not decades.

2.3.1 Flow Security: protecting the approach routes to northwestern Europe

Trends and developments

Most of the trade of Europe with the rest of the world depends on the unfettered and secure use of SLOCs with Asia and North America that run through the North Atlantic and North Sea. The big sea ports of Antwerp, Rotterdam, Amsterdam, Bremen and Hamburg all rely on these SLOCs. In overall monetary value, half of the EU's total trade is imported by sea.[11] According to Eurostat, Russia is the largest maritime trade partner (in 2017) of the EU by gross weight, mainly in crude and refined oil; the US comes second (see Table 1). Furthermore, the North Sea ports also receive ships from Africa, Latin America and Asia through the English Channel, making it arguably the most important maritime zone in the entire EU.

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10   In fact, there is not one single but several decision loops through which 'meaningful human control' can be exercised. See e.g. Horowitz and Scharre, "Meaningful Human Control in Weapon Systems."
11   Eurostat, "International Trade in Goods by Mode of Transport."

	2014	2015	2016	2017			2017			
	Q4	Q4	Q4	Q1	Q2	Q3	Q4			
	Gross weight of goods (in Mn tons)						Gross weight of goods (in Mn tons)	Growth rate on Q3 (%)	Growth rate on Q4 previous year (%)	Annual growth rate (%)
Russia	63.5	68.0	73.6	76.9	76.2	70.0	**72.4**	+3.3	−1.7	+4.5
United States of America	46.9	43.8	41.0	41.8	43.2	44.3	**46.3**	+4.4	+12.8	+4.5
Turkey	24.7	26.0	28.1	27.0	31.3	30.1	**31.0**	+3.1	+10.5	+7.7
Norway	34.5	28.6	30.8	30.1	30.9	31.9	**30.8**	−3.4	+0.2	+0.9
China	28.9	28.3	29.8	31.7	31.5	30.7	**29.6**	−3.5	−0.5	+2.1
Brazil	28.0	26.0	25.4	26.6	30.1	31.0	**28.1**	−9.3	+10.9	+6.2
Egypt	22.5	22.7	24.2	19.6	20.9	18.7	**20.0**	+6.7	−17.6	−19.8
Canada	12.1	13.6	15.9	14.4	14.2	16.6	**14.9**	−9.9	−5.8	−19.8
Nigeria	12.3	14.0	10.4	10.8	12.7	13.0	**13.3**	+1.9	+28.0	+2.2
Algeria	16.3	17.3	13.9	11.7	12.8	11.1	**13.0**	+17.2	−6.2	+20.5

Note: Data for Cyprus are not included.
Source: Eurostat (online data code: mar_qg_qm_ewhp)

Table 1: Top 10 extra-EU countries in maritime transport by gross weight of goods handled in main EU ports.[12]

Dutch ports process by far the largest share of sea trade in the EU, with 147mn tons in Q4 of 2017. In comparison, UK ports handled 115mn tons, and Italian ports 119mn tons.[13] Rotterdam handles 106mn tons, while Amsterdam still makes the top 5 of busiest ports in Europe, with 24.6mn tons (Q4, 2017).[14] The economic value of the port of Rotterdam to the Dutch economy is over 6% of GDP per annum.[15] These figures underpin the strategic role these ports have for the Netherlands and for the whole of Europe.

Looking forward, however, the golden age of globalization is over. It has given way to a new era of sluggishness, what the Economist calls "slowbalisation".[16] The cost of moving goods has stopped falling. Multinational firms have found that it is increasingly difficult to compete with local rivals. Activity is shifting towards services, which are harder to sell across borders. The specter of a tariff war continues to hover over the transatlantic trade ties. Global bloc formation could also detrimentally affect trade with the Far East. But slowbalization need not be a disaster for living standards. Continental-sized markets are large enough to prosper. Indeed, in spite of the vagaries of international commerce, the amount of shipped goods has continued to increase over the three years leading up to the end of 2017.[17] It is highly likely that in the period up to 2030-35, SLOCs within Europe, with Southeast Asia and with North America

12   Eurostat, "Maritime Transport of Goods - Quarterly Data."
13   Eurostat, 3.
14   Eurostat, 5.
15   Kuipers, *Het Rotterdam Effect*.
16   "The Steam Has Gone out of Globalisation."
17   Eurostat, "Maritime Transport of Goods - Quarterly Data," 3.

will remain vital and, because of the shared interest of all trading partners, constitute an important fundament under international collaboration.[18]

In addition to their importance for Europe's global trade, the North Atlantic and North Sea SLOCs will remain essential from a military perspective. US-based troops regularly reinforce the US forces already stationed in Europe as part of NATO's strategic messaging showing its resilience and unity. Even while Europe is trying to become more militarily self-supporting—with emphasis on the word 'trying'—in times of (open) military conflict, the supply of additional forces from North America will continue to be essential for Europe's security. These military transports will largely be done by sea, with the port of Rotterdam as the main hub in many scenarios. Russian naval ship-building plans result in an array of ships (entering service from 2015 to 2025) capable of interfering with the US–Europe SLOCs. Capable sub-surface and surface assets, some of them nuclear-powered, constitute considerable firepower that ties the US Navy to the North Atlantic and may disrupt military reinforcements from the US to Europe and onwards.[19] Concerns have also been expressed about Moscow's ability to engage in "offensive mine warfare and special forces operations, plus non-kinetic activity such as cyber-attacks, [so as] to disrupt maritime communications."[20]

Next to these quintessential military threats, the main tangible risks to Western Europe's sea lanes derive from the South rather than from the East, with one study finding that "new trafficking routes from Latin America to West Africa are bringing drugs, arms, and money onward [along Atlantic coastlines] through the Maghreb to Europe."[21] Other challenges are piracy, and the combined threat of trafficking, organized crime and terrorism.

Maritime military implications

Piracy threats are likely to remain a strategic nuisance for the routes to and from the port of Rotterdam and other northwestern European sea ports, potentially tying down considerable portions of naval assets for counter-piracy missions. The use of SLOCs for criminal activities such as drugs and human trafficking and arms trade is mostly a matter of civil authorities—e.g. coast guards and border control agencies—but do consume considerable naval assets in supportive roles.

The major change to account for in the coming years, however, is the return of creditable military threats to the SLOCs to and from Europe. Russia in recent years

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18 What slowbalization and the lack of global cooperation *do* mean, however, is that solving global problems like climate change, migration and tax-dodging is becoming even harder. And far from moderating and containing China, slowbalization will help it secure regional hegemony yet faster. As the Economist puts it: "Slowbalisation will be meaner and less stable than its predecessor."
19 Felgenhauer, "Russian Navy Preparing to Take on U.S."
20 Bosbotinis, "Defending the Seas: The US Navy Second Fleet and Atlantic Security."
21 Australian Defence Force, "Future Maritime Operating Concept - 2025: Maritime Force Projection and Control."

"has increased its patrols in the Baltic Sea, the North Atlantic and the Arctic."[22] Its submarine activity is especially deemed worrisome. In response, the US has reconstituted its second fleet, which has been playing North Atlantic waters since 2013.[23] A related risk is the possible use of sea mines, which are widely available. Such mines can be used strategically, channeling or denying passage through restricted waters and in and out of ports needed for sustenance by littoral nations. They can shape the naval battlespace and the approaches to it, setting the conditions of a campaign. Used tactically, they can slow or stop movement to and through narrow straits and to landing zones on beaches, and in so doing can also make a slowed or stopped force more vulnerable.[24] Legally, there is no restriction to laying mines in international waters, as long as it is advertised in which area these mines are deployed, in order for civilian shipping to evade these areas.[25] In response, there is a need to develop and maintain a superior intelligence position for situational awareness and situational understanding (SA/SU) of the threats posed to ports and littoral waters; and, in case of mines, adequate detection and clearing capacity.

2.3.2 Protecting sea infrastructure: the economic value of (under)sea assets and resources

Trends and developments

A major characteristic that previously distinguished land from maritime territories was the presence of population and industrial assets that needed to be defended. Such a distinction no longer really exists. Maritime areas increasingly have inherent economic value associated with trade routes, offshore installations, natural resources (including fisheries), and undersea cables and pipelines. Where in the past maritime territories could easily be vacated, today losing control over these terrains may have a high economic price.[26]

In recent years, we have witnessed—and will continue to witness in the coming years—a proliferation of infrastructure development both above and below sea level. Communication cables make up for more than 90% of all communication traffic between the US and Europe. Seabed cables are also used to transport energy. This is particularly the case in the North Sea, from the European mainland to the UK and Norway. Currently the longest inter-connector is the NorNed cable between Norway and the Netherlands. At 580 km, it is the longest submarine power cable in the world, with a capacity of 700 MW. The latest cable technology has a potential reach of up

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22   "Pentagon, Citing Russian Patrols, Bolsters U.S., NATO Presence In North Atlantic."
23   Stavridis, "The U.S. Takes Aim at Russia With a Resurrected Navy Fleet."
24   Abbey, "Sea Mines in Amphibious Operations."
25   Freedberg Jr., "Sowing The Sea With Fire: The Threat Of Sea Mines."
26   Note that economic significance is not the only factor that gives maritime terrain meaning. States often bestow political and nationalist significance upon contested maritime areas. For many regimes, like land territories, the ownership of certain maritime regions completes national sovereignty.

to 1,500 km.[27] With the construction boom of offshore wind parks, the number of seabed electricity cables will sharply rise. Because of their location and length, 24/7 monitoring—let alone protection—of seabed cables is a challenge.[28]
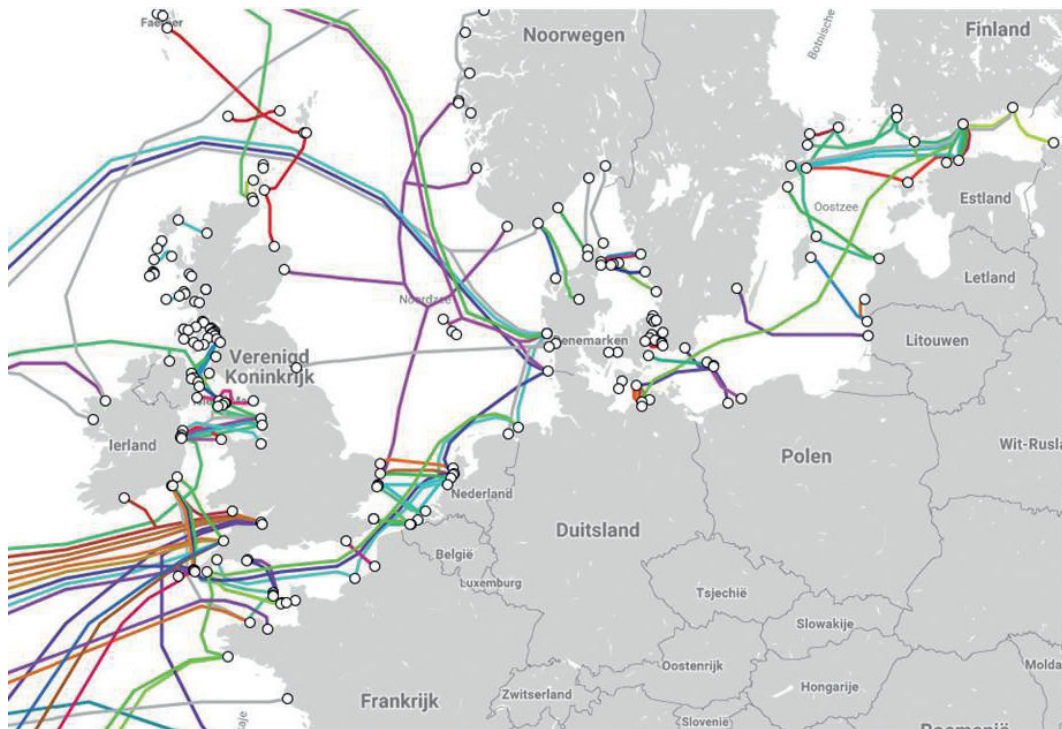

Figure 2: Overview of undersea cables in the North Sea, North Atlantic and Baltic Sea.[29]

Russian naval activity is seen as a threat to undersea cables,[30] chiefly because of growing "[f]ears of Russia cutting, disrupting or 'wiretapping' undersea communication lines" while "a lack of formal state ownership means cables do not have strong protection in international law."[31] The most concrete manifestation of Russia's capacity to jeopardize submarine cables is the deployment of the Yantar. This ship is said to carry "advanced surveillance equipment, including a remotely operated underwater vehicle and two manned submersibles that the BBC reported can dive about 6,000 meters."[32] The Russian navy is scheduled to complete construction on a second Yantar-class ship in 2019 and to begin building a third in 2020. "We are now seeing Russian underwater activity in the vicinity of undersea cables that I don't believe we have ever seen [...]. Russia is clearly taking an interest in NATO and NATO nations' undersea infrastructure."[33] In the first instance, it is not so much

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27   Subsea Cables UK, "Submarine Power Cables."
28   Barker, "Undersea Cables and the Challenges of Protecting Seabed Lines of Communication."
29   Source: "Submarine Cable Map"; An overview over time can be found here: "Messages in the Deep: The Remarkable Story of the Underwater Internet."
30   Hinck, "Evaluating the Russian Threat to Undersea Cables"; Johnson, "Russian Submarines Are Lurking near the Underwater Cables That Power the Internet."
31   "Russia a 'risk' to Undersea Cables, Defence Chief Warns."
32   Hinck, "Evaluating the Russian Threat to Undersea Cables."
33   Ziezulewicz, "Navy's Top Officer Warns of Increased Russian and Chinese Activity in the Atlantic Ocean."

a blunt cutting of communication cables that is worrisome, but rather activities like wiretapping.

Energy cables and oil and gas pipelines are equally vulnerable, difficult to monitor continuously, and impossible to protect completely. The consequences of disturbing the throughput will be felt severely in Western Europe and in the Netherlands, where the dependence on imported gas increases as a result of the shutting down of the Groningen gas fields. Disturbances of the gas supply will harm Russia as well, because they would deprive it of a major source of income. An example of such a multi-dimensional security concern is Nord Stream 2. This pipeline between Russia and Germany, intended to transport natural gas from east to west, has been controversial for some time, certainly now that the European Parliament has stated outright its opposition to the project.[34] Concerns are not only over energy security. With its $12bn in costs, the project gives Russia a good reason to ramp up defenses relevant to securing the pipeline. Within this scope, the pipeline's underwater depth is also perfectly suited for surveillance equipment, something which has been incorporated in Russia's plans for an underwater acoustic surveillance system.[35]

Maritime military implications

Monitoring of and safeguarding offshore installations and undersea cables is required, but generally more difficult than the protection of land-based vital infrastructure. The threat might be stemming from both non-state actors and state actors like Russia. Persistent presence and overview, based on superior and timely intelligence capable to counter opponents and saboteurs, is needed and requires sufficient capabilities to do so.

2.3.3 The naval offense–defense balance: modern warfighting at sea

Trends and developments

The seas and oceans are increasingly monitored around the clock. If not yet the case, over the next decade the position and movement of naval surface ships can and presumably will be tracked continuously, largely based on observations from space-based assets, both commercial and military-specific. As one observer puts it: "Movement in warfare entails hiding and seeking (attackers try to evade detection; defenders try to detect them) and penetrating and repelling (attackers try to enter opponents' space; defenders try to deny them access). But in a world that is becoming one giant sensor, hiding and penetrating—never easy in warfare—will be far more difficult, if not impossible."[36] The increased

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34   "MEPs Commend Ukraine's Reform Efforts and Denounce Russian Aggression"; "Polish PM Calls Nord Stream 2 'Weapon' Of Hybrid Warfare"; Discussed more generally in Radin, "Hybrid Warfare in the Baltics"; and Hall, "Weaponising Energy."
35   Assenova, "Europe and Nord Stream 2."
36   Brose, "The New Revolution in Military Affairs."

ability to detect ships is combined with the ability to conduct precision fires over long distances. The technology is there and available for the more advanced military actors. In the period up to 2030-35 the technology will further improve and is likely to proliferate, becoming available for more state, and indeed non-state, actors.[37]

Subsurface detection is much more complicated than it is above water, and much less robust. Although arrays of undersea sensors[38] and low frequency active sonars nibble away at their stealth, certainly in the open sea (as opposed to shallow and confined waters such as the North Sea), submarines remain far less vulnerable to detection, classification and targeting than surface vessels. This is unlikely to change in the period up to 2030-35.

Maritime military implications

In the coming decade, technological developments further impact the naval offense–defense balance, with the offensive side more and more prevailing in most elements of the engagement cycle, which concerns (1) detection; (2) classification & identification; (3) targeting; (4) weapon engagement; and (5) survivability (after a hit). This will have significant consequences for both naval strategies (as discussed in §2.6.3) and for the investment priorities in the naval capability portfolio.

The trend first and foremost affects warships, designed to function on the high end of the spectrum of possible confrontations where capable opponents may become engaged in lethal combat. In such engagements, the defender must avoid or at least delay detection, classification and identification. Once weapons are engaged, the defender is most likely running a lost race. The best bet seems to be active countermeasures, which therefore should lie at the core of the defender's investment focus. Survivability measures to remain functioning as an active warship after being hit is probably the least productive approach in the time frame up to 2030-35, from a technical but certainly from an economic cost–benefit perspective. The guided munitions, torpedoes or cruise missiles launched from a variety of naval platforms or land bases tend to be much cheaper than the assets they could credibly destroy.[39]

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37 A word of caution is in place here. The bare fact that the required 'sensor to shooter' technology suite becomes available to a wider range of actors, does not mean that these actors possess the advanced operational skill set to effectively deploy that technology suite, e.g. to have the proper coordination mechanisms in place to seamlessly connect 'sensors' and 'shooters'. Furthermore, the technology for deception is also advancing. Although the technology-driven long-term trend with the offensive–defensive balance tilting toward the former is unmistakable, this tendency should be looked upon in a nuanced way in actual operations, in particular against 'new' opponents lacking operational experience.

38 US activities are exemplary for what e.g. Russia, Taiwan, Japan, China and Israel are doing, see Stashwick, "US Navy Upgrading Undersea Sub-Detecting Sensor Network."

39 See e.g. Kelly, Gompert, and Long, *Smarter Power, Stronger Partners, Volume I*. This study states that "A2AD is significantly cheaper overall than platform-based force projection. A2AD weapons cost, on average, a small fraction of the cost of the platforms they are designed to strike, particularly missiles that target U.S. ships, aircraft, and bases. For U.S. force projection, the disadvantage is growing as the costs of U.S. ships and aircraft continue to climb faster than the costs of A2AD systems. These trends help explain why enemy A2AD is steadily improving relative to U.S. force-projection capabilities."

2.4 Maritime security issues in the Caribbean Region

Geopolitically, the Caribbean region has long played only a secondary role from the European perspective. The Kingdom of the Netherlands sees the Caribbean more as a theater of interest than of security threats. But the region is facing more volatility with a definite security angle. First of all, the broader geopolitical environment is changing as China and Russia seek more influence, while the US' interest and influence in the region has been eroding. Secondly, criminal networks continue to proliferate in the Caribbean, with the Netherlands Antilles being a linchpin of sorts in these networks. Thirdly, the region is increasingly being battered by tropical storms, some of which in the long run threaten the very existence of various islands, including the Windward Islands, St. Maarten, Saba and St. Eustatius.

2.4.1 Defending the Kingdom in a sea of geopolitical turbulence

Trends and developments

The instability in Venezuela is currently the most pressing security issue for the Netherlands Antilles, especially the islands Aruba, Bonaire and Curacao (ABC-islands). This instability feeds economic unrest, physical unsafety, criminality and environmental issues in the region. In a way, it is comparable to what Italy faces in Libya: an increasingly lawless zone from which boats head north with migrants, drugs and weapons, with the islands of the Kingdom being used as a waystation into the rest of the Caribbean. However, it is not this particular crisis in itself that is important in our outlook up to 2030-35, although we do highlight some of its consequences because they are illustrative for generic issues associated with enduring instability in the region.

For the Caribbean part of the Kingdom, the most direct impact of the Venezuelan crisis is that of refugees.[40] Since 2015, some three million people have fled Venezuela. Proportionally speaking, in early 2019 the refugee crisis has made Curaçao the second largest host country in the world, after Lebanon.[41] Another consequence is the rise of piracy in the southern part of the Caribbean: "In lawless ports like Guiria in the Venezuelan state of Sucre, the pirates operate with near impunity, kidnapping Trinidadian fishermen and holding them for ransom. [...] On the return run, the pirates bring back the ordinary provisions that are in desperately short supply in their home country: nappies, rice and cooking oil."[42] A final consequence is that despondent Venezuelans are being recruited by rebel forces in Colombia.[43] Even if

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40   O'Neil, "A Venezuelan Refugee Crisis."
41   Given that Curacao has about 161,000 inhabitants, see Loesche, "Lebanon Still Has The Highest Refugees Density."
42   Freeman, "Pirates of the Caribbean: How Venezuela's near Collapse Is Causing a Crisis on the Seas."
43   Otis, "Fleeing Crisis, Some Venezuelans Are Recruited By Rebel Forces Fighting In Colombia."

Venezuela's democracy is restored shortly, the economic situation will take years to normalize. With low living standards, as well as fuel and food shortages, people will continue to emigrate from Venezuela to surrounding countries, bringing potential instability there.

The Venezuelan crisis is also illustrative for its larger geopolitical angles. The increasing dependency of Venezuela on outside sponsoring by both China and Russia has enabled these countries to enhance their influence in the region. At present, China is Venezuela's largest trade partner and also the second largest importer of Venezuelan oil, behind the United States.[44] Caracas is also heavily indebted to Beijing.[45] Meanwhile, Russia, Venezuela's traditional benefactor, is also making further inroads in the region. In fact, it has been reported that Russia is "currently seeking to install a military base in Venezuela,"[46] has installed a number of S-300 air defense systems that overlap with the ABC-islands' airspaces,[47] and, more generally, heavily supports the Venezuelan armed forces.[48] China has undertaken multiple tours around the region with its navy vessel 'Peace Ark', first in 2011, and at least a second time in 2018.[49] The BRI now extends beyond Asia, Europe and Africa to include Latin America. For now, China keeps its military footprint in the region deliberately limited so as not to (unintentionally) provoke the United States.[50] Meanwhile, the US Navy has revived its Fourth Fleet (SOUTHCOM) in order to "have a significant presence in the Western Hemisphere in the eyes of the Latin American and Caribbean States, and also of superpowers such as Russia and China."[51] It is unlikely that the US will willingly accept a large military presence of either China or Russia in what they consider their strategic backyard.

Apart from the situation in Venezuela, there are plenty of border disputes that could in the (near) future lead to escalation (see Figure 3), causing similar security issues to those described above. These include unresolved border disputes between Guyana and Venezuela, which could spark conflict given the oil deposits in the area under dispute,[52] between Colombia and Venezuela and between Surinam and French Guiana.

44 Oosterveld, Wilms, and Kertysova, "The Belt and Road Initiative Looks East."
45 Ng, "China Says Promise of More Money for Venezuela Part of 'Mutually Beneficial Cooperation.'"
46 Martin, "Russia Seeks to Install a Military Base in Coastal Venezuela."
47 Fiorella, "Russians In Venezuela: What We Know So Far."
48 The Wagner group, a Russian PMC (also known as Putin's private army) is present in Venezuela. The Venezuelan armed forces are now almost fully equipped with Russian material, mostly pre-paid by future deliveries of oil and control over oil and gas fields, see Tsvetkova and Zverev, "Kremlin-Linked Contractors Help Guard Venezuela's Maduro.
49 Panyue, "Chinese Hospital Ship Peace Ark Makes Maiden Visit to Dominica."
50 Seligman, "U.S. Military Targets Growing Russian and Chinese Influence in Latin America"; Cox, "Defense Officials Warn of China and Russia Tampering in Caribbean."
51 "The US Fourth Fleet: Focus on Latin America."
52 "UN Boss Refers Guyana-Venezuela Border Dispute to International Court of Justice."
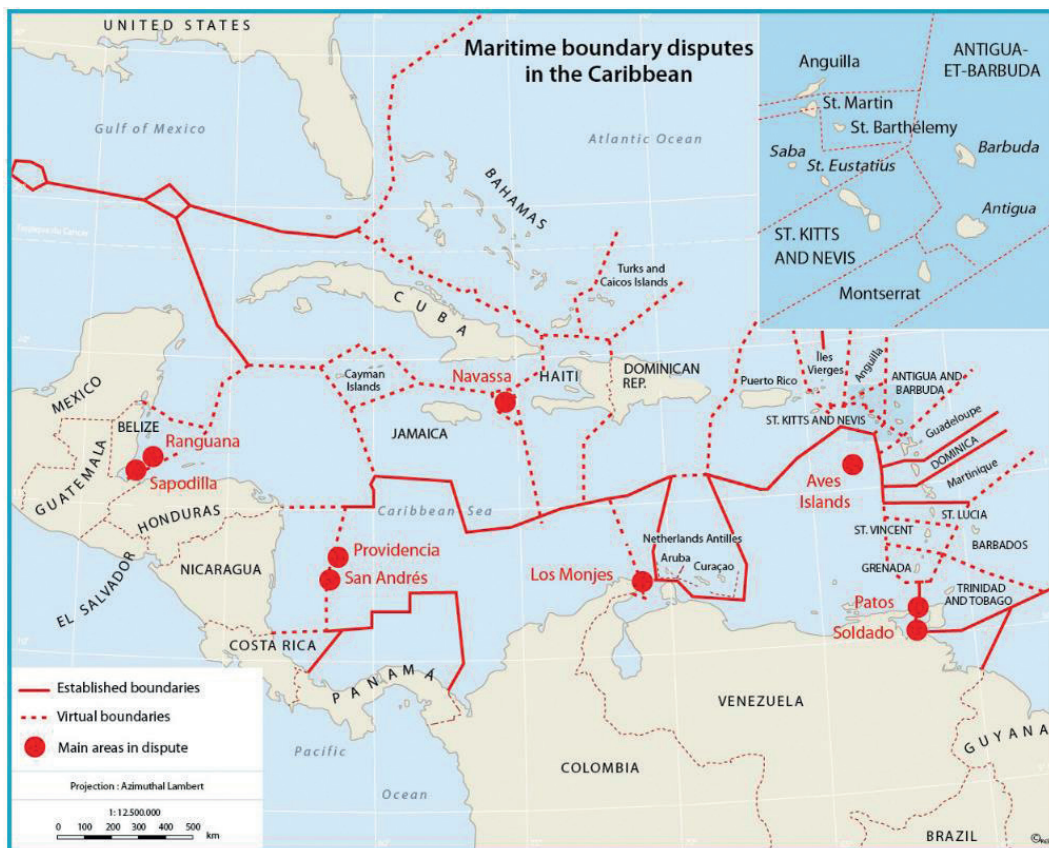
Figure 3: Maritime boundary disputes in the Caribbean[53]

Maritime military implications

The Charter for the Kingdom of the Netherlands states that maintaining the independence and defense of the Kingdom are Kingdom affairs.[54] The Netherlands therefore has the obligation to safeguard the Caribbean part of the Kingdom, in a similar way to islands where the UK and French flags still fly. The armed forces carry primary responsibility for this, both in terms of territorial defense as well as assistance to local civil authorities in upholding international law (the latter is dealt with in §2.4.2).[55] Bad governance creates instability in the region and the potential of political adventurism. With the Venezuelan situation as the current example, possible crisis scenarios, mostly centered on large refugee flows towards the islands of the Kingdom, require more military capability—with a heavy naval component—than the current 'tripwire' presence. Certainly in rapidly escalating circumstances, reinforcements from

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53   "Maritime Spaces - Multiple Low Level Disputes."
54   The Statute takes preference over the Constitution. The Defence White Paper of 2018 elaborated on this in Appendix I Charter, Constitution, main tasks and treaty obligations, see "Defence White Paper 2018: Investing in Our People, Capabilities and Visibility."
55   Koninklijke Marine, "Commandement der Zeemacht Caribisch Gebied." In the civilian realm, the Dutch coastguard has had an agreement since 2010 (the San Jose Convention) which enables cooperation with the coastguards of the US and France. There are also bilateral cooperation agreements, including one with Venezuela, which has been in place since 1997; see Kustwacht voor het Koninkrijk der Nederlanden in het Caribisch Gebied, "Jaarverslag 2016."

the Netherlands are bound to be too little, too late. US support to quickly (re)act in case of an escalating crisis is indispensable.

The dependency on extra-regional navies is exacerbated by many Caribbean nations' increasing dependence on military assistance: "Caribbean defense forces in general have limited defense budgets, hence new platforms, aerial or maritime, are not acquired or modernized regularly. Moreover, the aforementioned examples also highlight the continuous reliance on extra-regional allies for donations in order to expand the naval inventory of these defense forces."[56]

2.4.2 Criminal networks and emerging piracy

Trends and developments

Partly connected to regional political instability, drug production and trafficking—accompanied by other illegal activities, such as arms trade and trafficking of persons—will continue to plague the area. In recent years, there is a tendency towards increased and more diversified drug trafficking across the region.[57] Much of the trafficking takes place across the seas: "[t]he primary methods used by traffickers include shipping drugs in commercial containers, luxury craft or 'go-fast' boats, self-built submarines, commercial or private flights and human drug mules," which is facilitated by "long coastlines that are difficult to patrol, a flurry of commercial maritime and air traffic that helps conceal illicit cargos, and widespread government and security force corruption."[58] As a result, the US coast guard has beefed up its presence in the area in recent years.[59]

Violent crime is also on the rise. One report notes that there has been "a significant increase in violent incidents and anchorage crime, particularly in the anchorages of Venezuela and the recent violent incidents off Surinam in the first part of this year."[60] In general though, piracy is still relatively rare: "[a]lthough piracy occurrences in the Caribbean are low, the risk is not zero."[61] Even so, the organization Oceans Beyond Piracy registered 71 incidents in Latin America and the Caribbean in 2017, as opposed to 27 in the previous year, of which most incidents concerned "anchored yachts [which are] the primary targets for attackers."[62]

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56   Sanchez, "Tradewinds 2018 and the Caribbean's Maritime Security Challenges."
57   Clavel, "String of Large Drug Seizures Suggests Growth in Caribbean Trafficking"; UNODC, "Global Seizures of Drugs."
58   "Caribbean Profile."
59   "US Coast Guard Offloads Thousands of Pounds of Cocaine in Caribbean Sea."
60   "The State of Maritime Piracy."
61   "The Spiraling Cost of Maritime Security."
62   Sanchez, "Tradewinds 2018 and the Caribbean's Maritime Security Challenges."

Figure 4: Piracy events in the Caribbean[63]

Maritime military implications

The Dutch military presence in the Caribbean part of the Kingdom of the Netherlands is mainly geared towards support of local authorities in fighting organized crime, most of which drugs-related. Recent trends indicate that this fight has to be stepped up both in quantity and quality. In response, various regional navies have been upgrading their fleet. For instance, the Bahamas have been working with Dutch companies Damen and Van Oord, having the Royal Bahamas Defence Force (RBDF) "investing in nine new vessels and three port facilities to renew its naval infrastructure. [These] vessels are reported to be costing US$149 million, while the port facilities represent a further US$75 million."[64] The Jamaica Defense Force acquired two more Damen patrol vessels in 2017.[65]

Ensuring solid cooperation with likewise partners with interests in the region, such as the US, the UK and France, is a vital factor in protecting mutual interests. This cooperation is not only aimed at limiting criminal activity, but also at emergency relief and crisis management in the case of severe weather occurrences (see §2.4.3).

2.4.3 A region battered by storms: dealing with climate change

Trends and developments

The Caribbean has mostly made headlines in the past decades due to devastating hurricanes that have ravaged its coasts, especially the northern part of the archipelago.

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63   "Piracy And Armed Robbery Against Ships In Latin America And The Caribbean 2017."
64   "The Spiraling Cost of Maritime Security."
65   Sanchez, "Tradewinds 2018 and the Caribbean's Maritime Security Challenges." The website https://www.icc-ccs. org/ gives updated overviews of piracy actions.

In 2017, hurricane Irma devastated up to a third of all residential infrastructure on St. Maarten. While the frequency of such storms does not seem to have increased,[66] their severity has.[67] Ongoing climate change is projected to lead to deteriorating living conditions.[68]

The threat from climate change could become an existential threat to some countries in the region, including St. Maarten, Saba and St. Eustatius, as the costs of annual reconstruction could make it impossible to continue to sustain livelihoods on these islands. China has been ready to step in to help these islands become more climate resilient.[69] Indeed, local leaders have said that such engagement is needed "in the wake of US withdrawal from the region."[70] But there is also another security dimension in that widespread devastation can lead to social unrest and a breakdown of governance and law enforcement leading to long-term dysfunction.[71]

Maritime military implications

These environmental trends will likely intensify the demand for disaster relief, crisis management and post-disaster reconstruction, in which the RNLN may play its part. The US Navy has undertaken specific training exercises to this end.[72] The exercises fits in a larger context of the Caribbean Basin Security Initiative, which focuses on increasing regional cooperation for complex multinational security operations and humanitarian assistance and disaster response operations.[73]

2.5 Maritime security issues in the Mediterranean

The Mediterranean is of great significance to Europe, mostly because, as a recent RAND report concludes, "European security is increasingly linked to security in the Middle East and North Africa."[74] Migration flows across the Mediterranean will remain an issue in the period up to 2030-35. Furthermore, along the Mediterranean shores "[n]ew regional sea powers are gradually acquiring modern naval equipment and area denial systems (naval, anti-submarine, and air defense). [This] runs the risk of nations seeking to take control of maritime and air approaches to their territory, to the detriment of international freedom of movement."[75] The Mediterranean is also important from an economic perspective. As an example, some 65% of the oil and

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66   "Hurricanes and Climate Change."
67   Sneed, "Was the Extreme 2017 Hurricane Season Driven by Climate Change?"
68   "Caribbean."
69   Oosterveld, Wilms, and Kertysova, "The Belt and Road Initiative Looks East," 80.
70   Ward, "The PRC Bets on Climate Diplomacy in the Caribbean."
71   Whelan and Pop, "Looting Reported on Caribbean Island Struck by Hurricane Irma."
72   "Tradewinds 2018."
73   "Caribbean Basin Security Initiative."
74   McNerney, Persi Paoli, and Grand-Clement, "Cross-Cutting Challenges and Their Implications for the Mediterranean Region," 18.
75   Ministère des Armes: Strategic Review Committee, "Defence and National Security Strategic Review: 2017," 43.

natural gas consumed in Western Europe passes through the Mediterranean each year.[76] Finally, the expansion of China's footprint in the region may cause anxiety. Taken together, these issues make that the Mediterranean basin is set to remain a primary focus area for European navies.

Note that the re-emerged geopolitical military competition described in §2.3 is also visible in the Mediterranean, following a similar logic as expressed there. Again, Russia is the principal opponent. The development of the port of Tartous in Syria and efforts to control the Libyan ports of Tobruk and Derma are the most significant manifestations of Moscow's military presence today. From Tartous Russia can monitor NATO activity in the Eastern Mediterranean, including Israeli movements and activity on Incirlik airbase in Turkey.[77] Next to Russia, increasingly important roles are being played by regional powers such as Turkey, Israel, and Iran. Chinese presence is on the rise, and might well pose longer-term security challenges for Europe.

Furthermore, the Black Sea is of strategic importance to NATO members such as Romania and Bulgaria, but also for the Ukraine, as these countries' only maritime access is through the Istanbul Strait. The Montreux Agreement provides for guaranteed access, but when this is violated, the Strait represents a chokepoint that can be easily blocked. Most of the developments discussed below also tend to apply to the Black Sea region.

2.5.1 Developments in migration

Trends and developments

It may be argued that "Europe's greatest challenge is migration and management of its 3,000 miles of borders along the Mediterranean."[78] One root cause of migration is the fact that sub-Saharan Africa has "the highest fertility rates on Earth [and that] a great many of [its youth] can be expected to migrate in search of opportunities — assuming their own countries do not deliver on jobs and wages in the years to come."[79] Even if the current demographic projections are overestimated, the mismatch between population growth and economic growth in the Middle East and North Africa (MENA) region spell lasting migration issues for the period up to 2030-35, further exacerbated by the impact of climate change. This puts pressure on the 'blue' European borders in the Mediterranean, which are also to a large extent the Dutch external borders under the Schengen agreement.

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76   "Operation Sea Guardian."
77   Clara and Colom Piella, "La Geopolítica de Las Bases Militares," 8.
78   McNerney, Persi Paoli, and Grand-Clement, "Cross-Cutting Challenges and Their Implications for the Mediterranean Region," 5.
79   Engelke, Aronsson, and Nordenman, "Mediterranean Futures 2030: Toward A Transatlantic Security Strategy," 7.

Currently, the bulk of migrants are being transported through criminal networks. Europol has reported that over 90% of migrants travelling to the EU use 'facilitation services', in most cases provided by criminal groups. In 2015, criminal networks were estimated to have generated €3 to 6bn in income from these activities.[80] Human trafficking will remain an important security concern in the Mediterranean in the coming years. An agreement with Turkey in 2015 managed to stem a large part of the migrant tide. Another deal was struck with African countries in 2018, but it looks unlikely that European countries will continue to keep paying countries such as Morocco and Algeria to keep migrants from entering boats to Europe.[81] Meanwhile, in the seas off the Libyan coast, a lack of ability of vessels operating under the flag of Operation Sophia brought "unintended consequences of smugglers adapting and sending migrants to sea in unseaworthy boats, which resulted in a higher death toll at sea."[82] This example serves to show that there are no permanent solutions, but a continuously adapting patchwork of partial measures with an effectiveness limited in time.[83]

Maritime military implications

In principle, the military support civil authorities and agencies in managing migration flows at Europe's southern and southeastern borders. In practice, the operational role of the military can be substantial. Both the EU and NATO have missions running in the Mediterranean and Aegean Seas. Interestingly, a report by the House of Lords found that "[a] naval mission is the wrong tool with which to tackle migration in the central Mediterranean."[84] Indeed, naval assets are expensive to operate and represent an overkill of capabilities for these non-military tasks. At the same time, they generally have a very capable suite of sensors that are of great value in these tasks. Requirements for (new) ways to monitor, control and possibly close of the blue European borders in the Mediterranean, in combination with measures aimed at the root causes for the migration flows, will remain. It is, however, questionable to what extent Europe's armed forces will be (t)asked to provide the capabilities to meet these requirements in the period up to 2030-35, or that more focused non-military solutions will be developed.

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80 McNerney, Persi Paoli, and Grand-Clement, "Cross-Cutting Challenges and Their Implications for the Mediterranean Region."

81 Liberatore, "Migrazioni, Globalizzazione e Mediterraneo: Verso Un Obiettivo Di Sostenibilità."

82 Drent, "Militarising Migration? EU and NATO Involvement at the European Border."

83 Note that operations aimed at managing migration flows tend to have overlapping requirements with maritime security operations. Operation Sea Guardian, the current non-article 5 maritime security operation in the Mediterranean, aims to support regional stakeholders in maintaining maritime situational awareness, upholding freedom of navigation, conducting interdiction tasks, conducting maritime counter-terrorism, contributing to capacity building, countering proliferation of weapons of mass destruction and protecting critical infrastructure. See "Operation Sea Guardian."

84 Drent, "Militarising Migration? EU and NATO Involvement at the European Border."

2.5.2 China's expanding footprint in the region

Trends and developments

Being on the other end of China's BRI, Beijing has steadily been expanding its footprint in the Mediterranean basin. The best-known development is the lease by the China Ocean Shipping Company (COSCO) of the Greek port of Piraeus in 2008.[85] Significantly, Greece also controls the largest commercial fleet in the world. More than half of China's crude imports is shipped by Greek ships.[86] However, Piraeus is far from the only port of interest to China. Others include Cherchell in Algeria, Port Said and Alexandria in Egypt, Ashdod and Haifa in Israel, a port in Istanbul, and the ports of Savona, Trieste, Genoa and Naples in Italy. China has also expressed interest in ports in Portugal and Tangier in Morocco.[87]
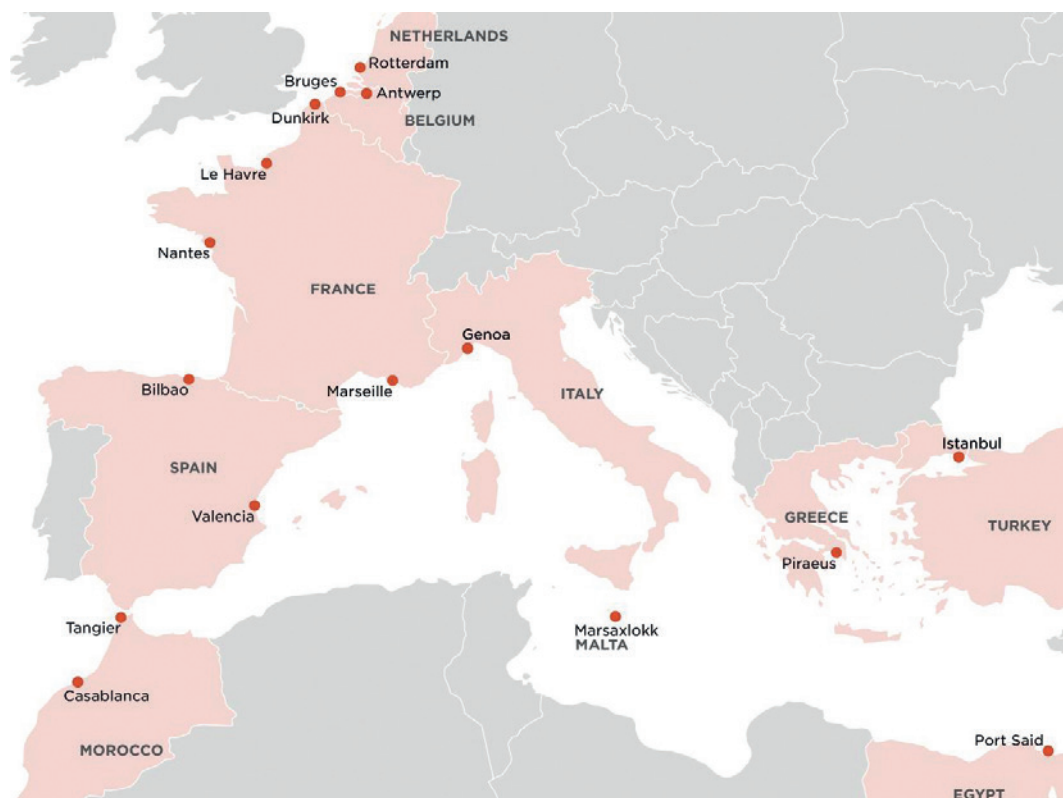
Figure 5: Ports in which the Chinese state-owned enterprises COSCO Shipping Ports and China Merchants Port Holdings have acquired stakes.[88]

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85   Kakissis, "Chinese Firms Now Hold Stakes In Over A Dozen European Ports"; Johnson, "Why Is China Buying Up Europe's Ports?"
86   Müller-Markus, "China Fondea En El Mediterráneo: ¿un Mar de Oportunidades Para Europa?"
87   Ekman, "La Chine En Méditerranée : Une Présence Émergente," 15–16.
88   Kakissis, "Chinese Firms Now Hold Stakes In Over A Dozen European Ports."

The Chinese are also using these ports as beachheads (or "Dragon Head", as the Piraeus port is sometimes called)[89] for accessing the hinterland. In Israel, this means creating a railway from Ashdod on the Mediterranean to Eilat, in order to bypass the Suez Canal, which can change the strategic calculus regarding that key international waterway.[90] Piraeus is supposed to be the end point of a future railway line that cuts into the heart of Europe—a railway that in itself has already caused a lot of controversy, and brought calls by the EU to strengthen competition rules.[91] The Chinese also seek to strengthen their cooperation with Mediterranean countries separate from engaging with the EU. For instance, akin to their 16+1 cooperation format in eastern Europe, they have initiated global maritime cooperation pacts with Greece, Italy, Spain, Portugal, Cyprus and Malta, whilst deliberately excluding France and the UK. However, in 2017 these countries apparently refused to go any further in formalizing these ties.[92]

On the southern and eastern coastal areas, China is strengthening ties with Egypt, as well as with several other countries and ports in Africa. Today, they have "upgraded their relations to a 'comprehensive strategic partnership' as China works to strengthen the Egyptian economy and improve links across Egypt's north, which gives the BRI network an opening into Africa."[93] China is also investing in sea cables: Huawei Marine Networks has developed a cable called Hannibal between Tunisia and Italy.[94] These investments could also lead to developing political and military activities, including intelligence gathering. In addition, such acquisitions may provide leverage to China being able to limit access to ports or other kinds of infrastructure, or securing political support.

Maritime military implications

The longer term strategic implications of the way China combines strategic economic and political motives in its BRI are already chiefly discussed in §2.1. Strategic investments in ports in the Mediterranean basin hold the possibility of an increased military presence of China in the region. Indeed, the Chinese Navy (PLAN) has negotiated the Mediterranean for some years now. They docked in the Israeli port of Haifa in 2012. What is more, the Chinese are also said to be developing facilities in the Russian military port of Tartous, Syria.[95] Mediterranean ports can serve dual civilian and military purposes for China. For instance, a terminal in the port of Naples is run by COSCO, but could also be used to observe activities relating to the

89   Brinza, "How a Greek Port Became a Chinese 'Dragon Head.'"
90   Stifani, "Il mediterraneo cinese."
91   Pandya and Tagliapietra, "China's Strategic Investments in Europe: The Case of Maritime Ports."
92   Ekman, "La Chine En Méditerranée : Une Présence Émergente."
93   Engelke, Aronsson, and Nordenman, "Mediterranean Futures 2030: Toward A Transatlantic Security Strategy," 12.
94   "Huawei Marine Successfully Delivers Hannibal Submarine Cable System for Tunisie Telecom."
95   Cristea, "Tribulations Chinoises En Méditerranée...."

nearby NATO base. The port of Piraeus can be used for evacuation operations of Chinese citizens from the Middle East.[96] Douglas Feith, a former Bush White House official, said in this regard that "[m]ost militaries use civilian technology, and that's one reason why the Chinese favor economic activities like expanding ports. These are not only commercial, but commercial with military implications."[97] But even if they are developing their military footprint, "there are no signs so far that China is interested in acting as a security provider in this region."[98] Although a direct military confrontation with China in Europe's back garden is unlikely for the foreseeable future, more hybrid confrontations might develop. As the renowned American analyst John Mearsheimer holds, it seems unlikely that the rise of China can be peaceful indefinitely.[99]

2.5.3 The geopolitics of energy from and through the sea

Trends and developments

The geopolitical significance of the Mediterranean Sea region is the result of three factors: its location at the junction of Europe, Asia and Africa, its significant international sea routes and straits (Gibraltar, Bosporus, Dardanelles, Suez Canal) and its potential as a source of oil and natural gas.[100] Both a production site and transport route of oil and gas, the Mediterranean is of key importance to the EU as one of the biggest net importer of oil and the biggest importer of natural gas worldwide, as well as to the fossil fuel-exporting MENA countries.[101]

Recent gas discoveries in Exclusive Economic Zones (EEZ) of countries in the Eastern Mediterranean have reaffirmed the region's potential as a source of oil and gas. The West Nile Delta, Nooros, Atoll and Zohr fields located offshore in the Eastern Mediterranean near Egypt's northern coast were fast-tracked for development by the Egyptian government, and production began at the end of 2017. Figure 6 provides an overview of these fields and the important energy route to Europe—the Suez Canal— as well as other hydrocarbon sources which have recently been discovered in the EEZs of Cyprus (Block 12) and Israel (Leviathan). The US Geological Survey estimated that the Levantine Basin is one of the world's largest deposits.[102]

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96   Müller-Markus, "China Fondea En El Mediterráneo: ¿un Mar de Oportunidades Para Europa?"
97   Ahronheim, "Naval Experts Concerned over China's Increasing Presence in Mediterranean."
98   Dokos, "Contested Mediterranean? NATO's Maritime Role Amid Shifting Balances."
99   Mearsheimer, *The Tragedy of Great Power Politics*, 340–411.
100 Prontera and Ruszel, "Energy Security in the Eastern Mediterranean."
101 Quattrocchi, "Energy Security."
102 Levoyannis and Labrèche, "New Gas Discoveries in Southern Periphery May Transform European Energy Landscape."
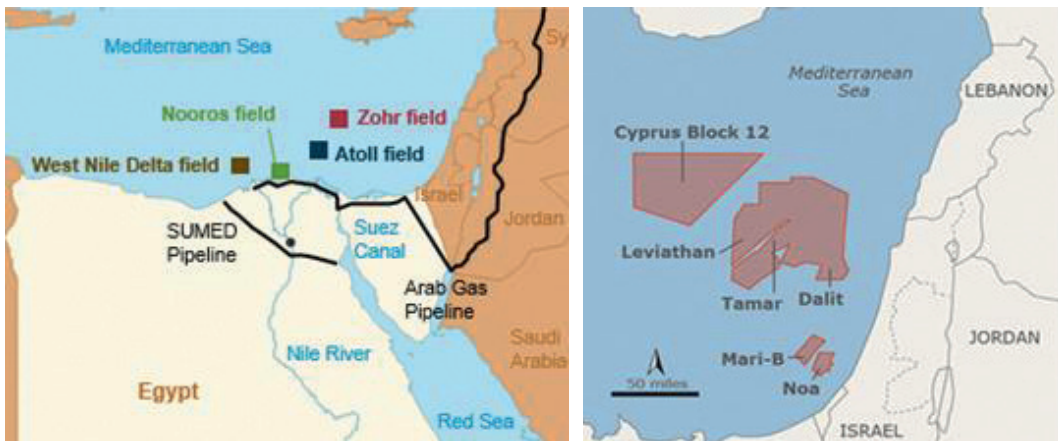
Figure 6: Egypt's natural gas fields[103] and gas fields in EEZs of Cyprus and Israel[104]

The strained relationship between Israel and Turkey signaled the end of plans to build a pipeline between Leviathan and Turkey. Instead, Israel recently decided in favor of planning the Eastern Mediterranean (EastMed) pipeline. Supported by the EU, the pipeline will transport gas from Israel's part of the Levantine Basin through Cyprus to Greece, Italy, and Bulgaria (Figure 7). The current design of the EastMed Pipeline envisages a 1,300 km offshore pipeline and a 600 km onshore pipeline.[105] When (and if) finished, it will constitute the longest and deepest underwater fuel pipeline in the world, with depths up to over three kilometers. In response, Turkey turned to Russia to agree on building the TurkStream pipeline.

Figure 7: The EastMed pipeline[106]

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103   Han, "Offshore Discoveries in the Mediterranean Could Increase Egypt's Natural Gas Production."
104   Source: Noble Energy
105   "Eastmed."
106   Ellinas, "EastMed Gas Pipeline Increasingly Doubtful."

Maritime military implications

As the energy potential of the Eastern Mediterranean grows, so does the potential for conflict. Even though there are some border disputes, a possible escalation of energy conflicts among the states in the Eastern Mediterranean constitutes the biggest threat to maritime security. It may cause a (temporary) blocking of choke points and maritime trade routes for oil and gas, and thus severely affect the energy supply to different parts of Europe. We highlight two current developments to illustrate the kind of security issues that may pop up—and potentially escalate—in the time to come.

First, Lebanon's decision to award exploratory licenses in disputed waters has prompted a harsh exchange with Israel, including Hezbollah threatening to attack Israeli gas installations early last year.[107] Renewed efforts to push for a maritime delimitation agreement between Israel and Lebanon are essential but seem difficult to reach due to the political environment in both countries and the wider region.[108]

Second, tensions between Cyprus and Turkey over offshore development are plaguing the future of gas development in the Eastern Mediterranean. Together with Block 12, Cyprus' recent discovery of the Calypso strengthened Nicosia's plans to produce and commercialize the gas (e.g. in the form of LNG). It is likely this possibility prompted Ankara to increase the pressure and prevent further drillings off the shore of Cyprus.[109] Turkish Energy Minister Berak Albayrak warned that Turkey would block "unilateral exploration" until there is an accord to reunify Cyprus and, subsequent to the Calypso announcement, Turkish warships prevented an Eni drilling ship from carrying out a scheduled exploration.[110]

Despite the geopolitical angles associated with (some) undersea pipelines,[111] the security risks seem to be limited.[112] Although pipelines may be prone to attacks from both state actors (in wartime) as well as non-state actors (as a deed of terrorism or sabotage), land-based pipelines are generally a more likely target.

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107   Barrington and Francis, "Hezbollah Says Lebanon Must Be Firm in Israel Energy Dispute."
108   Koranyi, "As the Energy Potential of the Eastern Mediterranean Grows, so Does the Potential for Conflict."
109   Koranyi.
110   Jewkes, "Turkish Blockade of Ship off Cyprus Is out of Eni's Control."
111   A politically much more controversial pipeline then e.g. EastMed is Nordstream 2 (NS2), entering Europe via the Baltic Sea. When completed, NS2 will cover 1200 km of offshore pipeline, with a maximum water depth of 210m. Due to permit restrictions in German waters, the water depth of NS2 is less than 20 m for 75 km of the route. NS2 has similar technical specifics as NS1, which has been operational since 2012, and follows a similar path as NS2.
112   Unless security comprises environmental security, as is the case in National Security Strategy of the Netherlands. The oil spill after the Deep Water Horizon disaster in 2010 (see e.g. "Gulf Oil Spill" https://ocean.si.edu/conservation/pollution/gulf-oil-spill) serves as an example of the calamitous results undersea pipeline breaks could have.

2.6 Maritime security issues in the Baltic Sea and Arctic Sea Regions

This maritime area is unique in itself, with the Baltics as a type of inner sea where NATO and EU countries join borders with Russia. Here, militarily relatively weak NATO countries are within direct spheres of influence of Russia, the latter manifesting itself more and more as an actor unwilling to stop playing the power game, in spite of international pressure. Further to the north, as a consequence of global warming, the Artic Sea region is becoming more navigable and open for mining resources from the seabed. Illustrative challenges in these areas are the developments in hybrid warfare, the opening or emerging of new SLOCs, and the effective A2AD strategy and systems deployed.

2.6.1 Evolving military strategy: conventional and hybrid strategies

Trends and developments

In the 21st century, hybrid forms of conflict have rapidly gained traction. Hybrid strategies turn (latent) conflicts into a multi-dimensional problem. The military, as well as other instruments of state power, have come to face rapid shifts from low- to high-intensity conflicts and multi-domain confrontations with varying levels of intensity. The persistence of this trend will require more flexibility and the option to rapidly alternate between different levels of readiness and types of capabilities.
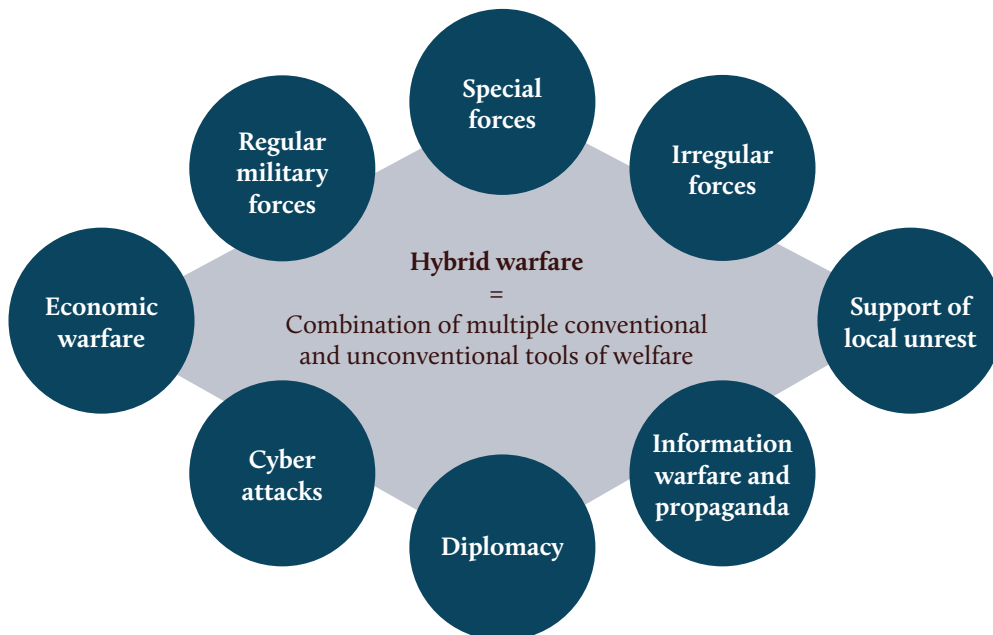

Figure 8: instruments of state power used in hybrid confrontations[113]

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113 Security Conference (@MunSecConf), "Here's a Chart from Our Munich Security Report Assembling Components of Hybrid Warfare […]."

From a military maritime perspective, hybrid strategies by the opponent broaden the range of risks and threats that have to be considered. There is (the risk of) "sabotage [or] navigational spoofing [...], resulting in lost or disrupted cargo, denial of access to critical port facilities, and environmental damage."[114] Equally, such attacks can impact energy infrastructure or seabed cables. GPS-signal jamming, such as occurred during the 2018 NATO-led exercise Trident Juncture, falls within the hybrid warfare category, and poses a serious risk to both military and commercial air traffic and shipping in the affected air and sea space.[115] Furthermore, mistaken intents and activities could result more easily in unintended friction and conflict.

In the Baltic and Arctic regions, Russia faces off against NATO, making Moscow more likely to opt for surreptitious hybrid tactics over traditional saber-rattling. In July 2017, China and Russia held a military exercises in the Baltic Sea. This military team-up appears largely a marriage of convenience, intended for strategic messaging towards the US.[116] The direct military threat is limited, but the strategic messaging can be seen as part of the hybrid game of building pressure towards the Baltic EU and NATO members.

Maritime military implications

Vulnerabilities to hybrid maritime security threats can lie in many domains. These can include commercial, cyber, energy, communications and disinformation, territorial and military and security forces related vulnerabilities.[117] Especially in the Baltic Sea theater, it is clear how hybrid strategies broaden the conflict to become a multi-dimensional problem. It is quite plausible that this increased multi-dimensionality further complicates conflict and conflict resolution in the period up to 2030-35. As a contemporary illustration, Europe's dependency on Russian gas increases Europe's vulnerability to Russian influence, while at the same time annoying the US who sees this as unwanted mingling within NATO. Germany, as voiced by Chancellor Merkel, puts emphasis on keeping the dialogue open, stressing the mutual dependencies and underlying economic power as the fundamental basis for building a high-tech military.

A purely naval or maritime answer cannot be given, but there is an important role for navies to patrol, show presence and force and to keep sea lanes open as part of an overall deterrence strategy.

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114   Kremidas-Courtney, "Countering Hybrid Threats in the Maritime Environment."
115   O'Dwyer, "Finland, Norway Press Russia on Suspected GPS Jamming during NATO Drill."
116   Ekman, "La Chine En Méditerranée : Une Présence Émergente," 20; Morgan, "Russia's Military Dalliance with China."
117   Kremidas-Courtney, "Countering Hybrid Threats in the Maritime Environment."

2.6.2 New SLOCs melting into existence

Trends and developments

The Arctic region, and the question of who it belongs to, has long been a source of discussion. This discussion has intensified now that climate change is having a serious impact on resource obtainability in the Arctic Ocean and navigability of the Northern Passages. Of the eight countries lying within the Arctic circle—Canada, the Kingdom of Denmark (Greenland), Finland, Iceland, Norway, the Russian Federation, Sweden and the United States (Alaska)—only the US has not ratified UNCLOS. However, the US regards it as customary law and abides by it.[118] According to UNCLOS, countries can claim an EEZ, which grants the state exclusive rights to the natural resources in the area. The EEZ area ranges up to 200 nautical miles, but can be extended up to 350 nm in the case of a natural prolongation of the territory on a so-called continental shelf. The most recent claim by Denmark overlaps with the claims by Russia and Canada, which can be a potential source of conflict. UNCLOS is further discussed in §2.7.2.

There is much debate how soon the melting Arctic ice is turning the centuries-old idea of the northern passages into an economically viable reality. Even though the Northeast Passage (NEP, the sea route north of Russia) makes the route from Rotterdam to Yokohama up to 37% shorter as compared to the Suez Canal route, it is unclear whether the route will be economically attractive any time soon. There are several challenges. First, the just-in-time principle of global supply chains is at odds with the unpredictability of the NEP. Second, surprisingly, the Suez Canal allows for the passage of bigger ships than the coastal part of the NEP due to its shallowness. The route for bigger ships is more northward, with more sea ice. The third challenge is the lack of intermediate ports. Container ships rarely sail from one port to another; the Suez Canal route from Rotterdam to Yokohama passes many large ports on the way, where cargo can be dropped off and picked up and where maintenance and support is possible. Fourth is the need to make ships Arctic-ready in terms of equipment and crew. Currently, Russian icebreakers and Russian pilots are for hire to navigate ships through the Northeast Passage, incurring additional costs for shipping companies. The economic feasibility thus depends on NEP navigation time, Russian fees and fuel prices.[119]

In conclusion, the opening up of the northern passages will slowly take shape, but is unlikely to become a major game changer in the period up to 2030-35. The NEP has historically been a Russian internal waterway and for practical purposes is likely to stay this way for at least the next decade.

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118   U.S. Navy Chief of Naval Operations, "The United States Navy Arctic Roadmap for 2014 to 2030."
119   Liu and Kronbak, "The Potential Economic Viability of Using the Northern Sea Route (NSR) as an Alternative Route between Asia and Europe."

Maritime military implications

Even though it is unlikely that the Arctic will become a vital maritime highway in the period up to 2030-35, it is important to monitor the developments. As maritime traffic develops, the first challenge will be search and rescue capacity, since the current infrastructure is not up to the task.[120] This will mainly be the responsibility of the littoral Arctic nations.

A more strategic challenge lies in the classification of the waterways. Canada and Russia both argue that the Northwest Passage and the Northeast Passage respectively are internal waters according to the UNCLOS framework.[121] Designating these areas internal waters will give the respective countries full sovereignty over the area, which allows for controlling transit. As a case in point, in December 2018, Putin signed a law that gives the Russian nuclear agency Rosatom control over traffic and infrastructure in the Russian part of the Arctic.[122] All foreign vessels that wish to enter and navigate the water area of the Northern Sea Route are now required to obtain prior permission.

Russia's military prioritization of the Arctic is understandable, given the economic importance of the Arctic to Russia, the sheer size of the Russian Arctic and its historical military presence, most notably the main base of the Russian Northern Fleet close to Murmansk. Russia has the biggest fleet of icebreakers, over forty, as compared to one for the US and six for Canada.[123] An additional maritime implication is that the Russian Navy through the Northern Sea Route could more easily connect its Northern Fleet with its Pacific fleet.

The entry of China in the Arctic complicates the picture. Although Russia has historically tried to limit China's Arctic ambitions, its stand-off with the West has forced Russia to pivot to the East, and it is "accommodating China in the Arctic." China's 2018 Arctic White Paper refers to China as a "near-Arctic state" and calls for the development of a so-called Polar Silk Road, integral to the BRI project. With regard to the Russia–China Arctic strategy, China has invested billions into the development of Russian LNG production on the Yamal Peninsula, and has been supporting Moscow in the development of transarctic shipping along the Northern Sea Route. According to one expert, "Russia and China can assert a lot of geo-economic influence over the Arctic by developing it as a transportation corridor outside of US control, which would be the only major waterway outside US control."[124]

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120   U.S. Department of Defense, OUSD (Policy), "Report to Congress on Strategy to Protect United States National Security Interests in the Arctic Region."
121   Wegge, "Cold Front. Conflict Ahead In Arctic Waters. David Fairhall. 2010."
122   Digges, "Legislation Grants Rosatom Control of the Russian Arctic."
123   Regehr, "NATO's Brussels Summit and the Arctic."
124   Sevunts, "NATO's Arctic Dilemma: Two Visions of the Arctic Collide as NATO and Russia Flex Muscles."

Even so, various observers note that the prospect for conflict over the Arctic remains limited.[125] First, the Arctic is governed by eight countries, of which six are littoral Arctic nations. Except for Russia, all littoral Arctic countries are NATO allies. They are organized in the Arctic Council, which deals with the governance of the Arctic, but with explicit exclusion of military security. Second, the countries involved are all rich and politically stable countries (again, with Russia as somewhat of an outlier), thereby likely posing a lesser challenges to resource governance. Third, almost all natural resources lie within internationally accepted borders, which make conflict over these resources unlikely. Last, history has shown that Arctic disputes have so far been resolved through diplomacy rather than through military measures. The resolution of the longstanding border dispute between Norway and Russia in the Barents Sea is one such example. The biggest risk for unrest in this area lies in the fact that confrontations between Russia and NATO elsewhere might spill over to the Arctic.

Monitoring local developments will be important but doesn't seem to lead to crucial consequences for the RNLN's portfolio planning in the timeframe up to 2030-35.

2.6.3 Asymmetric sea control: Anti-Access and Area Denial capabilities

Trends and developments

In this era of increased geopolitical competition, military conflict at sea is once again a possibility to seriously contemplate, after almost thirty years of an unprecedentedly permissive maritime environment. By that token, control over key maritime terrain is a crucial notion to consider. Key maritime terrain is an extension of the traditional maritime concept of choke points. Key maritime terrain is any maritime area of which the seizure, retention or control enables influence over the traffic, flow, or maneuver of military, civilian and illicit vessels, communication networks and resources. Most often, though not always, key maritime terrain consists of littoral maritime areas. Due to a range of modern technologies the littoral zone is expanding, moving both further onto land and further out to sea. It should further be noted that control over key maritime terrain also governs flows to and from the surrounding environments and to other nodes with which that particular maritime area is connected. Regional conflict over key maritime terrain is no longer just regional; it extends globally. Through key maritime terrain, naval forces can pressure competitors not just in the immediate vicinity but across the globe. Key maritime terrain is where control (or seizure or retention) is translated into power or vice versa: "Sea control and power projection are mutually reinforcing."[126]

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125 Brzozowski, "Fault-Lines Surface in Arctic as Region Turns into Geopolitical Hotspot"; Masters, "The Thawing Arctic"; Young, "The Future of the Arctic."
126 "A Cooperative Strategy for 21st Century Seapower."

This manifests itself in e.g. the A2AD bubbles Russia has created, which cover large areas of eastern Europe, including considerable overlays of the Baltic Sea, the Black Sea and the eastern part of the Mediterranean, as well as associated airspaces. These A2AD assets vary from known and openly operated, highly capable radar systems with modern ground-to-air missile launchers to persistent sub-surface presence of submarines. Demonstrated maritime A2AD systems include over-the-horizon targeting systems; long-range strike aircraft; anti-ship cruise missiles and ballistic missiles, submarines and missile-firing surface combatants, swarming fast manned and unmanned / autonomous attack craft above and underwater, mines and coastal defense artillery.[127] Russia's land-based A2AD capacities—both static and mobile— span an arc from the Kola peninsula in the north to Syria in the south, see Figure 9. In the Mediterranean, for example, Russia has deployed S-300 missiles to supplement its Yaryag cruise missiles based in the northern port of Latakia since late 2016. Together with the S-400 missiles based in Khmeimim airbase, this enables the country in creating an A2AD zone that stretches until and over Israeli territory.[128]

Figure 9: Russia's land-based air defense (red), anti-ship (black) and land attack (orange) capabilities[129]

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127   Krepinevich, Watts, and Work, "Meeting the Anti-Access and Area-Denial Challenge," 105.
128   Clara and Colom Piella, "La Geopolítica de Las Bases Militares," 7.
129   Williams, "The Russia – NATO A2AD Environment."

The Russian A2AD threat not only stems from land-based capabilities. The Russian surface fleet is heavily loaded with medium- to long-range cruise missiles. Russia has also indicated the ambition to pursue large surface vessels with impressive payload and tonnage, but it suffers from limited funding and lack of construction capability. Russia's submarines are much more capable than its surface combatants. However, as Heng Qin argues, "the prioritization of nuclear (SSN) over conventional attack submarines (SSK) suggests a focus on counter-value punishment and sea based deterrence as opposed to A2AD anti-submarine warfare." [130] He argues that, other than its surface fleet, "Russia's submarine fleet is not part of the offensive race" of which A2AD capabilities are a key expression. In short, the Russian Navy currently has relatively limited means to create A2AD bubbles at sea, away from its land assets.

It is important to note that the structural variables in the international strategic and military environment as well as technological trends therefore compel states to pursue offensive arms policies, *independent of intentions*. China and Russia are pursuing highly offensive A2AD capabilities, but not necessarily as part of aggressive policies. The bottom line, however, is that defensive systems with offensive capabilities will play an important in the military maritime environment in the period up to 2030-35.

Maritime military implications

Navies can now easily target adversaries across long distances. The most effective (and possibly cheapest) way to offset the firepower inherent in a potential adversary's naval combatants is not by building thicker hulls, which is in both technical and economic terms a losing battle (see §2.3.3), but by eliminating its platforms. Striking first helps disarm the other side and minimizes damage to oneself; displaying the ability and will to do so is a powerful deterrent. As a result, in today's and tomorrow's maritime conflict environment, those who operate within a confined maritime territory—such as the Mediterranean, the Black Sea or the Baltic Sea—are particularly subject to high-density incoming missile attacks. The more long-range and precise these missiles are, the more the offense–defense balance is shifted to the former. Since underwater platforms remain less vulnerable to A2AD, they can be part of the offensive mix (even if strategically not intended that way, see Heng Qin's argument above) in one's own effort to deny the enemy sea access and control. The same goes for small and expendable attack platforms.

It is important to note that the most effective A2AD bubbles are multi-domain, i.e. seek to control land, sea and air spaces as well as the electromagnetic spectrum

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130   Qin, "Troubled Waters: China's and Russia's Naval Modernizations Programs, and the Causes of Offensive Naval Arms Race"; The Human Security Centre, in its report, Allport, "Fire and Ice: A New Maritime Strategy for NATO's Northern Flank" mirrors this notion: "Russian naval strategy prioritises above all else the provision and support of the country's strategic nuclear deterrent, and the defence of the homeland."

and cyber domain. Effective countermeasures must also be multi-domain, with a high level of synchronization between land, sea, air, space and information / cyber, and including special forces operations. Furthermore, A2AD is a game that can be played on two sides. Effective A2AD capabilities can deny the other side access to a particular maritime area but cannot guarantee access to one's own. Essentially, one side can easily seize an area but cannot fend off attacks against its assets if the other side also possesses effective A2AD capabilities. This means that an essential part of a counter-A2AD strategy is the ability to create and maintain A2AD bubbles oneself. An A2AD competition thus raises the cost of victory and make conflicts less desirable for either side.

Additional elements of a counter-A2AD strategy are employing agile and autonomous defense systems for self-protection; applying covert tactics by making use of submarines or unmanned systems with low observability qualities; and conducting Freedom of Navigation exercises in order to challenge territorial claims trying to channel sea traffic or deny access.

The increased ability to engage targets across long distances also applies to ballistic missile defense. With extremely capable long-range sensors, launching options counter-missile missiles and the possibility for enduring forward presence, naval ships are highly valued assets for protecting regions against ballistic missiles.

2.7 Maritime security issues in the Indo-Pacific

The regions of the Indian Ocean and the Pacific Ocean—an area referred to as the Indo-Pacific—are of strategic interest for the EU and for the Netherlands.[131] At the two far ends of the Indian Ocean lie what are arguably the most important choke points in the world, the Strait of Malacca and the Strait of Hormuz. The value of the Indo-Pacific will increase in the coming decades as trade, commerce and connectivity continue to expand across the region. With the maritime expansion of China and the rise of regional powers such as India, Vietnam and Japan,[132] we see a growing competition over key maritime terrain and naval facilities, and significant militarization of the Indo-Pacific.

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131   Ghiasy, Su, and Saalman, "The 21st Century Maritime Silk Road."
132   The Japanese fleet has more large, modern ships than the UK and France combined. Under pressure of China's naval assertiveness, and with remarkably little fuss, Japan is upgrading and expanding its navy, including the conversion of the its two largest warships into aircraft carriers. See Japan Ministry of Defense, "National Defense Program Guidelines for FY 2019 and Beyond", December 18, 2018, p21.

2.7.1 Development of the maritime BRI

Trends and developments

The Maritime Silk Road Initiative (MSRI) is the maritime component of China's BRI, encompassing the establishment of three "blue economic passages."[133] The intention is to further connect China to other economic hubs worldwide. China's aspirations are the continued and updated development of its around $1.2tr blue economy; the improvement of food and energy security; the diversification and securing of SLOCs; increased ability to secure territorial sovereignty; and the power to shape international discourse.[134] The importance of improved connectivity in the Indo-Pacific for Chinese trade is not to be underestimated. However, as China's investments continue to grow in all areas important to the country's economy and security, it is clear that economic interests also serve military–strategic goals.

Over the past decade, China has acquired significant (controlling) stakes in a host of ports stretching from Singapore to Suez. Well-known examples are located in Sri Lanka and Djibouti, but companies like COSCO are also deeply invested in places such as Kyaukpyu in Myanmar, Gwadar in Pakistan, Chittagong in Bangladesh, Ihavanddhippolhu in the Maldives, and Mombasa in Kenya. Many of these developments have brought about concerns with respect to sovereign control of strategic infrastructure. For example, after India and Pakistan were included in the Shanghai Cooperation Organization (SCO)[135] in the summer of 2017, India was the only country in the SCO not to endorse China's BRI program—it cited how important it is for states to "respect sovereignty" as its cautioning reason behind this.[136]

Maritime military implications

The main concern with China's 'string of pearls' is that it can be used for military purposes. Most of the ports are in strategically useful places, and notably not all economically viable, feeding suspicions that they will be used to "service military assets deployed to the region in support of China's growing security interests."[137] These fears are specifically attached to a number of port projects, such as in Pakistan's Gwadar, Myanmar's Kyaupyu, and Hambantota in Sri Lanka. Gwadar, for example, has developed more rapidly than the surrounding areas' (on-land) infrastructure, and the fact that other areas in Pakistan tend to be better developed hampers the operating

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133 A China–Indian Ocean–Africa–Mediterranean Sea Passage; a China–Oceania–South Pacific Passage; and a Passage connecting to Europe via the Arctic Ocean.

134 Ghiasy, Su, and Saalman, "The 21st Century Maritime Silk Road."

135 The SCO is a Eurasian political, security and economic alliance announced in June 2001. It now has eight members: China, India, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan and Uzbekistan.

136 Dasgupta, "India Only SCO Member to Oppose China's BRI."

137 To test this notion, the economic viability and the logic behind the MSRI-associated projects in a numbers of terms can be assessed through a number of criteria: "(1) proximity to major shipping lanes; (2) proximity to existing ports; and (3) hinterland connectivity." See Funaiole and Hillman, "China's Maritime Silk Road Initiative: Economic Drivers and Challenges," 2.

of Gwadar. The lesser economic importance of these new ports point to possible dual-use intentions that should be tracked and reckoned with by other nations—and given the increasing control China has over some of these assets and, through the debt holding, even over some of the countries, the strategic use should not be underestimated in the relatively near future.[138]

Figure 10: Chinese port projects in relation to Indo-Pacific SLOCs and maritime choke points[139]

2.7.2 UNCLOS under pressure

Trends and developments

In general, but particularly visible in the South China Sea, China and the US have a different interpretation of their maritime rights as granted by UNCLOS.[140] In fact, although less documented in the Western press, the current face-off between Japan and China in the East China Sea is even more intense.[141] As China's People's Liberation Army Navy (PLAN) grows stronger and the country's international interests become more diversified, regional actors and littoral states have seen China become more adamant in its 'do as I say, not as I do' vision of the maritime world, despite the country's self-proclaimed commitment to UNCLOS and ASEAN's Code of Conduct.[142]

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138   Hurley, Morris, and Portelance, "Examining the Debt Implications of the Belt and Road Initiative from a Policy Perspective"; Dahir, "Zone of Opportunities: Thanks to China, Africa's Largest Free Trade Zone Has Launched in Djibouti."
139   Thorne and Spevack, "Harbored Ambitions."
140   Pham, "China Can't Just 'pick and Choose' from the Law of the Sea"; Dutton, *Military Activities in the EEZ: A U.S.-China Dialogue on Security and International Law in the Maritime Commons*.
141   As concluded in the RAND study by Burke et al., "China's Military Activities in the East China Sea", "China and Japan have experienced a dramatic increase in nonlethal encounters between military aircraft near Japan."
142   Pham, "China Can't Just 'pick and Choose' from the Law of the Sea"; Abdullah, "Asean and China Committed to Code of Conduct for South China Sea Disputes: Ng Eng Hen."

As China's capabilities continue to grow, its narrative also changes to suit its strategic needs. China's increased involvement—base construction, island-building—in the South China Sea has given it control over the Sea to such an extent that US Pacific Command stated that "China is now capable of controlling the South China Sea in all scenarios short of war with the United States."[143] So even as the US invokes UNCLOS to assert the freedom of navigation,[144] it will have little to no seat at the table in protecting its rights and claims within the treaty's institutional framework: the US has not ratified UNCLOS.[145]

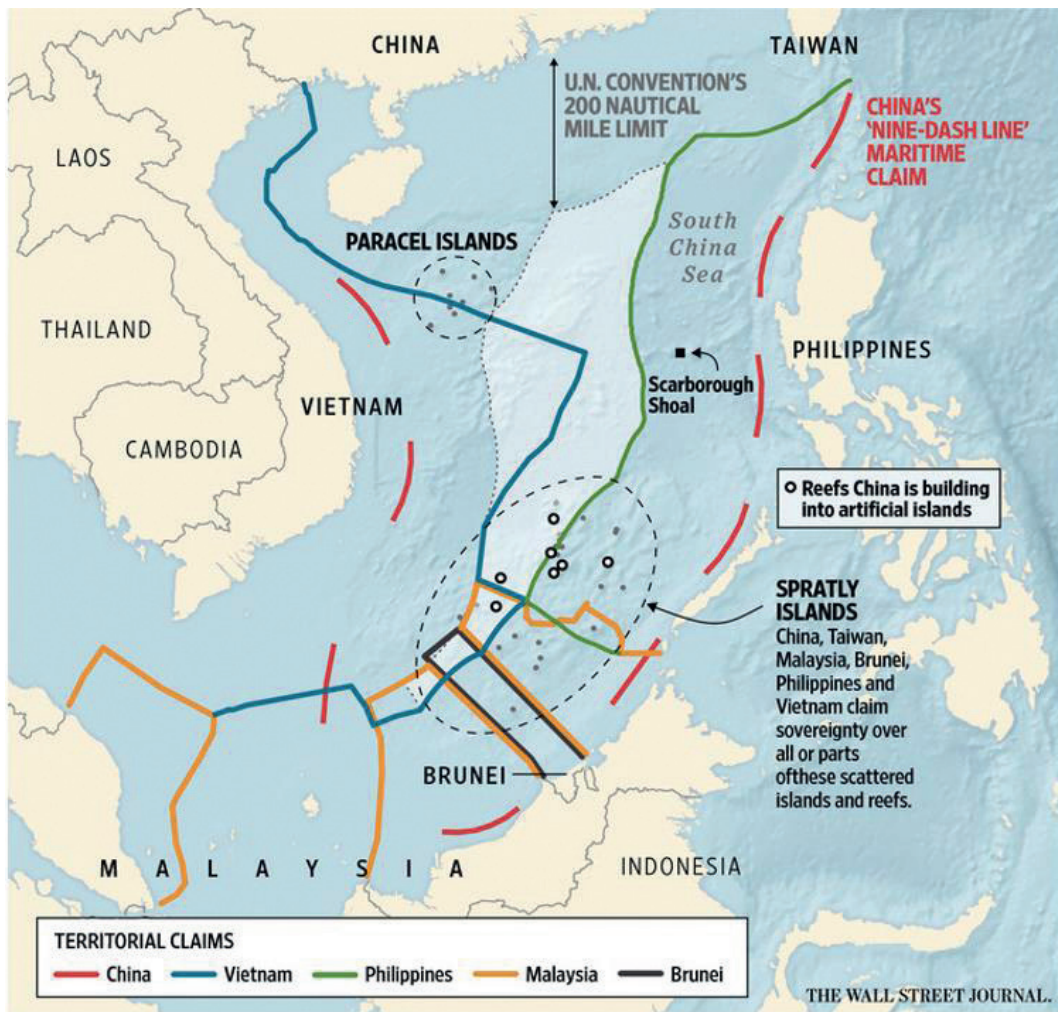**Figure 11: Territorial claims in the South China Sea**[146]

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143   O'Rourke, "China's Actions in South and East China Seas: Implications for U.S. Interests."
144   Valencia, "US 'picking and Choosing' from the Law of the Sea."
145   Almond, "U.S. Ratification of the Law of the Sea Convention."
146   Black, "The South China Sea Disputes: A Clash of International Law and Historical Claims."

An important part of China's blue water capabilities in the period up to 2030-35 follows from the country's Blue Ocean Information Network project, which is a self-described "civil–military integration marine information industry base."[147] This (preliminary) 5-year project includes the development of 'ocean e-stations' throughout disputed waters by the (state-owned) China Electronics Technology Group Corporation and the government, with a goal of 'informationizing' the oceans. These stations are ambiguous under international law, neither being neutral buoys nor counting as a fixed offshore oil platform would. Within these ambiguous realms, it is likely that these efforts to increase unmanned surveillance and communication abilities will spread to other Chinese waters and by 2030-35 possibly to shipping lanes in the wider Indo-Pacific region.

Outside of the South China Sea, national maritime boundaries in the Indo-Pacific have for now largely held up. Most coastal countries around the Indian Ocean and South China Sea are parties to UNCLOS. The heavy reliance on safe passage through these seas for these and other countries' (including the Netherlands') economic stability remains in the short term important enough to prevent large-scale tampering with trade flows. As of now, littoral states are also all members of the International Maritime Organization and they take part in various regional fishery organizations and environmental regimes.[148] This strong level of ocean interconnectivity indicates that states lean toward practicality in this domain, which bodes well for the notion of safe passage—for as long as no one country has the upper hand in such a way that it can block certain crucial SLOCs without hurting itself in the process.[149]

The tendency to claim sea territories, as done by China and Russia (Sea of Asov, control over which is one of the reasons for the annexation of the Crimea; and sea of Ochotsk), is likely to continue. We will see an increase in EEZ claims as a result of the quest for raw and rare materials. Freedom of Navigation exercises are needed to uphold UNCLOS principles, but will be more and more confined to certain areas and sea lanes.

Maritime military implications

The PLAN has a long-term dual goal to reduce dependence on the US Navy for securing important SLOCs and to create alternatives throughout the entire BRI. China's port projects in the context of the MSRI are all located along vital sea lanes, maritime choke points, and energy intake points.[150]

147   Dahm, "Chinese 'Ocean E-Stations' Deployed to the South China Sea."
148   Michel and Sticklor, "Indian Ocean Rising."
149   China Power Team, "How Much Trade Transits the South China Sea?"; China Power Team, "Are Maritime Law Enforcement Forces Destabilizing Asia?"
150   Thorne and Spevack, "Harbored Ambitions."

For now, Europe remains largely on the side, with little action backing up its wish for a rules-based order. The lack of action by the various regional (maritime) actors in support of such an order, such as Japan, the US, the EU or India in cases like the Maldives,[151] puts little power behind the often-proposed vision of a free and open Indo-Pacific.[152] Such a vision will not become reality unless the powers claiming to be in favor of it are prepared to take action now that global power relations appear increasingly malleable.

The increasing importance of the ocean and the 'blue economy' would indicate that those supporting a rules-based order should also promote equitable use of the ocean's resources. Adding the safety of marine life to the UNCLOS regime may influence the extent to which countries adhere to the Convention and how much importance they attach to the regime, indirectly impacting future questions of national and territorial ownership of oceanic regions.

2.7.3 The Militarization of the Indian Ocean

Trends and developments

Many of the issues playing in the other areas described above will also play in the 'beyond Suez' maritime area. In this sense, the main challenges do not differ much from other theaters. SLOCs and energy supply are major commodities at work, and for freedom of operations one might find Chinese A2AD bubbles to be obstacles, just as in the Baltics and Eastern Mediterranean. The players and their intentions are completely different, however. The sense of regional 'ownership' seems to be very strong in this part of the world and is enforced by blue water navies. Shipping to and from Asia has its impact on European prosperity, and therefore the area is of strategic importance, also for the Netherlands. But when freedom of movement is severely limited, Europe is not likely to intervene in a maritime fashion—only diplomatically.

The maritime power game now extends to over ten Indian Ocean countries with large navies and discernible strategic interests, and according to both national documents and various strategists, China is on track to continue ramping up its naval fleet throughout the period up until 2030-35.[153] Especially China began to make its Indian Ocean presence felt around 2008,[154] and it displays an increasingly conventionally powerful presence, such as its now sizeable naval base in Djibouti and its many port projects with dual-use opportunities all along its 'string of pearls'. Eastern African

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151   Small, "Maldives Is a Test Case."
152   Office of the Spokesperson, "Advancing a Free and Open Indo-Pacific Region"; Ayres, "The Quad and the Free and Open Indo-Pacific."
153   Mohan, "Great Game in the Indian Ocean"; The State Council Information Office of the People's Republic of China, "China's Military Strategy (2015)."
154   Smith, "Unpacking the Free and Open Indo-Pacific."

countries seem to have hardly any ambitions to develop blue water navies and thus form no factor of influence.

In terms of future naval capabilities, China's military shipbuilding industry has rapidly developed its quality and sophistication. The country has, in fact, seen the world's largest recent comprehensive naval build-up: according to the US Defense Intelligence Agency's *2019 China Military Power* report, it has over 300 navy vessels.[155] Compared to America's 280-290 ships, and in combination with the strongly improved quality of Chinese ships, this is significant. Nevertheless, China insists that it will remain prepared to cooperate militarily with the West. The PLAN cooperates with the US and plays a role in anti-piracy operations in various regions.[156] India is also modernizing its navy, and its $16bn plan for nuclear-powered submarines and naval warships is exemplary in its China-rivaling ambitions to develop a blue water navy.[157] In the Western Indian Ocean region, various Gulf States and regional (middle) powers such as Turkey are aiming to maximize their security and economic interests, similar to China, with local (government) agreements in eastern Africa and through commercial ports and existing military bases.[158]

Meanwhile, the US–Australia–India–Japan Consultations (the Quadrilateral Security Dialogue, or 'Quad') were reinvigorated in 2017 after a hiatus of about a decade; US, India and Japan have also commenced combined naval exercises. In 2018, Indo-Pacific states established the Comprehensive Agreement for the Trans Pacific Partnership with the US to counter China's rise. While attempting to counterbalance China, most of ASEAN feels that US engagement with Southeast Asia has decreased, and around a third of its populations has little or no confidence in the US as a strategic partner and regional security provider.[159] Several local tensions are playing in this area, such as between the Koreas, between Japan and China, and between China and Taiwan. Maritime disputes in this area will first and foremost hamper China in its (now seemingly halting) economic growth and thus will be less likely, or mainly managed by China.[160]

Maritime military implications

With the Indian Ocean region already being home to over half the world's armed conflicts, increased militarization of littoral states and its waters is a threat to the long-term security and economic stability of the Indian Ocean region. One of the most important areas with potential for some degree of commercial–military integration is shipyard infrastructure, and especially commercially intended types

155   "2019 China Military Power Report."
156   Glaser, *The PLA Navy's Growing Prowess: A Conversation with Andrew Erickson*; Glaser, *China's Maritime Militia: A Conversation with Andrew Erickson*.
157   Patel, Malik, and Nunes, *Indian Ocean and Maritime Security*.
158   Ardemagni, "Gulf Powers: Maritime Rivalry in the Western Indian Ocean."
159   "Southeast Asia Wary of China's Belt and Road Project, Skeptical of U.S.: Survey."
160   China Power Team, "How Much Trade Transits the South China Sea?"

of ships with a high degree of value-added aspects built in are important for the development of improved military ships. This is important to note with respect to China's military build-up and the earlier observations concerning the MSRI that China is aiming to connect strategic ports throughout the Indo-Pacific region.[161]

The dual-use nature of infrastructures such as ports is a development to watch, given that officially there is usually no military 'message' attached whatsoever. At the same time, however, Gwadar, Colombo and Djibouti have all three been used to station or refuel PLAN vessels. Many further MSRI port projects appear to be similarly well-chosen—although there is first and foremost an importance for large trade vessels tied to the strategically selected deep-water ports in Myanmar, Sri Lanka, Pakistan and the Maldives, but these types of ports are equally useful for the entering of naval ships.[162]

It is unlikely that European navies structurally take up large-scale exercises in this area, but they will, as part of a coalition of the willing, take part in Freedom of Navigation exercises, probably organized by the US to display its interests.[163] As such they will mainly operate in a large fleet where mutual support and protection is organically organized.

2.8 Wrap-up

The geopolitical trends discussed in this chapter sketch a dynamic and volatile future world. Western values and prosperity, reflected in and built upon an effectively connected world with internationally respected institutes, is under pressure. If we want to uphold the essential elements of the current liberal international order, including free trade and freedom of navigation, we—the West, Europe, the Netherlands—must be alert and willing to act and react. Military power remains an integral part of the set of state instruments to do so. This pertains to all three high-level strategic challenges for the Netherlands armed forces introduced in the 2017 Defense White Paper: (1) remain safe in the Kingdom of the Netherlands, the EU and the NATO territory; (2) foster security in Europe's neighboring regions (Middle East, North Africa and parts of the sub-Sahara and West Africa); (3) secure connections from the Netherlands as a hub and its lines of communication (flow security). Important naval elements in these strategic challenges include monitoring and, if need be, protecting the SLOCs to and from Western Europe, primarily in the North Sea and the North Atlantic; monitoring and, if need be, protecting naval and

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161   Glaser, *The PLA Navy's Growing Prowess: A Conversation with Andrew Erickson*.
162   Mohan, "Great Game in the Indian Ocean."
163   Indeed, the RNLN might partake in a Freedom of Navigation exercise in the South-China Sea in 2021, see Karremann, "Gaat in 2021 Een Nederlands Marineschip Met HMS Queen Elizabeth Naar de Zuid-Chinese Zee?"

port facilities and offshore and underwater infrastructure, primarily in the North Sea; and countering (or managing) piracy, drug trafficking and migration flows in the Mediterranean and off the coast of North, West and East Africa.

Furthermore, maritime operations should increasingly be joint and interagency, while remaining internationally embedded. This is especially the case in hybrid threat environments and where access to theaters is limited by highly effective A2AD bubbles. With frigates being at the center of command and control in warfighting scenarios and at the same time becoming more vulnerable to attacks, a crucial challenge is introduced. Future naval capabilities should be prepared against detection and identification in contested maritime areas—particularly through increasingly proliferated, highly capable A2AD systems—on the one hand, and be able to create their own A2AD bubbles as a self-defense shield on the other hand.

3. Broad implications for the RNLN

What does the changing strategic and security environment for the period up to 2030-35 imply for the (future) capability portfolio of the RNLN? This chapter describes some of the broader consequences pertaining to the qualitative and quantitative layout of the Dutch naval forces. Within this broad design framework, the following chapter will look in more detail at the actual design of the future capability portfolio of the RNLN.

3.1 Generic naval force profile

Although there is a lot to be said in favor of a tighter European military integration with smaller European force providers concentrating on niches where they 'can make the difference', the (political) conditions that would make such an approach feasible and valuable are unlikely to fully materialize in the period up to 2030-35. In our view, the starting point in contemplating the design of the future RNLN's capability portfolio should therefore, for the time being, remain a sovereign approach to promoting national interests. Of course, national interests are, out of principle and for practical reasons, as much as possible aligned with the interests of partners. For smaller countries such as the Netherlands, sovereignty in practice does not imply full freedom of action but rather—more limited—the ability to determine independently how and with whom cooperation is sought for securing national and shared interests and/through international order and stability.

Given this starting point, what kind of navy fits the Netherlands in the evolving maritime security environment as described in chapter 2? In order to arrive at a first cut profile, we use the classification of the world's navies listed in Table 2.

Operating environment	Rank (high to low) and designation	Capabilities
'Blue water'	1 Global-reach power projection	Multiple and sustained power projection missions globally
	2 Limited global-reach power projection	At least one major power projection operation globally
	3 Multi-regional power projection	Power projection to regions adjacent its own
	4 Regional power projection	Limited range power projection beyond EEZ
'Green water'	5 Regional offshore coastal defense	Coastal defense within and slightly beyond EEZ
	6 Inshore coastal defense	Coastal defense confined to inner EEZ
	7 Regional offshore constabulary	Maritime policing within and slightly beyond EEZ
'Brown water'	8 Inshore constabulary	Maritime policing confined well within EEZ
	9 Inland waterway riverine	Riverine defense of landlocked states
	10 Token navy riverine	Very basic constabulary if at all

Table 2: Naval hierarchy distinguished by capability[164]

Currently, the US owns the sole category 1 navy, France and the UK the only category 2 navies. India, Russia, Italy, Spain and Brazil are examples of category 3 navies, Japan and Australia of category 4 navies. China is rapidly moving towards category 2 or even category 1 if it so chooses to.[165] Typically, the RNLN has been categorized as a category 4 navy.[166] In our assessment, based upon the developments described in chapter 2, a 'regional power projection' navy remains the force profile the RNLN should strive for. For the period up to 2030-35, this category 4 profile continues to be the force profile of choice, because it:

- best fits the (maritime) interests of the Netherlands with its strong dependence on maritime trade routes;
- is in line with what our allies may expect as a valid contribution to our common security and defense, while remaining feasible within a (growing) defense budget;

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164   Kirchberger, "Evaluating Maritime Power: The Example of China"; Todd and Lindberg, *Navies and Shipbuilding Industries: The Strained Symbiosis.*

165   China's naval power is rapidly approaching that of the US, albeit still at some distance, for instance lacking extensive operational experience and world-wide bases. See e.g. Brennan, "How Does China's Navy Compare to America's?" China's aspirations as a naval power show definite signs of going farther than just Asia. The PLAN is planning and developing capabilities and logistical facilities throughout large parts of the world that may allow for future power projection in more regions (see §2.5.2, §2.7.3 and e.g. Brands, "China's Master Plan."). It is not unrealistic to expect more occurrences of Chinese naval vessels and submarines in the north and west Atlantic over the coming years. However, for the period up to 2030-35, this will not constitute an overwhelming naval force such as the US Navy fleets.

166   This was already the case in 1990, see Grove, *The Future of Sea Power.*

- is the most robust 'no regret' option for the RNLN in a dynamic and volatile maritime security environment; and
- builds upon the knowledge, experience and (industrial) capabilities embedded in the RNLN and its ecosystem.

In broad strokes, a category 4 blue-water navy implies force protection for sub-surface, surface and airborne (including space) threats, as well as a sustainable logistic reach, allowing a persistent presence at range. For the RNLN, a category 4 navy does not exclude naval operations outside of the European region, e.g. in the Caribbean and the Indo-Pacific, even if for force planning purposes the focus is on the European theaters. A hallmark of a blue-water navy is the ability to conduct replenishment at sea. In practice, a category 4 navy consists of a mix of surface and sub-surface combatants, ship-borne aerial platforms for intelligence purposes and extended force projection, and auxiliary ships for logistical purposes. The RNLN has also an amphibious capacity to conduct operations from the sea to influence situations on land. Maintaining such a mix allows the RNLN to remain capable of meaningfully contributing to coalition naval task forces across a broad range of operations and tasks, as elaborated in the next section—and up to a point it could even perform some operations with little or no support from allies.

3.2 Strategic focus and range of operations and tasks

The type of operations and tasks the RNLN must prepare for, and may become engaged in, for the period up to 2030-35 covers a broad range, very much as is the case today. We will therefore largely follow the taxonomy of maritime operations as defined in the current maritime military doctrine.[167] This taxonomy is likely to remain valid for the next 10 to 15 years; we have only introduced a few relatively minor changes (see the first column of Table 3).[168]

Most tasks may, in principle, play out in all of the operating theaters introduced in Chapter 2. However, when it comes to designing the future capability portfolio, some combinations of task and operating theater are more important than others. In recent years, developments in the global security environment have brought significant military and security challenges to Europe. This has resulted in an orientation of

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167 "Grondslagen van het Maritieme Optreden. Nederlandse maritiem-militaire doctrine."
168 Anti-submarine warfare is renamed under-water warfare to include the threat of other submerged assets, for instance smart torpedos. Anti-air warfare is renamed above-water warfare to include the use of missiles that follow a trajectory through space, i.e. (Theater) Ballistic Missile Defense, (T)BMD. Under *Maritime assistance*, we have left out the sub-category *Maritime assistance and support* ("maritieme bijstand en steunverlening") because it is already covered under *Maritime assistance to civil authorities.* Under *Maritime Security Operations* we have added a separate sub-category *Protection of infrastructure at sea.* In "Grondslagen van het Maritieme Optreden", this is included under *Countering violent crime and terrorism in the maritime domain.* However, protection of offshore installations and seabed warfare is projected to become much more important and is therefore promoted to a separate subcategory.

Europe's defense and security focus towards its own continent and direct neighborhood. Given the systemic geopolitical and geo-economic trends in the world, this focus is likely to continue for at least the next decennium. The return of Russia as a military capable regional power; the rise of China as a global political actor and its build-up of expeditionary naval capabilities; the increased pressure from the US on European countries to contribute more to their own security; and the relative diminishing of Western global shaping power (military and otherwise) all contribute to this assessment.

Within this increased focus on the European theater, the major requirements driver for the future capability portfolio of the RNLN, both in terms of quality and quantity, is protecting the Sea Lines of Communication to and from Western Europe and the Netherlands, in particular Rotterdam port (as discussed in §2.3.1). This is, in our view, the most fitting and valuable contribution the RNLN can make to the maritime security of Europe. These SLOCs increasingly include undersea pipelines and cables. The protection thereof is of increasing importance, as part of the strategic challenge of flow security (see §2.3.2). SLOC protection may extend to warfighting scenarios (see §2.3.3). A second priority is the security of the Kingdom in the Caribbean; this is a constitutional obligation that requires full attention and should therefore drive the design requirements for the future capability portfolio of the RNLN. The challenges here have a security rather than a purely military character (see §2.4), with an essential international dimension. A third priority is the protection of Europe's maritime borders in the Mediterranean, not in the least because in many formal and practical aspects they also constitute Dutch outside borders (see §2.5). These choices in prioritization of operating theaters and 'themes' (in the sense used in chapter 2) fit the blue-water, regional power projection force profile of the RNLN as discussed in §3.1.

All other thematic issues within the five operating theaters introduced in Chapter 2 may provide some additional requirements, but should not drive the essential design requirements for the RNLN's future capability portfolio. For instance, China's recent behavior suggests that it is bent on using its newfound power to restore a Sinocentric security system in Asia, in particular in the South and East China Sea. Taking on China in its back yard is way beyond the RNLN's scope and reach. However, some form of naval presence in support of US-led deterrence might fit, as part of a wider strategy of cross-domain deterrence strategy to keep China's regional or even global military ambitions in check. Such a politically significant task, however, should not be considered a portfolio design driver.

The priorities described above are depicted in Table 3. Green and yellow cells indicate that the type of operation or task in question in the operating theater in question is considered relevant for the RNLN's future capability portfolio design, with the green combinations driving the essential design requirements and the yellow combinations possibly generating add-on (but not essential) requirements. White cells mean that the

particular combinations of task and operating theater should not be considered in the portfolio design.[169]

Types of maritime operations and tasks	North Sea and North Atlantic	Kingdom in Caribbean	Mediterranean	Baltic and Arctic Sea	Indo-Pacific
Maritime combat operations at sea	Green	Yellow	Yellow	Yellow	
Underwater warfare	Green	Yellow	Yellow	Yellow	
Anti-surface warfare	Green	Yellow	Yellow	Yellow	
Above water warfare	Green	Yellow	Yellow	Yellow	
Naval mine warfare	Green	Yellow	Yellow	Yellow	
Maritime combat operations from the sea	Green	Yellow	Yellow	Green	
Amphibious operations	Green	Green	Yellow	Green	
Maritime strike operations	Green	Yellow	Yellow	Green	
Maritime special operations	Green	Green	Yellow	Green	
Riverine operations	Green	Yellow	Yellow	Green	
Maritime security operations	Green	Green	Yellow	Yellow	Yellow
Maritime interdiction	Green	Green	Yellow	Yellow	Yellow
Protection of infrastructure at sea	Green	Green	Yellow	Yellow	
Countering violent crime and terrorism	Green	Green	Yellow	Yellow	Yellow
Boarding	Green	Green	Yellow	Yellow	Yellow
Maritime assistance	Green	Green	Green	Green	Yellow
Maritime diplomatic assistance	Green	Green	Green	Green	Yellow
Maritime assistance to civil authorities	Green	Green	Green	Green	
Assistance at sea and from the sea	Green	Green	Green	Green	Yellow

Table 3: Priorities for the RNLN's portfolio design in task-operating theater combinations

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169   Which, in a dynamic and volatile world, does not necessarily mean that the particular combination cannot occur in reality. However, in the context of strategic planning that combination is not considered part of the equation.

3.3 A balanced portfolio

In the contemporary security environment, with its wide range of multi-faceted security challenges that may affect Dutch and allied interests, designing and building a (future) military capability portfolio takes the form of a balancing act. In this section, we discuss the most salient balances and how they are affected by the systemic trends and developments.

3.3.1 The surface / sub-surface mix

In §3.1 we concluded that the RNLN's capability portfolio should include a mix of surface and sub-surface platforms (next to ship-borne aerial platforms and auxiliary ships) in order to be able to fulfill the types of operations listed in §3.2. In this subsection, we elaborate on this mix.

As discussed in §2.3.3 and §2.6.3, surface ships suffer from the combination of an increasingly transparent maritime environment and the ability to conduct precision fires over long distances. In warfighting scenarios, anti-ship ballistic and cruise missiles and submarines are poised to wreak havoc. The Argentinian Navy used just seven Exocet missiles to hit three British ships and sink two of them in the Falklands War. Peer competitors such as China and Russia, with thousands of anti-ship missiles, could potentially sink any ship that comes within range.[170] The equation is different for submarines. The stealthy nature of these assets, aided by the difficulty posed by the underwater environment to detection and long-distance imaging technology, is likely to largely remain valid in the period up to 2030-35.

This crucial observation leads to a number of conclusions. First, given the vulnerability of surface combatants, in warfighting scenarios submarines are to be considered as the main platforms for offensive operations in contested maritime areas, in particular close to hostile shores.[171] These operations may include intelligence tasks, anti-surface and underwater warfare, naval mine warfare, land attack (maritime strike) and launching special operations forces.

This is not to say that surface ships do not play a role in warfighting scenarios. But they are highly vulnerable when within reach of enemy A2AD capabilities and should best avoid presence in such contested maritime areas. This, of course, limits the ability to generate effects in these areas and project force upon the land environment

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170   Although, as mentioned in §2.3.3, this requires a fast and finely tuned sensor to shooter network, which is extremely difficult to build and operate, even with the 2030-35 time horizon in mind.

171   Tunnicliffe, "Attack Sub to Underwater Spy"; Yung, "China's Evolving Naval Force Structure"; Werner, "Navy's New SSN(X) Attack Sub To Be Faster, More Lethal – And More Expensive"; "Russian Navy to Increase Precision Weapons and Blue Water Vessels."

adjacent to these areas. Our second point is that in order to (partly) overcome these limitations, investments for stand-off weapons fired from naval ships warrant priority.

Furthermore, as we have argued in §2.3.3, investment priorities for the protection of surface combatants should be in avoiding being hit through active countermeasures. This does not mean that investments in, for instance, hull integrity measures should be altogether skipped; these might prove very valuable in non-warfighting scenarios or in encounters with less advanced foes.[172] In addition, standard NBC doctrines and assets should be in place and practiced in order to continue operations under the threat of nuclear, bacteriological or chemical weapon usage. However, we propose that engaging in a defensive armor race to deal with barrages of incoming missiles in high-intensity conflicts with peer competitors is not a valid way forward.

One final observation in this context. Relatively small unmanned vehicles may escape detection, tracking and targeting more easily, and have a greater tolerance of being lost in action. By this token, unmanned platforms may play both defensive and offensive roles in A2AD-controlled areas. Surface ships, and up to a point submarines,[173] can act as 'mother ship' to launch and control smal(ler)—surface, sub-surface, and aerial unmanned platforms that may potentially operate over great distances and within enemy A2AD bubbles. This is further elaborated on in §3.3.4.

3.3.2 Quality and quantity

As all military services do, the navy faces so-called *techflation*. Every next generation of main military platforms—so-called big-ticket items—tends to be more expensive than the previous generation, accounting for inflation. As a result, the armed forces of especially small and medium-sized countries have seen a substantial decrease in the number and the diversity of platforms,[174] exemplified for the RNLN in Table 4. Even though many smaller Western armed forces still possess technologically highly advanced platforms, the paucity in numbers renders them strategically, operationally and economically vulnerable. Strategically, the options for long-term or simultaneous military commitments are drastically reduced. Operationally, it leaves them particularly vulnerable to attrition. They can hardly afford losing very scarce platforms, because it will immediately reduce their fighting force by a large percentage. This might well lead to risk aversion, which in turn also negatively

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172   Or in collisions with other ships, as the Norwegian frigate Helge Instad that was rammed by an oil tanker and subsequently sank, see "Norwegian Frigate Sinks after It Was Rammed by a Tanker."
173   Russia latest and the world's longest submarine, the K-139 Belgorod, is said to be an interesting example of a mother ship for smaller manned and unmanned submarines, see Rogoway and Trevithick, "Analyzing The First Images Of Russia's Huge Doomsday Torpedo Carrying Special Missions Sub."
174   The lack of diversity in platforms makes it more simple for adversaries to develop capabilities singularly aimed at defeating those one type of platform. In the context of deep uncertainty and a rapidly changing environment, uniformity is generally considered a weakness rather than a strength.

impacts the country's strategic options. Economically, lack of economy of scale further exacerbates affordability issues.

Weapon system	1990	2019
Maritime Forces Operational Staff	0	1
Frigate	14	4 (LCF) +2 (M)
Ocean-going patrol vessel	0	4
Submarine	5	4
Replenishment ship	3	0
Amphibious transport ship	0	2
Joint support ship	0	1
Marines battalion	2 (+1 reserve)	2
Mine countermeasures ship	22	6
Embarked helicopter	22	12 NFH + 8 TNFH
Maritime patrol aircraft	13	0

Table 4: Numbers of platforms and units from 1990 to 2019

Operationally, the RNLN has invested in all weapon systems in order to maintain high operational standards, which still makes it a credible force that may offer meaningful contributions to coalition efforts. In terms of quantity however, the RNLN is close to—and in some instances possibly already below—minimum thresholds. Below these lower *quantitative* limits, operations, training, maintenance and through-life upgrades can no longer structurally meet the required *qualitative* standards. Of course, economy of scale (or lack thereof) arguments also apply: the unit cost for a small series of platforms can be drastically higher than for a larger series. New lines of thought have to be introduced to break out of the techflation spiral in order to maintain a high-quality, versatile and sufficiently large fleet. In this area of strategic competition between the great power blocs, we can no longer afford to be on the wrong side of the cost curve. Two approaches seem particularly promising: modularity by design and flexible configurations of manned and unmanned platforms. These two concept are elaborated on in §3.3.3 and §3.3.4 respectively.

An interesting development to expand operational deployment cycles—offering some relief for the quantity issue—is flexible on-board maintenance and repair through the use of 3D-printing. As this technology develops further and certified spare parts can be produced on-board as the need arises, the dependency on shore-based logistics, warehousing and transport decreases while the effective on-sea time increases.

3.3.3 Flexibility, adaptivity and modularity

Flexibility and adaptivity have meanings which are broadly the same, but are generally not interchangeable. Adaptivity, the ability to adapt, indicates long-term changes. Flexibility, the ability to flex or bend, pertains to more short-term alterations. In military terms, flexibility points to the ability to take on multiple missions simultaneously or in quick succession and to deal well with diverse operational circumstances, given the means available. Adaptivity points to ability to change military posture relatively quickly and easily in response to shifts in e.g. technology standards, the geo-strategic environment or the national strategy. Flexibility is a characteristic of each of the tools (capabilities) in the military toolbox, adaptivity a characteristic of the toolbox (capability portfolio) as a whole.

Adaptivity implies anticipation: looking ahead, generating and analyzing future options, choosing ways forward, planning and preparing, adjusting. This requires a solid strategic anticipation function within the RNLN and the defense organization as a whole.

The wide range of potential operating theaters, missions and tasks the RNLN faces calls for flexibility and adaptivity.

Both are essential to guarantee political and military–strategic freedom to act, in particular in this age of hybrid threats and great power competition, with the distinction between war and peace blurring.

One solution to provide flexibility is multi-role platforms. However, multi-role platforms tend to be complex and therefore difficult to adapt over time (and suffering from techflation, see §3.3.2). A powerful alternative is to whole-heartedly embrace modularity. Modularity, building a complex product or process from smaller sub-systems that can be designed independently yet function together, is nothing new in itself. In fact, within the military domain, it has become fashionable to think in 'building blocks' that are part of a 'toolbox' which, as a whole, offers the flexibility to confront a range of challenges through recombining modules into tailor-made configurations. The concept applies both to the level of systems (with more and more software-defined functionality),[175] of platforms (with reconfigurable mission modules linked by using common standards for key interfaces) and of units (task forces compiled for the mission at hand joined together in a network). Modularity, however, must become *the* central design principle—a *conditio sine qua non*—for the future capability portfolio.

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175   As an example, main radar systems such as the APAR, which make up a large part of the investment costs in naval ships, are increasingly modularized. The price–performance ratio can be scaled through variations in the number of (expensive) front-end antennas; and most of the functionality has become software-defined and can be easily upgraded.

At the platform level, modularity involves creating fixed boundaries, defined interfaces and defined ship services—power, cooling, support for personnel, space and bandwidth—to standard portions of a ship, which are termed modules. We define three types of modularity:[176]

1. **Common modules used across multiple classes of ships**. These common modules are structural pieces of the ship that are built and tested in a factory-like environment. Potential applications include hotel-like functions such as galleys, medical facilities and laundries.
2. **Self-contained modules that provide a plug-and-play capability** for the equipment inside the module. These modules have defined interfaces and boundaries and are designed for a specific task, such as firing a missile.[177] Where common modules can be used across different classes of ships, self-contained modules are often used within a single class of ships. But for example a 'containerized' towed sonar array could be used across various classes.
3. **Modular installations that provide basic ship structure and services** that allow various mission packages to be installed and interchanged as needed. Modular installations, like self-contained modules, have defined interfaces but much more broadly defined boundaries. The US Navy's Littoral Combat Ship and the Royal Danish Navy's Absalon class ships provide examples of this type of modularity.

Design flexibility is a broader, less precisely defined concept, but generally means constructing ships in such a way that they can more readily adapt to changing missions and technologies. Modularity can be a subset of design flexibility and together they contribute to adaptable ships. Design flexibility involves the ability to change boundaries, whether they are physical or related to ship services. We discern three types:[178]

1. **Flexible infrastructures that allow changes to the boundaries of ship spaces** to be made more quickly. Flexible infrastructures use standard tracks, panels and interfaces to allow the movement of bulkheads and the connection of ship services such that spaces can be reconfigured to meet evolving needs.
2. **Additional space within a ship**. Where flexible infrastructures allow the interior boundaries of a space to be adjusted, expanding the space within the ship can also provide future flexibility, in cargo/mission space and in weight. This type of flexibility implies larger ships.

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176   Schank et al., "Designing Adaptable Ships," xiii.
177   See e.g. Gertz, "China Building Long-Range Cruise Missile Launched from Ship Container" This example is instructive because it also shows an other implication of modularity, namely that civil (by design) vessels may increasingly perform military tasks, and not only in an auxiliary role.
178   Schank et al., "Designing Adaptable Ships," xiv.

3. **Additional ship services within a space**. Modernizations for new missions or technologies typically involve adding power, cooling and fiber-optic hookups to the equipment within a space. Having extra power, cooling and fiber-optic drops within a space increases the flexibility of the ship to address future modernizations at a lower cost.

By having ample reserves of ship services, ships can accommodate changing missions as well as novel technologies or more advanced versions of existing ones. As the RAND study *Designing Adaptable Ships* observes: "The case for 'bigger is better' needs to be considered more widely [...] A key challenge will be to understand where the additional space will be needed and how best to use available space until it is needed, designing internal boundaries accordingly."[179] Of course, new designs must include sufficient weight and stability margins to accommodate future ship modifications.

The combination of modularity, design flexibility and standardization of key interfaces makes multi-role, cross-stovepipe platforms possible. Examples are ships that combine hydrography, counter-mine and patrol tasks; or submarines that combine intelligence and defensive and offensive force projection tasks while acting as a mother ship for unmanned underwater attack systems (e.g. smart torpedoes) and as a launch platform for onshore special operations. Integrating Anti Ballistic Missile Defense, Air Defense and Space Situational Awareness can be done with the SMART Multi Modal radar. The ship carrying the radar may have the follow-on shooter capability or can direct other platforms. At the same time it may, for instance, accommodate headquarters and hospital functions (in a form of sea basing). An interesting development further would be installing a Processing Evaluating Disseminating (PED) element on-board for assessing UAV imagery into actionable intelligence, thus adding an important OODA-loop element closer to the sensors and shooters to accelerate decision-making. Other smart combinations may follow by combining innovative thinking and operational experience.

It should be noted that these design principles have drastic repercussions for the whole chain of development, production, in-service use, maintenance, through-life upgrade etc. of naval platforms, but also for education, training and mission preparation. With regard to the latter, there is a huge premium on easy-to-use, user-friendly handling of the various modules, both in being added to (or subtracted from) the basic configuration and in day-to-day operations. As a by-product, user friendliness may increase the feasibility of crew rotation, the practice of using more than one crew to operate a single ship.

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179   Schank et al., "Designing Adaptable Ships."

In the open literature, little hard data on the cost impact of modularity or on the prerequisites for achieving possible cost benefits can be found. In 2013, the European Defence Agency commissioned a consortium of Fincantieri (Italy), Navantia (Spain) and Damen shipyards (the Netherlands) to investigate the life cycle costs (LCC) of modular naval ships.[180] It was concluded that the LCC of modular frigates were higher than for traditional frigates, and roughly similar for Maritime Mine Counter Measures vessels. However, the study had serious limitations in the types of costs taken into account, and considered only one type of modularity (basically type 3 above).

3.3.4 Manned and unmanned systems

The pressure—and indeed the technical possibilities—to further reduce the crew size of naval ships will continue in the coming period. The current Dutch M-frigate has a crew size of approx. 150; its envisaged replacement should have a basic crew of some 100 people.[181] Currently, about a third of the M-frigate manning has technical duties, part of which can be automated. SA/SU can largely be automated. Human tasks will further shift from operator to supervisor.

In principle, the crew number can even be further reduced through a shift from on-board to shore-based personnel that may execute tele-operations if and when needed. A National Maritime Operations Centre (NMOC) may host personnel that is directly engaged in naval operations through permanent live connections with the assets at sea. The roles, tasks and responsibilities of such an NMOC in relation to the commanders at sea need to be established in the years to come. The same holds true for the link between an NMOC and other information hubs within the armed forces, such as the National Air & Space Operations Centre (NASOC) the RNLAF is establishing as part of its 5th Generation Air Force program; to other government agencies; and to international information and control hubs.[182]

Indeed, an increasing selection of tasks at sea can be done with no on-board crew at all. In the past few years, we have seen the first test runs with remotely controlled and autonomous commercial ships. The technology is largely there. However, maritime law does not anticipate this development. For autonomous shipping to become a reality, efforts at all regulatory levels are needed. Experts believe that autonomous driving on land is likely to be achieved more quickly, even if it is more complex. If the benefits of autonomous cars are proven, pressure will mount to achieve similar results

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180   Report under EDA Contract Number 13.R&T.OP.589, *Impact of mission modularity on a naval ship's life cycle cost*, April 2015.

181   The Zumwalt class, one of the most automated destroyers of the US Navy, has a crew size of 140, or about half of what was needed for similar US war ships. In comparison—although the comparison is seriously flawed because the functionality is completely different—modern super cargo ships and tankers, with a 20 times larger tonnage, operate with a crew of between 15 and 25 people.

182   We, however, caution against dependencies on hub-and-spoke networks in warfighting scenarios, see §3.3.6.

at sea. It should be noted that, while the achievements in commercial shipping may provide some sort of a benchmark for naval auxiliary ships, it is unlikely that naval combatants will move towards full autonomy. Another development is much more likely, and indeed almost inevitable, as discussed below.

An important, possibly *the* most important, function of the next generation of major naval platforms will be to act as the 'mother ship' (launch platform and overall command and control function) to a (growing) number of unmanned 'satellites' that may operate in the wider vicinity of the mother ship. Many different configurations can be envisaged. The satellites may be unmanned surface vehicles (USV), unmanned underwater vehicles (UUV) or unmanned aerial vehicles (UAV) (as an ensemble known as UxV). They may vary in size—although the environmental conditions at sea probably make the use of sub-meter unmanned vehicles less feasible. They will vary in autonomy. Unmanned systems operating in the vicinity of the mother ship will mostly be remotely operated, while systems that operate over the horizon may have to operate with full autonomy. UUVs by necessity will also have to be autonomous because communication under water is cumbersome if not impossible. They will vary in tasks. They will certainly have sensing tasks for Intelligence, Surveillance, Target Acquisition and Reconnaissance (ISTAR) purposes. But in the longer term, unmanned systems may also perform defensive and offensive force projection tasks, maybe focusing on Electronic Warfare rather than hard kill. Finally there is the possibility of large quantities of unmanned systems, so-called swarms, operating in sync. Swarm technology is not yet mature but might become fully operational in the period up to 2030-35. As such, it is certainly a technology and tactic to take very seriously for the longer term.

Overall, unmanned systems will significantly improve the range, persistence and mass of naval forces. Since the tolerance for losses is much higher for unmanned than for manned systems,[183] they lower the threshold for operating in contested areas. UAVs in a maritime environment are already operational; many new, more effective and efficient solutions are likely to be developed in the coming decade. A range of possible USVs is likely to follow. UUVs are more difficult, if only because the required level of autonomy is much higher. In general, the technical challenges might be less of an issue than rules and regulations on the one hand, and a change in mindset and culture on the other. Optimal use of unmanned systems to speed up operations and enlarge the range of influence requires 'empowerment' of remote operators at the tactical level and of machines that act autonomously. The organization, and indeed the people that make up that organization, must accept and accommodate for that.

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183   Indeed, unmanned systems can be designed to be expendable.

As long as unmanned systems are not fully autonomous—which is the case for most naval tasks in the period up to 2030-35—this will spur a 'battle for bandwidth', because bandwidth is necessary for human–machine interaction. The need to be able to stay connected is further elaborated in §3.3.6.

3.3.5 The human factor

Certainly in its warfighting tasks and capabilities, the RNLN has a strong high-tech focus. Advanced sensor, weapon and battle command systems largely determine the successful outcome of engagements with (near-)peer competitors. As described in §3.3.4, the trends is towards more advanced technology rather than less, for instance to deal with ever-shortening decision cycles. The role of humans will further shift from operator to supervisor, from '*in* the loop' to '*on* the loop'. Over the period up to 2030-35, this is likely to have dramatic consequences for the required competencies of military personnel, and therefore for literally all elements of wider personnel policies and arrangements: recruitment and job market profiling; initial and lifelong education and training; career opportunities and associated inflow, throughflow and outflow schemes; remuneration schemes; work location (more back office, less at sea?); manning concepts;[184] organizational structures and procedures; and more.

It is not only the quality, but also the quantity of personnel that is likely to be affected. In fact, difficulties to obtain certain categories of (highly qualified) personnel may reinforce the shift from human-centric to technology-centric solutions, as well as the tendency to outsource services that are not quintessentially military in nature and may be better performed by utilizing external service providers rather than by maintaining in-house capabilities.

However, where in warfighting scenarios less forward (in harm's way) deployed personnel might be attractive, this does not hold for many non-warfighting tasks. Although new technology may help, humanitarian relief operations, for instance, will remain human-centric. This tension between more pronounced technology-centric tasks and solutions versus more human-centric tasks and solutions, is destined to grow in the period up to 2030-35.

3.3.6 Connectivity and cyber resilience

As demonstrated in §3.3.4, the future norm is likely to become that naval tasks and operations are performed by manned platforms augmented by a suite of remotely controlled and (semi-)autonomous unmanned systems. In warfighting scenarios,

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184   E.g. disconnecting crew and platform, which might increase overall availability. This option is rendered (more) feasible, because already the vast majority of the individual education and training and a large proportion of the team training takes place in on-shore locations, not on the platform itself.

high-value manned assets preferably stay at a safe distance from A2AD bubbles, sea mines, possible opponents and other direct threats, but launch and command their unmanned satellites to operate within contested areas. This distribution, potentially over long distances, between commanding and executing tasks requires reliable links, directly or through air and space-based relay nodes. Non-operational connectivity will also increase: logistics systems with health monitoring functions, automated repair and replacement orders to warehouses, even entertainment systems (on-board Spotify and Netflix, next to Facebook and WhatsApp—or their future successors). 24/7 long-range shore–ship connections in non-warfighting scenarios also require a major increase in communications means and network architectures.

Furthermore, conflicts are increasingly fought simultaneously across the land, air, sea, space, information and cognitive domains. Due to the ever deeper integration of IT technology, the pace of conflict continues to accelerate while the strategic, operational and tactical levels are further compressed. To remain effective, armed forces need to be able to coordinate and synchronize actions both horizontally (across the warfighting domains) and vertically (across the levels of war). Multi-domain, multi-level operations require high levels of connectivity in order to create shared situational awareness and understanding and to synchronize actions and effects. But traditional communications hub-and-spoke networks with vulnerable single points of failure will not survive in war. They must be replaced by reconfigurable distributed networks that are resilient. In the long run, already starting in the period up to 2030-35, but extending beyond that time horizon, platforms and units must become autonomously able to process and make sense of the information they gather on its own, without relying on a command hub.

The trend towards 24/7 connectivity is irreversible in the military realm as it is in the whole of society and the economy (cf. internet of things): "if you cannot plug in you cannot join in." All these connections, within a ship, between a ship and its satellites, over long distances to connect e.g. an NMOC with assets at sea, and between naval, air, space and land-based platforms and units, create vulnerabilities. Cyber security and cyber resilience are essential. In this networked environment, lack of connectivity is a show stopper and the availability of bandwidth therefore a must. The 'battle for bandwidth' will be a key element of future conflicts. As cyber security has taken on a crucial role for economic development, and the digital space has become a potentially endless battlefield, robust, secure, resilient and interoperable (across services and domains) communication systems will be, more than ever, a critical factor.

Another factor to take into account is the possibility of electronic attacks, in their most extreme form in the shape of electromagnetic pulses (EMP) as a result of a nuclear explosion. The hardening of communication assets—and indeed of the entire C4ISR structure—is back on the agenda, and with a new priority.

3.3.7 Cooperation

We have, once again, entered an era of strategic competition between the great powers. This long-term competition is a comprehensive competition. As China and Russia use sophisticated instruments to project influence abroad, a holistic response is required to counter their ambitious geo-economic and geopolitical strategies being implemented. Challenges such as geo-economic competition or gray-zone conflicts, which are highly coercive yet do not reach the threshold of war, often occur in the seams between departments and agencies.[185] This is why structural joint and interagency cooperation at all levels is of paramount importance in the period up to 2030-35.

Joint. A crucial insight is that, in period up to 2030-35, military effects will more and more be generated through integrated contributions from all military domains. Thus operational planning will have to be conducted in a truly joint fashion as well (as indeed large portions of the defense portfolio planning). Cooperation between the services, emphatically including a dedicated cyber force (say, the future incarnation of the Defense Cyber Command), begins with building shared SA/SU. The required intelligence may only be acquired by a multitude of sources throughout all military domains and in a permanent process. The various service-specific information hubs, such as a Maritime Operations Centre, must closely interact to produce meaningful, comprehensive, timely and actionable intelligence. Operationally, countering A2AD is a particularly challenging joint task. Degrading enemy A2AD systems requires a multi-domain approach with air power, special forces, maritime attack capability and cyber weapons acting in concert in a well-prepared and excellently executed way. Such a quintessential joint operation will have to be led by a single commander and executed by distributed forces in all military domains, and requires effective planning, joint doctrine and TTPs (tactics, techniques and procedures) and robust connections. Organic air support in the form of UAVs will become more exploited in the period up to 2030-35, but support from aircraft stationed on land will remain vital for many naval operations. The dependency on satellites will further grow for precision navigation, maritime situation awareness and 24/7 communications.

Combined. With fully-fledged American support to essentially European security challenges less of a given than in the past, European countries must (more) closely cooperate to compensate for the possible lack of US mass, quality and variety of capabilities, in the maritime domain and elsewhere. Possibly a post-Brexit Europe would find it easier to set up coalitions of the willing on specific issues while bypassing difficult and lengthy decision-making processes in the EU, something that France emphatically promotes. It is clear, however, that the Netherlands will always be

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185   Brands, "The Lost Art of Long-Term Competition," 38–39.

dependent on coalitions to defend against serious infringements of its (hard) security interests, be it through the EU, NATO or coalitions of the willing and able. The RNLN has international cooperation in its DNA and is very proficient in such collaboration. [186] This should continue and possibly be strengthened, in sync with political initiatives within Europe, in the period up to 2030-35.

Interagency. In the contemporary world, the boundaries between international and societal security have faded. Furthermore security has become closely related to many other concepts and processes—as in, amongst others, economic security, security of supply, cyber security and human security. In such a world, the armed forces must interact, coordinate and cooperate with a host of other agencies to be able to face comprehensive security issues. In practical terms, this puts a huge premium on interoperability between these agencies, not 'just' in a technical sense (a challenge in itself), but also in a procedural, doctrinal and cultural sense.

With industry and service providers. In November 2018, the new Defence Industry Strategy (DIS) was published.[187] The DIS states that national sovereignty requires a stable Netherlands Defence Technological and Industrial Base (NL-DTIB)[188] that ensures that the armed forces have access to advanced capabilities with a high degree of secured readiness in order to protect the essential national security interests of the Kingdom. The NL-DTIB is also vital for Dutch participation in international development programs and as a supplier in international development and supply chains, thereby gaining access to relevant state of the art knowledge, technology and capabilities. The DIS acknowledges the increased dependence on civil partners for the development of new military capabilities, but also in support of its operational output. Triple helix cooperation between knowledge organizations, industry and Defense is essential to create and maintain integrated military solutions that, through their full life cycles, remain at least as effective as, but preferably superior to, what peer competitors can field. As part of this public–private cooperation, new thinking is required about ownership of capabilities versus access to services that provide these capabilities (or, rather, the functionality these capabilities represent). Guaranteed access, operational security, state-of-the-art technology and service levels may be decoupled from ownership.

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186   The cooperation between the Dutch and Belgium navies is the most extensive in the world.
187   "Memo: Defence Industry Strategy."
188   The NL-DTIB consists of companies and knowledge institutions within the territory of the Kingdom of the Netherlands, but also includes the in-house technical and operational knowledge and skills of the Ministry of Defense.

3.4 Wrap-up

In this chapter, broad design considerations for the RNLN's future capability portfolio were derived from the trends and developments described in chapter 2. In summary, important notions are:

- A blue water, 'regional power projection' navy remains the most apt overall force posture of the RNLN, with the European seas (North Sea, Baltic Sea, Mediterranean) and the North-Atlantic (SLOCs with North America) as its main operating theaters. The odd one out is the protection of the Caribbean part of the Kingdom under the Charter for the Kingdom of the Netherlands, requiring specific portfolio design considerations.

- Such a navy consists of a mix of surface and sub-surface combatants, ship-borne helicopters and UxVs for intelligence purposes and extended force projection, marines for operations from the sea and long-range land attack capability to counter A2AD threats. Auxiliary ship capacity for logistical purposes—quite possibly increasingly acquired 'as a service'—would augment the future mix.

- In line with the previous point: the current set of maritime operations remains applicable with some minor changes. For example, the protection of sea infrastructure, in particular seabed cables, should receive more attention; and the 'above water' (air) domain should explicitly be augmented with space (primarily ballistic missile defense).

- New lines of thought have to be pursued to deal with the paucity in numbers of platforms and to accommodate for rapid technological progress. Modularity by design, in combination with software-centered functionally, seems the way forward to guarantee flexibility and adaptability. Task-specific configurations of manned platforms that operate as 'mother ships' for a range of unmanned UxV 'satellites' hold high promises, but other forms of modularity by design should be practiced as well.

- The shift in tasks moving from humans and technology will continue, with integrated solutions such as man–machine teaming becoming more prominent. This will likely lead to a further reduction in personnel at sea.

- Networked operations, based on shared SA/SU, are the new normal. All naval and military missions will be part of, contributing to and resulting from multi-domain/multi-level operations. Remaining connected is key: physical and digital security are closely connected.

- These networked operations are joint, combined and interagency. This puts an emphasis on technical, procedural, doctrinal and cultural interoperability within the armed forces, between (ad hoc) coalition partners and with other security providers. These interoperability requirements will dictate training, doctrines and procedures.

- Cooperation between knowledge organizations, industry and the Defense organization is essential to create and maintain effective military solutions.

4. Design considerations for the future RNLN capability portfolio

This chapter takes the broad design considerations of chapter 3 a level deeper. The chapter is organized following the categorization of maritime operations in Table 3 in §3.2.

Some developments in great powers' fleet designs

Based on their procurement plans, the future design of the world's strongest navies carries little surprises. The future navies of the US and China will be built around aircraft carriers and frigates for blue water operations, reinforced by submarines for a strategic element of surprise. Russia will eventually catch up in the aircraft carrier business, after constructing a new wharf outside of Ukraine (where the previous carriers were built). India is planning to commission its first aircraft carrier in 2020. In warfighting scenarios against a peer competitor, we see strong operational and economic arguments against this choice—basically, relatively cheap missiles or UxVs stand a good chance of incapacitating a multi-billion dollar carrier. However, the 'sex' appeal of having carrier battle groups, as well as their unmistakable utility in crisis and (some) warfighting scenarios, apparently overrides these considerations. China and Russia are also investing in amphibious capacities.

Forms of stealth for new frigates and corvettes to reduce long-range detection are contemplated. However, the trend towards more transparency of surface movement on the seas and oceans (and full transparency for the most capable actors) seems inevitable. Surface combatants will be provided with self-defense and some hull integrity measures, but no defensive armor race against barrages of missiles in high-intensity conflicts is evident. The current trend of multifunctional launch capabilities from the containerized systems has proven itself and will further increase with newly developed missiles against sea, land, air and space assets, including theater ballistic missile defense. Submarines will evolve into quieter systems with lower sonar signatures (through passive and active means). Aided by new propulsion systems, the possibilities to stay submersed vastly increase. Because of their ability to avoid detection, submarines will remain the main platform for surprise and will thus

remain strategic rather that tactical warfare assets. Developments in submarine armament will increase offensive capabilities, adding to the operational value of the platform. Amphibious warfare ships are increasing in size and may carry a considerable amount of air power—mainly helicopters—, and land platforms that can be put on shore. Ship-to-shore combat operations can be executed in an effective way, for example for creating beach heads for follow-on forces. Such assets will also be crucial for disaster response operations.

For surface ships, the most impact will come from revolutionary new weapon systems such as laser and energy guns and railguns as a new means to launch grenades.[189] These systems require vast amounts of energy from power production facilities onboard. Furthermore, significantly more powerful sensors will be developed. Another revolutionary development will be the development of autonomous close-in defense systems against swarms of projectiles and drones, which will be threatening the saturation levels of the radar systems.

As military operations increasingly depend on high-quality and robust SA/SU, the connectedness within ships, between ships and with land, air and space assets will increase. In particular, the interconnectivity of naval assets with the air and space domain, where most strategic information will be generated, will be crucial.

4.1 Maritime combat operations at sea

Maritime combat operations at sea constitute the backbone of naval doctrine. These operations revolve around force-on-force engagements with the aim to destroy or neutralize the enemy's naval warfighting assets. This is achieved through the use of physical striking power and information activities, and requires highly trained crew. In high-intensity conflict, the slightest mistake may jeopardize a ship. Reversely, when a battle is handled expeditiously, a combat vessel projects a huge amount of power and is a formidable fighting asset.

In warfighting scenarios, the current Dutch frigates may find it impossible to gain access to some of the relevant confined European operating theaters, such as the Baltic Sea. The frigates are vulnerable to Russian anti-ship weapon systems, while submarines are increasingly vulnerable to Russian underwater warfare. Submarines,

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189   Both the US and China are working on railgun technology. It appears that the Chinese might have taken the edge in this development, see Trevithick, "Is This Chinese Navy Ship Equipped With An Experimental Electromagnetic Railgun?"

electronic warfare, supersonic[190] anti-ship missiles and maritime patrol and anti-submarine aircraft pose serious threats, effectively denying access. The ability to project power over long distances is therefore increasingly a decisive factor.

Underwater warfare (UWW) remains a big challenge. For the period up to 2030-35, submarines will see their role as strategic assets, which can also be used tactically, reinforced. With their stealth remaining largely intact, and with enhanced offensive capabilities, they form a deadly opponent especially for surface assets. What likely remains true is that the best way to fight submarines is with other, better submarines with first-strike capabilities. In order to strike first, superior SA/SU is key. SA/SU should be obtained through multiple sources, such as space assets; long-range, long-endurance and increasingly unmanned aircraft; embarked helicopters; and all sorts of pre-positioned or air-dropped sensors, in combination with competent intelligence cells with increasingly fast information processing cycles. Using AI and big data analysis techniques, (better) tools to predict the location of enemy submarines will have to be developed. With actionable intelligence as a fundament, fast and accurate strike capabilities against submersible enemy assets are required, preferably with long ranges in order to reduce the vulnerability of one's own assets.

UWW is mainly a blue water game, with the North Atlantic and parts of the Baltic Sea and the Mediterranean as the important operating theaters. However, seabed warfare—attacking and defending underwater critical infrastructure such as seabed cables, particularly in relatively shallow waters—might well become part of future warfighting scenarios. This would require (multi-domain) defense against the threat of relatively small, unmanned submersibles in e.g. the North Sea, possibly launched from (apparent) merchant ships.

Anti-surface warfare (ASuW) has its own challenges due to the vast amount of surface contact and possible covert use of commercial vessels for military tasks, such as mine-laying ships disguised as freighters. For collective defense, in the period up to 2030-35 Europe will remain dependent on US military support. Although the US is currently strengthening its forward presence in Europe, in case of conflict most of the troops and equipment will have to be shipped in. *Reforger*-type reinforcement operations have been practiced several times. The dependency on safe sea lanes and port facilities is extensive. These routes and infrastructures are vulnerable and must be protected and defended. Also from a purely economic point of view, protecting North Atlantic SLOCs is of huge importance. Exacerbating this task is the vulnerability of surface ships, restricting their use in a contested environment. Possibly the best way to defend surface ships is by creating an A2AD bubble around them, in combination with first-

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190   In the period up to 2030-35, hypersonic weapons with erratic flight paths and low-observable capacities will also
       be introduced.

strike capability. Again, superior SA/SU is crucial. In a battle against other surface assets, long-range outwardly deployed UAVs and USVs will act as eyes and ears. In the longer run, such platforms may also routinely carry offensive weapons.

Attacking an opponent's A2AD shield requires a multi-domain approach with air power, maritime power, special forces and cyber weapons acting in concert in a well-prepared and excellently executed manner. The countering of surface assets may benefit from new weapons, e.g. loitering 'intelligent' torpedoes. In order to be effective, a large amount of autonomy will have to be instilled in such a system. This also applies to the self-defense systems of manned vessels that without a high level of autonomy will not be agile enough against swarms of incoming missiles or hypersonic weapons. Traditional weapon systems such as guided missiles will continue to be meaningful as part of a ship's offensive weapons suite. ASuW is relevant in all European operating theaters, and potentially also in the Caribbean theater.

Above water warfare (AWW) and anti-surface warfare will increasingly merge as the proliferation of USVs and maritime UAVs increases in the period up to 2030-35. Ships will deploy unmanned systems for intelligence, defensive and offensive purposes. The same offensive and defensive tactics and techniques will be used from the sea's surface and in the air above it. Another critical AAW subtask is ballistic missile defense (BMD). With the current proliferation of missile technology and the suspension of the INF treaty, the threat is increasing considerably. Dutch naval vessels are already equipped with the very capable Thales SMART-L ER radar systems. These will (have to) be enhanced for space object tracking, including the tracking of (warheads of) ballistic missiles. Target information can either be relayed to other vessels with appropriate shooter capabilities, or dealt with through indigenous counter-missile missiles such as the SM3 and its successor. The latter option is more robust.

Naval mine warfare (NMW). Sea mines constitute a cheap method for maritime area denial. The proliferation of sea mines is massive. Furthermore, mine laying is allowed under international law under certain circumstances. Mine laying can be covertly done by seemingly innocent commercial vessels. We see a development towards submarines engaging in mine laying as well. Ships sunk by mines may block up shallow and narrow approach routes. Even the scare of mines may grind commercial shipping to a halt. In the congested North Sea, with maneuvering space further reduced by offshore wind farms, deployment of sea mines will have dire economic consequences for the Netherlands and Western Europe. In an escalation scenario where sea mines are deployed, the effort to keep choke points and approach routes open will be an ongoing battle. Navies worldwide will have to be prepared to continue operations under the threat of sea mines. Modern counter-mine techniques, using a combination of a manned mother ship and unmanned satellite USVs, will merge mine sweeping with mine hunting; with the same platforms also capable of laying mines.

The projected Belgian and Dutch counter-mine capability, with a planned in-service date somewhere halfway the next decennium, should be in line with the above. Continuous development is required to keep this capability ahead of the operational developments in this domain.

4.2 Maritime combat operations from the sea

In the absence of a peer competitor, maritime combat operations from the sea have been neglected for three decades. Navies had no access problem; fighter aircraft and bombers would prepare the battleground for stabilization and intervention forces. But the pendulum has swung back: the ability to attack land-based targets from the sea, with speed and precision, is back as a important element of strategic deterrence, and in particular as part of a joint counter-A2AD toolbox.

Counter land-based A2AD capabilities from the sea combine maritime strike, amphibious operations and maritime special operations. Currently, only a few potential adversaries possess advanced A2AD capabilities, notably Russia, China and Iran (and Venezuela as a separate case, see §2.4.1). As the US considers China and Iran its principle adversaries, they are likely to take the lead in counter-A2AD operations in the South China Sea and the Persian Gulf. Where the US are leading, its allies—including the Netherlands—could be tasked to protect the adjacent SLOCs and choke points. It is unlikely that this will include strike operations from the sea. This is different for the Russian threat. Although the US will likely not be absent in a future confrontation with Russia, Europe has a definite role to play in engaging Russian A2AD bubbles. Therefore, the land attack capabilities of the RNLN should be designed with the Russian A2AD threat in the European theater in mind.

The initial US response to the A2AD challenge was the Air–Sea Battle concept, very much aimed at the development of new capabilities countering Chinese A2AD in the South China Sea. In 2014, this concept was replaced by the Joint Concept for Access and Maneuver in the Global Commons. This new concept focused more on joint warfighting in a contested environment, rather than on procurement of counter-A2AD capacities. Instead of 'disrupt, destroy and defeat' the adversary's capabilities, the new concept focused on defeating the adversary's plan and intent. Effective operations would require joint and combined operations, with all elements of combat operations from the sea included. This shift in thinking holds an important lesson for future combat operations launched from the sea. The procurement of new capabilities must be considered in the context of a sound operational concept, one that enables strategy.

If the RNLN does not possess the ability to counter advanced A2AD capabilities, it will face a marginal role in naval warfighting scenarios with Russia (and possibly China,

Iran, Venezuela, …).[191] With its A2AD capabilities, the Russian leadership aims to 1) deter; 2) deny the opponent's naval forces access to the Eastern Mediterranean, the Black Sea, the Baltic Sea and the Arctic; 3) deny the opponent's naval forces freedom of action once they have gained access to those waters; and 4) provide cover for offensive land, sea and air based operations. While Russia possesses a strategic advantage since NATO is not allowed to deploy large numbers of troops at its eastern borders, it has a disadvantage in the maritime domain. Its navy is relatively small and NATO forces can relatively easily seal off its naval bases.

In peacetime and during crises, credible counter-A2AD capabilities will deter the adversary from risky behavior such as blocking SLOCs and denying access to maritime terrain. In wartime, defeating the adversary's plan and intent requires capabilities to gain access, based on the overall requirements of the mission, combining maritime, airborne, land-based and special forces, as well as cyber capabilities and long-distance precision strike. These capabilities should operate along multiple independent lines of operations in multiple domains. The aim is to create corridors to penetrate the adversary's defenses. Another element is to deny Russia the use of its naval assets. Blockades and the targeting of naval facilities could be part of this effort. Adopting this approach will have important consequences for the RNLN capability portfolio.

Maritime strike operations. To counter A2AD threats, the 2018 Nuclear Posture Review proposed a low-yield nuclear-tipped SLBM and mentioned a new nuclear-tipped Long Range Cruise Missile.[192] For technical and political reasons those systems are not a valid option for the RNLN. Consequently, the RNLN should put conventional long-range weapons on its priority list. Among the most used Land Attack Missiles are the aging Tomahawk subsonic cruise missile with a range of 2,500 km; the Interactive Defense and Attack System (DAS) for submarines, a short-range missile currently being developed for the new Type 212 submarine class of the German Navy; the Norwegian anti-ship and land-attack missile Naval Strike Missile (NSM) with a range of 550 km; the Swedish surface-to-surface missile Robotsystem (RBS) 15 with a range of 300 km (to be replaced); and the Israeli LORA, which is an artillery weapon system consisting of a long-range, tactical, ground-to-ground missile with a range of up to 400 km.

As naval strike scenarios are likely to be executed during an escalating conflict, the use of nuclear weapons by the adversary should be taken into account. This implies hardening of all C4ISR assets against electromagnetic pulses. The same holds for the protection against cyber attacks.

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191   Note that the current frigates and submarines cannot be equipped with long range standoff missiles without major modifications; their replacements should have (modular) provisions for such capabilities.
192   "Nuclear Posture Review."

Amphibious operations. Amphibious forces are an instrument in modern deterrence. With their high readiness status and relatively small logistic footprint, amphibious units offer a rapid-response capability in crisis situations.[193] Because of their offensive flexibility, they may cause multiple operational and strategic dilemmas for a potential adversary. Modern doctrine[194] for and tasking of amphibious units places great emphasis on unopposed landings, ideally at night, to maximize stealth, surprise and the amount of time available to get reinforcements and equipment ashore before the enemy is in a position to counterattack.

Particularly in an A2AD environment, amphibious operations tend to merge with (maritime) special operations in operations aimed at suppressing or destroying critical enemy A2AD installations and C4ISR nodes. Submarines may play a crucial role as a launching platform for amphibious (special) forces in contested coastal areas.

Maritime Special Operations, carried out by Special Operations Forces (SOF), are an integral part of a multi-domain effort to counter an enemy's A2AD capacities and C4ISR. SOF can be used to collect intelligence about the location of those capabilities, especially if mobile launchers are used. Special reconnaissance followed up by direct action, such as sabotage or strike, can be effective against those capabilities as well. SOF can be used to maximize surprise through deception and ambiguity. This will complicate enemy targeting. Unmanned, autonomous systems may enhance the effectiveness of SOF.

Special operations launched from sea require specific knowledge and a particular mindset and skillset of the SOF involved. The specific knowledge and experience rooted in maritime SOF relates to e.g. conducting intelligence operations at sea and from the sea, amphibious explorations, evacuation operations, boarding and maritime counter-terrorist operations. Therefore, maritime special forces— the Royal Netherlands Marines—are a specific element in the national special operations command.

4.3 Maritime security operations

Maritime security operations (MSO) protect the interests of the Netherlands and its allies in the face of violations of the international rule of law. They include countering drug trafficking, illegal immigration and terrorism, but also preventing or acting upon UNCLOS breaches. The maritime domain makes forward presence possible without crossing borders or creating an offensive posture. Forward presence sends a message

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193   The ability to load or unload goods and people from the coast in disaster response operations is covered in §4.4.
194   As exemplified by initiatives such as Expeditionary Advanced Base Operations (US), the Littoral Strike Concept (UK) and the Future Littoral Operating Concept (NLD),

of attention and resolve, through a very overt posture (possibly augmented by covert assets for escalation dominance).

MSO target civilian actors. However, state actors may use civil actors as gray zone substitutes for military capabilities ('proxies'). The South China Sea is a case in point. In the South China Sea, China carries out a gray zone operations with maritime surveillance, law enforcement units, armed fishing vessels and PLA combat elements. In response, the US carries out Freedom of Navigation exercises as apart of a credible forward presence. Gray zone confrontations in the South China Sea blur the distinction between military and non-military operations, and mark the trend that MSO could escalate into higher-intensity operations and interstate conflict. This emphasizes the need for escalation dominance in MSO.

Violations of international law (and the use of force that may follow) take new forms. The 2018 blocking of the Kerch Strait east of the Crimea and the Sea of Azov by Russia was a clear violation of international law and a harassment of Ukrainian military and commercial shipping. In 2004, Russia and Ukraine defined the Azov Sea and the Kerch Strait as shared territorial waters. That treaty is still in force. Nevertheless, as only Ukraine and Russia have rights to those waters according to international law, NATO could not routinely patrol the area and assist Ukraine. Consequently, a law enforcement operation could only be based on an invitation by Ukrainian authorities. Such an operation could easily escalate into a hot confrontation with Russia. Legally, a law enforcement operation would take place under the control of (Ukrainian) civil authorities. But in a Kerch Strait scenario the Ukrainian authorities would probably refer to the right to collective self-defense enshrined in Article 51 of the United Nations Charter. Thus, the law enforcement operation can no longer be labeled MSO.

In sum, gray zone operations change the nature of MSO. Escalation dominance becomes more important than in 'traditional' MSO such as counter-piracy operations. This will have the following consequences for the different types of MSO.

Maritime interdiction is designed to enforce prohibition on the maritime movement of specific persons or materials within a defined geographic area. In order to seek escalation dominance, the balance of power in the area should be taken into account. An unfavorable balance of power could demand rapid reinforcement and a combination of light weapon systems, such as machine guns, and heavy weapon systems aimed at fighting and winning in a high-intensity environment. New approaches should be perused as well. The US Navy has developed the concept of 'distributed lethality' by increasing the volume of munitions carried on board of ships and relying on a larger number of less expensive, rapid-fire systems instead of expensive, precision-guided munitions. The aim is to enhance forwardly deployed firepower (note that this concept transcends the interdiction task).

Countering violent crime and terrorism at sea will remain at least as important as it currently is. For the foreseeable future, the security situation will not diminish the need to protect vessels and convoys, create safe areas and corridors, and end hostage situations. Consequently, the need for **boarding operations** is unlikely to change, although the context may call for more escalation dominance. For example, Iran is believed to provide Hutu rebels in Yemen with sea mines, threatening shipping routes.

Protection of critical infrastructure at sea. Only state actors tend to have the means, motives and capabilities to sabotage critical infrastructure such as undersea cables, pipeline and wind farms (as far as the means are concerned, this might change in the period up to 2030-35). Protection of the maritime infrastructure should therefore be considered in the context of escalating crises and interstate conflict. In the North Sea, attacks on critical infrastructure are likely to result in an invoking of Article 5 of the NATO treaty. UUVs to routinely monitor seabed communication cables for possible intrusions ('taps') may be required as part of the RNLN's future capability portfolio. As already indicated in §4.1 under the UWW heading, protection of critical infrastructure at sea might become part of warfighting scenarios that lie beyond the 'security operations' context here.

Note that the political acceptance in the Netherlands of the use of private security companies (PSC) in some security operations seems to be slowly shifting. Recently, a law was passed to allow the deployment of armed private security guards on board of Dutch merchant ships.[195] This might open up possibilities for more public–private cooperation in the various security operations described here, under relatively strict government oversight because the state monopoly on violence is at stake.

4.4 Maritime assistance

Maritime assistance is performed with or towards other nations, basically without the use of 'hard' military power unless for self-defense. Again, as for maritime security operations, the maritime domain makes forward presence possible without crossing borders or creating an offensive posture.

Maritime diplomatic assistance is a form of exerting influence in accord with Dutch foreign interests and policy. The most benign form is conducting friendly port visits, where naval ships can serve as a stage for trade missions. A port visit conducted with a submarine sends another signal: that of strategic surprise and unpredicted presence. Conducting training operations with other navies sends a message that our nation is aware of the situation and is there to act if needed. These kinds of activities are done

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195   Stemming Wet ter Bescherming Koopvaardij.

with vessels as they are, with little or no specific requirements. They do, however, demand diplomatic skills of the crew as a hole. A more volatile form of naval diplomacy is conducting a Freedom of Navigation exercise in an illegally claimed sea area. In such cases, the ship's self-defense should be well organized with deployed sensors of different kinds and the possibility to create an A2AD bubble around the ship.

Maritime assistance to civil authorities is conducted when and where civil capabilities are lacking or where specific military qualifications or means are required. Search and rescue missions, maritime policing tasks and coast guard tasks in order to support or build up the rule of law fall under this header. Such tasks generally require good SA/SU. Self-defense and communications have to be organized. Shallow-water and aerial assets are often crucial. Diving assistance, ordnance disposal and hydrographic survey missions require specific capabilities which could be part of a modular (task-containerized) ship. In relief missions and non-combatant evacuation operations, the ability to load or unload goods and people from or to the coast while port infrastructure is lacking or rendered unusable, critically depends on the number of people a vessel can berth, the tools and equipment it can carry, and the embarked helicopter capacity it possesses.

Assistance at sea and from the sea may apply to many different tasks. Examples are refugee support, supplying food, building shelter and performing infrastructural repairs. It is likely that the demand will rise in the period up to 2030-35, due to the effects of climate change and population growth in delta regions. Similar remarks apply to those listed under the header above, Maritime assistance to civil authorities.

4.5 Wrap-up

In chapter 3, it was concluded that a mix of surface and sub-surface combatants, ship-borne helicopters and UxVs for intelligence purposes and extended force projection, modern amphibious forces, and long-range land attack capability to counter A2AD threats would best fit the (future) capability mix for the RNLN in the period up to 2030-35.

Because of their low observability and high strategic value, in warfighting scenarios, submarines will more and more become the platform of choice for forward offensive operations, including intelligence tasks, anti-surface and underwater warfare, naval mine warfare, land attacks and launching special forces. Within its niche of ocean-going, non-nuclear powered submarines, the RNLN should continue to offer a highly valued contribution to the protection of SLOCs to and from Europe. Long-range attack capabilities, such as ballistic and cruise missiles, render it possible to achieve effects while avoiding A2AD environments, for sub-surface as well as surface

combatants. Naval land attack capabilities are required in a multi-domain approach to counter advanced A2AD capabilities. Amphibious and special operations (partially merging) launched from the sea also feature in this integrated approach. Counter-A2AD capabilities in effect create one's own A2AD bubble. UxVs will increasingly be deployed for intelligence gathering and force projection, in particular in contested areas.

For the next generation naval combatants, new weapon types such as energy weapons, railguns, hyper-velocity missiles and intelligent torpedoes should be contemplated, but quite possibly not initially acquired. Modularity by design / provisions for this, e.g. multifunctional launch containers, should make it easier and less costly to introduce new technology on board of the new frigates. The deployment of military modules on non-naval vessels is an option to consider. Highly autonomous, active self-defense systems are required to counter some of the new types of weapons deployed by possible opponents.

(Counter-)mine capabilities will increasingly merge. Sea mines, as a cheap means for area denial, play an important role in e.g. various terrorist and (escalating) gray zone conflict scenarios. After the commissioning of the projected Belgian–Dutch counter-mine capability, a continuous development capacity is required to keep the RNLN ahead of the operational developments in this terrain.

In security operations, surface ships are required, again increasingly aided by embarked helicopters and UxVs that provide considerable range extension and flexibility. In particular, protection of infrastructure at sea is of increasing concern. UxV threats against sea infrastructures, including seabed cables, need to be countered, quite possibly largely countered by own UxVs—with a debate on the role of the RNLN vis a vis other public and private security providers possible. In the period up to 2030-35, escalation dominance becomes more important in security operations.

Evacuation, disaster response and humanitarian relief operations require surface ships that have the (amphibious) capacity to pass people and goods onto and from shore under difficult circumstances. Whereas auxiliary ships for replenishment at sea and other logistical purposes could increasingly be acquired 'as a service', it is in the former kinds of operations that in-house capable ships are required most.

In the period up to 2030-35, operations will increasingly be multi-domain and multi-level. High-quality and timely SA/SU is key, shared across domains and levels on the basis of 24/7 connectedness. Using AI and big data analysis techniques, better tools to produce actionable intelligence are vital as the foundation for successful joint and multi-actor missions.

5. Final observations

In this study we have portrayed a plausible maritime security environment for the period up to 2030-35; the Dutch interests that are at stake and possibly at risk in this environment; the missions and tasks for which the RNLN must prepare in facing these risks and threats; and a broad layout of the RNLN's future capability portfolio capable of successfully executing those missions and tasks. So where do we stand? And what "areas where current 'ends, ways and means' of the RNLN are expected to become inadequate, and innovative solutions are required" (§1.2, final objective) did our analysis highlight?

The future world we have sketched in chapter 2 is not drastically different from today's world, but represents an evolution of a number of systemic trends. We have not introduced extreme shocks, such as (to name but a few): the collapse of China, Russia, the EU or NATO; a severe reversal of globalization, with more or less autarkic regional blocs emerging; or climate change-induced extreme weather conditions causing massive global catastrophes—all maybe not very likely, but certainly not impossible and definitely high-impact. The problem with such shocks is that there are too many options, both conceivable and less conceivable. But even gradual changes add up over a period of 15 years, and may cumulatively change the face of the world we live in quite drastically and in often unexpected ways. Many of the outcomes of these change processes cannot be fully appreciated or anticipated beforehand, let alone planned for other than in a very generic sense through robust, flexible and adaptive portfolios.

Even without shocks, the security environment of the next one or two decades is likely to be more challenging than was the case over the past two decades. Great power competition has become more antagonistic. Geopolitics and economic policy will further merge, adding to complexity in international relations. Western technological overmatch has eroded and will further erode, with air and sea dominance no longer a given. China's rapid naval expansion will force the US Navy to further pivot to the Indo-Pacific region, with the European NATO partners compelled to do more in the European theaters. We face continuous gray zone conflicts, largely in non-military and partially in virtual domains, but with definite military repercussions. The global commons— space, the arctic, the internet—might be on the brink of becoming militarized. Accelerating technological developments, largely driven by civil markets, generate new but rather opaque arms races. Information has become *the* central production factor of the information age, and indeed of the military 'production process'.

This is not to say that the Netherlands' maritime interests—and therefore the type of tasks the RNLN faces in defending these interests—will drastically change, other than in accents. These interest have been remarkably constant over time and are deeply connected to what we are as a nation. Unobstructed access to and from Dutch ports remains essential for our prosperity, with traditional SLOC protection increasingly augmented by the protection of critical infrastructure at sea and under the sea. The developments in the Caribbean may well put more strain on Dutch naval presence and naval assets in the period up to 2030-35. The same applies to safeguarding the European borders in the southern and eastern fringes of our continent. Clearly, threats to these interests cannot be met by the military alone. However, in many instances the armed forces remain the first and most visible answer to show resolve and resilience in defending them.

With the type of naval operations and tasks for the period up to 2030-35 largely enduring, we envisage the core of the future naval force to remain a versatile mix of surface, sub-surface vessels and amphibious units. These, however, will be augmented by unmanned systems in space, the air and on and below the sea: UxVs that will increasingly take over the operational functionality of the manned 'mother ships' (which, for the period up to 2030-35, remain the central command hubs at sea). All main vessels should be ocean-going, able to navigate under all conditions the main operating theaters for the RNLN: the North Sea and (northern) Atlantic Ocean, the Baltic Sea, the Caribbean and the Mediterranean. 'Excursions' are likely to be made into the Arctic Sea and the area beyond Suez, the Indo-Pacific region.

Access to these theaters, however, will not always be a given. With modern A2AD capabilities and strategies, surface ships in particular are increasingly vulnerable. The counterstrategy is multi-facetted and requires a concerted multi-domain, multi-level strategy. Giving substance to this strategy is an important challenge for the period up to 2030-35.

A new domain that requires attention is the seabed, hosting an increasing number of data cables, power supply and energy supply lines crucial for our economy. By covertly tapping undersea internet cables, communication can be distorted, compromised or spoofed. This kind of tampering would typically fit in gray zone conflicts, but could fit warfighting scenarios as well. As Western Europe becomes more dependent on wind parks at sea, electricity cables on the seabed will increase in number, constituting a new dependency and vulnerability. In addition, the seabed seems destined to become a major mining area because of its richness in minerals and other valuable raw materials. Competition in mining concessions might lead to tensions over EEZ claims, the use of A2AD strategies and, ultimately, military conflict.

'Navies-only' operations are a thing of the past: next to combined, joint and interagency cooperation will be the norm. High-quality and timely maritime SA/SU requires multi-domain sensors and information exchange with a host of military and non-military actors. Big data and AI will play an increasing role in processing information into actionable intelligence. In warfighting scenarios, resilient defense concepts should consider ever tightening Observe-Orient-Decide-Act loops that are highly automated; all the more so given the development of smart, supersonic and hypersonic weapons and of swarm tactics. In an increasingly transparent security environment, the elements of concentration of force and of surprise likewise require rapid and integrated multi-domain action. Such developments could radically change the face of war,[196] but in most estimations not yet within the 2030-35 time horizon.

The diverse areas of technology expected to change warfare most significantly in the period up to 2030-35 are neither inherently military nor civilian. They have low barriers to entry, which means they will be proliferated. This issue is not one merely of the hardware, but also the spread of ideas, which is more and more decentralized and therefore harder to control. One important corollary is the urgent need for tight cooperation in capability portfolio development between industry, knowledge institutes and government in order to speed up (continuous) innovation cycles. The Defence Industry Strategy of 2018 provides a framework for operationalizing this need.

The bottom line is that even while we expect that the *why* and the *what* for naval operations and tasks will evolve within reasonable brackets for the period up to 2030-35, the *how* of the RNLN (its personnel, materiel, doctrines and processes, organization and structures) must substantially innovate—but not beyond recognition. All details aside, now more than ever, the overarching requirement for a robust, flexible and adaptive (future) naval capability portfolio requires the knowledge, experience and capabilities embedded in an expanding ecosystem of partners of the RNLN. This is possibly, in an abstract sense, the most daunting challenge for the RNLN in the period to come. Opening up to embrace innovative influences from and dependencies on such an ecosystem on the one hand; while remaining responsible for and capable of producing high-quality, guaranteed military effects in and from the sea on the other. It is in the reconciliation of these two, at times (seemingly) conflicting, perspectives and mindsets that the RNLN is likely to find the strength to successfully face a rapidly evolving, increasingly volatile security environment.

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