2021 CUTTING THE BOW WAVE

COMBINED JOINT OPERATIONS
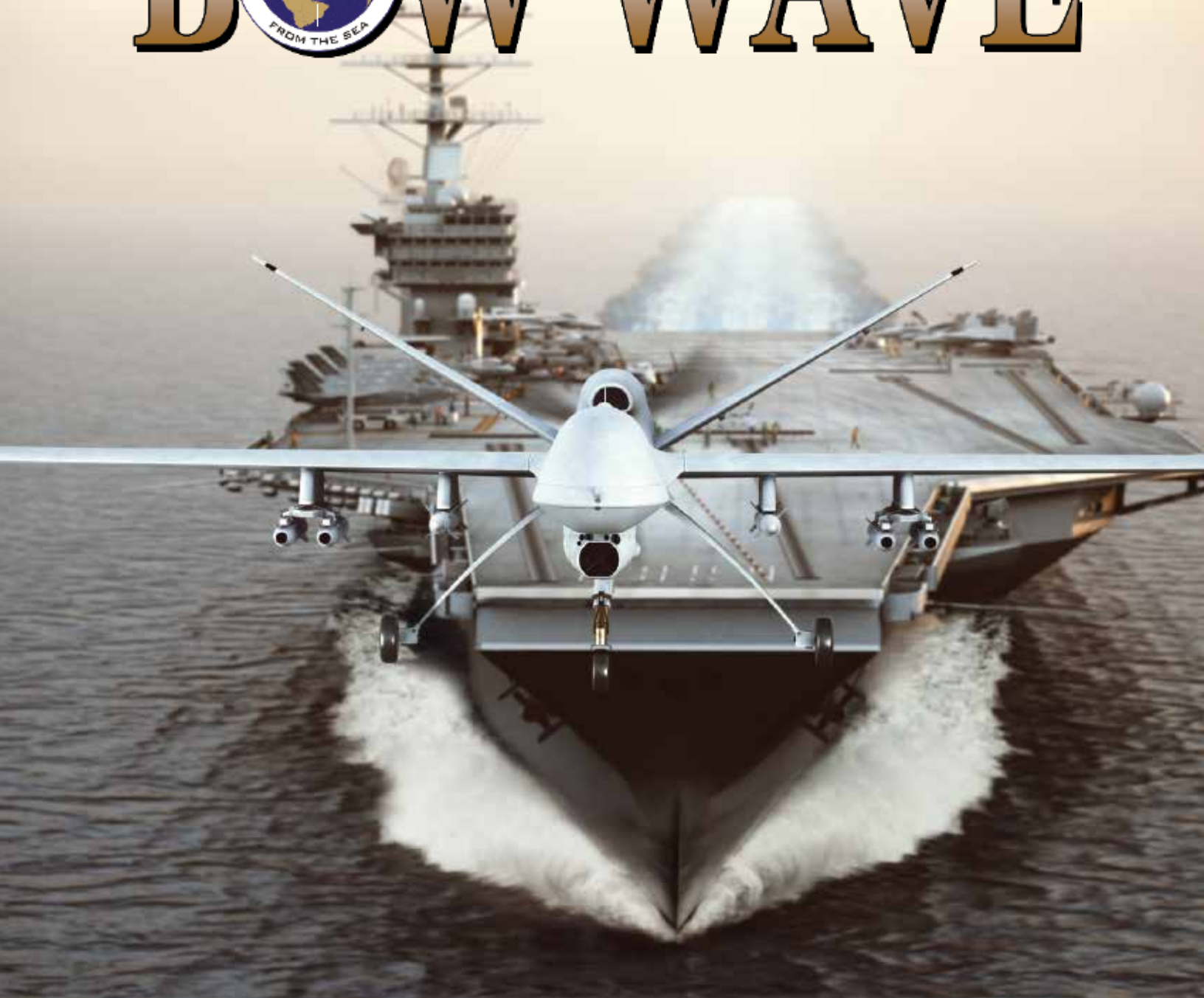FROM THE SEA

COMBINED JOINT OPERATIONS FROM THE SEA CENTRE OF EXCELLENCE

TRANSFORMING ALLIED MARITIME POTENTIAL INTO REALITY

Publisher's Note

Cutting the Bow Wave is an annual publication by Combined Joint Operations from the Sea Centre of Excellence, U.S. Second Fleet, in Norfolk, Virginia. For publication purposes, all articles and materials submitted become the sole property of CJOS COE.

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CVN 75 - USS Harry S Truman of US Second Fleet at anchor in Stokes Bay, Hampshire UK

Cutting the Bow Wave 2021 Director's Foreword:

2020 has seen sweeping challenges to international relations across the globe. Even to the layman, it is obvious that we are not operating in the same security environment as we were at the start of the 21st century; we now face the reality of multiple near peer competitors operating across multiple spectrums of instruments of power. The North Atlantic is a more contested and complex space, and more than ever we need to ensure alignment and cohesion within and across NATO's maritime domains. As NATO continues to evolve to maintain its strategic advantage, there has been an evolution here too, and a subtle shift in emphasis, with the Directorship of CJOS COE being aligned with the Command of US SECOND Fleet and Joint Force Command Norfolk. While CJOS will continue providing the support to the Alliance as it always has, under the direction of its Sponsor Nations, this shift helps to better align missions and their interconnectedness. I am really excited about the positive effect this will have on improving allied maritime interoperability across the North Atlantic, while linking the really valuable forward-looking conceptual work that CJOS does with operational and tactical maritime commanders.

CJOS brings a wealth of knowledge and expertise, from providing practical advice and education to support Allies working together effectively in the maritime domain now, to thinking about how we harness unmanned systems and artificial intelligence in the future maritime battle-space.
With our ambitious program of work for 2021, we will continue to drive Alliance maritime warfare development, and specifically support SECOND Fleet and JFC Norfolk in their deterrence and defense missions. This alignment effort must move the yardsticks not only on interoperability but bring more effort on integration, interchangeability and resilience at a level that provides "reflexive responsiveness" to any challenge presented by our adversaries. I am committed to developing these themes through a networked approach. If you think CJOS can help you, or you can contribute to the collective mission, please get in touch.

A Navy Sailor directs an F-18 Hornet fighter aircraft around the flight deck of an aircraft carrier

Vice Admiral Andrew Lewis is a native of Los Altos, California, and a 1985 graduate of the U.S. Naval academy. He was designated a Naval Aviator in April 1987.

His command tours include Carrier Strike Group 12, Naval Strike and Air Warfare Center, Carrier Air Wing (CVW) 3, Strike Fighter Squadron (VFA) 106, and Strike Fighter Squadron (VFA) 15. Lewis' operational sea tours include Attack Squadron 72, 800 Naval Air Squadron, and VFA-192. Other deployed tours have been as a battle director at the Combined Air Operations Center in Al Udeid Air Base, Qatar, and as the maritime operations center director at U.S. Naval Forces Central Command/U.S. 5th Fleet/Combined Maritime Forces.

Ashore, Lewis served at Training Squadron 23, at Joint Warfare Analysis Center, Naval Air Forces (Atlantic), Naval Air Forces/Naval Air Forces (Pacific), and the Joint Staff. As a flag officer, Lewis has served as the deputy Chief of Naval Operations for Operations, Plans and Strategy (OPNAV N3/N5), vice director for Operations (J3), and director of Fleet Training (N7) at Fleet Forces Command.

He has flown over 100 combat missions in Operations Desert Shield, Desert Storm, Southern Watch, Deny Flight, Enduring Freedom and Iraqi Freedom. He has accumulated over 5,300 flight hours and 1,100 arrested landings. He was the recipient of the Naval Air Forces Pacific Pilot of the Year in 1996. Lewis assumed duties as commander, U.S. Second Fleet in August 2018 and was named Commander, Joint Forces Command Norfolk in October 2018. He became Director, Combined Joint Operations from the Sea Centre of Excellence (CJOS COE) in October 2020.

His personal awards include the Navy Distinguished Service Medal, Defense Superior Service Medal (two awards), Legion of Merit (six awards), Bronze Star, Defense Meritorious Service Medal, Meritorious Service Medal, Air Medal (seven Strike Flight and four Individual with Combat "V"), Navy and Marine Corps Commendation Medal (three awards; two with Combat "V"), and the Navy and Marine Corps Achievement Medal, as well as various service and campaign awards.

Cutting the Bow Wave 2021
Deputy Director's Foreword:

As our Director has outlined, security challenges abound, and CJOS COE is firmly focused on supporting NATO in maintaining the edge in the maritime domain. But whilst our focus is on the maritime domain, 'multi-domain' and 'cross-domain' thinking is coming increasingly to the force, and the commanders of the future will be 'domain agnostic' as they grapple with ever increasing amounts of information, sorted and delivered by rapidly advancing technology. They will wield weapons with levels of range and precision that stretch the boundaries of areas of interest, both geographically and conceptually. Notwithstanding the increasing porosity of domain boundaries, as Allied Command Transformation (ACT) defines its warfare development priorities for the coming decades, and Allied Command Operations (ACO) refines its deterrence strategy, CJOS COE's work in support of both of those is focused on those factors affecting operations over, on, under and from the sea.

As SACEUR, General Tod Wolters, notes in his foreword to John Andreas Olsen's excellent 'Future NATO' Whitehall Paper, NATO needs to be challenged, conceptually and intellectually: "We must replace old ideas with new thinking." You will see in this edition some of our new thinking on the implications of developments in hypersonics, big data and cyber interoperability. However, our focus is not solely technical; geopolitics, strategy and command and control are also key factors in how warfare develops, and the reader will find thoughts on strategic developments in and beyond NATO's traditional area of responsibility, from the Black Sea to the Baltic to the High North and the Far East. From a practical perspective, we have an equally vital discussion on future sea-basing and sustaining maritime operations, and the necessary interoperability basics to keep the Alliance effective at sea and from the sea. As we strive to push the boundaries of Alliance maritime thinking, we are, as ever, indebted to our broad network of military and academic partners, and I am

delighted that in this edition we once again have outstanding thought-provoking contributions from a broad range of extraordinary external contributors. We look forward to hearing from anyone who has further interest in our programme of work, and our aim of 'turning Allied maritime potential into reality.'
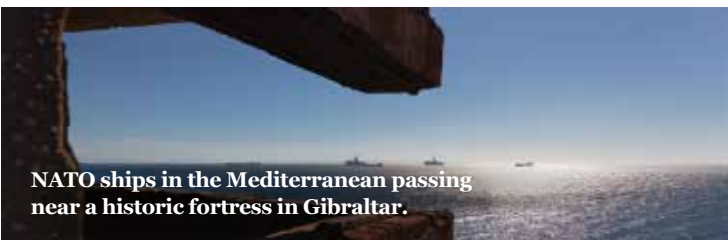
NATO ships in the Mediterranean passing near a historic fortress in Gibraltar.

Tom Guy is fortunate to have enjoyed a broad range of rewarding operational, staff and command roles ashore and afloat from the UK to the Far East. Early appointments included a wide variety of ships, from patrol craft to mine-hunters, frigates, destroyers and aircraft carriers, ranging from fishery protection to counter-piracy and UN embargo operations as well as training and operating with a broad range of NATO allies. Having trained as a navigator and diving officer early on, Tom specialised as an anti-submarine warfare officer and then a Group Warfare Officer. He then went on to command HMS Shoreham, a new minehunter out of build, and then HMS Northumberland, fresh out of refit as one of the most advanced anti-submarine warfare frigates in the world. His time as Chief of Staff to the UK's Commander Amphibious Task Group included the formation of the Response Force Task Group and its deployment on Op ELLAMY (Libya) in 2011 and he later had the great privilege of serving as the Captain Surface Ships (Devonport Flotilla).

Shore appointments have included the Strategy area in the MOD, a secondment to the Cabinet Office, Director of the Royal Naval Division of the Joint Services Command and Staff College, and the role of DACOS Force Generation in Navy Command Headquarters. He has held several Operational Staff appointments, including service in the Headquarters of the Multi-National Force Iraq (Baghdad) in 2005. Other operational tours have included the Balkans and the Gulf, both ashore and afloat. In 2016-17 he was the Deputy UK Maritime Component Commander in Bahrain, working alongside the US Fifth Fleet Headquarters. He assumed the role of Deputy Director of the Combined Joint Operations from the Sea Centre of Excellence in Norfolk, VA, in September 2017.

A graduate of the UK's Advanced Command and Staff Course and the US Capstone Course, with a Master's Degree from Kings College, Tom is a Younger Brother of Trinity House and a keen yachtsman (qualified as an Offshore Yachtmaster), as well as being a classic car and bike enthusiast. He is married to Katie who is a sailing instructor and they have two grown up children, both of whom are also keen sailors.

The Combined Joint Operations from the Sea Centre of Excellence (CJOS COE) was established in May 2006. Representing 13 nations, CJOS is the only Centre of Excellence in the United States, and one of 26 NATO accredited Centres worldwide, representing a collective wealth of international experience, expertise, and best practices.

Independent of the NATO Command structure, CJOS COE draws on the knowledge and capabilities of sponsoring nations, U.S. Second Fleet, and neighboring U.S. commands to promote "best practices" within the Alliance. CJOS COE also plays a key role in aiding NATO's transformational goals, specifically those focused on maritime-based joint operations. We enjoy close cooperation with Allied Command Transformation (ACT), other NATO commands, maritime COEs, and national commands.

Comprised of 25 permanent staff and 20 U.S. Navy reservists, CJOS COE is highly flexible and responsive to its customers' needs. The Centre cooperates, whenever possible, with industry and academia to ensure a comprehensive approach to the development of concept and doctrine.

REQUEST FOR SUPPORT

NATO Organizations should submit Request for Support (RfS) via the TRANSNET website for inclusion into the CJOS program of work. Individual nations or institutional stakeholders who wish to submit a request may contact CJOS COE directly and submit a request to the Directorate Coordinator. The CJOS Program of Work is on an annual cycle. Request for the 2022 Program of work should ideally be submitted by 15 August 2021. If the requests are approved by the Steering Committee, they will be included in the 2021 PoW. We also are available to take emergent request as an Out of Cycle RfS. If submitting an out of cycle request via TRANSNET, there must also be a email directly to CJOS COE for timely acceptance and work to begin on the project.

Our aim is to be a pre-eminent source of innovative military advice on combined joint operations from the sea. Our strength lies in our diverse staff spanning 13 different nations from multiple military branches. We continue to improve our products and services by collaborating with institutions, universities and other organizations that are leaders in their fields of expertise. We take full advantage of our location in Norfolk, VA and the numerous universities, and research facilities in our area. We also have a unique tie to the United States Navy's Fleet Forces Command, SECOND Fleet and NATO's Joint Force Command Norfolk.

If you are interested in receiving project support from our staff, simply submit a request to CJOS COE as described above via the following link https://portal.transnet.act.nato.int/Pages/home.aspx . TRANSNET accounts can be requested from the TRANSNET website or you can visit our website at www.cjoscoe.org. RfS' can be submitted to any staff member or the Directorate Coordinator at:

Email: USFF.CJOS.COE@NAVY.MIL or Phone: +01-757-836-2611

Hope to hear from you soon!

WHAT IS CJOS COE?

The Combined Joint Operations from the Sea Centre of Excellence is a preeminent, independent, multinational source of innovative advice and expertise on all aspects of maritime operations, charged with developing and promoting maritime concepts and doctrine in order for NATO, Sponsoring Nations, Allies and other international partners and organizations to optimize the efficient delivery of Maritime Effect.

CJOS COE MISSION

To support the sponsoring Nations (SN) and NATO in improving their ability to conduct Allied combined joint operations from the sea in order to counter current and emerging maritime global security challenges

CJOS COE VISION

Working closely with partners and stakeholders from international militaries, governments, non-governmental agencies, industry and academic communities of interest, CJOS COE aims to be the Alliance's source of expertise in the conduct of combined and joint operations in the maritime environment.

CJOS COE WILL ACCOMPLISH ITS MISSION:

- Through the development of innovative concepts and doctrine thus supporting transformation of NATO to meet the demands of future operations in the maritime domain.
- By identifying and resolving obstacles to a networked response to maritime security challenges.
- By applying the principles of Smart Defense and pooling subject matter experts.
- Through broad intellectual engagement thereby supporting the Connected Forces Initiative.

> " Victory, however long and hard the road may be, for without victory there is no survival. "
>
> – *Prime Minister Winston Churchill*

VADM KEITH BLOUNT, CB, OBE
DR. JAMES H. BERGERON

NATO'S MARITIME DOMAIN

We have now entered the third decade of the 21st century, a period which has witnessed waves of terrorism, the resurgence of Russia and the rise of China as central security challenges. Throughout this period, NATO has been on a continuous journey to adapt in order to retain its credibility and relevance as the world's premier multinational security institution in the West and, indeed, in the world.

The maritime domain has been an intrinsic part of this story and has again become a principal stage for strategic competition. The geography of this dynamic is new and strongly focused on the seas and the littorals. In the Cold War, we looked east to the Fulda Gap as the flashpoint of conflict with the Soviet Union. Today, however, Russian strategy is to project power and focus efforts almost everywhere except the plains of central Europe, but particularly at sea. Further afield, China has emerged as a great naval power that is increasingly present in NATO waters.

Since the creation of the NATO Response Force in 2002, the Alliance has been bolstering its ability to rapidly and credibly respond in a crisis.[i] There is now a growing appreciation that to credibly deter aggression, NATO must demonstrate its ability to act simultaneously across land, sea, air, space and cyberspace. That means dealing not only with concurrent challenges in multiple regions, but also with cyber and space warfare, disinformation and fake news. The strategic seas of the Alliance are a connective tissue between all these domains, cementing the distinctive role of maritime power in both deterrence and defence. Delivering this for NATO is the task of the Allied Maritime Command (MARCOM). This article considers current and prospective challenges in the maritime domain, assesses NATO's current deterrence and defence posture at sea and suggests steps that it might take to sustain its operational superiority.

The Russian Naval Challenge

The Russian Federation navy has improved considerably over the last 20 years. The recently constructed Russian light fleet of destroyers, frigates, corvettes and patrol boats armed with Kalibr long-range land-attack cruise missiles has changed the character of war at sea for the Alliance. Russia has similar sea-attack missiles that can threaten warships and merchant vessels from hundreds of miles away. Matching this new offensive capability are well-established air-defence systems such as the S-400 and coastal-defence batteries such as the Bastion. All of this leverages an asymmetry of cost-effective but relatively inexpensive systems and platforms. Russia's fleet is small, swift and not particularly sustainable, but nonetheless capable of hitting land and sea targets from stand-off ranges.

As important as the capabilities is the asymmetric strategy they support. Russian strategic thinking increasingly focuses on 'local wars' - short conflicts of which only a few weeks might involve 'high-end' warfighting; the objectives are limited and not existential for an adversary.[ii] This strategy involves giving minimum notice, employing deception tactics and pushing Russia's military posture to the brink of armed attack, raising the political costs of Allied response to force a resolution on Russian terms; or failing that, executing a high - intensity, short - duration offensive to force the Alliance to back down.

A critical and new element in this strategy is electronic warfare, designed to degrade the enemy's weapons and systems. Russia's use of electronic spectrum jamming and manipulation, GPS disruption and false navigational readings is becoming common, as is the ability to interfere with undersea fibre-optic cables and pipelines.[iii] Merely a credible threat to do these things gives an adversary a deterrent advantage. Cyber weapons offer the least expensive method of attack and are largely deniable– thus constituting the perfect hybrid weapon. Cyber security is a major security concern of the world shipping community today, and that threat has an impact on navies as well, since too often ships communicate on unsecure circuits.[iv]

An important factor in Russia's overall maritime capability is the speed with which its naval forces can act. Enjoying unity of command, indigenous equipment, aligned tactics, training and procedures, and a common culture, the Russian fleet can set sail quickly and with little notice. Russia's strategy counts on that cohesion and agility being superior in the early phase of conflict to the Alliance's ability to integrate operations among more than a dozen major navies.

HMS Queen Elizabeth sails with ships of NATO's SNMG 1

There is an additional factor to consider: an ironic outcome of effective conventional and nuclear deterrence – which NATO arguably presents in any 'long-war' scenario – is to drive a peer competitor to a hybrid or 'grey-zone' strategy. Examples include the disruption of freedom of navigation in the Black Sea, GPS jamming in the Eastern Mediterranean and the seizure of Ukrainian patrol boats in the Kerch Strait in 2018.[v] This creates the operational dilemma of sub-threshold activity and how to defend against it.

The Atlantic Nexus

The North Atlantic, Arctic and Baltic regions form a strategic 'Atlantic Nexus'. As recently demonstrated in the Russian navy's 2019 Exercise Ocean Shield, assets from both the Northern and Baltic fleets can be redirected to concentrate force across this area.[vi] The character of the Atlantic Nexus has changed remarkably since the Cold War. Then, as now, NATO's critical challenge in the North Atlantic is to protect the sea lines of communication and transatlantic resupply in a conflict by keeping Russian forces contained above the Norwegian Sea. But the Arctic, once valuable only as the cover for Russia's nuclear - powered, ballistic missile - carrying submarine force, is now a contested civil and economic space. Furthermore, the Baltic dilemma is inverted from its Cold War manifestation: then NATO's strategy was to keep the Soviet Navy from breaking out into the Atlantic through the Danish Straits or the Kattegat; today, the strategy focuses on ensuring that NATO maritime forces can break in to help defend its Baltic Allies.

The Atlantic Nexus disappeared from NATO's agenda after the demise of the Soviet Union, and until recently few were adept in the art of transatlantic maritime resupply. Since 2014, NATO has recognised the challenge and in 2018 empowered MARCOM as the 360 - degree Maritime Theatre Component Command while establishing Joint Force Command Norfolk with the mandate to secure Atlantic sea lines of communication.[vii] The US Second Fleet has been stood up again with a strong Arctic and North Atlantic focus. The German navy is developing a Baltic-facing maritime headquarters at Rostock with the ambition to take on

coordination and (during a conflict) command roles for Allied naval forces in the Baltic.[viii] The Polish Navy is developing a similar capability.

At the heart of this Atlantic challenge is the submarine threat. Recent years have seen an explosion in studies on the need to protect transatlantic sea lines of communication against the Russian submarine force as part of NATO's credible deterrent posture.[ix] These have been paralleled by conversations and planning inside the Alliance. Unsurprisingly, reinvigorating NATO's anti-submarine warfare (ASW) capability is a high priority for NATO and MARCOM. More than any other form of naval warfare, ASW operations must battle the elements as much as an adversary. The sheer size of the oceans presents difficulties for both attacker and defender, not least as the result of the reduced fleets of surface ships, submarines and maritime patrol aircraft on all sides. New technology also portends a change in both the lethality of submarines and the possibility of detecting them by non-acoustic means.[x]

But there is a second dilemma in relation to the Atlantic Nexus: the peacetime impact of the Russian navy's 'Kalibrisation' coupled with these forces' presence in the Eastern Atlantic and the Mediterranean. This leaves the western flank of Europe potentially vulnerable to missile attack from the sea. Although of limited use in a protracted and major conflict, such naval forces fit well with a hybrid strategy based on a short-war model that seeks to intimidate the Alliance into backing down in a crisis.

Effective deterrence in this scenario depends on NATO's ability to counter that threat and assure Allies through its credible naval capability and persistent presence when needed, before crisis occurs. That requires a fully resourced Standing Naval Force and close coordination among Allied forces operating under national command.

Norway and Iceland

The defence of Norway and Iceland presents unusual joint challenges that have maritime power at their core. Both countries occupy critical strategic space in the Atlantic Nexus. Carrier strike and amphibious power projection provide the main, although by no means exclusive, sword and shield in contesting the North Atlantic in a conflict. New questions abound: how can NATO best use aircraft carriers in the North Atlantic given today's technologies? How does the Kalibrisation of the Russian fleet alter both Russian and NATO strategy? Arguably, Norway and Iceland are even more valuable to the Alliance deterrent posture today than during the Cold War, given NATO's need to reinforce its ability to operate in contested northern waters against credible adversary forces.

The Baltic Sea

NATO's objectives in the Baltic Sea are clear and indeed are the same objectives it has everywhere: to deter conflict and, if necessary, to defeat aggression. NATO must find ways to perform four critical tasks to prevail in the Baltic: counter Russia's potential for destabilising hybrid tactics and the clever use of 'lawfare'; enable NATO naval forces to demonstrate the capability to break into the Baltic past the Danish Straits; operate with acceptable risk inside an anti-access/area denial (A2/AD) space or neutralise that capability; and enjoy effective support and resupply from regional ports.[xi] For amphibious forces, this includes overcoming A2 strategies to deploy forces ashore. It must be emphasised that these tasks require joint and multidomain responses; the navies of individual NATO members cannot execute all these operations alone. Furthermore, as recently noted by the Commandant of the US Marine Corps, General David H Berger, amphibious power ashore may play a key role in easing the pressure on deployed naval assets.[xii]

Since 2016, NATO and individual Allies have bolstered their Baltic presence and improved their responsiveness to ensure that even a bloodless fait accompli attack on any part of the Alliance will prompt an effective NATO response. NATO has also placed a strong focus on improving defence capabilities and joint integration of maritime forces with Enhanced Forward Presence battlegroups as well as NATO Multinational Corps Northeast. These actions are all matched by efforts at the political and senior military levels to engage Russian leadership in order to avoid misperception while signalling NATO's resolve to ensure the freedom and security of its members.

HMS Queen Elizabeth sails with USS George H.W. Bush

The regional dimension of Baltic defence ought to be highlighted, given the strategic risk to immediate reinforcement posed by possible Russian operations through the Danish Straits and by Russian A2/AD systems. There is a growing and recognised need for Baltic region navies to exercise local sea denial, keep the sea lanes open from the threat of mines and maintain situational awareness that they can in turn share with Allies. Poland's 2017 maritime security strategy highlights the country's objective to provide greater support for Alliance security in the Baltic Sea.[xiii] The Estonian, Latvian and Lithuanian navies are similarly proactively considering the roles they can play in the future, while the German navy's headquarters in Rostock will play an important role. NATO's Swedish and Finnish partners are also key stakeholders in the security of the region.

The Arctic and the High North

Finally, NATO has more than a theoretical interest in the High North, since its Treaty Area of Responsibility for Collective Defence includes the territories, ships and aircraft of Allies in the North Atlantic above the Tropic of Cancer. That area has always been defined as reaching to the North Pole. Five of the eight Arctic Council members and four of five littoral states are NATO Allies. The Arctic was a contested undersea space in the Cold War and Russia still maintains its seaborne deterrent there. But new dynamics have emerged as a result of climate change and its effect on the Northern Sea Route, Russia's strongly asserted claims over Arctic transits, the risk of environmental damage and the growing influence of China. The Arctic connects naval force deployments between several regions. As transit opens up, that

connection will grow, opening quick inter-fleet transit between the Atlantic and the Pacific to all major naval powers. That will present a challenge in ensuring freedom of the seas – for all – and maintaining a rules-based international order.

The Mediterranean Nexus

A strategic link also exists among the Atlantic approaches to the Mediterranean through the Pillars of Hercules, the Mediterranean itself with its Ionian and Aegean Seas, and the almost-enclosed Black Sea. The operational dilemma in the Mediterranean Nexus stems from the complex mix of conventional military and insurgent or terrorist threats operating in or emanating from this area.

The Eastern Mediterranean

The Eastern Mediterranean is strongly affected by the war in Syria, migration tensions and the Russian naval presence. It has been said that if the North Atlantic is the Russian navy's highway, the Eastern Mediterranean is its playground and tactical laboratory. Electronic jamming and spoofing have increased substantially in the region.[xiv] As a result, the Eastern Mediterranean is a principal site of great power competition and deterrence management.

In spring 2016, NATO directed MARCOM to stand up a maritime surveillance activity in the Aegean to help the Greek and Turkish coast guards and the European Border and Coast Guard Agency (Frontex) tackle illegal migrant trafficking.[xv] MARCOM had Standing NATO Maritime Group 2 (SNMG2) on station in the area within two days – a good example of the rapid response that the Standing Groups can provide. Soon after NATO launched this effort, migration rates across the Aegean collapsed, driven by the EU–Turkey agreement and the closing of borders in southeast Europe. But the SNMG2 deployment played its part as an element in the complex chemistry that has significantly reduced the massive flows to the islands.

In the Central Mediterranean, the major challenges are political instability and the transnational criminal networks that help sustain it. The Libyan conflict has continued into 2020, partly fueled by

external financing and proxy forces that threaten to regionalise the conflict. As a part of this, arms trafficking and illegal fuel transfers have spread to the maritime domain.[xvi]

NATO engages in many initiatives to counter terror and regional instability, and one of its instruments is Operation Sea Guardian (OSG), established in 2016. Building on the experience of Operation Active Endeavour, OSG was granted a much wider mandate to address maritime security challenges, using separately resourced forces so that NATO's Standing Naval Forces can remain focused on day-to-day deterrence, training and other activities. The mission has a more mature and geopolitically relevant approach to its objectives than Active Endeavour. Rather than looking for 'terrorists' in the abstract, OSG focuses on the flows of arms, fuel and contraband between North Africa, the Central Mediterranean and the Eastern Mediterranean that can fund terrorism. It is also working to understand the underlying dynamic and then be ready to act against it where possible. In this regard, OSG will also contribute to the situational awareness and capacity-training work undertaken by NATO's Strategic Direction – South Hub, which was established at Joint Force Command Naples in 2017 as a fusion centre for Mediterranean security awareness.[xvii]

The mission also presented excellent opportunities to deepen NATO's cooperation with the EU counter-migrant trafficking initiative called Operation Sophia. NATO and the EU agreed that NATO would support Sophia with logistics and information, and further areas of cooperation were being discussed in Brussels when Op Sophia was superseded by Op Irini.[xviii] The two headquarters were in regular contact and the collaboration was mutually beneficial.

The Black Sea

The Black Sea presents special challenges to Alliance security. Among all of NATO's strategic bodies of water, it has seen the greatest change in Russian naval posture over the past decade. Once rusting and moribund, Russia's Black Sea fleet is now one of the most agile and effective in the Russian navy and the most powerful naval force in the region. Russia's recent efforts to claim the Black Sea as a proprietary space include attacks on Ukrainian vessels in the Sea of Azov, harassment of Allied naval forces and the establishment of overly broad navigational warning areas.[xix] Such behaviour risks an inadvertent and unnecessary clash.

The operational dilemma results from the Black Sea's almost enclosed nature and the limits on the numbers of ships, tonnage and length of stay of non-regional navies in peacetime imposed by the Montreux Convention. Within those limits, NATO has acted to expand its maritime presence and enhance regional capabilities. In 2018, NATO tripled the sea days of its Standing Naval Forces, and the forces participated in several exercises designed to improve skills – including in ASW – and help Allies to operate as an integrated force.

China

NATO's traditional competitor has always been Russia, but the Alliance cannot ignore the rise of China's naval service. While China is still predominantly a regionally focused maritime power, confronting many unresolved geopolitical challenges in its immediate geographic area, military adventurism 'out of area' nevertheless appears to mirror its global policy of economic expansion. The Chinese navy's reach includes recent exercises with Russia's navy in South Africa, a well-funded base in Djibouti and, in the High North, the goal of a stakeholder role as a 'near Arctic nation'.[xx] With two aircraft carriers at sea and more under construction, China has a declared objective of full military development by 2035 with the aim of 'resolving the Taiwan problem' by 2048.[xxi] It should therefore come as no surprise that the recent NATO Leaders' Meeting in London devoted time to consider the rise of China and the security challenges this poses.

The increasing presence of Chinese naval power in the transatlantic area raises questions regarding how NATO should respond. In June 2019, the US Department of Defense warned that China might position its ballistic missile submarines under the Arctic ice cap.[xxii] Russian military specialist Alexander Shirkorad has written in support of such Russian–Chinese cooperation in this regard and the Chinese navy of late has taken an interest in under-ice operations.[xxiii] Such a move – indeed, any

significant joint military posture with Russia in the Western Hemisphere – could have serious implications for NATO's maritime deterrent posture. In addition, Chinese strategic acquisitions in its Belt and Road Initiative of key maritime infrastructure in Europe might potentially impair NATO's military readiness or logistical flexibility.[xxiv]
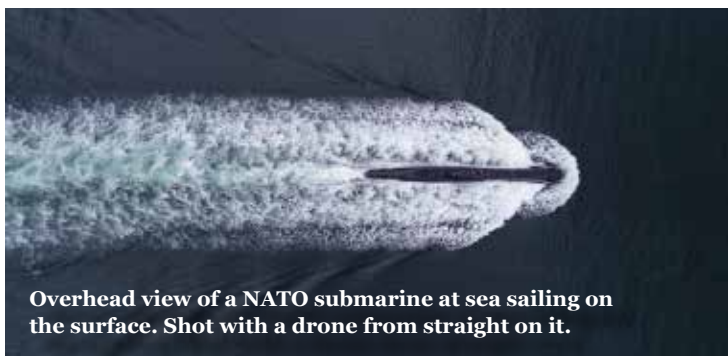
Overhead view of a NATO submarine at sea sailing on the surface. Shot with a drone from straight on it.

Building Credible Capability into NATO's Maritime Response

In 2019, NATO adopted a new military strategy, its first for almost 50 years. Building on that strategy, NATO has undertaken implementing work that is significant in both size and scale, called 'Deterrence and Defence of the Euro-Atlantic Area'. This addresses the challenges noted above, principally through the concept of 'deterrence management'. It places new responsibilities on the Joint Force Commands to coordinate deterrence across all domains to deliver a synchronised, sophisticated and appropriate force posture.

Credible warfighting capability and coherent command and control remain the bedrock of the Alliance's deterrent posture; however, much its application may be varied or nuanced. Since 2014, the Alliance has taken a number of steps to reassert its traditional superiority in the maritime domain. Changes began with the MARCOM headquarters itself, which, since 2016, has re-established itself as the principal maritime coordinating hub for NATO and has now been expanded and received a new mandate as NATO's Maritime Theatre Component Command. This role extends the function of the commander of MARCOM as NATO's Principal Maritime Advisor and involves a closer relationship with the Joint

Force Commands, ensuring that maritime effects are synchronised with other components in the overall management of joint deterrence.

This joint deterrent posture requires an effective maritime force under NATO control, supported by credible Allied naval assets that could quickly join in a crisis. The Standing Naval Force that MARCOM commands plays a key role in the NATO Response Force (NRF) package and the four Standing Groups of Allied ships that comprise it are NATO's first responders. When robustly manned, the Standing Groups are a potent force, more powerful than most countries could field on their own and at far less cost to each supporting navy. MARCOM typically commands 10 surface combatants and nine mine countermeasures vessels, deployed, fully certified and ready. A single navy fielding a sustainable deployed force of that size would need at least 30 surface combatants and 27 mine countermeasures vessels in its inventory.

To underpin Allied ability to operate in challenging threat environments, MARCOM and the Allied navies have focused very heavily on training. Exercises Dynamic Mongoose in the North Atlantic and Dynamic Manta in the Mediterranean have improved NATO's ASW capabilities. In 2016, MARCOM conducted a major maritime exercise, Noble Mariner, off the coast of Scotland, which was fused for the first time with the UK's Unmanned Warrior exercise to train with and against unmanned vehicles in the air, surface and subsurface environments – the first exercise at such a scale.

More broadly, NATO has leveraged multi-domain exercises such as Joint Warrior, BALTOPS and Maritime Express to build surface warfare and air-defence capability in support of a reinforced Allied maritime posture, as directed by the heads of state and governments at the Warsaw Summit.[xxv] The recent NATO Readiness Initiative (NRI) will ensure that 30 additional Allied naval assets will be ready to join the NRF within 30 days of its activation. Together, the NRF and NRI imply a naval force of between 60 and 65 naval vessels, as well as associated maritime patrol aircraft and submarines, within a 30-day response timeframe.

This constitutes the bulk of ready, sustainable Euro-Atlantic Allied naval forces.

As the Maritime Theatre Component Commander for Allied Command Operations, one of MARCOM's key functions in crisis and conflict is to advise SACEUR on maritime force allocation and prioritisation among multiple joint task forces operating in different strategic seas. To coordinate this potent force in peacetime, MARCOM has recast its relationship with maritime stakeholders. It has proposed a new 'Standing NATO Maritime Framework' that encourages and facilitates information exchange at speed and will allow MARCOM to be both a hub and a portal for all events at sea and for consultations on how to respond.

Looking to the Future

The challenges described above would suggest seven areas that merit near term efforts by the Alliance to further improve its deterrent capabilities at sea. First, navies succeed or fail as part of a multi-domain effort. NATO must foster full integration in its operations, between maritime and land-based air power, with land forces and also in links to space and cyber operations. This work is progressing rapidly.

Second, NATO could place greater emphasis on power projection. In recent years, the Alliance may have concentrated too much on countering adversary offensive systems and not enough on bolstering its own. Wars are not won nor peace maintained by playing only defence; NATO must also be able to hold potential adversary interests or manoeuvre forces at risk. Maritime NATO thus needs depth and credibility in carrier strike and amphibious power projection that are visibly integrated into joint effects. The F-35 and other fifth-generation capabilities are critical to both. NATO should also bolster the offensive strike doctrine and tactics for frigates.

Third, the Alliance needs to provide an effective counter to the Russian navy's Kalibr fleet and the threat of land attack from Russian ships at sea. After five years of tracking Russia's light, distributed fleet of Kalibr platforms and posturing forces against them, MARCOM has learned that a credible but nuanced NATO maritime presence where the Kalibr platforms are located enhances deterrence. That presence requires a fully manned, fully

ready Standing Naval Force as well as parallel national deployments. NATO and Allied units must be able to assure the Alliance – and convey to a potential adversary – that NATO can manage and counter the missile threat on Day Zero of a conflict.

Fourth, NATO should strengthen efforts to deliver ASW capability in depth. MARCOM has a critical need for continuous ready access to a minimum ASW force in strategic seas such as the North Atlantic and the Mediterranean, even if that only takes the form of one effective ASW frigate with a towed array, one modern diesel submarine and a regular maritime patrol aircraft schedule. Again, a fully resourced Standing Naval Force will meet this need, but where numbers are lacking, some alternative arrangement may be required.

Fifth, NATO must leverage innovation in unmanned and autonomous systems as well as new technologies to greater effect. MARCOM fostered experimentation with autonomous underwater vehicles in Unmanned Warrior off Scotland's coast and has pushed that agenda in every ASW exercise it could. Closer cooperation with NATO's Centre for Maritime Research and Experimentation is needed to bring the products of research and development into NATO for operational exploitation. This effort calls for further development and a regular programme; it would pay substantial dividends in the current race for technological advantage.

Sixth, the Alliance needs to continue to develop and evolve the way in which it works with Allied forces working under national command, not only to better deliver more coordinated deterrence to prevent escalation or miscalculation, but also to ensure that, should deterrence fail, NATO command and control is agile enough for the Alliance to win any short war. Any presumption by a competitor that NATO's liberal democracies and their navies will be slow to react in the transition to, or in the early phases of, conflict must be dispelled through more sophisticated exercising and other peacetime activity.

Finally, and encompassing all the other recommendations, greater investment in NATO's strategic communications dimension could bolster its maritime deterrent posture. Operationally, NATO's

current deterrence challenge is to sense danger early, project forces rapidly and further remove any belief of an easy win or fait accompli from an adversary's calculus. No one can win a long war of attrition with the NATO Alliance, and potential adversaries know it; the test of deterrence today is precluding a misguided attempt to launch a short war for limited goals. NATO needs not only to have the means to make that case, but also to communicate that message effectively.

Conclusion

Individually these improvements are important, but collectively they can be game changers in the Alliance's collective deterrent posture and readiness against traditional and emergent challenges. NATO already possesses the advantages of force and mass at sea; the capability gap to be addressed relates to joint integration, speed of response, agility in fielding critical capabilities when and where needed, re-asserting the Alliance's coordinated ability to project power and addressing a new generation of weapons and tactics. Achieving these will ensure that the maritime domain remains one in which the Alliance possesses a strategic advantage well into the 21st century.

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COORDINATING THE FOURTH BATTLE OF THE ATLANTIC

The struggle for control of the Atlantic Ocean was a key strategic battleground in the 20th Century. In the absence of an overwhelming force to control the Atlantic, submarines offer a low-cost means of threatening the transatlantic link, especially as each boat can impose a significant cost on a defender. In two World Wars, Germany sought to thwart the superior Royal Navy, and later the Soviet Union would invest heavily in submarine technology of their own.

With each confrontation, technological innovation and national strategy drastically changed these three "Battles of the Atlantic" – only geography remained static. The first was a nascent affair, characterized by technological limitations and tactics still in development. The second is generally known as the Battle of the Atlantic for good reason; it resulted in over 100,000 casualties, saw tremendous innovation, nearly brought Britain to its knees, and introduced air power as a permanent feature of anti-submarine warfare (ASW). The third was a "Battle" in which no shots were fired in anger, but the stakes were even higher than before, given the introduction of nuclear weapons. Interestingly, NATO and the US largely misread Soviet intentions, pigeonholing the Cold War confrontation into the strategic experience of previous battles, only adapting to the reality of Soviet capability and strategy in the 1980s.

Many observers have described the situation unfolding in the North Atlantic today as a new, Fourth Battle of the Atlantic. Often this comes without a nuanced understanding of what it entails, who is involved, and is prone to the same mistakes as we made in the early Cold War. In truth, there is already a contest underway involving several nations, each pursuing overlapping but distinct objectives. In order to prevail, it will be necessary to effectively coordinate the multiple entities and nations involved and establish a coherent effort to develop situational understanding and deter aggression.

Value of the link

Shortly after the signing of the Washington Treaty, the Allies recognized the importance of the transatlantic link and established Supreme Allied Command Atlantic in order to ensure the free flow of forces across the Atlantic. SACLANT was then disbanded in 2003 as the Allies pivoted away from the NATO of the Cold War towards a "NATO 2.0," with the North Atlantic free from threats.

Today, successive SACEURs have underlined the renewed

importance of the transatlantic link, even through a scenario involving large-scale reinforcement. The greater value of the transatlantic link today is its symbolic value to the relationship between the two continents, which has increasingly come under strain in recent years. With concerns over burden sharing and an American pivot to Asia, observers on both sides of the Atlantic have questioned the long-term health of the transatlantic relationship.

The link is also economically important, with trade in goods and services between just the EU27 and the US totaling $1.1tn USD in 2019. Prior to COVID19, some 50 million seats were available to tourists and business travelers on transatlantic flights every year. On the seabed, a burgeoning digital economy is connected via communications cables, bringing the contents even closer together. The mutual economic benefits of this complex connection further strengthens transatlantic unity and organizations. For any adversary to such unity, disrupting the transatlantic link, whether physically or symbolically, becomes an attractive target.

VADM Lewis, USN and RADM Betton, RN, cut the ribbon at JFC Norfolk's Initial Operating Capability celebration.

A Fourth Battle of the Atlantic

No shortage of ink has been spilled over Russian military modernization, or aggressive actions against its neighbors in the past decade. However, even with extensive investment, Russia cannot begin to approach the military scale of its storied past. The development of its maritime power can nevertheless present significant dilemmas to NATO, particularly in the undersea domain. New submarine deployments cannot match Soviet numbers, but exceed Soviet levels of quality and capability, especially in noise reduction.

Expanded long-range strike capabilities now allow submarines to achieve their objectives at a safe distance, which defies the hunter's logic of the first two battles. Why chase a heavily protected convoy far from home when you know its destination port, well within range of safe waters? In its intervention in Syria, Russia tested its submarine-launched cruise missiles (SLCMs) in a theatre of war and sent a clear signal of renewed capability to NATO. The hybrid tactics seen on display in Ukraine and elsewhere have also entered the maritime domain, as the little green men of Crimea have learned to swim in the Russian Underwater Reconnaissance Program (RURP) and are capable of threatening seabed infrastructure or possibly intercepting secure communications.

Thus, the contours of a new Battle of the Atlantic begin to emerge – limited in scale by comparison, but with new and unique grey zone challenges. It is difficult but necessary to move beyond the harrowing image of dogged sailors and merchantmen crossing the ocean. After all, we are 75 years removed from the days of Tom Hanks *Greyhound*, and we were too slow to put that image behind us during the Cold War.

Instead, today we are looking at a confrontation in which Russia can employ a single modern, silent, and capable submarine as leverage in a crisis concerning an entirely different issue or theatre. Beyond the historic GIUK Gap and into the deep blue waters of the mid-Atlantic, a single undetected boat could threaten both Europe and North America. It is a Battle in which submarine communication cables can be severed in conjunction with cyber-attacks on either side of the Atlantic, causing billions of dollars in damage, without

a culprit confirmed. Coupled with unexpected snap exercises that stretch NATO's attention to the limit, a lack of situational awareness will afford an immediate advantage to an adversary as NATO action is stymied by ambiguity, non-attributable aggression short of war, and extensive disinformation campaigns. Thus, the adversary is one, if not two steps ahead of the Alliance.

Adaptation

Russia remains highly unlikely to seek direct confrontation with the Alliance and its members. But its capabilities now mean that it can present NATO with significant dilemmas in the North Atlantic, should its objectives clash with the Alliance elsewhere, or if a conflagration should arise outside the Euro-Atlantic area. There is also the enduring risk of misperception as military activity increases on both sides. In response to these developments, NATO embarked on a programme of adaptation that included the establishment of Joint Force Command Norfolk, as a new advocate for the Atlantic.

Much of the adaptation work across NATO has involved carefully dusting off old plans, with innovation required to adapt to the new realities. JFC Norfolk is cut from the same cloth as the old SACLANT but is an operational-level command that instead reports directly to SACEUR. Like SACLANT, it is closely tied to the US Navy, led by the same US commander who heads the Second Fleet, Vice Admiral Andrew "Woody" Lewis. Both are forward-leaning and agile commands, focused on the operational space that stretches from Florida to Finnmark, from seabed to space. Recently, Vice Admiral Lewis was also named the Director of CJOS COE, aligning the intellectual successor of SACLANT's Striking Fleet Atlantic in a triad focused on winning the Fourth Battle of the Atlantic.

But much work still remains. In the aftermath of the Cold War, NATO nations rightly enjoyed a peace dividend with reduced defense spending across the board. While the 2014 Defense Investment Pledge (2% of GDP) reversed a decline, NATO today can deploy roughly half the number of frigates it had in 1990, despite 14 new members. And in coming years, COVID19 will present further challenges to ambitious increases in national defense budgets.

Systems and platforms are also more expensive in real terms, leading to key nations deploying fewer assets per dollar spent. While the arms industry may insist that a fifth generation jet is twice the plane of its predecessor, you still cannot deploy a single plane in two places, even if you're paying double price. This is particularly pressing in resource-intensive ASW, where Allied capabilities and expertise has been allowed to atrophy since the end of the Third Battle of the Atlantic.

Photo Credit WO Christian Valvadare

Coordination and interoperability

Most of the military activity you will see in the Atlantic and High North by Allied nations (let alone what you will not see) is conducted under a national mandate in the spirit of NATO collective deterrence and defense as opposed to under NATO C2. This was the case during the Cold War and will continue to be so in the future. National control affords flexibility, and 30 Allies will have varying degrees of support for forward-leaning operations as NATO faces an array of complex threats. Growing national activity risks creating a congested space, ripe for inefficiency and duplication efforts. Without coordination and synchronization, deterrence efforts can even become provocations, inadvertently increasing security risks in the Atlantic.

In the absence of unity of command, it thus becomes imperative to ensure unity of effort, by coordinating and synchronizing military activity. Exercises or operations, from Florida to Finnmark, should not be conducted in a unilateral vacuum or multilateral bubbles, but instead be synchronized by a central actor capable of straddling seams between key national and NATO operations. This effort should work with Allies and Partners to maximize the capabilities and expertise of individual nations, while drawing on established NATO resources, such as the Standing Naval Forces, Air Policing Missions, or Allied Ground Surveillance.

Effective coordination will be a driver for interoperability, crucial to NATO military efficiency. NATO's largest exercise since the Cold War, Trident Juncture 2018, was held in Norway and Iceland in an early sign of Allied interest in North Atlantic operations, as was the deployment of the Harry S. Truman Strike Group alongside the exercise. Interoperability further breeds integration, as we now see US Marine Corps F35s deployed on HMS Queen Elizabeth, multinational missions in the Barents Sea, and expanded international participation in specialized national exercises such as Canada's Operation Nanook. The end goal is for Allied forces to be as interchangeable as possible, erasing or bridging seams between the 30 Allies and NATO's operational partners.

Winning 4BOA

Winning the Fourth Battle of the Atlantic comes down to transatlantic cohesion, and showing that in action. Nations must act coherently in the North Atlantic in pursuit of interoperability, integration, and interchangeability. As Vice Admiral Lewis has said, "the only way to guarantee trouble for NATO in the Arctic is to ignore the issue." The key for NATO will be to coordinate presence, establish situational awareness, and maintain vigilance.

JFC Norfolk, along with US Second Fleet, supported by CJOS COE, offers the natural central nexus for the coordination of the synchronization of effects from Florida to Finnmark, from seabed to space, embodying the multinational (but crucially, US-led) Joint campaign necessary to prevail in a Fourth Battle of the Atlantic. As the command moves from the Initial Operational Capability declared in September 2019, to Full Operational Capability by the end of 2020, the HQ will move from a vision of Atlantic coherence to a comprehensive Atlantic Plan for success, guided by SACEUR's strategic direction, in close coordination with MARCOM, AIRCOM, and national military leadership.

But crucially, JFC Norfolk also holds a symbolic value. It was created at the height of concerns about American disinterest in the Alliance and has frequently (and rightly) been highlighted as a sign of America's enduring commitment to the Alliance. After all, it is the first operational NATO command established in North America since the 1950s and dispels any notions that NATO is about European safety alone. As we now move into an era of "NATO 3.0," JFC Norfolk stands as the operational embodiment of the transatlantic relationship, ready to protect the transatlantic bridge that connects the most successful alliance in history.

Ships of SNMG1 and SNMG2 sail together with FRMARFOR

MISSION:

Provide a resilient US-led, Operational level, joint multi-national, static headquarters, permanently under OPCOM of SACEUR, to plan, prepare, conduct and assess operations across all domains, from Baseline Activities and Current Operations through Crisis, up to Maximum Level of Effort in order to support NATO's three core tasks.

Through its command network, including single service component commands, NATO entities, national and multi-national headquarters, JFCNF maintains comprehensive awareness and synchronizes effects across the transatlantic area and the High North, thus contributing to the 360-degree coverage of SACEUR's Area of Operations.

Through the command of high-end NATO Joint operations within the Atlantic, the High North and relevant littorals, ensure NATO's strategic transatlantic lines of communication remain open in order to support the sustainment of Europe.

Lead and contribute to NATO contingency planning, participate in relevant NATO exercises and develop high-readiness headquarters capability in order to enable rapid and seamless transition to crisis establishment.

JOINT FORCE COMMAND NOFOLK

Joint Force Command Norfolk (JFCNF) is being established to project stability, deter aggression, and defend NATO's Allies and Partners in the North Atlantic and High North. JFCNF is led by the dual-hatted Commander of the U.S. Navy's 2nd Fleet. The two commands are separate, but inextricably linked due to their shared mission and geographic focus.

FORCES

SCHEME OF MANOEUVER — A multi-national, U.S. led, joint operational level command, supported by component, Allied and Partner commands, responsible for the North Atlantic, the High North and adjacent littorals.

MANOEUVER TO ENSURE READINESS — Maintain strong relationships with Allies and Partner command entities and agencies to provide comprehensive and anticipatory situational awareness, lead contingency planning, and contribute to NATO responsiveness.

MANOEUVER ACROSS THE SPECTRUM OF CONFLICT Develops and maintains persistent, comprehensive, and predictive 360 degree awareness. Synchronizes efforts within the battlespace, while developing and maintaining plans, and employ joint forces across multiple domains.

STAFF

LEAN — Organized to be operational, JFCNF relies on synchronized Joint Force component commands as well as Allied and Partner command entities in the region.

AGILE — Able to quickly and skillfully navigate in a multi-national and alliance environment, across the full spectrum of conflict.

PERSISTENT — JFCNF will integrate allocated forces, including NATO Force Structure entities, while synchronizing multi-national and allied effects to achieve strategic and operational objectives.

CAPTAIN TODD BONNAR, MSC
ROYAL CANADIAN NAVY

RUSSIAN UNDERSEA RESEARCH

In 1858, when the first submarine cable was installed, the congratulatory exchange between Queen Victoria and President James Buchanan, took nearly 18 hours to make its way across the North Atlantic.[1] In today's reality in which information has become a commodity that is quickly and widely disseminated and easily available, especially through the use of computer technology, undersea cables make that instant communications possible. By some estimates, 99% of global international data, including both phone and internet traffic, moves through these cables rather than paths such as satellites.[2] They also form the heartbeat and the backbone of the world's international financial system and the global infrastructure writ large. Roughly $10 trillion in financial transactions are transmitted via these cables each day.[3] Any intentional interference or destruction of critical undersea cables at the hands of malign state actors could cause economic damage that would make the costs of COVID 19 pale in comparison.

Comprising more than half a million miles of fiber-optics, our undersea cable network is the indispensable infrastructure of the modern 21st century military. However, as the networks have become fundamental to our operations and our ability to "fight, move, communicate", their security remains a challenge for NATO. Funnelled through exposed choke points (often with minimal protection) and their isolated deep-sea locations made readily available in the public domain, the arteries upon which the Alliance depends have been left highly vulnerable.

In terms of military operations, undersea cables and communications satellite are the two-pronged enablers to effective command and control in the information epoch. Since about 2015, NATO has observed markedly increased activity levels by Russian vessels' activities around undersea data cables in the North Atlantic. NATO military and intelligence officials spoke openly of a sustained pattern of Russian submarines and vessels 'aggressively operating' near cables, highlighting that the vital lines of communication are vulnerable to attack by Russian naval forces. It was reported that US officials were 'monitoring significantly increased Russian activity along the known routes of cables'."[4]

It must be stated that to date, there is no open source information or corporate reporting suggesting any of these data superhighways have been tapped or cut. That being said, the threat is still existential. Selective attacks on the North Atlantic cable infrastructure could electronically isolate NATO and severely hinder the Alliances' abilities to react to or defend itself from a coordinated attack. In today's modern maritime domain, it is absolutely imperative that NATO has the ability to coordinate and control deterrent effects, move information from the right sensor to the right war fighters at the right

time. Despite this critical requirement, currently, cable security and cable repairs are considered a commercial responsibility, rather than a national security concern.[5] In late October of this year, NATO defence ministers discussed the protection of critical infrastructure such as submarine cables under the North Atlantic, amid growing concerns those could be cut or tapped by adversaries.

NATO's maritime leadership has warned that the Russian navy is aggressively probing undersea communications cable networks. Attacks of this kind could be part of hybrid warfare, a mixture of open and covert acts of war. Russian leadership at both the political and military level have increasingly stressed the importance of controlling the flow of information to keep the upper hand in a conflict, said Katarzyna Zysk, Norwegian Institute for Defense Studies in Oslo. As Zysk explains, "*No matter where in the world a conflict might be brewing, cutting those undersea cables, might force an adversary to think twice before risking an escalation of the dispute.*"[6] Beijing and the CCP view control of undersea infrastructure as part of a broader strategic competition for data stating publicly "although undersea cable laying is a business, it is also a battlefield where information can be obtained."

The vulnerability of undersea cables is not a new phenomenon. During World War I, the British successfully destroyed numerous German undersea cables using the British General Post Office Cable Ship *CS ALERT*, thus extensively limiting them in all manner of communications. This type of operation was repeated during World War II, and the United States eventually commandeered the cut German cables to link to its forces in Europe. It has been suggested that during the Cold War, special U.S. submarines tapped Soviet military cables in the Barents and Bering Seas. The Soviets took a similar interest in Western cables in 1959, when the U.S. Navy boarded a Soviet trawler suspected of deliberately tampering with and damaging AT&T lines off the east coast of Canada.[7] More recently, according to UK Member of Parliament, Rishi Sunak, when Russia annexed Crimea, one of its first moves was to sever the main cable connection to the outside world.[8]

On 1 July 2019, a fire onboard a secretive Russian nuclear submarine killed 14 sailors before it was extinguished. President Vladimir Putin revealed that seven of the deceased were Naval Captains "first rank", and two were previously awarded the distinction "Heroes of Russia". That is an unusually high concentration of decorated senior officers for a simple "bathymetrical data collection" mission. Russian military authorities still have not disclosed what triggered the blaze on the *Losharik*, an AS-12 nuclear-powered spy submarine, and the pride of Russia's deep-water intelligence gathering program. The blaze on board a nuclear-powered Russian deep-diving submersible cast some light on Russia's top-secret underwater intelligence service as well as its growing focus on the resource-rich polar region.

The submarine, the Losharik, the small nuclear-powered submarine that is alleged to conduct underwater espionage activities as part of Russia's hybrid warfare capability inventory. Losharik was designed to operate on the ocean floor, equipped with front-mounted floodlights, remotely operated arms for manipulated equipment, and retractable ski feet for sitting on the seabed. Despite its designation as a "scientific research submarine", she is assigned to the Main Directorate for Deep Sea Research. According to *The Barents Observer,* GUGI's fleet of nine submarines frequently depart on "special missions". "Little is known about the nature of those voyages, except reports of significantly increased activity along subsea cables.

The Main Directorate for Deep Sea Research, shortened to GUGI, is the command charged with this mission. Although collocated with the Northern Fleet at the Olenya Guba base in the Kola Peninsula, about 100 kilometers east of the border to Norway, it is an organizational structure within the Russian Ministry of Defense that is separate from the Russian Navy, reporting directly to the General Staff of the Armed Forces.

Outside of Russia, GUGI is seen as principally an undersea espionage organization fielding specialized submarines, oceanographic research ships, undersea drones and autonomous vehicles, sensor systems, and other undersea systems. Through GUGI, Moscow has the ability to run the world's largest fleet of covert manned deep-sea vessels dedicated to intelligence operations, operating ocean going "research ships", deep sea submersibles and divers known as "hydronauts" and special purpose submarines including eight very specialized nuclear-powered submarines.[9] More broadly, GUGI has advanced unmanned assets, including some of the world's largest autonomous vessels, the *Harpsichord* series, and the *Harmony* surveillance system planned for the Arctic.[10]

GUGI operates two nuclear-powered "motherships" that can transport smaller nuclear deep-sea vessels like the Losharik, to a distant site and provide support throughout the mission. The current two motherships are converted Delta III and Delta IV strategic ballistic missile submarines (SSBNs). The original SSBN missile tubes were removed and the hulls were stretched to create large midship special mission compartments with a docking facility on the bottom of the hull for one of the small, deep-diving submarines.[11]

Russia continues to invest in special purpose ships designed for deep sea activities. On 23 April 2019, Russia launched its latest and largest "special mission" submarine at a quiet ceremony in Severodvinsk in the Russian High North. Based on a modified Oscar II hull design, the Belgorod is one of the largest submarines in the world carries the Poseidon torpedo, an autonomous intercontinental nuclear-powered and nuclear armed torpedo.[12] It is anticipated that the Belgorod will play a role in GUGI's mission to build military underwater infrastructure in the Russian Arctic.[13] More than a year after schedule, the Zvezdochka yard in Severodvinsk,

northern Russia, officially transferred over the "Akademik Aleksandrov" to the Russian military in the Northern Fleet Area of Responsibility in the summer of 2019. The ship is the 3rd in the Navy's new series of special-purpose ships made for transportation of big-dimension military and special equipment, as well as search and rescue operations. Open source information about the handover is quite scarce given Akademik Aleksandrov is built on an order from GUGI.[14] The Akademik Aleksandrov will join GUGI's fleet of "ocean research vessels", such as the Yantar, which hold specialised equipment, including miniature submarines, able to identify and interface with underwater communications cables.

Russia clearly has military ambitions in the deep sea, and how they figure into a plan to leverage naval power to achieve its strategic goals around the globe, including the ability to choke off vital international communication channels at will.

NATO's newest command, Joint Force Command Norfolk, was stood up to protect and establish sea control of the vital sea lanes of communication within the North Atlantic between Europe and North America. As part of the hybrid JFC Norfolk / Second Fleet triumvirate, CJOS COE assists in its tasks to maintain situational awareness, conduct exercises and draw up operational plans for areas from the east coast past the Greenland-Iceland-Britain gap, and into the Arctic.

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RUSSIAN AMPHIBIOUS CAPABILITIES

Introduction

In the past few years we have observed a revival of the North Atlantic as a maneuver space of vital importance for both NATO and Russia. Russia´s Navy is increasing its maritime capabilities, both in numbers and in technology, driven by a clear strategy that if left unchecked, could lead to a dispute for sea control in the North Atlantic. One of these capabilities is its amphibious force, with a shipbuilding program developing ships for near shore-to-shore operations (e.g. LST), expeditionary out of area operations (e.g. LHD), as well a strong investment in Naval Infantry.

As stated in previous *Bow Wave* editions, NATO is still deciding how to strengthen the Alliance Maritime Posture. These decisions include the aggregation of NATO amphibious capabilities in order to bolster NATO's operational and strategic responsiveness in order to counter Russia's growing capabilities. The amphibious forces provide unique capabilities in terms of scalability, high readiness, flexibility, agility, speed of maneuver and the ability to operate across all domains.

The aim of this article is to provide an overview on present and future amphibious capabilities (ships and landing forces), any likely changes in doctrine and also to introduce possible roles of Russia´s amphibious forces in a next Battle of the Atlantic.

Russia's Amphibious Forces: From Soviet Union to Present

In the beginning of the 80s and the height of the Cold War, the Soviet Union possessed an impressive amphibious capability with about 100 amphibious ships and some 120 short-haul landing craft (including the world´s largest air-cushioned landing craft). These ships and landing craft were primarily built to conduct amphibious operations along the maritime flanks of the Soviet Union, and had extremely limited capability to intervene in expeditionary operations.

After the breakdown of the Soviet Union, the amphibious capabilities of Russia´s Navy saw a general degradation, in line with those the of the Russia Armed Forces as a whole. Drastic cuts initiated by the Russian Ministry of Defense in the 90s led the way for a substantial reduction of the amphibious fleet, along with downgrades of the Naval Infantry strength. The Naval Infantry conducted limited military interventions during the 1990s and the 2000s, but none of these operations were executed "from the sea".

It was in 2008, during the Russo-Georgian conflict, that a Russian naval task force, including three LSTs with two battalions of Naval Infantry embarked, performed a landing on the coast of Abkhazia. Even though the landing was unopposed, the landing force had to meet up with their vehicles and supplies transported by rail, highlighting the inability of the Russian Navy to project a credible

landing force. Some sources refer to this operation as the possible trigger for the decision to contract the purchase of two French Mistral class LHDs and to build another two similar LHDs in Russia. However, following Russia´s military intervention in Crimea in 2014, France refused to sell the two ships and no LHDs have been built in Russia to date.

Paradoxically, it was due to the Crimea crisis that the Naval Infantry started to recover its image as a capable and credible force; this image continued to improve with their involvement in the Syrian Civil War from 2015 and onwards. In the Syria campaign, navy infantry is employed as ground forces, and the LSTs from different regional fleets were used as transport ships for vehicles and equipment.

Building on lessons learned from both conflicts, the Naval Infantry expanded with new and reinforced units and began to receive additional upgraded capability, including tanks. Brigades started to reorganize giving a common operational structure with the ability to conduct independent operations in general, and expeditionary joint operations specifically. More recently, the amphibious fleet saw the *Ivan Gren* LST commissioned in 2018 after a lengthy construction delay (her keel-laying ceremony took place in 2004). Anticipated in the upcoming years, Russia will add five more amphibious ships to the fleet, three LSTs of the *Ivan Gren* class and two new LHDs.

Russia divides its territory into the following military districts: the Western, Southern, Central and Eastern district, all with their own Strategic Command. With the exception of the Northern Fleet, the fleets and the Caspian Flotilla are distributed over these districts and receive their operational orders from its district Strategic Command. However, all fleets still receive their administrative instructions directly from the Navy Staff, resulting in a hybrid military organization. Since 2014, the Northern Fleet Joint Strategic Command has acted independently from the Western Strategic Command, and as of January 2021, this command will have a similar status as the district Strategic Commands. This will further increase the strategic role of the Northern Fleet, as well as the relevance of the North Atlantic area, including the Arctic.

Figure 1 – Russia´s actual Amphibious Toolbox by Military Districts and the Northern Fleet Strategic Command. (Map created by authors with NATO map layer)

Russia's Actual and Future Amphibious Capabilities[1] - Amphibious Ships

The amphibious platforms are meant to operate near former USSR and/or Russia's borders.   The Russian Navy's amphibious inventory consists of 20 Landing Ship Tanks (12 Project 775 , 3 Project 775M, 4 Project 1171 and 1 Project 11711) and 37 Landing Crafts (2 LCAC, 29 LCM and 6 LC type BK).

Project / Type	Class	In service	Under Construction	Cargo		Heli		Well Deck
				Troops	Vehicles	Heli Pad	Hangar	
Project 775 / 775 M (LST)	Ropucha	15	--	340	10 MBT or 12 BTR	No	No	No
Project 1171 (LST)	Tapir	4	--	300	13 MBT or 36 BTR	No	No	No
Project 11711 (LST)	Ivan Gren	1	3 (2020 / 2023 / 2024)	300-400	20 MBT or 40 AFV	Yes (1 pad)	Yes (2x Heli)	No
Project 23900 (LHD)	Ivan Rogov	--	2 (2026 / 2027)	900-1000	50 IFV 10 MBT	Yes (6 pad)	Yes (deck and hangar can hold up to 20 Heli)	Yes (6 LC)

Table 1 – Russia's Navy Actual and near Future Amphibious Ships

The four venerable Project 1171 LSTs were built in the 1960s, and the fifteen Project 775/M LSTs were built in the mid-seventies and early nineties. Therefore, the true military value could be argued in terms of age, sustainability, technology and systems. However, these platforms are still a contributing combat asset when used in the right operational environment (i.e. in near operations or even in inter-island support missions). From the modern fleet, the only ship that can be considered to have some expeditionary capabilities (tactical and non-tactical)[2] is Project 11711 (*Ivan Gren*)

with considerable improvements in terms of capacity (20 tanks or 40 APCs, 300 troops), and organic capabilities (2 helicopters), allowing limited over-the-horizon landings by the use of transport helicopters. Three additional ships of the *Ivan Gren* class are planned to be received into the fleet in the near future with one platform respectively in 2021, 2023 and the last one in 2024[3].

The most significant project for the Russian Navy is the Project 23900 amphibious assault ship (LHD). Russia signed a contract worth 100 billion rubles (approx 1.35 Bn US$) for the construction of two ships (named *Ivan Rogov* and *Mitrofan Moskalenko*), with both keel-laying ceremonies having taking place in July 2020. It is anticipated that the ships be commissioned in respectively 2026 and 2027. These LHDs will be capable of carrying and operating Ka-31, Ka-27 or Ka-52K helicopters, and will have a well deck to carry and operate different landing craft. These two LHDs, designed to be the Russian alternative for the two never received LHDs of the Mistral class, will bring true expeditionary warfare potential to the Russian Navy.

Figure 2 - Official rendering of the Project 23900 LHD (c) by Zelenodolsk Design Bureau (https://www.navalnews.com)

Naval Infantry

The Naval Infantry, along with the Coastal Missile Artillery Forces, form the Coastal Defense Troops of the Russian Navy. While the Missile Artillery units are primarily designed and equipped to protect Russia's ports and coastlines, the Naval Infantry is able to conduct amphibious operations (i.e. raids, assaults, and riverine operations), maritime security operations (i.e. counterterrorism, anti-piracy, and ship force protection missions), and military operations other than war (i.e. peacekeeping operations beyond Russia territory). A landing force of a Russia Amphibious Force can incorporate units from the Naval Infantry,

Coastal Missile Artillery Forces and Army Ground Forces. For the purpose of this article, only Naval Infantry will be considered as the main source for the buildup of landing forces.

Currently estimated with a total strength of 12,500 personnel,[4] the main units, five brigades and one regiment, are subordinate to the four fleets (Baltic, Black Sea, Pacific and Northern) and to the Caspian Flotilla, having the same C2 arrangements as referred to previously. The organization and equipment of the Naval Infantry units is generally comparable with the motorized rifle units of the Army Ground Troops. Naval Infantry brigades have some differences in terms of composition and organization, but in the near future, all brigades[5] will adopt the following structure: six maneuver battalions (three Naval Infantry battalions, one airborne assault battalion, one reconnaissance battalion and one tank battalion), with associated combat support[6] and combat service support units.

Figure 3 – Common Naval Infantry Brigade Future Organization (assumed)

Typical main assets of the Naval Infantry include Main Battle Tanks (mostly T-72 and some T-80), Armored Personnel Carriers (BTR-82, BTR-80 and MTLB (currently being modernized to the MLBSh variant)) and Infantry Fighting Vehicles (BMP-2). Different fire support systems are Self-propelled Artillery (2Sp, 2S3, 2S19, 2S9 and 2S23) and Towed Artillery (2A36, 2A65 and 2B16), as well Multiple Rocket Launchers (9K51). Amongst the new equipment in place, a special notation goes to the IFV BMP-3F, already tested, approved, and implemented during the Caucasus 2020 exercise. This vehicle is specifically designed for the fleet with more buoyancy, protection and firepower, and will significantly increase the combat power of the Naval Infantry units.

Figure 4 – New combat vehicles for Russian Naval Infantry (http://roe.ru/)

The Boomerang 8x8 APC developed specially for the ground forces, still in experimentation phase, will be provided to the Naval Infantry and will replace the BTR-80/82. This APC allows more options to disembark the landing force[7], and has better technical and operational characteristics due to the modular design. One of the ongoing projects is the development of a new amphibious assault vehicle, also referred as multi-disciplinary infantry fighting vehicles with specific requirements for the Naval Infantry. This vehicle allows over-the-horizon landings, and is capable of operating under extreme temperature conditions (from Artic to Desert). Although Russia has declared 2025 as the planned year for entering into service, this aggressive timeline includes development, experimentation, tests and manufacturing, and might be unrealistic.

Figure 5 – New amphibious assault vehicle for Russian Naval Infantry (http://www.overtdefense.com)

Possible Roles in the Next Battle of the Atlantic

Russian naval strategy relies on deterrence and layered defense of the Russian homeland. Russia has developed, and is still fortifying, a strong multi-layered Bastion Defense concept with an outer area to conduct sea-denial operations and an inner area with the aim of sea-control. The main purposes of this concept are to defend strategic submarines, to ensure the Northern Fleet access to the Atlantic, and to protect the Russian Arctic and the Russian Western flank in a major conflict of war. The Bastion Defense concept includes the ability to conduct

offensive operations. Examples are the seizure of important tactical and operational geographical areas, the conduct of long-range missile attacks, and the attack of the Alliance's Sea Lines of Communication between the U.S. and Europe. The seizure of important geographical areas implies or might imply the use of maritime expeditionary forces and the possible conduct of amphibious operations.

The Russian Navy is therefore changing its view on the execution of amphibious operations, shifting from amphibious assaults using the LSTs to land directly on the shore[8], to over-the-horizon operations with the ability to conduct ship-to-objective maneuver. The employment of Russian amphibious forces is no longer exclusively for the defense of the Russian territory and in support of the ground forces. Amphibious forces are to be employed beyond Russia's borders at the tactical and operational level, acting as a real expeditionary force, independent or in support of a wide spectrum of major joint operations.

Today, the number, condition, and capabilities of the actual amphibious ships does not comply with the above-mentioned level of ambition. If all amphibious vessels were available and would be used, Russia would have an overall landing capability, by theater, of approximately:

- Northern Fleet: a reduced Naval Infantry battalion
- Baltic Fleet: a Naval Infantry battalion
- Black Sea Fleet: a reinforced Naval Infantry battalion
- Caspian Flotilla: 1–2 Naval Infantry companies
- Pacific Fleet: a reinforced Naval Infantry battalion

The Naval Infantry has lost the capability to conduct brigade-level amphibious assaults and is only capable of executing battalion level amphibious operations. The main offensive mission of the Naval Infantry is to conduct amphibious landing operations, with the intent of securing beachheads to facilitate the arrival of heavier ground forces units within the framework of a joint defensive operation or a joint offensive operation in one the Baltic or Black Sea states or the Northern coast of Norway.

However, if Russia were able to deliver its amphibious shipping projects on time, and execute its transformative ambitions and reinforce the Naval Infantry as planned, these developments could become a game changer. Were Russia to develop and maintain operational readiness of two LHDs and four LSTs of the *Ivan Gren* class and at least 50% of her present fleet of LSTs was still operational, this will provide Russia with expeditionary capabilities to effectively support its Bastion Defense concept.

A possible role/mission for the Naval Infantry could be to seize tactical and operationally important geographical areas in the High North (the Norwegian islands Jan Mayen, Svalbard, and Bear Island). If forward operating bases (FOBs) for tactical aircraft, coastal defense missiles and/or surface-to-air missiles were established on these islands, Russia could significantly extend the range of her Bastion Defense (sea denial) and reduce the Alliance's ability to conduct sustained anti-submarine warfare operations supported by maritime patrol aircraft and thereby, increasing the freedom of maneuver for Russian submarines. Another possible mission in the same context could be to seize the harbor and airfield of Reykjavik, Iceland, followed by the necessary ground and airborne reinforcements by a mixture of civilian/commercial and military shipping and aircraft (the Red Storm Rising scenario). A third mission could be to seize the Gotland and Oland islands of Sweden in the Baltic Sea in order to cut off Alliance access to the Baltic States. In the Black Sea or Eastern Mediterranean Sea, there is a broader spectrum of possible amphibious operations that Russia could conduct for example in Ukraine, Georgia, Syria, or other geographical areas of interest.

Russia's amphibious forces could become without any doubt an important asset for deterrence and power projection. A separate and more detailed study of Russia's future amphibious capabilities should be conducted.

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[2] Nevertheless, the older LSTs have been deeply engaged as transport ships for the Russian operations in Syria.

[3] Some sources refer to a possible order of more units.

[4] There are several reports and unofficial data mentioning a strength of 35.000, but most likely, these reports and data refer to the totality of the Coastal Forces including Naval Infantry.

[5] The 177th Naval Infantry Regiment tends to be a Brigade like the others.

[6] Including a sniper company and an unmanned aerial vehicle company

[7] The Boomerang version (K-17M) for the Russian Naval Infantry is optimized to support amphibious operations, capable of swimming distances of over 60 kilometers at speeds up to 6.5 knots

[8] In some situations, the LSTs launch the amphibious vehicles close to the shore, and they swim to the landing beach.

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A LOOK AT RUSSIA'S BASTION DEFENSE STRATEGY

The convergence of several strategic trends is redefining the global security environment, including significant changes in political, social, technological, economic and environmental areas. In this changing security environment, a resurgent Russia is using all means available to achieve its national goals, expand its global reach, and secure its homeland against external threats. Over the last decade, Russia has transformed, increasing both the numbers and lethality of its fighting platforms. Russia now has more ships available, has increased the range of air and surface missile systems, has technologically more advanced systems, better trained forces, and several physical military bases in the Arctic that have been modernized.

Today, Russia´s naval force structure, in general, consists of smaller naval vessels than before, but more advanced with improved weaponry. From 2008 to 2017, Russian fleet size increased, especially the number of submarines (+10), corvettes (+18) and fast attack crafts and patrol boats (+ 118).[1] There may be several reasons for this development, but Russia is clearly improving its power projection

and long-range strike capabilities significantly, for example, equipping many recently commissioned combatants with the Kalibr cruise missile, a weapon system able to neutralize both land and sea targets all over Europe.

Russia's construction of many small and medium size naval units the last decade has increased resilience and the number of available missile carrying units. Many of these units are not considered as primary targets for torpedoes and surface-to-surface missiles (they are too small, too fast or built for littoral operations where missile seekers on standard surface-to-surface missiles may have difficulties acquiring target-lock-on), and therefore, a diversified and redundant range of capabilities able to counter the large amount of these smaller weapon-carrying-units should be acquired or developed.

Russia is modernizing its submarine forces; it is creating tracking dilemmas for NATO with the introduction of its new submarines. In order to mitigate this increased submarine threat, a cross-domain comprehensive approach should also consider ways and means to integrate civilian resources that can also mitigate the threat from submarines during tension and war.

In many ways, the Russian Bastion Defence reflects Russia´s traditional anti-access area denial (A2D2) homeland defence strategy, now applied

to protect both the strategic submarines of the Northern Fleet and access to the Atlantic. The main goal of an anti-access strategy is not to engage an opponent but to deter him through physical defence while also leveraging softer instruments of power such as diplomatic, information, and economic means.[2] The Bastion A2D2 strategy serves to protects the Russian Arctic and its right flank in the event of a major conflict or war, denying access to the Murmansk and Kola area and important infrastructure such as harbours, airports, maintenance and logistical facilities, and supports a base of operations for Russian power projection towards Europe, the United States and the NATO Alliance Nations.

The Bastion Defence currently appears to consist of a geographically and horizontally layered defence, with overlapping military capabilities from a range of different weapon systems covering all domains, which vastly improves the resilience of their defence network. Traditionally, the Bastion Defence has been visualized as consisting of two main sectors: one being the outer area with the aim of conducting sea-denial operations, and an inner area with the aim of sea-control. With the establishment of the new Russian Joint Strategic Command North (OSK Sever) and the military build-up in the Russian Arctic, it should be expected that this sector, with the aim of sea-control, would also include the Russian littoral area, stretching from Wrangel Island, in the East Siberian Sea, to the Norwegian border. Whilst it will take several years before the Bastion Defence reaches its full potential, Russian military capability improves every year.

From an economic perspective, smaller vessels are generally cheaper to acquire, and increasing the number of platforms provides defense in depth and increases resilience. Though Russia still maintains high value units or high value targets, they may not all be as strategically important since smaller submarines and corvettes may be able to deliver the same effect on targets.

In this respect, Russian weapons and weapon systems are becoming more important than the platform which houses them.

Many Russian units are equipped with long-range missiles, and it appears that Russia in many situations, could have a weapon range advantage. In order to mitigate this advantage, it would be beneficial to acquire more long-range conventional missiles able to reach and attack strategic targets within Russia. The aim would be to deter Russia from military actions, and at the same time have sufficient conventional response alternatives to the increased missile threat from Russia.

The maritime domain has important infrastructure such as communication cables, electrical export cables and oil and gas pipelines, in addition to windmills and oil and gas installations. In times of tension or war, protection and survivability of this infrastructure and the connected deliverables should be ensured. Most of this infrastructure is civilian owned, with vested interests to protect, maintain and repair it. However, during times of tension and war, it is likely that additional protective means by military resources would be required. In order to achieve a combined, comprehensive and cross domain foundation for protection of important infrastructure, close cross-border cooperation and coordination between military and civilian resources should be established and nurtured.

K-535 Yuriy Dolgorukiy Borei Class SSBN - designed to replace Russia's Delta Class

In order to deter potential aggression, it may be expedient to routinely carry out large scale joint military exercises vice the regular drumbeat of smaller domain specific exercises. Likewise, it would be prudent to regularly demonstrate an ability to rapidly respond. At the same time, this supports assurance measures, strengthens cohesion and shows the commitment to support one another in times of tension and war. Russia, for example, schedules their large-scale military exercises in a four-year cycle. These exercises rotate annually between the Western (Zapad), Eastern (Vostok), Southern (Kavkaz) and Center (Tsentr) military districts. In addition, Russia conducts unannounced military exercise, so called snap-exercises.[3]

Since 2008, Russia has managed to transform its naval forces significantly. Today, its naval force structure in general consists of smaller units than before; however, they are more technologically advanced, and they have a better and modern weapon inventory, increasing resilience by providing a wider range of possibilities to attack targets all over Europe. Russia is developing a strong and resilient multi-layered Bastion Defense consisting of a variety of different capabilities. Though some years away from its maximum potential, with credible and trained forces, it seems like the Bastion Defense will be a very hard nut to crack. Even though it is called the Bastion Defense, it appears to include offensive actions, like seizing tactical and operational important geographical areas or conducting long-range attacks on important military and civilian infrastructure. In this changing security environment, a resurgent Russia appears to be using all means available to aggressively pursue and protect increasingly farther-reaching national goals.

As a result of the so-called "peace dividend" following the end of the Cold War, NATO nations, especially smaller European nations, re-prioritized budgets and executed fiscal policies that saw a drastic reduction in military capability. In the maritime domain for example, the number of submarines, frigates and destroyers, and maritime patrol aircraft were reduced, impacting both fighting capability and the requisite resiliency (or redundant capacity) within certain warfare domains such anti-submarine warfare.

With the resurgence of the Russian Federation's Navy and a capable Bastion Defence strategy, future assumptions and acquisitions surrounding NATO's European maritime forces should be re-examined. Most of the rather alarmist accounts of Russia's A2/AD-capabilities in recent years have been based on unchallenged acceptance of Moscow's claims concerning the range and performance of missile systems to deny access and protect the Bastion. On much closer examination, Russia's "A2/AD bubble" and its strategic bastion is smaller than often thought, not impenetrable, and probably even burstable. Only by realistically assessing Russia's A2/AD-capabilities and their inherent challenges and NATO's possible countermeasures, can the challenges be handled, provided there is political and military will and that the commensurate resources are allocated to establish and maintain sea control.[4]

Sea control and power projection across the North Atlantic would enable NATO to maintain fighting capability in a European theatre until reinforcement forces arrive. CJOS COE has been working with the NATO Maritime Enterprise to build the necessary capabilities and force structures so that the Alliance is able to withstand surprise attacks and strategic shock. Our Conflict 2020 and Beyond series intends to address challenges the NATO Alliance might face in a future Battle of the Atlantic.

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ICELAND, THE MARITIME AND SEA LINES OF COMMUNICATION

Iceland being both a North Atlantic island and an Arctic coastal state, it is an obvious, derivative fact that the sea has always been central to Icelanders identity, culture, history, economy and politics. From the outset of the settlement of the island and founding of the earlier Commonwealth, in the 9th and 10th centuries, the connection to the outside world lay across the North Atlantic. The generations from the early settlers onwards have relied on the resources of the sea to sustain their existence at the edge of the hospitable world. Seafaring trade was (and is) central to bring vital goods, as it was for earlier communications with the neighbouring countries that would much later join with others to form the NATO Alliance in 1949, a few years after Iceland became independent and founded its Republic in 1944.

Industrialization of the fishing fleet in the 19th and 20th centuries significantly boosted economic development, massively increasing export revenues gained from selling fish to nearby markets. The fishing industry remains one of the fundamental pillars of the Icelandic economy. Iceland's efforts to protect its territorial waters, for forming its Exclusive Economic Zone (EEZ), to gain international recognition for both, was an endeavour both conducted at sea and through diplomatic means. These were and are core national interests, central to developing the economy and securing wellbeing. Sustainable management of fishing stocks was recognized early as an integral foundation for these efforts.

Dependency on the sea brings with it the awareness to maintain sustainability of resources and protection of the marine environment. The elements and features of the North Atlantic and Arctic environments, and changes to them, bring an awareness and molds attitudes. These aspects are interrelated. It is evident that the interlinkages between issues require a broader view on security interests. As an example, the effects of climate change are manifestly plain. Expected increases in ship traffic and off-shore resource extraction in the High North, correlated with increasing access due to receding sea ice, present risks to the marine environment, a principal source of exports and well-being. The Arctic marine environment is one of the priorities Iceland highlights in its current chairmanship of the Arctic Council. Increasing access within the Arctic region relates however not only to commercial ship traffic. Since Russia's annexation of Crimea in 2014, concerns have been raised about the increasing militarization of the Arctic, which Iceland has long sought to avoid.

Iceland's national security policy fundamentally aims at ensuring the protection of Iceland's independence and sovereignty, to secure the integrity of its territory and territorial waters, to ensure the safety of citizens and the safeguarding of infrastructure. Iceland maintains a host of bilateral and multilateral relations, in the shared effort to tackle global and regional issues. The most multifaceted relations are located within the Euro-Atlantic Area, institutionalized in the various regional bodies and agreements to which Iceland is a member. Iceland is not a member of the European Union, but has access to the internal market through the European Free Trade Association, and is a member of the Schengen Area. Membership in

other regional organizations includes the Arctic Council, the Nordic Council, the Northern Dimension and OSCE to name a few.

Iceland does not have military forces. Icelandic civilian institutions such as the Coast Guard and Police handle defense related tasks. The overarching governing authority for Icelandic defense is the Ministry for Foreign Affairs. The roles of the Coast Guard are multiple and familiar to counterpart organizations abroad. Maritime patrol, search and rescue, law enforcement at sea, response to natural disasters (a recurring feature of the island's geology), protection of the EEZ, explosive ordinance disposal, etc. The Icelandic Coast Guard is also a participant in various frameworks of international cooperation, such as the Arctic Coast Guard Forum and the EU's Frontex tasks in rapid border interventions, humanitarian emergencies and rescue at sea. Furthermore, the Coast Guard's operations are a part of Iceland's defence cooperation, both bilaterally and multilaterally.

NATO membership and the bilateral Iceland-US defence agreement from 1951 remain twin pillars of the national security policy. Iceland also participates in strengthening Nordic defence cooperation through NORDEFCO. The policy was approved in 2016 by Althing (Parliament) and forms the basis of the Government's own policy on security and defense. It is Iceland's aim, in cooperation with Allies and partners, to maintain predictability in our region, in support of security in the wider Euro-Atlantic area. A priority for Iceland is security and preparedness in the North Atlantic, including joint defence in the GIUK-N gap. A principal aim is to ensure that defence infrastructure, equipment, capability and expertise in Iceland remain sufficient to meet the challenges that Iceland faces in the security realm and to uphold its international commitments. The need for increasing cooperation to protect sea lines of communication, undersea and off-shore infrastructure

remains clear. Therefore, Iceland was an early supporter of JFC Atlantic, which later became JFC Norfolk.

Following the departure of the US Navy from Keflavik in 2006, the Icelandic government assumed all responsibility for the former Naval Air Station, now run by the Coast Guard as an Icelandic security zone named Keflavik Air Base. Allied deployments to Keflavik are frequent, and are conducted on the basis of the Status of Forces Agreement. To contribute to the common defence of NATO, Iceland is committed to the operation of defence facilities and equipment, including the Iceland Air Defence System (IADS), providing host nation support for other operational requirements such NATO´s Air Policing missions from Keflavik Air Base, increased rotational deployments such as for, but not limited to, Anti-Submarine Warfare, and the associated joint planning and execution of defence exercises for the Alliance. The most recent NATO exercise held off Icelandic waters was the DYNAMIC MONGOOSE exercise in 2020. Bilaterally, Iceland and the U.S. have jointly highlighted the increased rotational deployments in recent years, and both nations have invested in infrastructure to support this.

Iceland's national security policy emphasizes a broad definition of security, to include environmental security and wider respect for human rights and gender equality. This is in order to make a fuller account of the wide spectrum of threats and risks. The National Security Council, established in 2016, has met on numerous occasions to discuss non-military threats and risks such as natural disasters or the pandemic. Iceland ensures its broader security interests with active international cooperation on the basis of international law and the peaceful resolution of disputes with a focus on disarmament and arms control, respect for human rights, and adherence to the rule of law. Furthermore, Iceland has declared that its territory and territorial waters shall remain free from nuclear weapons, subject to Iceland's international commitments.

Maritime security, domain awareness, environmental protection and sustainability are all interrelated aspects that bolster human security in the Arctic and the North Atlantic. Facing challenges such as climate change, the need to maintain cooperation between the Arctic states is evident, as is the need to maintain close consultation with Allies and partners for preparedness in the North Atlantic.

Disclaimer: The views presented in this article are those of the author and do not necessarily represent the views or official policies of the Ministry for Foreign Affairs, Iceland.

VICE ADMIRAL DARREN HAWCO (RET'D)
ROYAL CANADIAN NAVY

NATO DIPLOMACY
TIME TO GET SERIOUS ABOUT DETERRENCE

NATO has been one of, if not the most successful alliances because it has remained focused on deterring and defending against the meaningful and real threats from Russia and terrorism. Each of these actors have taken advantage of opportunities to aggressively advance their respective interests. The Russian Federation's illegal annexation of Crimea and its exploitation of the security vacuum springing from the failing state of Syria are but two recent examples.

The global pandemic presents another geostrategic opportunity for potential adversaries for which the Alliance must be ready to discern, deter, and if necessary, defend. To do this, NATO needs to consider deterrence from the lens of today and not the past, to evolve its role as an international actor, and to reassess the capabilities required to deter potential adversary actions across the spectrum of conflict, which includes hostile measures short of war.

Managing the Bear

The Russian Federation is both a rational actor and a dangerous adversary at the same time. Russia will rationally assess cost and benefits before making a decision – Putin is not crazy, but he is conniving and calculating. That said, Russian actions over the past 15 years have employed a freeze / thaw strategy and a willingness to engage in hostile measures in support of its national interests, which poses a significant threat to European security.

The continued growth of the Alliance membership – from the original 12 in 1949, to today's 30 (11 nations have joined in just the last 17 years) – has all but eliminated Russia's historical sphere of influence and is gravely concerning to them.

As Canada's representative to the NATO military committee, I observed NATO Russia Council discussions first-hand, and believe there can be no reasonable expectation that Alliance assurances of good intentions will assuage Russia's concerns or preclude any opportunistic and reactive hostile measures to maintain its influence. Alliance members recognize this and need to get serious about deterrence.

Watching the Dragon

Choosing a more subtle path, the Chinese dragon is focused on increased global influence, investments in European critical infrastructure, increasing military buildup in the South China Sea, and a pattern of industrial espionage that undermines western global competitiveness. NATO must double down on its efforts to better understand, productively engage, and deter such threats from China.

Modern Deterrence

With the Bear and Dragon in mind, if a renewal of the Alliance's approach to deterrence is required, what should a powerful consensus-based political military alliance do about it?

I suggest three main areas to focus on, namely re-frame its military approach to deterrence, learn how to act as a global diplomatic persona similar to a state, and meaningfully advance the integration of its force development activities to be as robust and flexible as necessary to face these modern challenges.

Deterrence Theory in Application

NATO has the capability, but it does not exercise and operate in a way that deters. The Alliance plans its exercises years in advance, devotes itself somewhat slavishly to transparency, and frets (politically) about the potential for provocation – so much so that its exercises and activities have no meaningful deterrent effect.

To put that into perspective: if I were to telegraph a bully with details of how I would respond to provocation, explain that I would be slow to respond because I would need to think about it for a bit, and advise that I would generally look to deescalate in every situation when confronted, I should not be surprised that the bully's behavior does not change over time (if not become worse…).

In this post-Cold War and grey zone era of strategic competition, the basics of deterrence theory – raise costs of success or impose costs of action – continue to apply.

NATO's significant exercise program provides excellent conventional training for NATO allies, but it does more to inform Russia on how we operate than have a deterrent effect. Most NATO exercises look like a ponderous and predictable sledgehammer.

History informs that Russia will be opportunistic in pursuing limited objectives for which a large conventional force (sledgehammer) would be an ill-suited response. When thinking about deterring Russia, NATO needs more carpentry and fewer construction tools in its toolbox.

To be more effective, future NATO activities would be designed to reshape Russia's understanding of the operational environment – much as a fine set of chisels over time can create a statue from a block of wood. The objective should not be to scare Russia, because it takes a lot to scare a bear. NATO would see better results by shaking Russian operational assumptions and campaign models, as could be done by complementing the traditional Alliance exercise program with more small rapid responses and tailored activities in a snap exercises platform.

The idea is to cause them to pause and wonder (not believe they know) how we will respond.

NATO also needs to be able to command and control a wider range of force structure capabilities than it is currently used to, such as special force elements, and operations in the information and cyber domain.

To position, leverage and employ more nuanced and discreet force packages will be a challenge for an alliance practiced in consensus-based crisis-response and process-laden decision-making (that is a lot of hyphens…).

Together, a wider range of military capabilities, and a refined ability to command and control them, will enable the Alliance to exercise and conduct activities that pose meaningful operational dilemmas to Russia, who will then assess a higher real cost of success and greater risk, serving to deter.

The Politics of the Matter

Potential adversary tactics have continued to evolve. Terror groups, proxies, and other non-state actors – alongside powerful state actors like Russia and China – are now impacting the Alliance via hybrid tactics that are increasingly hard to attribute, let alone address, via traditional diplomatic, economic, and conventional military means.

To be able to respond, NATO needs to act more like an international state actor than an alliance of 30 member states in a consensus-based decision model. That is not to say that decisions should not be consensus based, but rather that the decision-making processes must be reinvented to enable coherent and responsive decisions (such as meaningful consensus of agreed upon pre-authorized military, strategic communications, and diplomatic decisions and authorities).

By thinking more like a state, the Alliance can develop a longer-term strategy to achieve its principal strategic objective of deterrence.

In this strategic competition, potential adversaries take a longer-term view, even if their actions on a given day appear opportunistic – when do you think Russia actually began the very detailed planning cycle necessary to design, train, equip, and execute the Feb 2014 operations in the Ukraine? I would be very willing to bet the operational planning was ready before 2013 in anticipation of the right conditions.

Time to Refresh

The year 2020 is going to be recognized as one that initiated a global refresh of our most traditional sectors, and NATO is one of those needing to examine old

practices. So how to start? NATO needs to have a serious dialogue regarding the extent to which it should emulate an international actor or state. What type of foreign policy elements would that require? How best can it leverage all aspects of Diplomacy, Information, Military, and Economic (DIME) power in support of agreed Alliance interests? How far can the Alliance go as a diplomatic actor when responding to measures short of war where attribution, economic, and diplomatic tools are effective deterrent and response measures? What should the NATO defence industrial base strategy be?

To be clear, there is room for both NATO and the European Union in this equation. Protectionist efforts to preserve EU gravitas by NATO Allies who are also EU members only serve their own domestic image and potential adversaries.

Following the United Kingdom's Brexit, approximately 70% of Alliance military and economic force resides outside of dual EU/NATO members. If able to be fully leveraged, the diplomatic, information, military, and economic clout of NATO would be a significant complement to what the EU brings to table.

In practical terms, dual EU/NATO members need to stop blocking NATO from using its diplomatic voice and economic muscle in true collaboration with the EU in the shared pursuit of deterring potential adversaries.

Re-stocking the Toolbox

NATO doesn't need more forces, just different force mixes that create political and military options capable of giving potential adversaries reason to pause.

This all said, understanding modern deterrence and having the political will to tackle the challenge is not enough – not if NATO doesn't have the right military capability mix and readiness options.

To ensure it does, the Alliance needs to redirect the monolithic NATO Defense Planning Process (NDPP) from its current focus on conventional capabilities (sledgehammers) in support of legacy deterrence objectives. Instead, it would be more effective for the NDPP to identify and inform the development of a wider range of conventional and asymmetric capabilities that the alliance requires.

Of course, Allied Command Transformation (ACT) needs to be adequately resourced to deliver a renewed NDPP.

Finally, the NATO Support and Procurement Agency (NSPA) and NATO Communications and Information Agency (NCIA) roles in capability design and delivery need to be reframed. Common capability development and acquisition of C17s by a number of Allies is one example that can be emulated in other areas such as sea lift, EW capabilities, ammunition, small tactical helicopters, small arms, radio, and so on. Beyond stretching the value of limited defence dollars for smaller nations, it will foster interoperability and enhance the Alliance Defence Industrial Base.

I do not wish away the challenges of EU versus American industrial complex interests, nor the sovereign obligations related to indigenous defence capabilities and the broader development of its national industrial complex. Rather, I recognize that an NDPP-informed, NATO-wide, order book of small-to-large capability requirements provides significant opportunities for Allies to partner in acquisitions of various complexities and sizes in a way that is not currently possible.

Bringing it Home

NATO has a fundamental understanding of deterrence, but it has lost – if it ever really had – the ability to act nimbly as a coherent political military actor, which is necessary to effectively deter potential adversaries such as the Russian Federation, and to shape NATO's relationship with and the behaviour of global powers such as China.

NATO asserts that it is in a strategic competition. If this is truly the case, then it is doubly important to adapt its approach to deter hostile measures short of war, and to create the type of relationship with these two global powers that are in the Alliance's interests.

As Canada continues to inform ongoing Alliance adaptation discussions, we should reflect now on how to prepare for and engage the next United States Administration on future pending decisions related to continental defence and NORAD modernization as identified in the government's defence policy, Strong, Secure, Engaged.

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MISS ANNA DAVIDSON
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PRE-EMPTING MISCALCULATION BETWEEN NATO, RUSSIA, AND BELARUS

Miscalculation has brought Belarus to the point of uncertainty. Long predicted by experts were the alleged interference and rigging of Belarus' presidential elections results on August 9, 2020 and Alexander Lukashenko's determination to maintain his position as president despite public opposition. Less predicted was the unprecedented degree to which the Belarusian government would forcibly and violently enforce the official election results in the midst of peaceful protests which in turn fuelled the sharp increase in the number of protestors, protest consistency, and labor strikes in Minsk and regional cities. Sviatlana Tsikhanouskaya, Lukashenko's leading opponent in the elections, has fled to Lithuania despite having received 60-70% of actual votes according to exit polls (the official percentage Tsikhanouskaya received was 10.1% according to Belarus' electoral commission).[1] Remaining in Belarus is the steady increase of uncertainty for the country's future and the future of its relations with the West, the East, and the voices within.

Foreign coordinators and "puppeteers" are to blame for the thousands of protesters, according to Lukashenko.[2] Lukashenko claims that NATO is building up military forces on the border of Belarus with enhanced forward presence (eFP) exercises and he accuses NATO of attempting to "topple the authorities"

and use the protests to replace the government in Belarus.[3] NATO's interests in Belarus, according to Lukashenko, hinge on the geostrategic location of the country and access to the Belarusian market. Transit via Belarus is a component of European trade with Russia, without which Lukashenko claims NATO will "need to go over the Baltics or the Black Sea to trade with Russia."[4]

NATO's doctrine of eFP deployed in 2017 to Poland, Estonia, Latvia, and Lithuania and is intended to maintain a "defensive, proportionate" posture that is "in line with international commitments," consisting of four rotational battlegroups led by Canada, Germany, the United Kingdom, and the United States.[5] Tensions between Lithuania and Belarus have exacerbated demands for eFP with the completion of Belarus' first nuclear power plant located about twenty miles from Vilnius. These tensions are also of importance to Russia's territorial integrity of the Kaliningrad Oblast, located between on the Baltic Sea between Lithuania and Poland, with passage from Belarus via the Suwalki Gap. If this route were to be impeded due to tensions between Belarus and Lithuania, or Belarus and NATO, then the next best option for Russia to reach Kaliningrad would be an enhanced presence of the Russian Navy on the route through the Gulf of Finland from St. Petersburg.

The hedging against NATO by Lukashenko has not been entirely dissimilar to the Belarusian leader's position towards the Kremlin. Belarus maintains a historical identity as a Slavic nation, part of Europe, and formerly a Soviet state that is now the signatory

of a Union Treaty with Russia as well as maintaining the identity as distinctively Belarusian (the latter of which contains multiple different sub-identities within Belarus). Nevertheless, Belarus has exhibited indifference towards integration with Russia, seeking equal status in the Union State, and decreased dependency on Russian oil and natural gas imports. Russian President Vladimir Putin has stressed the need for Minsk to advance integration, otherwise Moscow may fail to reduce the price of natural gas exported to Belarus or implement the energy subsidies which Belarus requests.[6] Thus, the backdrop against which the uncertainty in Belarus evolves is not without its complications and nuances.

At the time of writing, the Kremlin has for the first time publicly condemned the brutality exhibited by Belarusian law enforcement towards protestors in Belarus with the death of Raman Bandarenka on 12 November.[7] Bandarenka, who died in hospital from a head injury, was reportedly bludgeoned and abducted by men believed to be Belarusian security forces after confronting their attempt to remove Belarusian red and white flags (representative of the protest movement against Lukashenko) at Peremen Square (or the Square of Changes).[8] The red and white flag is distinctive as a national symbol from the official red and green one flown by the government in that the former was used by the Belarusian People's Republic (an attempted state that only existed from 1918 to 1919 before incorporation into the USSR as the Socialist Soviet Republic of Belarus) while the latter is a refinement of the flag of Soviet Belorussia. The Kremlin's condemnation arrived five days after the death of Bandarenka by Dmitry Peskov as Russian presidential spokesman and is assessed by some to represent the conditionality upon which Russia's relationship with the Lukashenko regime rests as it is the first instance in which Moscow has come close to condemning the Lukashenko regime for its management of the crisis. According to the statement, "violence against Belarusian protesters by law enforcement is unacceptable..." and, "as President Lukashenko said himself, brutality that was not provoked by the actions of protesters is undesirable and unacceptable."[9] However, the statement also attributes this brutality to "provocations against law enforcement officers," which the Belarusian authorities, according to Russia, are potentially proving unable to properly manage.

This lack of capacity to properly manage provocations from protestors and instead meet these provocations with unacceptable brutality is preventing, according to the statement, what Russia would like to see, which is "Belarus calm, stable and prosperous..."[10] This has resulted in the perception by Russian officials that Lukashenko is not taking the protests as seriously as necessary and that there is a need to "explain the real situation to ...[Lukashenko] in private - the situation where he is, and which he clearly underestimates."[11] Russia's representative to the UN has officially stated his willingness to speak with Sviatlana Tsikhanouskaya, the opposition candidate to Lukashenko, about resolving the situation in Belarus.[12] What this may mean for NATO and for Belarus is that Moscow is signalling that its support for the Lukashenko regime is not guaranteed. It also means that the Kremlin is in some manner shaping the narrative that Lukashenko may not be capable of stabilising the situation in Belarus without help, mediation, or intervention. This point is significant as the Russian perception of soveriegnty is not a legal issue but a capacity; thus the inability of the Lukashenko regime to guarantee its own sovereignty (or capacity to be sovereign) would mark the need for change in Russia's approach towards Belarus.

The question remains what is to be done, if anything, by NATO in light of this signalling. Military invasion by Russia into Belarus is extremely unlikely due to the delegitimising effect such a course of action would impose upon Russia's position. Moscow is very well aware of its commitments in Article 6, Part 1 of the Treaty on the Creation of the Union State which states that "Each participating state shall retain, taking into account the powers voluntarily transferred to the Union State, sovereignty, independence, *territorial integrity*, and state structure," (translation and italics mine).[13] However, there is room for a calculated Russian presence in upholding the commitment to maintain stable and normal relations and cooperation with Belarus. This is especially evident in Article 1 of the Treaty of Friendship, Good Neighborliness and Cooperation between the Russian Federation and the Republic of Belarus, which states that "The Contracting Parties will build friendly, good-neighborly relations and develop cooperation, guided by the principles of mutual respect for state sovereignty and territorial integrity, inviolability of borders, peaceful settlement of disputes and non-use of force or threat of force, equality and non-interference in internal affairs, respect for

human rights and fundamental freedoms, conscientious fulfillment of obligations, as well as other generally recognized principles and norms of international law," (translation mine). The mechanisms for upholding these principles are ambiguous.

This leads to the significance of the point made by specialists on Russian foreign policy who have questioned the lack of application of the NATO-Russia Council as it is a mechanism for deconfliction. The Council was suspended of practical cooperation with Russia due to the 2014 conflict in Ukraine and has since been used only sparingly with two to three meetings occurring each year to maintain dialogue.[14] If Russia were to enhance its presence in Belarus, either militarily or diplomatically, then active dialogue between NATO and Russia will be required and necessary to address any instances of confliction. This action would also refute the Russian claim that NATO has reneged its commitment under the Founding Act on Mutual Relations, Cooperation and Security between NATO and the Russian Federation established in 1997. Active dialogue is a prerequisite for deconfliction, not a luxury for cooperation, and keeping the channels of communication open, however difficult it may be, enables this prerequisite.

Given these commitments, it is important to recognize that if any Russian intervention were to occur in Belarus, it would happen in such a way that positions Russia as a peaceful resolver of conflict, not as an instigator of it. The change in narrative by Moscow towards the opposition in Belarus, as stated above, as well as the condemnation of police and security forces' brutality may indicate the transition of this perception by the Kremlin, and it is one that NATO member states, especially those in the Baltic region, would do well to notice in order to avoid further repercussions of miscalculation.

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Photo credit: President of Russia, "Meeting with President of Belarus Alexander Lukashenko." 14 September 2020. http://kremlin.ru/events/president/news/64031

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LIEUTENANT COMMANDER HATICE GOMENGIL
TURKISH NAVY

RUSSIAN BLACK SEA PRIORITIES AND CAPABILITIES

Throughout history, the Black Sea has been a crossroads of cultures, civilizations, and conflicts between the world's empires. Today it remains one of the most geopolitically and economically significant locations in the broader Eurasian region. Known for its diversity, the Black Sea is home to two European Union (EU) members (Romania and Bulgaria), three NATO Allies (Turkey, Romania, and Bulgaria), two NATO partner nations (Ukraine and Georgia), and Russia, who considers the Black Sea essential for power projection into the Mediterranean and the Middle East.

The Black Sea region forms an important crossroads and a strategic intersection of east-west and south-north corridors. Access to the Black Sea is vital for its littoral states and neighbours. At the same time, control of the Black Sea enables power projection toward mainland Europe, particularly the Balkans and Central Europe, the Eastern Mediterranean, the South Caucasus, and the northern Middle East. Additionally, the Black Sea has geopolitical significance as an energy transit hub from the oil-and gas-rich Caspian region and from Russia to Europe.

The Black Sea's strategic importance to Russia (and the Soviet Union before) has evolved over the years. After the break-up of the Soviet Union, Russia's Black Sea fleet slowly declined, leaving its combat capabilities uncertain.

Given the sea's enclosed nature and controlled access to the open seas through the Turkish Straits, Russia's Black Sea fleet was not a significant component of the Russian Navy until this century.

Russia's 2015 "Maritime Doctrine" and "The State Policy of the Russian Federation in the Field of Naval Operations" are the most significant articulation of Russian maritime interests and goals. Some notable points emphasized in these documents:

• Safeguard the national interests of the Russian Federation in the World Ocean and reinforce the Russian Federation's standing among the leading maritime powers.
• The policy identifies the Atlantic, Arctic, Pacific, Caspian, Indian Ocean, and Antarctic areas as regional priorities of the National Maritime Policy. The policy is adapted to the specific features of each region.
• Focus on the modernization of shipbuilding, particularly shipbuilding and ship repair industries in Crimea.
• In the Black and Azov Seas, the policy's focus is the accelerated modernization and comprehensive reinforcement of Russia's strategic position while maintaining peace and stability in the region.
• Strive to maintain its position as the world's second most combat-capable Navy.

While the Black Sea region is not listed as one of the priority areas for Russian Federation naval operations, improving the Black Sea Fleet's operational capability is one of their primary goals. A robust Black Sea Fleet will be capable of providing support to Russian interests in the Mediterranean and Middle East.

The most ambitious features clearly articulated in these documents are establishing and maintaining the world's second most powerful Navy and restoring the Russian Navy as a blue-water force capable of operating on the World Ocean. Creating a blue-water navy is a long-term ambition that will require significant resources and economic power.

During the Soviet period, Russia had a size-able blue-water navy whose area of responsibility encompassed the Black and Mediterranean Seas and the Indian and Atlantic Oceans. After the Soviet Union's collapse, the Black Sea Fleet became less significant, and its capabilities deteriorated.

Since the early part of this century, Russia has re-evaluated its posture in the Black Sea, based on the naval support that was necessary during the Georgian War and more recent interests in the Mediterranean and Syria.

Russia's ambitions in the Mediterranean required a modernised and effective Black Sea Fleet.

The lease agreement between Russia and Ukraine for the Sevastopol Base imposed limitations on the number of units deployed on the peninsula and Russia's ability to modernise the Black Sea Fleet. Given that the Sevastopol Naval Base is home to the Black Sea Fleet and a portion of the Black Sea Fleet serves as a Russian Mediterranean Task Force, the need for full sovereignty over Sevastopol is considered a primary motivation for the annexation of Crimea. The annexation energised its plans for the Black Sea Fleet and allowed renewed naval activities in the Mediterranean.

As a part of its great power ambitions, Russia seeks more access and freedom of movement in the Mediterranean region. The Tartus Naval Base was leased from Syria's Assad Government at no cost for 49 years, giving Russia logistical support in the region.

After the 2008 war between Russia and Georgia, Russia's Ministry of Defence initiated an ambitious armament programme. The programme's objective was not expressly to enhance the Black Sea Fleet's capabilities but to stop unit and capability loss while maintaining an acceptable operational level. Despite the 2011-2020 State Armament Program not being fully implemented, the fleet received many new ships and submarines.

Under this Armament Plan, the Russian Ministry of Defence initially ordered six Admiral Grigorovich-class frigates, capable of firing Kalibr land-attack cruise missiles (LACMs) or anti-ship cruise missiles. The crisis with Ukraine, however, caused construction delays resulting in a reduction to three frigates for the Black Sea Fleet.

Another stated priority for the 2011-2020 Armament Plan was to enhance the Black Sea Fleet's submarine capabilities. Russia commissioned six Improved Kilo-class diesel submarines (derived from the classic Soviet Kilo-class attack submarines) between September 2015 and early 2018 to achieve this goal quickly.

Six 1300-ton Vasily Bykov class patrol boats, two of which are already in service, will round out

the Black Sea Fleet. Like almost all other Russian combat ships in construction, the patrol boats will be armed with universal cruise missile launchers.

The manner of Black Sea Fleet ship acquisitions corroborates the Russian military's decision to focus on a combination of submarines and smaller ships equipped with highly capable long-range missiles that do not require heavy tonnage for employment. Russia's two Buyan-M class small missile ships are a good illustration. They are designed to operate in littoral zones protected by shore-based air defence systems while holding enemy ships or land targets at risk with long-range cruise missiles.

To mitigate the shortfalls of shore-based air defence, the Russian Navy developed the 800-ton Karakurt-class, another Kalibr-armed small missile ship. Six of these ships are expected to join the Black Sea Fleet by 2022. Compared to the Buyan-M Class ships, these ships have a deeper draft increasing their stability in rough seas. They are also equipped with Pantsir-M air defence systems. Together, these two modifications allow operations farther from shore while retaining the same long-range strike capability.

The 2011-2020 Armament Plan underlines the Russian Navy's transition from an aging blue-water fleet toward an agile, multi-purpose green-water navy. The production of less expensive and easier to build light units facilitates this transition. The Kalibr cruise missiles give these light units long-range weapon capability while operating under the land-based air defence protection.

Russia's anti-access and area denial (A2/AD) capability relies on mutually supporting land-based surface-to-air missile (SAM) systems and anti-ship cruise missile (ASCM) systems. The anti-air component includes the S-400 SAM system, with a medium and long-range variant ranging up to 250 kilometres. There are five battalions of S-400s based out of Crimea that are supplemented by the S-300 SAM and Pantsir-S1 point defence system. Anti-ship capability is provided by the Bastion-P coastal defence cruise missile system with a range of up to 300 kilometres.

An equally significant Russian military capability in the region is the over-the-horizon sensor system, covering nearly the entire Black Sea. In 2014 and 2015, there was an influx of Russian surface-to-air missiles, air defence radars, including long-range early warning, target acquisition, and target engagement radars into Crimea.

Russia's illegal annexation of Crimea triggered the NATO Alliance (with a substantial presence in the Black Sea region with three NATO countries and two NATO partners) to deliver on its core task of collective defence to maintain its credibility. NATO has taken proportionate and defensive steps to strengthen its presence in the Black Sea region. At the same time, the Allies have agreed to keep open communication channels with Russia, demonstrating their willingness to be predictable and transparent.

At the 2016 Warsaw Summit, NATO heads of states, for the first time since the end of the Cold War, directly addressed Russia's aggressive actions. They discussed Russia's provocative military activities and defined these acts as damaging to Euro-Atlantic security. After referring to Russia's actions and policies, including the illegal annexation of Crimea and military activities near NATO's eastern flank (including in the Baltic Sea and the Black Sea), the Alliance announced its decision to enhance its defence posture by maintaining a forward presence in the eastern part of the Alliance states. NATO stressed the evolving challenges and deteriorating security situation in the Black Sea region. It stated its intention to support regional efforts by Black Sea littoral states aimed at ensuring security and stability.

Allied nations agreed that using Standing Naval Forces to increase NATO naval presence in the Black Sea would provide enhanced training and situational awareness while bolstering regional deterrent credibility. NATO further supports regional exercises, most notably SEA BREEZE and SEA SHIELD, in the region. Turkey initiated Operation Black Sea Harmony, another excellent example of

Turkey's contribution to maritime security in the region. As the NATO Secretary-General outlined, these measures show that the Allies stand together, united, and strong.

The Turkish Straits and the Montreux Convention that regulates passage through the Straits are another strength of the Alliance. Considering the Black Sea's enclosed nature and controlled access to the open seas, the Montreux Convention represents a valuable legal tool allowing a NATO country to regulate and constrain transit should the need arise.

The frigates of the Russian Black Sea Fleet, Admiral Grigorovich, and Admiral Essen, as well as the patrol ships Pytlivy and Smetlivy, conducted anti-air exercises in the Mediterranean Sea near the shores of Syria, repelling a simulated air attack from a conventional enemy.

It is apparent that the Black Sea region is not as stable as it appeared to be a decade ago. NATO expects the growing trend of growing Russian military presence in the region to continue in the coming years. The Russian Black Sea Fleet will likely take on additional missions beyond the Black Sea and act as a foundation for Russia's ability to ensure its interests and future activities in the Eastern Mediterranean. However, the chances of open conflict seem unlikely provided that NATO and its partners counter Russian activities by using deterrence and collective security mechanisms sustained by the Alliance.

Russia's interests in the Eastern Mediterranean and maintaining the Tartus base are the game-changers for Russian Naval policy and lessens the importance of the Black Sea to Russia. Nevertheless, NATO's deterrence in the region is vital to maintain strategic balance and support regional Allies and Partners.

The success of NATO's Black Sea security depends on close cooperation among the littoral countries. As stated by the Turkish and Serbian Ministers of Foreign Affairs during the 2017 Black Sea Economic Cooperation meeting, "political, economic and security challenges in the Black Sea region can only be effectively addressed through increased interaction, enhanced coordination, constructive dialogue, and focused, result-oriented cooperation." To establish this kind of cooperation among NATO countries and partners, the Alliance must bolster collective security mechanisms of the region's littoral states.

This analysis is predicated on the current Russian Maritime Doctrine, which is due for review by the end of 2020. In light of this emergent Russian policy document, an updated study will be conducted by CJOS as part of its 2021 PoW; however, it appears unlikely that Russia's interests in and the importance of NATO efforts to contain Russian and maintain sea control in this dynamic region will diminish in the near future.

DR. DIRK SIEBELS
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NATO 360: POTENTIAL LESSONS FROM WEST AND CENTRAL AFRICA

NATO's influence in West and Central Africa is generally limited. When it comes to maritime security issues, however, the region could serve as a case study, providing lessons that can be applied in other areas which are a more strategic concern to the alliance. Lessons can be learned from the overall lack of sea control coupled with a diverse set of maritime security challenges in general as well as from the implications of the Covid-19 situation in particular.

Piracy in the Gulf of Guinea, comprising coastal states between Cóte d'Ivoire and Gabon, has developed into an increasing concern for the shipping industry and, by extension, for governments in many NATO member states. The International Maritime Bureau, for example, has warned that this area is 'increasingly dangerous for commercial shipping', accounting for virtually all maritime kidnappings worldwide.

In reality, however, the situation is complex. Countries across West and Central Africa have improved capabilities and cooperation in recent years, leading to a more accurate picture of illicit activities at sea. These are affecting all coastal countries in the region. Piracy may be the most headline-grabbing symptom, but it is only one of many issues related to maritime security and can therefore not be analysed or addressed in isolation.

NATO's influence in the region is limited at best. The alliance is largely monitoring the situation, for example through NSD-S Hub as well as some efforts undertaken within other centres and initiatives. Actual involvement related to maritime security issues 'on the ground', however, is mostly based on activities conducted by individual member states. In many cases, these are embedded in bilateral relations such as US programmes conducted through AFRICOM or the – often controversial – French connections with francophone countries in sub-Saharan Africa. Furthermore, various NATO members are engaged in multilateral initiatives, mainly through programmes funded by the European Union or various UN agencies.

Naval operations similar to those conducted by NATO during the height of Somalia-based piracy are neither planned nor feasible. At the same time, many senior naval officers have gained at least some experience with counter-piracy operations in the Indian Ocean. Such experiences are unfortunately often projected to the Gulf of Guinea, failing to take into account that the situation in West and Central Africa is entirely different.

Regional efforts – template for other areas?

In a nutshell, it is impossible to gain a comprehensive understanding of piracy in the Gulf of Guinea when this

phenomenon is looked at in isolation. Many alleged pirate attacks, for example, are closely related to disputes between criminal groups. Individual incidents must therefore be carefully analyzed to identify probable links between piracy and other illicit activities at sea. Counter-piracy initiatives led by international stakeholders are further hampered by different priorities of virtually all governments across West and Central Africa. On the national level, piracy is generally not the primary concern related to maritime security.

Since most threats to a secure environment at sea are transnational by nature, regional efforts are required to eradicate or at least reduce them. Governments have long recognized the need for enhanced cooperation and adopted the Yaoundé Code of Conduct in 2013, bringing together coastal countries from Senegal to Angola. Cooperation has made significant progress in recent years, even though it has not come at the speed that representatives from the shipping industry or international partners would like to see. Furthermore, regional efforts are not merely aimed at a reduction of piracy.

Deepening cooperation will lead to improvements, but only in the longer term. In the immediate future, different maritime security issues are likely to become more visible. Preventive efforts require additional financial and human resources for navies and other maritime agencies. Most governments, however, have to deal with budget shortfalls, largely due to the economic impact of Covid-19. This state of affairs is likely to be similar around the globe. For NATO in particular, maritime security challenges in West and Central Africa are therefore an important case study.

Many aspects that are important here are – to varying degrees – also important elsewhere, for example in the Mediterranean or the Persian Gulf. From a NATO perspective, it would therefore be useful to reduce the focus on immediate security concerns such as piracy. Instead, it makes sense to a look at the bigger picture to gain valuable insights that could be applied during more direct engagements in other region.

Diverse challenges offer vital insights

Arguably one of the most interesting features of ocean governance in West and Central Africa is the fact that sea control is – in many cases – merely virtual. Navies lack sea-going assets while surveillance capacities are generally limited and governments are unable to monitor the Exclusive Economic Zone. Moreover, interoperability is hampered by a lack of human and financial resources within the region as well as rival interests from the outside.

At the same time, naval forces are facing a diverse set of challenges. Responses have to fit regional requirements. Nevertheless, they can provide insights and help to adjust the responses to similar challenges elsewhere, including in areas where NATO has a larger role. Naval planners around the world should be familiar with at least some of the challenges in West and Central Africa, such as:

- limited or decreasing importance of traditional naval tasks, namely the projection of 'hard' sea power;
- increasing focus on constabulary tasks which sees navies largely employed in a coastguard role;
- emerging tasks related to non-traditional security threats, e.g. various forms of migration or environmental issues;
- close links between different illegal activities at sea as well as links between illicit activities on land and at sea;
- growing involvement of non-traditional external actors in the security sector (namely China, but in some countries / areas also Russia, India and others).

Not all of these issues are actually relevant on the national level. However, they can be identified to varying degrees throughout the region and require ongoing attention. Simply observing how related challenges are tackled may offer valuable lessons to NATO and its individual members.

In the next step, the Alliance could also decide to play a more active role. Given the limited interest in West and Central Africa, it is unlikely that NATO is able to really shape developments. Nevertheless, more cooperation in the maritime environment can be useful to build trust which is required to address more controversial land-based issues such as terrorism in the Sahel region or migration from West Africa towards Europe.

Another aspect that should be monitored closely is the impact of COVID-19, not only on government budgets as mentioned above, but on the security situation in general. While it is currently too early to assess the longer-term implications of an unprecedented pandemic for maritime security, it is unlikely that threat levels will decrease significantly or that specific threats will even disappear. The more likely scenario involves stable or somewhat increasing threat levels and a diversification of security challenges. The Gulf of Guinea with its already diverse set of challenges – which affects various stakeholders from coastal communities to the shipping industry – may offer important lessons about increasing threats, but also about coping mechanisms.

In a nutshell, today's navies already have to deal with an increasing set of issues on top of traditional roles and operations. Naval planners therefore have to prepare to 'do more with less', e.g. keep abreast of technological advances or tackle an expanding number of constabulary tasks without a corresponding increase in resources. Operational and procurement budgets are unlikely to be increased as governments around the world are likely to adjust their spending priorities towards the health sector as well as to economic recovery packages.

Sea control and the 'blue economy'

The limited amount of sea control mentioned above does not only limit the effectiveness of naval operations or law enforcement at sea. It also means that virtually all countries in West and Central Africa currently fail to realise the potential benefits of their respective maritime domains. Improvements are ongoing, for example in Nigeria with the US$195 million Deep Blue project. It is supposed to offer the Nigerian government with the ability to monitor the entire Exclusive Economic Zone for the first time ever.

Whether this large-scale project will indeed be a success remains to be seen, but it certainly points in the right direction. Unfortunately, even remotely similar capabilities are rare across the region. Maritime situational awareness (MSA) therefore remains limited at best, despite advances in technology and the fact that at least some capabilities are now much cheaper compared with ten or even five years ago. Using drones

to replace patrol aircraft, for example, offers significant savings while maintaining a similar level of aerial surveillance capabilities.

MSA is also useful to pinpoint law enforcement operations at sea, ensuring that the limited number of assets are used in an efficient manner. By extension, it would then very likely become obvious that 'good governance at sea' has a positive impact for domestic populations and even for government revenues. It may even be possible to quantify these effects within maritime business plans on the national level, including potential benefits of the 'blue economy' and the costs to ensure that these benefits are realised.

Some countries in West and Central Africa have already started to work on such plans or even on broader national maritime strategies. These efforts are also a very important case study for navies across NATO member states. Overall, flag officers and politicians have traditionally tried to justify naval spending with national security requirements or similar strategic questions. Looking at ongoing efforts in many African countries – as well as in some other regions around the world – could help to facilitate a different approach. After all, potential benefits of at least some naval capabilities are quantifiable. When even the direct benefits outweigh the costs, the political decision to invest in such capabilities becomes much easier.

Barbed wire attached to the ship hull, superstructure and railings to protect the crew against piracy attack in the Gulf of Guinea in West Africa.

COMMANDER SG JOERG MAIER, DEU N
CAPTAIN (N) TODD BONNAR, MSC, RCN

DEALING WITH THE DRAGON

In an era when the United States, as a dominant unipolar regime, has seen the re-birth of great power competition, China has now become the top focus of U.S. defense planning and budgeting. As then US Secretary for Defense, Mark Esper, recently explained in a speech from Honolulu, Hawaii, he has told the military to make China "the pacing threat in all of our schools, programs and training." NATO members now need to decide what the US policy towards China's growing military power means in general, and, for individual members' navies.

Concurrently, after decades of downsizing military maritime capabilities and capacities on both sides of the Atlantic, there is now a definitive renewed requirement to focus on the reinforcement of Europe. The decisive force requirements of maintaining a credible deterrence effect currently places most of the burden squarely on U.S. shoulders. Second and Sixth Fleets are clearly the major muscle for the North Atlantic in terms of maritime deterrent effect.

Therefore, it is not surprising that American military leaders claim that the U.S. is in a new long war – an approach with obvious impacts on NATO and European security. The stated goal of the US' three front war against Russia and China is a containment line that would stretch from the Korean Peninsula around Asia across the Middle East into parts of the former Soviet Union in Eastern Europe and finally to the Scandinavian countries. As described by the Pentagon's National Defense Strategy, American military forces, reinforced by the military forces of trusted allies, should aim to control every segment of this line to block hypothetical advances of Chinese and Russian influence. To execute this, the two principal Combatant Commanders, EUCOM and PACOM have submitted force requirements to the US Congress that would "continue to expand Intermediate Nuclear Force Treaty-compliant theater strike capabilities to effectively counter adversary anti-access/area-denial [A2/AD] capabilities and force preservation tactics." The potential bulk of these types of forces comes primarily from the Navy.

This approach thus poses a challenge for NATO's maritime forces. The military dilemma for Brussels is, with its stretched military forces, should it ask NATO's other navies to step up even more and provide a maritime maneuver arm that acts as a deterrent to Russian forces in the NATO Area of Responsibility, thus freeing up the USN to pivot more forces to their 7th Fleet AOR to deal with China?

If not, what are the alternatives? What happens to NATO's VJTF(M) combat effectiveness if EUCOM is directed to support PACOM and re-deploy assets into the Indo-Pacific, in particular into the four

unpredictable flashpoints: the Taiwan Strait, the South China Sea (SCS), the ECS and the Korean Peninsula? How can European navies widen their focus and strengthen their efforts in the Atlantic to make room for U.S. Navy mobility? Are there options that can be explored with the Joint Expeditionary Forces (JEF) and the carrier forces of UK, France, Italy and Spain? Should NATO's nations build capacity for Indo Pacific regional navies to support America's "Free and Open Indo-Pacific" (FOIP) operation or participate in its "Freedom of Navigation Operation" (FONOPS) program? Or should more European resources be dedicated to augmenting the Standing NATO Maritime Groups, supporting Long Range Patrol Aircraft and ISR, creating more integrated and effective maritime task groups and thus relieving pressure on the US forces in Europe. NATO members now need to decide what China's growing military power means in general, and, for individual members' navies.

China's navy, which Beijing has been steadily modernizing since the early to mid-1990s, has become a formidable military force within China's near-seas region, and it is conducting a growing number of expeditionary operations in more-distant waters, including the broader waters of the Western Pacific, the Indian Ocean, and waters around Europe. For the first time since the demise of the USSR and the end of the Cold War, the People's Liberation Army – Navy (PLA-N) is viewed as presenting a major challenge to the U.S. Navy's ability to achieve and maintain sea control of blue-water ocean areas in the Western Pacific. It is a significant contender to the long-standing status of the United States as the leading military power in the Western Pacific.

There is perhaps no greater public manifestation of the ever-increasing tensions between the White House and Beijing than the drama that plays out in the South China Sea. Despite the fact the PRC took part in negotiating from 1973 to 1982 and ratified it in 1996, the South China Sea dispute is essentially a dilemma with UNCLOS. In the spring of 2020, a PRC surveillance vessel rammed and sunk a Vietnamese fishing boat in the South China Sea. Despite public attention being focused on a growing global pandemic, the world and in particular the United States very publicly condemned Beijing's multi-year assertions in the disputed waters. The U.S. was highly critical of China for sinking the Vietnamese fishing boat, saying that it was "seriously concerned" by reports of what Beijing did, while China accused the U.S. of attempting to negate its "legitimate claims" in the South China Sea. The issue is, most western and some Asian countries do not recognize these so-called "legitimate claims".

Fiery Cross Reef - courtesy of the South China Morning Post

For decades now China has claimed nearly 90 percent of the SCS in what is commonly referred to as its nine-dash line, a version of which was first used in the 1940s. China uses the line to define its territorial claims in the contested region. Furthermore, China claims extended territory in the SCS by occupying and constructing artificial islands from seven reefs: Mischief Reef, for example off the Philippine coast has been filled in and turned into a Chinese military base complete with radar domes, shelters for surface-to-air missiles and a runway long enough for fighter jets. Six other nearby shoals have been similarly transformed by Chinese dredging; Gaven Reef, Hughes Reef, Subi Reef, Fiery Cross Reef, Johnson Reef, and Cuarton Reef.

During the past five years, China has made technological achievements, such as AI-enabled unmanned surface vessels, which Beijing plans to use to patrol and bolster its territorial claims in the South China Sea. In 2019, the private PRC-based company Ziyan UAV exhibited armed swarming drones that

it claimed use AI to perform autonomous guidance, target acquisition, and attack execution. There is no doubt that the Chinese Communist Party's intention is to extend their territory and thus their sovereignty in its own front yard. With China's new naval and air capabilities, a desire to rebalance regional power, stronger cooperation and a new posture of deterrence, the "so what for NATO" needs to be discussed amongst the usually inward looking international European community and more specifically, amongst NATO allies.

It was reported in June of 2020 that China had deployed a network of sensors and communications capabilities between Hainan Island and the Paracel Islands in the northern South China Sea. These capabilities which will significantly aid in the exploration and control of the maritime environment are part of a "Blue Ocean Information Network" developed by China Electronics Technology Group Corporation (CETC), a Chinese state-owned company. The network constructed in the northern South China Sea between early 2016 and 2019 is referred to as a demonstration system. However, future plans for the Blue Ocean Information Network involve expanding the sensor and communications network to the rest of the South China Sea, the East China Sea, and other ocean areas far from Chinese territory. Environmental data, especially detailed, persistent hydrographic data, will allow the PLA-N to better understand how active and passive sonar systems will operate in underwater environments.

Subi Reef - courtesy of Digital Globe, Google

Both the floating and fixed platforms are intended to host several different sensors and act as a communications conduit for the information that they collect. The floating platform's communications functionality and some of its sensing capabilities are housed within the radome on its upper deck. Communications capabilities outlined include a Ku-band satellite antenna, an L-band satellite antenna, radio antenna, and cellular communications antenna. Sensing systems include an Automatic Dependent Surveillance Broadcast (ADS-B) antenna and an Automatic Identification System (AIS) antenna as well as a small air- and surface-search radar. Based on open source intelligence, the fixed platforms possess additional capabilities that their floating counterparts do not.

The rebalancing of power between the three big competitors, Russia, China, and the United States, requires a very systematic and focused analysis with a filter on the resultant implications for NATO's European forces. CJOS COE's 2021 Programme of Work will examine this "China and the implications for NATO" dynamic as we assist the Maritime Theater Component Commander, Joint Force Commanders and individual Alliance nations. We aim to contribute to efforts in protecting our combat critical information, conducting maritime operations in a D2C2 environment, increasing our logistical resilience and enhancing the interoperability of our maritime and amphibious forces as we continue to enhance NATO's ability to stay ahead of peer-adversary capabilities.

[1] Congressional Research Service Report, China Naval Modernization: Implications for U.S. Navy Capabilities—Background and Issues for Congress. April 20
[2] https://www.stripes.com/news/pacific/esper-lays-out-us-efforts-against-chinese-threats-during-speech-in-honolulu-1.642783
[3] https://towardfreedom.org/global-news-and-analysis-global-news-and-analysis/the-pentagon-is-planning-a-three-front-long-war-against-china-and-russia/
[4] Ibid
[5] Ibid
[6] https://www.cnbc.com/2020/04/14/china-advances-claims-in-south-china-sea-despite-coronavirus-pandemic.html
[7] https://www.defenseone.com/threats/2020/09/china-rapidly-increasing-nuclear-naval-and-next-gen-tech-pentagon-warns/168166/
[8] https://amti.csis.org/exploring-chinas-unmanned-ocean-network/
[9] Ibid

> **"** All the business of war, and indeed all the business of life, is to endeavour to find out what you don't know by what you do.
> *- Arthur Wellesley, 1st Duke of Wellington* **"**

CAPTAIN (N) TODD BONNAR, MSC, RCN

OPTIONS FOR NATO'S SPACE BASED ISR

It is hard to get past headlines painting the portrait of a world besieged physically and economically by a medical crisis on a global scale and a nation that has turned the national spotlight onto the fundamentals of its constitutional democracy, including the persistence of racism, the right to protest and the character of local and national security forces in the United States. Lost in this mass media reporting is a story worth a more detailed examination for it may portend a revolutionary change for modern naval warfare – advancing NATO's maritime situational awareness and understanding resiliency through commercially available space-based assets.

On Saturday, May 30, 2020, SpaceX's Crew Dragon spacecraft carried NASA astronauts Doug Hurley and Bob Behnken into orbit for a rendezvous with the International Space Station. Of national significance was the fact that the Crew Dragon launched astronauts from U.S. soil for the first time since the last Shuttle flight in 2011. The real point to note, however, is that the SpaceX Crew Dragon spacecraft is the first to be designed, built and launched to space by a private entity. That is an accomplishment only three nations — the U.S., Russia and China — have achieved previously. "A private company has just achieved a feat that heretofore has only been achieved by nation-states." As CNBC reported it, "The launch unlocks the possibility of a new era of sustained, private, commercial activity in space."

A very natural extension of the significance of CNBC's statement is to ask "what impact will commercialization have on space-based military applications such as Intelligence, Surveillance, Reconnaissance (ISR)". A celestial vantage point, as the ultimate high ground for overwatch, offers significant potential for satisfying a fundamental tenet of naval warfare - Maritime Situational Awareness (MSA). Having a clear picture and access to timely, relevant information is essential as it enables the early identification of potential threats and enhances appropriate responses. Information superiority through high quality MSA enables naval

warfare commanders at all levels – tactical through strategic – to get inside their adversaries' OODA Loop.

When naval warfare operators think of ISR, for many, minds are often immediately drawn to modern day, advanced technological capabilities – low orbit earth observation or military communications satellites rapidly passing large data sets which ultimately result in operational outputs such as coordinated surface and subsurface TLAM strikes on shore based targets or providing high resolution imagery to assist with ship and submarine movements. In reality, it is actually a system of systems that make up the space based ISR toolbox.

It is undeniable that NATO's joint maritime operations rely on space support provided by satellites, such as Satellite Communications (SatCom), Position, Navigation and Timing (PNT), and Intelligence, Surveillance and Reconnaissance (ISR), as critical mission enablers. The services of ISR systems, in particular, have become more and more essential to NATO's decision-making and planning processes as the Alliance continues to project deterrence based on strength, readiness and speed of response with our Command and Control.

Some defense planners envision a future battlefield in which the ground is crawling with robots and the skies are darkened by drones. Swarms of unmanned systems would dominate in the battle for an ISR advantage. In reality, the issue of quantity versus quality when it comes to next-generation ISR is yet to be resolved. This is particularly the case in contested environments where targets are mobile or hidden, defenses have proliferated, a drone's guidance systems can be jammed and networks compromised. In such a world, more sophisticated platforms deploying multiple sensors of greater range and acuity and carrying defensive and even offensive capabilities may make more sense.

It is widely agreed that as civilization entered the "Age of Information," but a couple of decades ago, militaries have seen ISR capabilities expanding in the air, land, maritime, space and cyberspace domains, across what has been called 'today's knowledge-based environment.' Although one could of course, easily argue that acting on knowledge is absolutely nothing new, it is also just as easy to argue that the complexity and the

sheer volume of data and information management that indeed makes this the 'Age of Information". Thus, we now find the 'knowledge-based environment' in which today's modern navies must operate.

If NATO is to succeed in the race to master this "knowledge-based environment", it has to optimize maritime ISR in the Alliance, and in turn, is compelled to consider the range of options available and add more tools to the ISR toolbox including resiliency through commercial applications. In terms of force requirements, NATO will continue to ask the member states to strengthen their high-end capabilities quantitatively and qualitatively as well as to invest in cyber security and key enablers such as intelligence and reconnaissance, networked C4I, etc. In a post COVID economy, this will be very difficult to accomplish with military acquisitions competing with much required social and economic impetus projects. Thus, NATO's nations absolutely need to look at more cost-effective options and models for acquisition and implementation.

CJOS COE has played a key role in the ongoing development of the NATO Maritime Enterprise's road map for a updated Command & Control structure, adapted to a rapidly changing future maritime security environment.

WARRANT OFFICER STEPHEN SCOTT
ROYAL MARINES

KEEPING WARFARE DOWN TO EARTH – CAN WE STILL OPERATE IN A SATELLITE DENIED ENVIRONMENT?

Satellite technology including GPS, has now become in many instances, the primary means of communication and navigation for much of the world's militaries. But how reliant are we now on this technology? How vulnerable is it and what would be the impact of a major loss? Importantly, are we doing enough to mitigate the risk posed or would a sudden unprovoked attack or natural disaster be checkmate for our adversaries?

On Dec 20 2020, the US Space Force (USSF) was established[1]. The USSF mission is to be "*a military service that organizes, trains, and equips space forces in order to protect U.S. and allied interests in space and to provide space capabilities to the joint force. USSF responsibilities include developing military space professionals, acquiring military space systems, maturing the military doctrine for space power, and organizing space forces to present to our Combatant Commands.*"

Earlier in 2020, both the UK and the US had accused Russia[2] of launching satellite-based weaponry capable of attacks to vital communication. AVM Harvey Smyth (Director Space UK MoD) said "*Actions of this*

kind threaten the peaceful use of space and risk causing debris that could pose a threat to satellites and the space systems on which the world depends. We call on Russia to avoid any further such testing.*"

In Oct of 1955, the US Air Force Ballistic Missile Division whose primary role was the development of strategic missiles, was given the task of creating the first Military Satellite system[3]. The original purpose of the programme was to develop the technology to detect missiles and conduct reconnaissance. This has progressed greatly with satellite capabilities being used as vital communications for both deployed platforms and static operating bases throughout the globe. However, it is the military use of satellites for navigation that has tipped the balance to making us dangerously reliant on the technology. GPS and the timing system gained from GPS is a key component of accurate placement of platforms and guided missiles as well as multiple software defined communication systems and encryption devices. The further we go towards global allied interoperability and a full vision of Network Enabled Capability (NEC), the more reliant on this type of technology we will be.

There are a number of different types of satellites. When a satellite is launched into space, they are generally placed into an orbit that is most suitable for the role they are to perform.

In basic terms these are generally in a Geostationary Earth Orbit (GEO) at approx. 36,000 Kms above the equator or Low Earth Orbit (LEO) at approx. 800 to 2000 Kms above the earth surface. There are other orbits but these two are the most common for military use. They both come with their own advantages and vulnerabilities. For example, a military GEO satellite, an example of this being the Airbus Defence and Space SKYNET Constellation, will generally have a robust level of protection and due to its distance from the earth will be less vulnerable to some of the types of attack mentioned later. However, these types of satellites are prohibitively expensive and complex to readily replace in the event of a failure. In contrast to this, the typical LEO spacecraft, a recent example being the SPACEX Starlink launched by Elon Musk with their closer proximity to the earth and lack of hardened capability, make them more vulnerable to attack. However, these are comparatively cheap to build and launch and due to the nature and availability of viable spacecraft will likely be able to be replaced quickly.

Vast amounts of investment are made to ensure that satellites are as reliable as possible before they are launched as clearly once they are in orbit there is little that can be done in the way of physical repairs. The inability to access satellite technology is a reality for both the commercial and military worlds. Reasons for this could be as simple as non-availability of required military SATCOM due to security or budgetary constraints or basic technical faults. The technical fault don't necessarily need to be on the spacecraft themselves; there are multiple areas that can fail from power on the ships to issues at the satellite ground stations. This is aside from basic human error and a lack of available trained personnel. As the availability becomes greater, which is driving down the cost of access, and use of all types of Satcom becomes more prolific and entrenched as a vital military tool, there are other causes to consider.

As stated in the introduction, there is an ongoing race to control the latest space technology. The 1967 Outerspace Treaty Article IV prohibits the placing of any object carrying nuclear weapons or WMDs from orbiting the earth[4]; there is no ban on air, ground or conventional space based anti-satellite weapons. Many nations continue to develop this type of weaponry to give themselves an edge and there are non state actors with an ever growing arsenal of possibilities. Common and most widespread examples of this are HEMP, ASAT and DEW.

HEMP. High Altitude Electro Magnetic Pulse.
This is the effect generated by a nuclear weapon detonated exo-atmospherically, at an altitude of 30-400 km. Where there is a large emphasis on the use of an intercontinental missile attack carrying a nuclear payload, the potential impact of an EMP attack is often overlooked. The effect of an EMP blast from a satellite would be almost undetectable due to the lack of an entry vehicle; a weather balloon with a sufficient payload capability would work. This would not only have a catastrophic effect on the orbiting satellites, but it is estimated that a HEMP instance over the continental US could shut down the US power grid for an indefinite period.[5]

Anti-Satellite Missiles (ASAT) and Direct Energy Weapons (DEW).
There are various ground and space-based weapons already developed that are a significant threat[6]. As far back as 2007, using a ground launched ASAT, China destroyed one of its defunct weather satellites more than 500 Miles above the earth.[7] The US, as well as its adversaries, are developing more powerful DEW.[8] These are generally either reversible or irreversible weapons. An example of a reversible would be the US owned Harris L3 Counter Communications System that can block a satellites transmission but can return full operational capability after. Irreversible would likely be space mounted or a ground mounted laser and utilise directed energy to destroy the satellite's circuitry[9].

Satellites are effectively vehicles made of lightweight materials, circuitry, fuel cells and RF transponders. They are designed to sit undisturbed in a vacuum and although there is a degree of robustness built into them, the area surrounding them is vast. They are vulnerable to natural elements and unplanned events as well as the geography and location of the requirement.

Solar[10].
Coronal Mass Ejections (CME) are the large expulsions of plasma and magnetic fields from the Sun's Corona. They can eject billions of tons of

coronal material and magnetic fields at speeds ranging from 250 to 3000 Kms per Sec. A good example of this was in 1989 when Quebec suffered a nine hour blackout due to CME[11]. This also caused the total loss of control of several satellites and over 250 other spacecraft anomalies. In addition to CME there are other solar phenomena such as Solar Storms that are able to increase the charged plasma in the ionosphere and dramatically affect the accuracy of the ground receiver or lose it entirely.

Congestion and Space Junk. Since the first space launch in 1957, the number of items orbiting the earth has grown at an incredible rate. Most recently in 2018, Elon Musk's SpaceX launched the first of its Starlink constellation. The US Federal Communication Commission (FCC) has granted SpaceX the authority to fly 12,000 satellites with future plans to increase this up to potentially 30,000. To put this into context, at the start of 2020 there were about 2,000 artificial satellites in the earth's orbit and there have only ever been around 9869 items ever launched.[12] Large numbers of the total items launched into space remains in the earth's orbit. This includes discarded satellites and launch vehicles post separation as well as flecks of paint and other parts of broken spacecraft. It is estimated that there are in excess of half a million objects currently orbiting the earth.

Why congestion and space junk is a problem. In physics Newton's Second Law of Motions states that Force (F) = mass(m) x acceleration(a). In practical terms this means that an object the size of a small bolt travelling at 17,500 Mph will hit with the force of a 250Kg object travelling at 60 Mph. To compound this issue even further, we also need to take in to account the Kessler effect[13]. The Kessler effect is a situation where due to the density of Low Earth Orbiting objects, a collision between two could generate a domino of collisions due to the ever-multiplying items after every collision.

Geography. With an increase in activity and interest in the far North, the requirement for military grade satellite access has never been so relevant. Military SATCOMs offer a hardened and sovereign capability, making them generally a preferred choice for operations. However, due to the nature of the orbit of the GEO satellites, there is a level of degradation and gaps in coverage when operating above 70 Deg North. There are other constraints to take into account as well when operating at these latitudes. One notable constraint is the angle that the satellite receiver will need to be placed at in order to still be able to point towards the Equator, imposes heavy limitations on the areas that they will function. An example of this would be operating in the mountainous north of Norway, where careful consideration needs to be made in order not to block the view of the satellite from the ground. Even on a moving platform, ships regularly experience the effects of 'wooding' particularly in the polar regions where the ship's structure acts to block the satellite signal.

There are a number of ways that we can continue to operate in the event of satellite denial. However, like any other area of operations this needs to be planned and practiced at available opportunities with regular frequency. The only way to be proficient without satellite availability, is not to expect availability. Here

are some of the ways this is currently being addressed.

At the basic level, navies continue to teach recruits basic skills of navigation, for example, using a sextant; HF is still a widely used alternate to a loss of satellite provided voice and data. This needs to not only be taught, but as perishable skills they need to be exercised regularly. This will always be required in the event of no other option being available, although this will heavily impact the speed and data richness of the operational environment.

The satellites provided are equipped with varying degrees of resilience as part of their assured services. This ranges from availability of the transponders on the spacecraft to mirrored ground terminals. However, with many of the spacecraft the demand is very close to and in some case out stripping the supply. Should access be lost on one channel, it may come down to prioritisation whether you have access on another. In addition to this, the responses that are required by the user to remain on the satellite in the event of failures, still need to be practiced. Some of the responses to stress, although assured by the satellite providers, will in themselves cause such degradation to the services that it renders them as effective only for emergencies.

Emerging BLOS technologies

Surrogate Satellite. This is a pragmatic approach to the issues that sees us using similar principles to satellite technology but within the earth's atmosphere. The obvious limitation to this is that it will not allow for the same ranges as extra-terrestrial craft; however, it does offer more control over placement. Some current range extending capabilities include:

Helikite[14] (Aerostat tethered helium kites).
The helikite can be rapidly deployed from land or a platform of opportunity to increase the range of ground-based communications. In principle, the kite flown at 3000 ft can offer 80 Miles omnidirectional Line of Sight (LoS) meaning over 20,000 sq. miles of coverage. When used in conjunction with other technologies this can be a highly effective tool, particularly in the tactical environment.

Unmanned Aerial Systems.
This is another area that is experiencing rapid interest and growth. There are various UAS widely in use by various countries. These have operational applications at both the tactical and strategic environments. One example of this is the MQ-4C Triton. This is a High Altitude Long-Endurance (HALE) UAS developed by Northrop Grumman for the US Navy. As well as ISR and SIGINT, this can act as a communication relay platform and can fly nonstop for 24 hours at an altitude up to 56,500ft. Currently under development is the Airbus Defence and Space Zephyr programme.[15] This will enable flight at 70,000ft for months at a time through to its use of solar energy. It is estimated by the manufacturers that a Zephyr UAS deployed can offer the same coverage as 250 Cell Towers.

Wide Band High Frequency (WB HF).
For many militaries', HF provides a reliable backbone communication method. HF, when operated correctly, offers huge ranges with only a small amount of relatively cheap equipment. In addition, you are reliant on other platforms to relay as you are with pseudo satellite technologies. The major drawback with HF, other than that it can be affected by various climatic conditions, is that HF can traditionally only achieve narrow bandwidths and so is not suited to large data transfers. WB HF seeks to address this and using Wide Automatic Link Establishment (WALE) technology, WBHF has achieved speeds up to 240Kbps.[16]

Mobile Ad hoc Networks (MANET).
Although not strictly a Beyond LoS capability, many of the emerging tactical RF capabilities that are being explored fall under this category. One of the key components of MANET is that is creates a self-forming

and self-healing network. What this means is that you can overcoming constraints over distance and terrain and should one platform lose connectivity, the network will automatically try to route another way. With the radios on these networks also being software defined, technically, with preplanning, you can utilise other satellite and non-satellite bearers as well. This opens up many possibilities for how to ensure C2 for deployed troops, especially in more communications austere environments.

Tropospheric Scatter. This is a radio technology that has been around since the 1950s but was largely never adopted by the military as a main solution due to the emergence of satellite technologies and the impracticalities of the large size weight and power requirements, although it has remained in service[17]. This has continued to be used globally by civilian networks. In recent years there has been a re-emergence of interest in this capability. The bearer size and power requirement have been significantly reduced with relatively large amounts of available bandwidth.

Meteor Burst Communications – Another less conventional method of achieving BLOS communications that is being investigated is Meteor Burst Communications (MBC)[18]. Discovered in the 1930s and first used by the military in the 1960s, this works by using the ionised trails of meteors that have burned up in the earth's atmosphere to bounce radio waves large distances. There have been several attempts to capitalise on this technology most notably by the USMC in the 1990s[19].   This offers interesting possibilities particularly for its low probability of intercept; however, it can prove unreliable and only suitable currently at very low data rates.

As the Information Age presses on, we become ever more hungry and expectant of plentiful and accurate information immediately at the touch of a button. Industry is seeing this and satisfying this need. Within the next few years it will be possible to get fibre speeds to every individual on the planet using the emerging satellite constellations. As professional militaries we cannot afford to ignore this and need to capitalise on technology to give us an advantage over our adversaries. Ironically, in order for this technology to benefit us, we need to plan and train for not having it

or it will be used as a weapon against us. Every major exercise and planning phase needs to include operations in a satellite denied environment for all capabilities.

As users it is vital for us to address these points to redefine our tactics and procedures. 'Days without space' needs to be a key feature in the training objectives of all minor and major exercises. Use of other methods of communication, in particular HF, need to go from an alternate to a primary method. This will keep the operators current and mitigate the risk to operational capability especially when there is a requirement for interoperability between nations. Satellite alternates and international reinvestment of a global HF network infrastructure is a solution that we can strive toward. However, this will still be ineffective without addressing the requirements for basic training and the application of the basic principles of communication network PACE[20] planning.

Fast, effective and accurate information can make the difference in the modern information warfare battlefield. But we can't forget there is a fine line between 'a cutting edge' and a 'cliff edge'.

[1] https://www.spaceforce.mil/About-Us/About-Space-Force/
[2] https://www.theguardian.com/world/2020/jul/23/britain-us-accuse-russia-launching-weapon-space-satellite-threat
[3] http://www.milsatmagazine.com/story.php?number=1811044549
https://2009-2017.state.gov/t/isn/5181.htm
[4] https://www.centerforsecuritypolicy.org/2019/03/11/north-koreas-satellites-could-unleash-electromagnetic-pulse-attack/
[5] https://media.defense.gov/2019/Jan/16/2002080386/-1/-1/1/190115-F-NV711-0002.PDF
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[11] figures from
[12] http://www.unoosa.org/oosa/osoindex/search-ng.jspx?lf_id=
[13] Also known as the Kessler Syndrome
[14] https://www.helikites.com/communications
[15] https://www.airbus.com/defence/uav/zephyr.html#introduction
[16] https://www.afcea.org/content/wideband-steps-fill-gap
[17] https://www.marines.mil/News/News-Display/Article/1169154/the-antrc-170-continues-to-stay-reliable-for-the-corps/#:~:text=The%20%20Tropospheric%20sister%20Microwave%20video%20%20Terminal%2C%20or%20the,that%20transports%20data%20from%20one%20position%20to%20another
[18] https://web.archive.org/web/20060317192509/http://www.meteorcomm.com/technologies/tech_burst.aspx
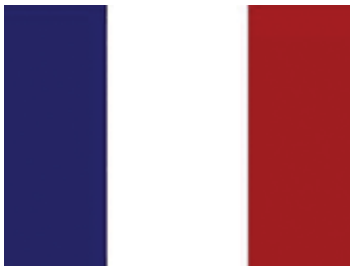[19] https://www.globalsecurity.org/space/library/report/1990/JJP.htm
[20] PACE – Primary, Alternate, Contingency, Emergency.

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SEA CONTROL AND A2AD

The United States has steadily increased the strength of the U.S. Navy since Alfred Thayer Mahan published "The Influence of Sea Power upon History" in the 19th Century. Since then, it has been an efficient tool of America's foreign policy, effectively wielding the big stick anywhere on the globe's surface, making it a modern thalassocracy. After the defeat of Japan in 1945 (another proponent of Mahan's sea power theories), the U.S. Navy has been ruling the seas just as the English Fleet did in the late 18th Century after the Seven Years War and throughout the 19th Century.

Since the end of World War II, Russia and more recently, China, have become the two major competing powers that the United States has faced who have pursued a strategic policy which aims to constrain U.S. influence around the world. From the collapse of the USSR in 1991 until the end of the last century, there was a brief interlude where the ability of U.S. Navy to project power without meaningful risk to personnel and material went unchallenged. Over the last two decades, however, a resurgent Russia and a rising China have been developing Anti Access/ Area Denial (A2/AD) capabilities with the intent to hinder, or even arguably, counter U.S. hegemony.

As defined in a report to Congress on Precision-Guided Weapons, an anti-access system ("A2") is "capabilities associated with denying access to major fixed-point targets, especially large forward bases." An area denial ("AD") system is defined as "capabilities that threaten mobile targets over an area of operations, principally maritime forces, to include those beyond the littorals." With the development of significant A2/AD capabilities by NATO and the U.S.' competitors, the latitude available for U.S. forces to operate without risk on the globe is at stake.

Thus, the United States Navy has a challenging task maintaining freedom of navigation to operate on the high seas and use international waters as it sees fit for strategic sea control, power projection, and the preservation of tactical strike options.

A nation extending its sea power on the high seas relies heavily on one key pillar: the inability of any other nation to lawfully claim sovereignty or exercise jurisdiction over international waters to the exclusion of others. Enshrined in international law, the United Nations Convention on the Law of the Seas (UNCLOS) preserves the rights of all countries to freely navigate and overfly all areas where the convention prohibits the expansion and exercise of national interests. Should another nation state or non-state actor contest or compete to any degree, with the rights of the United States to maneuver as it wishes on the high seas, the

ability of the U.S. to exercise its rights, especially its freedom to maneuver and the protection of its interests abroad, is potentially impacted negatively; both its hard and soft power may be correspondingly weakened.

At first glance, Moscow and Beijing appear to share the same strategy in seeking to exploit both the cyber and space domains to their advantage, as well as developing highly robust A2/AD capabilities. Both nations continue to demonstrate their ability to use space-based systems, leading to a space based arms race. In the cyber domain, they have demonstrated time and again that they are very comfortable operating within the "gray zone", trying to achieve "cyberspace superiority" through the use of non-attributable offensive cyber operations.

On the ground, the two countries are building forceful A2/AD capabilities all along their periphery with particular dense networks of air surveillance and weapons systems in key areas. For instance, Kaliningrad Oblast (a strategic exclave of Russia on the Baltic Sea wedged between two NATO member states) and the Crimea (that Russia illegally annexed from the Ukraine in 2014) has focused the U.S. And NATO's attention on Russia's hardening of its positions on the doorsteps of Western Europe. For its part, China has concentrated its efforts in the East and South China Sea, through a continued militarization of its first island chain.

Since the mid 1990s, Russia has been committed to the development of hypersonic weapons. Program advancements have accelerated in recent years in response to U.S. missile defense deployments in both the United States and Europe, and in response to the U.S. withdrawal from the Anti-Ballistic Missile Treaty in 2001.[1] With highly publicized achievements the domain of hypersonic weapons, Russia and China have taken a step forward, achieving impressive results in the development of next generation weaponry apparently able to, at least theoretically, contest the U.S. Navy's freedom of maneuver.

As a new capability able to deter or hinder any U.S. military intervention in peer competitor peripheries, one cannot deny major technical breakthroughs have likely occurred. But, one could raise the question of the efficiency of such weapons. With the development of "wonder weapons" like the hypersonic glide vehicle, the notion of range seems outmoded. Except for highly advertised or even potentially staged tests and trials, most of these capabilities have never been used in operational environment.

In March 2018, in his annual state of the nation speech, Russian President Vladimir Putin unveiled new Russian strategic weapons as a strategic tool to ensure Russian strategic forces can penetrate future U.S. air and missile defenses. Russia seeks to exploit its new military capabilities on the political scene in an attempt to re-emerge as a great power competitor and further agitate the debate of a new multi-polar world model.

The threat level has unquestionably increased for the NATO and the U.S. Navy in some more contested waters, but is it really something new? Referring to the use of the word "denial", the former CNO, Adm. John Richardson added, "it is too often taken as a fait accompli when in fact it really describes an aspiration. The reality is far more complex."[2] Thus an examination of what exactly the United States and NATO is facing in terms of Anti-Access and Area Denial is required.

An anti-access system deters, prevent or denies enemy forces access to a local area through a combination of dense air surveillance, command and control networks and surface to air weapons. Employment of such systems

Russian Kinzhal hypersonic missile mounted under belly of Russian Air Force Mig-31K

weakens the ability to project air power from above enemy territories by means of fighter/bomber or cruise missiles. Even though surface to air defense weapons systems are only a part of the kill-chain equation, anti-air weapons are the most visible part of the capability and drives most of its assessed credibility.

The development of a new generation of anti-air weapons systems started during the Cold War in the Soviet Union era, well before the acronym A2/AD became a over-used buzzword. In the modern era, the Russian's venerable S-300 air defense missile family is the cornerstone of anti-access systems in use by both Russia and China.

Russia has developed a renowned and effective family of air defense systems. The S-300 (NATO name SA-10 Grumble), includes a combination volume search air radar system and surface to air missiles. Multiple land-based, ship-based or export versions are currently in service. The S-300 PMU (NATO name SA-20 Gargoyle) is the most capable version with a range exceeding 190 km when using the latest variation of the missile body.

The S-400 Triumph (NATO name SA-21 Growler) is now the most advanced version of the family with a claimed increased range up to 400 km. In service in the Russian army since 2007, the system has been sold to export customers such as India and Turkey. The radar as advertised, can detect and track targets within the distance of 600km and can simultaneously track up to 300 targets. The U.S. strike on Syria on April 7th 2017 calls into question the limit of anti-access capabilities and in particular the effectiveness of S-400 in a real theater of operations.

In retaliation for a chemical attack on Syrian civilians, the USN launched a salvo of 59 cruise missiles from by USS ROSS and PORTER on the Syrian Shayrat Airfield. The airfield was used by Syrian forces to store chemical weapons. At that time S-400 air-defense systems were deployed at a Russian air base at Latakia and its naval base at Tartus, 75 km away. Although Shayrat Airfield was, in theory, under the umbrella of Tartus's system, the battery remained still and US missiles struck their target. Aside from the question of the willingness of Russian forces to intervene, this potentially challenges the true effective range from the advertised.

The Avangard is a hypersonic glide vehicle (HGV) launched from a ballistic missile carrying a nuclear or conventional warhead, alleged to fly at Mach 20 in the atmosphere and with a range of 6000 km. Initial development started in the mid-1990s and since then, more than a dozen test firings have occurred. Russian sources have reported that the weapon system has been operational in the Russian Army since December 2019, although not confirmed in open source reporting.

The Kh-47M2 Kinzhal is an air launched ballistic missile capable of attacking fixed and movable targets such as aircraft carriers. It can carry both conventional and nuclear warheads, has a claimed range of more than 2,000 km, a speed of more than Mach 10, and the ability to perform evasive maneuvers at every stage of flight. The missile has been operational since 2017 from the MIG 31 platform.

The 3M22 Zirkon (NATO codename SS-N-33) is a ship launched (submarines and surface ships) scramjet cruise missile flying at speeds of between Mach 6 and Mach 8 with a range of 1000 km. After a successful first test launched on a target ashore from RFS Admiral Gorshkov frigate at the beginning of 2020, a second test launched occurred on a target at sea on October 2020, indicating a forthcoming operational capability.

China has developed the Hong Qi (HQ) family of air defense missiles based on the Russian S-300 weapon system, which were purchased from Russia at the beginning of the 1990s. Produced organically through reverse engineering and undergoing a constant upgrading regime, since then the HQ missiles have been the backbone of the Chinese air defense system. The first version, the Hong Qi-9 (HQ-9) is similar to the Russian S300 PMU. Debuting as a land-based weapon system offering a range of 200 km, the HQ-9 has now been adapted to a naval variant for the PLA-N. Newer versions with more advanced performance such as the HQ-15, the Chinese version of the S-400, and the HQ-18 have entered service and are currently replacing the older HQ-9.

It is believed that China shares Russia's concerns regarding increasingly sophisticated U.S. missile defense,

and the potential inability to counter a preemptive attack. Chinese weapons programs demonstrate similarities with Russia's, particularly concerning the HGV mounted on ballistic missiles like the DONG FENG DF-17, a medium-range ballistic missile, or the DF-41 an intercontinental ballistic missile, capable of carrying a conventional or nuclear payload.

The DF-ZF is a HGV that has been allegedly operational since 2019. Usually but not exclusively associated with the DF 17 ballistic missile, it offers a range of 2000 km at speeds between Mach 5 and Mach 10 and capable of extreme maneuver during flight. Analysts report that its primary mission could be to perform conventional precision strike against U.S. CVNs and Carrier Strike Groups by acting as an anti-ship ballistic missile.

In addition, China is currently developing the Starry Sky-2 (or Xingkong-2) a hypersonic cruise missile that makes use of "wave rider" technology (riding on the shock waves it generates). The hypersonic vehicle is mounted on a rocket before separation like an HGV however, unlike a HGV, the missile flies at a slightly lower speed (up to Mach 6), at a relatively low altitude, but with a more unpredictable flight path. The system could be operational by 2025.[3]

The DF- 21 (NATO reporting name CSS-5) is a medium-range ballistic missile that entered service in 1991. The DF-21D is an evolution of the former DF-21 and was designed as an anti-ship ballistic missile with a range of 1500 km and a conventional warhead. The land-based missile releases a maneuverable terminal re-entry vehicle to hit its target. A single missile is capable of disabling an aircraft carrier with the hypersonic kinetic energy of the reentry vehicle. This capability has been assumed to be operational since 2010. The DF-26 is an intermediate-range ballistic missile with a range of 4000 km and is capable of carrying a conventional or nuclear warhead. There is speculation that it could carry a HGV much like the DF-17 and DF-41.

For anti-access purposes, surface to air missiles are only one piece of a complex integrated air defense system alongside with early warning radars, AEW aircrafts, point defenses and a robust and effective C2 chain of command. Density and mutually supporting networks (radar sites and SAM batteries) is key to avoid any gaps in the air coverage.

The threat has changed since the cold war, with the development of modern day hypersonic weapons, especially HGV, the speed of which is highly challenging to defend against, leaving in theory only a handful of seconds to react. However, as mentioned previously most of them are launched by ballistic missiles. For decades U.S. forces are building and upgrading robust and operational Ballistic Missile Defense (BMD) capabilities. The launching of a ballistic missile would be detected promptly by satellites triggering an early warning, thus providing at least a couple of minutes to react. Destroyers or cruisers fitted with the "AEGIS" BMD system, permanently deployed at sea, would be able to engage either the ballistic missile or the terminal vehicle with a wide combination of missiles from SM-3 to SM-6.

In technical terms, both China and Russia have had impressive outcomes during tests and trials, but no proof of a genuine operational capability has been detected thus far. Objects flying at hypersonic speeds must overcome significant technical challenges such as maneuverability, connectivity and updated targeting data to ensure accuracy. At the time of writing, there has not been a demonstration of such capabilities by Russia or China on a maneuvering target at sea. It appears that these "wonder weapons" are at least, at the moment, primarily a way to back a political narrative.

The proliferation of A2/AD systems is a way for two near peer competitors mentioned in the National Defense Strategy, China and Russia, to contest the ability of the USN to maintain freedom of maneuver, as enshrined in UNCLOS, as a means to project power. As some within the US Naval leadership have said, "we need to demystify the A2/AD buzz that doesn't reflect reality or consider the varying complexities in different theaters of operations and the different rationales of U.S. competitors."[4]

[1] https://fas.org/nuke/control/abmt/news/uswithdraw121301.html
[2] https://news.usni.org/2016/10/03/cno-richardson-navy-shelving-a2ad-acronym
[3] https://www.scmp.com/news/china/diplomacy-defence/article/2158524/chinas-hypersonic-aircraft-starry-sky-2-could-be-used
[4] https://warontherocks.com/2017/01/demystifying-the-a2ad-buzz/

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CYBERSECURITY INTEROPERABILITY AND SEA CONTROL

The maritime domain is one of constant change, affected by large-scale technological and economic developments. One of these developments has been the increased importance of the cyber domain to warfare and its impact on other domains. Thus, cybersecurity and interoperability have become essential components in maintaining allied sea control.

The global maritime balance of power has shifted from one in which the U.S. Navy had uncontested command of the sea to one in which regional powers are contesting U.S. dominance.[1] Influential regional actors, such as Russia and China, are using Anti-Access/Area-Denial (A2/AD) capabilities to threaten or hinder the ideal of freedom of navigation.

Sea control may be defined in different manners. First, sea control may be viewed as "the condition that exists when one has freedom of action within an area of the sea for one's purposes for a period of time in the subsurface, surface and above-water environments."[2] Another definition is the "secure use of the maritime domain by one's own forces and to prevent its use by the enemy." There is often a difference between a nation's sea control capabilities and its desired outcomes in the maritime domain.

Naval forces perform many essential sea control functions within the maritime domain across the spectrum of peacetime through to open warfare. Peacetime sea control operations include maritime security objectives ranging from protecting shipping, embargoes against economic or military transport, and maritime interception operations.

In conflict, sea control may include the destruction of enemy naval forces, suppression of enemy sea commerce, the protection of one's own vital sea lanes, and the establishment of local air and naval superiority in the area of friendly naval operations. Additionally, naval forces could be employed in other maritime operations to locate, classify, track, and target surface vessels, submarines, and aircraft.

The world's oceans are vast, and as previously mentioned, there are an increasing number of areas being contested by regional powers. These present a significant challenge to NATO's and her Allies' ability to maintain sea control and freedom of the seas. The scale of the maritime space, the duration of a maritime operation, and the opposing forces' size determine the forces necessary to maintain sea control.[3] Maintaining sea control and freedom of the seas in the modern era will undoubtedly require joint and combined operations.

No matter the maritime operation or mission, interoperability is necessary for forces to cooperate and collaborate. A joint operation between services from the same nation requires different services to be able to cooperate. Each separate service is likely to have systems and programs optimized for warfare within its specific domain and to meets its specific needs (whether operational, budgetary, or other), making the goal of interoperability between different services of the same nation a significant challenge.

An even more complex challenge is interoperability within an alliance or coalition since each nation develops capabilities within the various warfare domains differently. At the Warsaw Summit of 2016, Allied Heads of State recognized cyberspace as a warfare domain in which NATO must defend itself as effectively as it does in the land, sea, and air.[4] Interoperability is an even more significant challenge within the new domain of cyberspace. Operating effectively within the cyber domain will require development along several lines of effort. One of these lines of effort is that of cyber interoperability.

Cybersecurity interoperability is the simultaneous existence of organizational and technical interoperability. Organizational interoperability consists of implementing standard procedures, doctrines, and policies, while technical interoperability refers to physical interoperability, data standardization, and information interoperability. Both ultimately enable a common understanding of cybersecurity

and the operational status of forces concerning the operational impact of cyber threats on friendly forces' digital systems.

Different echelons of the command structure should be responsible for managing cybersecurity interoperability. In the naval domain, building technical interoperability should be the primary focus. Higher echelons with an alliance or coalition should focus on decisions relating to organizational interoperability.

Cybersecurity systems interoperability is the central aspect of technical interoperability. The primary purpose of discussing cybersecurity systems is to identify opportunities to increase technical interoperability. It is inappropriate to speak about technical interoperability without considering systems interoperability consisting of similar internal and external characteristics. Information syntax, storage, processing, and presentation are essential internal features that facilitate internal interoperability and personnel training. The ability to share information between systems is the most critical feature of interoperability.

A specific unit's command level impacts its need to share information and the necessary complexity of its cybersecurity systems. The higher the level of
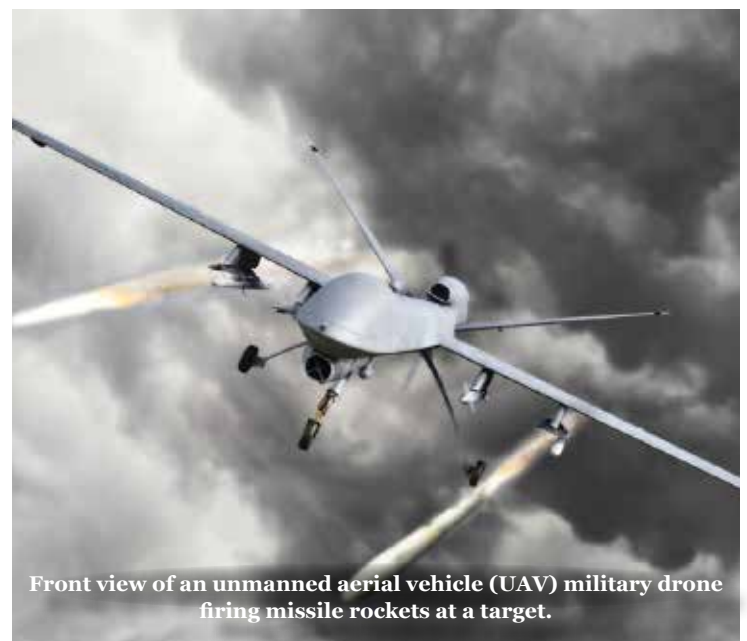
Front view of an unmanned aerial vehicle (UAV) military drone firing missile rockets at a target.

command, the more complex the systems it needs. The more complex an organization's role, the wider the diversity of cyber information sources it needs.

Cyber interoperability in the naval domain has the same characteristics. Each member nation has developed its organizations, systems, and standards for exchanging information under its operational offensive or defensive cyber needs and available technologies.

The variety of cyber threats requires the development of solutions dedicated to specific threats. Combatting these complex threats requires ongoing technological innovations. Stand-alone solutions developed by individual national organizations will often be incompatible with existing solutions on the market.

Cybersecurity systems describe various tools used by incident response teams to collect, manage, and analyze security information. There are many different cybersecurity tools on the market today that can address almost all kinds of cyber threats. According to industry analysts, organizations use 25 to 49 different security tools from up to 10 vendors on average, each generating siloed data.[5] Implementing different cyber products without an agreed-upon set of standards could negatively affect interoperability both at the national and allied levels.

Courtesy of https://www.qinetiq.com/en/news/qinetiq-leads-next-phase-of-unmanned-systems-exploitation

Integrating cybersecurity systems into the naval domain requires identifying interoperability opportunities between organizations (both national and allied). Achieving interoperability is a complex process given the operational realities and needs of different organizations.

Improving cyber interoperability requires consideration of specific aspects of the maritime domain. The most appropriate cyber systems that meet operational needs should be selected from existing cybersecurity solutions. Improving interoperability can also include modernizing existing tools by integrating existing solutions developed by different companies. Important considerations in selecting the most suitable cybersecurity solutions are:

• Improving the decision-making process when conducting naval operations requires all available information, including cybersecurity information. Cybersecurity information consists of cyber situational awareness, cyber threat intelligence, and operational cybersecurity information. Cyber situational awareness is related to the security status of naval forces systems. Cyber threat intelligence (CTI) is intelligence received by naval units and commands. Finally, operational cybersecurity information relates to the operational impact of cyber threats.

• Each entity operating in the naval domain is responsible for protecting its digital systems, leading to the development of different cybersecurity capabilities and standards for information dissemination produced by various suppliers.

• National assets transmit cybersecurity information to organizations within each nation. Different formats, policies, and lack of a common cyber information-sharing infrastructure hinder the pace of information exchange, processing, response, and command processes.

• An insufficient number of cybersecurity experts require automated solutions for protection, incident response, and information sharing. Implementing complex systems requires complex training and may complicate military staff reactions to cyber threats.

• Proper decision making requires situational awareness and knowledge of both friendly and opposing strengths and weaknesses. Information made available to designated commanders using different routes, times, and message formats may hinder timely assessment of each unit's operational status, affecting operational planning and conduct.

Mitigating cybersecurity limitations within the naval domain can be accomplished using automated systems for protection, incident response, and information sharing to support all types of operational decision-making processes. Automated systems are desirable for ships at sea or in remote areas due to limits on the number of cybersecurity personnel.

Functional and effective automated cybersecurity solutions require interoperability. Automated systems enable information sharing and collaboration between naval units, help mitigate advanced threats, and respond rapidly to cyber events. Interoperability is an essential element in ensuring the resilience of capabilities and mission success.

Besides technical features, a cybersecurity solution should offer additional functions that estimate the operational impact of different cyber threats on force readiness. The cybersecurity systems should share information with command and control systems to enhance information quality regarding unit readiness. A unit's operational cyber status information should be integrated into tactical message formats to improve situational awareness. They should provide information on the unit's ability to carry out its mission, the effect of any threats, including operational impacts on naval systems. Situational awareness allows the commander to understand the status of friendly forces, while threat intelligence allows an understanding of the enemy.[6] Naval operations require both situational awareness and threat intelligence.

Current and future naval operations using unmanned systems for sea control will require automated systems. They can automatically exchange information among naval entities and respond in real-time to limit cyber threat impacts while providing the force commander with situational awareness. Automated and unmanned systems will have to be integrated into current platforms and built into future systems.

Regardless of their decision support role, all future digital systems should be integrated to facilitate automatic information sharing (including cybersecurity information) and fusion to shorten the decision-making loop. Optimal engagement requires intelligence on the enemy and knowledge of friendly forces' ability to accomplish the mission. The force that knows itself and its enemy is more likely to be the victorious force.

[1] Talking about Sea Control, Robert C. Rubel, 2010, pag.2
[2] AAP-06, Edition 2019, page 114
[3] http://cimsec.org/the-nature-of-sea-control-and-sea-denial/37705
[4] https://www.nato.int/cps/en/natohq/topics_78170.htm
[5] https://opencybersecurityalliance.org/news/launch/
[6] https://www.splunk.com/en_us/form/the-siem-buyers-guide-for-2020.html

LIEUTENANT COMMANDER JAY HULS, USN

NATO'S NEED FOR A BIG DATA STRATEGY

President Barack Obama stated in his Nobel Peace Prize address in 2009 that "war, in one form or another, appeared with the first man."[1] Warfare is as old as mankind and continues to evolve at an ever-increasing pace. Think about the technological advances from the first recorded war in history in 2700 BCE[2] as humans have moved from sticks and stones, to iron weapons, to crossbows, to cannons in [as early as] the twelfth century CE[3]-this happened over centuries. Since 2001, there has been a shift from "dumb" munitions to laser-guided precision munitions or "smart" bombs-a span of less than twenty years! Today, warfare stands on the precipice of hypersonic conventional weapons and weaponized artificial intelligence which will revolutionize warfare: expanding stand-off distances, defense borders, and kill zones beyond economic exclusion zones and reducing the decision-making timeline to mere minutes. Artificial intelligence feeds off the data that is created at exponential rates by the numerous sensors available throughout the Alliance.

A data strategy[4] is required to harness the near-future weapons systems being developed, tested and even deployed now. By not providing a data strategy now, steps are skipped that will lead to larger consequences in the future. Data is a strategic asset with a subjective value that NATO's competitors will continue to interfere with. Now is the time to create the strategies that are needed to support future warfare.

The Alliance has come to the realization that the artificial intelligence (AI) revolution has great military potential. It has grabbed decision maker's imaginations; however, without a proper strategy, vision, and policies, AI will fail without the proper use of big data. AI can be seen as an equation that requires a learning algorithm and proper data sets from which the algorithm learns. Qualitative analysis shows that building one part more (or too quickly) without building the others creates an imbalance that may prevent AI from being fully utilized.

Building a data strategy that allows access, sharing, and accounts for protection of intellectual property and data is the only way to move forward before an AI policy is approved and can be productive. Think of big data as a sophisticated capability to collect, organize, control, and operationalize the vast amounts of extremely valuable data that already exists within the Alliance. Once data is created, it endures and has effects and influences on individuals, businesses, society, governments, etc. The need to set the stage for the proper exploitation of this data has been stated in countless documents and by key world leaders such as Russian President Vladimir Putin and Chinese President Xi Jinping. The goal for NATO should be to get data to key decision-makers at the

speed of relevance to compete and win at a level below armed conflict, and to do the same if armed conflict is the only answer.

A data strategy for the Alliance would provide the framework for exploiting data as the trend moves toward future warfare with artificial intelligence, autonomy, robotics, etc. A NATO Data Strategy should be addressed through the lens of who, what, where, when, why, and how. It must have clearly defined goals while balancing the old stand-by of "need to know" versus "dare to share". Education and training to strengthen the foundation of data collection and use, supported by open data and flanked by improved data capture and storage infrastructure with an overarching umbrella of access and security leads to a strong strategy to push NATO forward in the data battle.

there is to data, the more vulnerable data is to being manipulated in ways that alter its usability, forcing algorithms to function differently than desired. Cyber security helps with the where, who and how data can be accessed and protected. The approach to cyber security needs to move beyond old concepts based on prevention and protecting the perimeter. While both should be secure, the strategic focus needs to shift from the network being the unit of protection to data being the unit of protection.[5] Since sharing, interoperability and securing privacy when required are at the core of designing a data strategy, technical standards matter. Following policy and procedure, like the STANAGs already in place, need to be a priority.

Data is not consistently managed as a strategic asset and lacks a proper strategy. Data value exists and

For big data to be plausible, the idea of open data must be discussed. The two are not only interrelated, they are interlocked. Without open, usable data, big data just becomes data. Ultimately, a transformational impact at all levels is the goal. The democratization of knowledge through open data flattens the hierarchy by disseminating information more evenly, allowing those at the bottom to have the same information as higher-tier decision makers and allowing for better decision making at the tactical edge. Data exchange will require authenticated access for security and privacy regulations. Communal access and opportunities for collaboration within the Alliance is paramount. The more access

it is subjective. The value of certain types of data to a member nation may be extremely different than it is to any other partner or member nation. The bottom line is that decision makers need to recognize and account for the potential use and exchange value of data when developing and implementing policy. Nations are procuring and holding the same (or similar) data sets, meaning each government may be paying for the same asset multiple times, and efforts to make data truly open and accessible are not coordinated and are, therefore, unable to maximize their ability to achieve outcomes, seek efficiencies and ensure that they are not simply getting data rich and, at the same time, knowledge poor.

Complementary and coordinated initiatives woven together will provide the necessary framework to propel a vision and strategy.

A comprehensive strategy for NATO to approach data will be comprised of three elements:

• Increasing access to data to drive innovation and inclusion: Continue to harvest real-time data through the myriad of sources and channels available today. Increased investments in disseminating online anonymized micro-data and provisioning big data with the appropriate analytical and visualization tools are essential. NATO needs to play a far more prominent role in providing unbiased and well-documented data and information through multiple channels. This could be achieved via significant improvements to NATO websites, enhanced web portals and the development of leading-edge data visualization to promote uptake across the spectrum of data expertise.

• Mobilizing data: Investments in robust, scalable, and modern technical, statistical and legal infrastructure are essential for NATO to deliver on its role as an effective data steward. There is a need to break down the policy, legislative, cultural, and technological barriers built by outdated laws and regulations between nations, departments/levels of government, and between organizations within the Alliance to open up data holdings. These include regulations related to Personal Identifiable Information (PII), privacy, electronic information management and storage,

etc. Key investments would enable multiplying the value of data holdings, while safeguarding privacy and confidentiality.

• Increasing data literacy and statistical capacity building: Initiatives are required to coordinate and build data literacy and numeracy across the school and university systems, as well as in governments and businesses. These could seek to increase the data usability, relevance, knowledge and products for all members. Alliance action could enable new opportunities for the member Nations to develop and create value from data, by ensuring the right skill sets and capacities exist, and that they increase innovative uses of data and information.[6] The proposed mission statement would therefore read:

The mission of the NATO Data Strategy is to fully leverage the value of Alliance data for mission, service, and innovation by guiding the Alliance in practicing ethical governance, conscious design, and a learning culture to increase access, mobilize data, and increase data literacy.[7]

Ensuring that the Alliance has data that is sharable, accessible, secure, and usable, even at the tactical edge, will nearly guarantee success as it advances its reach into the military use of AI, autonomy, and robotics. The future is near and now is the time grab the reins on big data to harness the advances in technology that are coming faster than ever before.

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[2] Mark, J. J. (2009, September 02). "War in Ancient Times." Ancient History Encyclopedia. Retrieved from https://www.ancient.eu/war/, 15 October 2020.
[3] Manucy, A. (1949). "Artillery Through the Ages: A Short Illustrated History of Cannon, Emphasizing Types Used in America." National Park Service Interpretive Series History No. 3. United States Government Printing Office, Washington, D.C.: 1949.
[4] Portions of this article are adapted from the Programme of Work 2020 Project L1-P-9: "Call for a NATO Data Strategy", written in two parts and published by Combined Joint Operations from the Sea Centre of Excellence.
[5] A National Data Strategy for Canada: Key Elements and Policy Considerations
Published on Feb 8, 2018 https://issuu.com/cigi/docs/paper_no.160
[6] Ibid.
[7] Portions of this strategy are from the United States Federal Data Strategy, adapted for the NATO Military Structure.

COMMANDER JOSH HEIVLY, USN

NATO MARITIME LOGISTICS AND SEA BASING

NATO operations rely on the smooth and efficient delivery of sustainment to deployed combat forces. At the highest level, logistics is treated as a joint concern, but within the maritime domain logistics is organized around shore and afloat lines, largely relying on the provision and delivery of support using national assets and resources. Some provision has been made for towards collective responsibility for logistics within the maritime, but this is largely focused on port visits. As the Alliance begins to reinvigorate capabilities designed to sustain forces at sea, it must embrace latent seabasing concepts designed to counter anti-access strategies, impose operational dilemmas on potential adversaries and enable power projection from the sea to objectives ashore. NATO can exploit the vast spaces of the Atlantic to its advantage, but this can only be possible through the judicious application of logistics in support of forces afloat.

As an Alliance in which a group of nations acts together to ensure mutual security and provide for the common defence, NATO logistic support flows along both national and collective lines to deliver sustainment to combat forces. Ultimate responsibility for support of forces provided to NATO rests with the nations, minimizing reliance (and necessary investment) in Alliance structures while ensuring that forces are directly linked to their normal, optimal sources of supply in accordance with their organization, equipment and national requirements. Collective responsibility is invoked in parallel to enable the nations to work together to find efficient, economical ways of pooling resources, streamlining management and optimizing the delivery of support. All NATO logistics doctrine flows from this dichotomy.

AJP-4, as the capstone joint logistics publication, lays down the central tenets of Alliance logistics and provides the baseline definition:

Logistics is the science of planning and carrying out the movement and maintenance of forces. In its most comprehensive sense, the aspects of military operations which deal with:

- design and development, acquisition, storage, movement, distribution, maintenance, evacuation and disposition of material;
- transport of personnel;
- acquisition, construction, maintenance, operation and disposition of facilities;
- acquisition and furnishing of services; and
- medical and health service support.

More specialized references provide guidance on health service support, host nation support, asset visibility and much more. At the same time, NATO Standardization Agreements (STANAGs) provide the guidance that enables national forces to adhere to specific configuration, equipment and procedural requirements that serve to make them interoperable and thus mutually able to deliver and receive support.

In practice the Alliance manages logistics through a set of organizations at the strategic, operational and tactical levels. At the political level from NATO Headquarters in Brussels, the Logistics Committee delivers high-level logistics guidance and policy for implementation

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within the Alliance. These policies are then implemented at the military-strategic level by the staff at Supreme Headquarters Allied Powers Europe (SHAPE), whose J4 Division exercises broad control over the execution of logistics support for Allied forces. At the operational level, support and sustainment responsibilities are divided among several commands. The Standing Joint Logistics Support Group acts as the theatre logistics component, conducting peacetime preparation and coordination activities and advising SACEUR, while the other theatre domain component commanders (MARCOM, AIRCOM, LANDCOM) coordinate, enable and advise on logistics matters related to their medium (maritime, land, air). The three Joint Force Commands, sited at Brunssum, Naples and Norfolk, are the standby operational-level commands that will execute operations as directed by SACEUR using forces as provided. Each JFC staff includes a Support Directorate and a subordinate J4 division dedicated to preparation, coordination and execution of sustainment in support of and using assigned forces. Finally, the Joint Logistics Support Groups (JLSGs) are the stand-by, tactical-level combat service support headquarters that will employ assigned logistics units to deliver sustainment to operational forces; these organizations are described in detail in AJP-4.6. The considerable capability of the JLSG platform was most recently demonstrated during exercise TRIDENT JUNCTURE 2018, during which a JLSG deployed to Norway to conduct Reception, Staging and Onward Movement (RSOM) and sustainment functions in support of air and land forces flowing into the country for the exercise.[1] The success of the JLSG in this exercise was a strong indicator of NATO's logistics capabilities, enabling and enhancing the generation of both deterrence and assurance effects.

Allied Maritime Command (MARCOM) acts as the Theatre Maritime Component Commander, and as such it advises and coordinates on all domain-related

Setubal, Portugal, 19th April 2019. Replenishment Vessel "USNS Medgar Evers" T-AKE-13. United States - Military Sealift Command (MSC).

issues, to include maritime logistics. Central to the sustainment of Allied naval forces is Allied Logistics Publication ALP-4.1, Multinational Maritime Force Logistics, which is maintained and updated periodically by MARCOM. ALP-4.1 divides sustainment functions between Afloat Support and Shore Support activities, and includes detailed descriptions of key processes and procedures. Several supporting publications provide additional guidance regarding procedures for requesting naval logistics support from Allied nations, arranging port visits, replenishment at sea and maritime humanitarian operations. At a more fundamental level, all maritime logistics are enabled by the common adoption of applicable STANAGs, which standardize fuel types, couplings, procedures and much more in an effort to ensure that Alliance navies are interoperable and prepared to provide and receive mutual support.

Sustainment of NATO forces at sea is conducted using Underway Replenishment (UNREP) procedures, which are subdivided into connected replenishment (CONREP) also referrred to as replenishment at sea (RAS) CONREP and Vertical VERTREP processes in which supply ships deliver commodities to receiving ships. Within each of the Standing NATO Maritime Groups (SNMGs) these activities are organized by the Group Logistics Coordinator and UNREP Coordinator.

At present NATO nations maintain over 45 replenishment ships in and around the Atlantic, totaling over 1.3 million displacement tonnes, with an average age of 23 years, some considerably older. Most are oilers, although the majority are to a varying degree able to deliver both fuel and materiel at sea. Additional to these are over 50 ocean-going support ships of various types, mostly salvage tugs or rescue ships, with a smattering of general purpose support ships and tenders. Currently only the UK and the US maintain dedicated hospital or medical ships as part of their navies, although Spain operates two small hospital ships in support of her fishing fleets. Over the next decade the Alliance is projected to build over thirty new replenishment ships, including seven Vulcano-class multi-role replenishment ships for the French and Italian navies. Most of the rest of these new builds will be the US Navy's John Lewis-class oilers.

Shore support for maritime operations provides the vital link between replenishment ships and national supply chains. Within the SNMGs this function is managed by the Shore Logistics Coordinator (SLC) and attached staff. Typically, sustainment for afloat forces flows into a Forward Logistics Site (FLS), which acts as a staging area for replenishment ships to load commodities or

for combat vessels to conduct port visits to receive fuel and stores. Most NATO members active in the maritime domain conduct their port visits under the aegis of the Naval Logistics Support Partnership (NLSP), which is managed by the NATO Support and Procurement Agency (NSPA). Through contracting mechanisms NLSP provides husbanding support for port visits and assists with procurement activities.

Emerging in the past few decades as a response to basing challenges, sea basing concepts rely on maritime logistics to enable naval forces to operate within sea spaces to project power ashore, reduce vulnerability and impose operational dilemmas on potential adversaries. The Netherlands, the UK and the US are the most active in sea basing practices, while NATO's Concept for Joint Sea Based Operations (NJSBO) concept, published in 2014, remains relatively undeveloped and has not yet gained much traction beyond several interesting studies conducted by NCIA and the introduction of the term into NATO doctrine. As it stands, NJSBO defines sea basing very loosely:

NATO Joint Sea Based Operations (NJSBO) are joint and combined operations creating sustained effects from the sea, across the wide spectrum of Alliance operations, conducted from a base at sea that is composed of a joint and combined HQ, expeditionary forces and associated support. NJSBO is an option within a pool of choices that might provide NATO with a greater operational advantage by overcoming accessibility constraints and reducing logistic and security challenges through the exploitation of the maritime domain.[2]

This definition is similar to the US model, embracing a wide range of platforms for use in delivering effects from the sea. It is however somewhat lacking in specificity in terms of how this would actually be executed.

National definitions for sea basing vary. The Dutch MoD's concept focuses on the use of maritime logistics to directly support land operations:

Maritime support of land operations is also known as sea basing, with maritime units functioning as a floating compound and support site (sea base) for the land operations. Sea basing is not limited to logistic support, however; a sea base can also provide other functionalities and forms of support for land operations, such as C2, fire support and air defence. The main advantage of the sea base is that there is less dependence on the circumstances on land to deliver support. Furthermore, a sea base offers greater security, as maritime forces provide their own force protection.[3]

The United Kingdom's approach to sea basing is similar to the Dutch concept but focuses on the wider littoral operating area:

Joint sea basing can deliver effect in the littoral during expeditionary operations. It is not restricted to logistics but may include strike, command and control, close air support and fires. Logistically, using RFAs, or commercially chartered shipping, to support other components may help reduce risk (for example, by reducing the logistic force protection bill ashore). Using maritime basing also allows for superior environmental control of stocks and can assist the land component in providing greater flexibility in the short notice delivery of force elements, equipment and stores, even in the face of changing requirements.[4]

The US vision for sea basing is larger in scope in accordance with its long-term sea basing program, which includes dedicated platforms, exercises and highly developed doctrine and TTPs.

Seabasing is defined as the deployment, assembly, command, projection, sustainment, reconstitution, and reemployment of joint power from the sea, without reliance on land bases within the operational area (OA). Seabasing accelerates the deployment and employment of naval power and provides JFCs with the ability to conduct select functions and tasks at sea without dependence on infrastructure ashore. As such, it minimizes the need for stockpiles ashore while positioning joint forces for immediate employment.[5]

As can be seen, the former two definitions focus on flexible approaches to sea basing and replenishment, while the latter is more expansive in scope.

In some ways, Allied navies already execute some sea basing functions, primarily through their replenishment assets. Sea basing relies on maritime logistics, so any task group operating at sea and sustained on-station is essentially "sea based," although capabilities vary widely. In its widest conception, sea basing can include amphibious ships, Marine units, replenishment ships, aircraft carriers, escorts, sealift, and even Army units. Currently only the Netherlands and the US operate dedicated sea basing platforms, although the UK is considering adding such ships to its fleet.

Sea basing is more than simply sustainment; it is the exploitation of the vast sea space by persistent operational forces to deliver effects across all domains.

The North Atlantic sea space is central to NATO's mission, providing the connective tissue between North America and Western Europe upon which will flow reinforcements and resupply in the event of a conflict. As such, it is key for demonstrations of Alliance resolve, the generation of deterrent effects and the stage for ongoing operations necessary for maintaining collective security. The Atlantic comprises the largest part of SACEUR's theatre of operations and most of NATO's maritime domain. It is not only a space to be defended but also a space to be exploited – it offers over 16 million square miles of ocean in which to conduct operations in support of Alliance objectives. Naval forces, dispersed or concentrated, can manoeuvre and position themselves to best effect, denying free access to the central Atlantic, matching and monitoring adversary activities and ultimately using the sea to threaten centres of gravity from multiple axes and domains.

Seabasing is the platform that can enable NATO to capitalize on the Atlantic in this way. By using maritime logistics assets to sustain forces at sea, the vulnerability of the Lines of Communication is reduced by providing ready and responsive forces on-station. Replenishment ships can operate from multiple ports at great distance from potential threats, able to tap into supply chain flows as required without building up large and vulnerable shore establishments. Afloat sustainment intrinsically enables the mobility of naval forces, reducing their vulnerability, enhancing their responsiveness and imposing dilemmas on opposing commanders. Perhaps more cogent is the ability of seabasing to counter the anti-access and area denial strategies currently in vogue by potential adversaries.[6] Power projection from afloat platforms allows basing issues to be skirted, while the mobility and firepower of naval assets enables the sea base to complicate targeting, defend against attacks and ultimately hold at risk entire littoral areas.

For amphibious shipping and Marines, sea basing represents a significant change in operational approach. NATO doctrine recognizes five types of amphibious operations: demonstration, raid, assault, withdrawal, and amphibious force support to crisis response and other operations.[7] Demonstrations, raids and support to crisis response are typically smaller in scale, while larger forces are generally utilized for assaults, usually with the purpose of creating a lodgment, securing an access point for the flow of follow-on forces into an operational theatre. Sea basing reverses this dynamic, emphasizing the use of landing forces to deliver effects directly on operational objectives without creating a lodgment. Indeed, sea basing effectively establishes the lodgment at sea, presenting a fait accompli to the adversary without providing a fixed target for a riposte. Operating from amphibious shipping, land forces can fully capitalize on Ship to Objective Maneuver[8] methods, striking directly and immediately reconstituting afloat, continuously manoeuvring at sea to minimize exposure to enemy detection and fires, ready to conduct follow-on operations and deliver additional effects as required.

Ultimately, sea basing will allow the Alliance to generate and sustain a ready, effective and highly mobile maritime force-in-being, in direct support of NATO's core tasks. In the maritime domain, Collective Defence is enabled by delivering mobile, responsive forces that use the sea space to both protect and to threaten. It provides a ready means to exercise Crisis Management functions using adaptable, scalable forces with a wide range of capabilities. Finally, sea basing enhances Cooperative Security by incorporating and sustaining Allied naval assets on-station as they are employed to deter potential adversaries and assure Allies and partners.

Maritime logistics is already a standard part of NATO's maritime operations, although this is offset somewhat due to the requirement that nations directly sustain their own forces. Afloat replenishment reduces vulnerability, enables mobility and forms the bedrock foundation of responsiveness. Sea basing builds on these capabilities to provide a counter to anti-access and area denial strategies and in turn threaten the centres of gravity of potential adversaries. To this end, seabasing approaches transform amphibious forces into striking forces – their power projection capabilities offer much more than the ability to establish a lodgment. NATO must take a fresh look at its maritime logistics capabilities and find ways to utilize seabasing approaches to deliver effects at sea and ashore.

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" OP ED: Is it time for a new concept of seapower? "

DR. ROB HUEBERT
UNIVERSITY OF CALGARY

Canada and its NATO allies are heading into a new, dangerous and rapidly transforming geopolitical maritime environment. Now is the time for rethinking what constitutes seapower and how it will be used to defend the national security of its member's states. New weapon technologies are being developed, and in some cases are already being tested, that will rewrite how maritime battles will be fought and won in the future. But even more significantly, the existing geopolitical framework is entering a state of flux with serious ramifications for NATO and especially for the smaller state members. Historically, medium powers such as Canada have protected Canadian maritime security by tying Canada to the strongest maritime power. First it was the British and now it is the Americans. Following the end of the Second World War, the smaller western European nations and Canada saw the benefit of collective security and joining in a formal defence alliance led by United States. Therefore, for the smaller members such as Canada, the meaning of seapower has been straightforward – develop a navy that can fight alongside the biggest and strongest navy in a specialized role. These were hard roles, but ones that did not require considerable independent thought. Once the specific role was picked, the challenge was learning and maintaining the ability to engage in the task, no further strategic thought was required. However, this will soon change.

Canada, like many of its allies, is in the process of rebuilding its navy – it is building or preparing to build replacements for its frigates, destroyers and replenishment vessels. In addition, for the first time since the 1950s, a class of patrol vessels for the Arctic is being added to the fleet. This is one of the most substantial procurement policies for the Royal Canadian Navy (RCN) since the end of the Second World War. Questions arise, such as how will this new fleet defend Canadian security into the 2060s, and when will the fleet need to be replaced? It is highly likely that the ships will not simply follow the roles of their predecessors. Rather they need to be prepared for new roles based on different concepts of seapower that need to be much more independent and fluid than they have in the past. This is an especially difficult task for any of the smaller navies that have relied heavily on the larger navies for setting the strategic direction of their naval forces.

There are at least five new type of technologies that require a rethink of how navies respond to threats, including: hypersonic long-range missiles; autonomous underwater vehicles; Artificial Intelligence; cyber-warfare; and directed energy weapons While space precludes a detailed consideration of the impacts of these new technologies, it is possible to offer some observations. The naval battlefield of the next 40 years is one in which the speed and range of conflict will be greatly enhanced. An attack by an enemy armed with long-range, maneuverable hypersonic weapons will threaten to overwhelm most existing defensive systems. If such an attack were to occur at the same time that the same naval units were also attacked by underwater autonomous vehicles, the complexity of the defensive response is apparent. The development of Artificial Intelligence systems also suggests that it will become increasingly possible for a future enemy to launch a coordinated attack that can overwhelm existing defensive systems. Going into the future, Canadian naval vessels will need to be able to defend and fight at a much higher rate of action or have the means to avoid conflict in the first place.

Complicating this, the smaller allied navies such as Canada, do not have the ability to develop their own national responses to these technological threats and will continue to depend on the larger allies for the technical means to respond. But unlike in past years when smaller states such as Canada made some contributions to new technologies, they will increasingly become a consumer of the defensive capabilities necessary to exist in a hostile maritime environment. This requires Canada to remain closely allied with the major maritime powers. What happens if the major power does not want or values that relationship in the future? There are four developing geopolitical trends that could change this requirement: worsening relations with the United States; problematic relations within NATO allies; stagnant and/or deteriorating relations with like-minded Asian states; and new challenges from new or renewed enemies. These trends may require fundamental rethinking of how the smaller NATO state uses seapower to protect their national interests in the coming decades.

Since the Second World War, Canada's relationship with the United States has been the core means to defend Canadian security. Canadian concepts of seapower are tied to those of the United States with Canada as a junior partner. However, the way the administration of Donald Trump has acted is a disturbing reminder that it is dangerous for Canadians to assume that the relationship will always be without fundamental challenge. It is possible that Trump is an anomaly and that once he is gone from office, relations between Canada and the United States will return to normal. However, it is also possible that he has unleashed forces that will change the relationship with Canada. The special relationship may not be so special. This could mean that Canada's ability to integrate so closely with the United States in terms of maritime security is lost. This would require that Canada develop an ability to act on its own when the United States will not stand with it.

It is also clear that unfriendly outside forces are learning to attack the solidarity of the Western alliance system through social media and other new tools. Significant divisions are developing and many suspect that these forces – probably led by Russia and China – will intensify their efforts to sow discord. Social media has already played a key role in dividing the UK from the European Union. This has already created concern about possible disputes regarding fishing rights in the region. There is also mounting evidence that other NATO states are also being targeted to provoke discord and division. What happens to the collective security provided by the unity of the alliance if it is disrupted? What do the smaller states need to do in terms of naval power to protect their

maritime relations and trade if the NATO alliance is reduced or lost?

NATO's security relationships with like-minded Asian states, such as Australia, Japan, South Korea and India, will be equally challenging going into the future with major impacts for their navies. But there will be a need for careful thinking moving into the future which will need to see these countries as security partners going into the future. This means a rethinking for some of the smaller members states. For example, Canadian policymakers have often dismissed Asian initiative to contain China and seem unable to build strategic relations with Japan, India and Australia. This will need to change. As China's power grows, the Asian democracies are now developing new relations amongst themselves and redeveloping their own naval capabilities. As China grow more powerful, what will the NATO members do to protect their interests and security with these like-minded states? This will involve their seapower but the question is what will it look like and how will it be done?

Finally, Canada and the smaller allies have enjoyed a period of peace and stability since the end of the Cold War in which each could pick conflicts that it wanted to join, and always did so in concert with others. The geopolitical reality was that NATO did not face any direct threat. This is now changing. As Russia has rebuilt its strength, it has also become increasingly assertive against Western interests. This can be seen in an increase in naval activity and challenges to Western naval actions. But even more challenging is the development of China as a near-peer competitor to the United States. China now has the second largest navy in the world. It has amazed most observers with the speed of its naval procurements as well as its determination to become a naval power of the highest rank, willing to use its power to defend its interests – a fact of which Canada in particular has increasingly been made aware in recent times.

Ultimately the combination of a new fleet, a new maritime weapon environment and a new geopolitical reality means that the smaller NATO states needs to think about how they will use their navies in the coming years. Looking forward, the question remains – how do they prepare to use the navy that many are now starting to build? They cannot continue as they have in the past. They face revolutionary changes to both weapons technologies and their position in the world. Do they retreat to do nothing and hope no one notices, or do they start to prepare for a future in which the possibility of conflict with China and/or Russia increases at a time when their own relationship with each other is under challenge? Now is the time to start thinking about what the future of seapower for all will look like.

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CJOS COE would like to extend a very special thank you to the individuals listed below on their contributions to this year's Cutting the Bow Wave magazine. Topics and ideas in these articles give us a different perspective and broadens the conversation. Please accept our sincere gratitude and appreciation for taking the time to contribute to our annual magazine.

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CJOS activities are guided by a programme of work (PoW) approved by the sponsoring nations based upon requests received by NATO, CJOS member countries, and other entities. CJOS is open to requests for support by any organization. Requests received will be considered for inclusion in the PoW based upon alignment to CJOS interests and those of the sponsoring nations and NATO. The 2021 CJOS PoW is listed below:

Programme of Work - 2021

1. Integration of Maritime C2 into the Joint/Combined Space

- Dependency on Technology in C2
- Maritime Warfare Symposium
- Maritime Security Regimes Round Table
- C2 of Multinational Maritime Forces *
- The Arrival of 5G Networks *

- NATO Expanded Task Force Concept (SFN) *
- Development of Need to Share Culture
- Integrated NATO Maritime Logistics
- Support JFCNF Logistics Concept *

- C2F C2 of NATO SNF *
- Support to JFCNF DDA Activities *
- Standing NATO SECRET OPTASKs for C2F *
- MCC Certification *

2. Support the Alliance's Development of Amphibious Capability

- Marine Integration Across Countries
- Understanding Amphibious C2
- NATO ATF Concept
- Cutting the Bow Wave

- NATO Amphibious Leaders (NALES)
- AMPHIBOPS WG
- Joint Combined Sea Basing WG
- Participate in CPAOT

3. Support the Alliance's Development of Unmanned Systems Capability

- Cooperative ASW C2
- Maritime Domain in the future Multi-Domain Operations

- Manned-Unmanned Teaming in Joint Operations *
- Maritime Unmanned Systems Tactical Doctrine Development

4. Deepening Our Understanding of Challenges and Our Competitors in the Maritime Domain

- Russian Maritime Priorities and Doctrine
- Resource Scarcity & Climate Change
- Long Term Military Transformation PoW – SFA/FFAO

- Conflict 2020 & Beyond – Middle East and North Africa (MENA) *
- Historical RFN forces study *

5. Contributing to Interoperability, Integration, and Force Development

- NATO Stand-in Forces *
- Maritime Level of Effort *
  - North Atlantic MCCs *
  - Manoeuvre Arms for NATO Maritime *
- Support to ACT's NWCC activities
- IAMD Conference
- MEAB WG
- Collaboration with NDU

- NATO All dimension ASW Concept
- NATO Future Over the Horizon NMCM Concept *
- Maritime Strike Operations
- Maritime ISR Doctrine
- MAROPS WG
- M2I2
- Liaison to NWDC
- Lessons Learned Process and Analysis

- Support to MSR RT WGs
- Annual MARSEC Conference *
- Support JFCNF and C2F Development
- I2AG
- Interoperability and Coordination Guide
- Exercise Support

* = New 2021 Project or Activity

TRANSFORMING ALLIED MARITIME POTENTIAL INTO REALITY

COMBINED JOINT OPERATIONS FROM THE SEA