

MS&D magazine

international
conference on
maritime security
and defence

MS&D



AUGUST/2024

on maritime security & defence

www.msd-magazine.com



The enduring importance of securing underwater infrastructure

Lee Willett

Page 12



Maritime piracy situation in the Gulf of Guinea in 2024

Jean-François Auran

Page 34



TAMMMEDIA

international
conference on
maritime security
and defence

MS&D



**MS&D IS
SPONSORED
BY NVL**

JOIN US AT MS&D

We look forward to meeting you at MS&D, the largest conference at SMM, from 05 to 06 September 2024, to discuss the challenges in the naval and maritime domain. Visit us at our exhibition stand, B4. EG 219.

N·V·L

THE DNA OF SHIPBUILDING



Hans Uwe Mergener
Editor in Chief

Welcome to Hamburg – as we look forward to an inspiring Maritime Security and Defence Conference

Today's approach to maritime security encompasses more than just the protection of national maritime borders and choke points. In our global village, the understanding has grown that oceans don't separate continents and countries; rather, they connect them. Against this backdrop of an interconnected world, maritime security has to reflect sea lines of communication, be it trade routes, be it physical connections. This encompasses not only the sea's surface – one also has to consider the depths of the seas, as well as looking upwards into space.

As in other areas, the range of challenges in the maritime domain is both broad and complex. Its arc extends from piracy and illegal fishing, from underwater infrastructure to modern communications, with the latter being particularly sensitive to multiple manipulations. This MS&D Conference intends to address some of the latest developments. In tandem, this magazine seeks to complement the requirement for opportunities of civil and military collaboration. From an editor's point of view, there is a need for greater

navigation in the complicated transitional naval and marine domains. The war in Ukraine in particular demonstrates that technological progress and tactical development go hand in hand. It also reveals that we have to overcome a certain sluggishness. Implementing lessons learned from the battlefield into the organisation seems to be anything but easy. What is missing is the agility to react to new threats. Staying abreast of the latest developments, therefore, needs more than just technological innovation.

Hopefully, this conference will support the awareness and understanding that maritime security is no longer confined to naval forces. The scene is well set since the SMM demonstrates the collaboration between civil, scientific and military application.

Yours aye

Hans Uwe Mergener



VISIT US AT SMM
HALL B4 | STAND N° 212



PIONEERING – IN PARTNERSHIP – PERFECT

Creating innovations and building perfect ships together with our customers: For almost 100 years, we have been a partner for navies all over the world.

ABEKING & RASMUSSEN

www.abeking.com



Rear Admiral (Ih) Christian Bock
currently serves as Chief of Division Military
Strategy and Operations at the GER MOD.

Geopolitical challenges: The need for effective Navies

As a member of the Executive Board of the German Maritime Institute, I would like to welcome you to the Maritime Security & Defence Conference 2024 at SMM.

Historically, the success of Western values and growth in prosperity is based on the symbiosis of curiosity and funding for research, confidence in the future and the will and ability to defend welfare and values. Beginning with Columbus, this developed into the world order that manifests itself today in the Charter of the United Nations. This order was and is deeply maritime in character, because growth and the survival of the globalized continents is inextricably linked to the dimension of the sea, under, on and above the water.

When this world order is shaken today, when sea routes are blocked, critical infrastructure is threatened, the law of the sea is violated and merchant ships and naval forces of other nations are fired upon and sunk, both from and at sea, states and communities of states must respond. This rattling threatens our rule-based international order and values. The National Security Strategies of allied Nations clearly identify the systemic disruptors of these order, whether militarily or through clear influence via treaties or on trade or politics: Russia, Iran, North Korea and unfortunately also China are not (or no longer) compatible with the order that has ensured peace and stability in Europe for over 70 years and has avoided wars between nations all over the world.

With the aforementioned countries come various maritime dependencies and possible disruptive factors, for which each nation must prepare itself technologically and with its own maritime strength. The right to the free use of sea lanes of communication, access to resources, the protection of data cables, pipelines and goods traffic through to the maintenance of multinational cooperation via defence diplomacy can only and must be implemented by Navies on behalf of the state.

The German Navy is ideally designed for this with a wide profile of capabilities. However, it must be able to keep pace with the technological progress presented at the SMM and be constantly aligned, regionally routed but globally committed. Every innovation gives rise to both opportunity and risk. These are to be utilised or mitigated in cooperation with partner Navies in NATO or nations with similar interests worldwide.

The MS&D offers a very suitable framework for the exchange of discursive opinions, views and insights across the continents. What makes SMM and MS&D so special is the fact that personal dialogue and the opportunity to reflect on state-of-the-art technology are possible on site. Let's use this opportunity! I wish us a successful and insightful conference. ■



Dr. Hans Christoph Atzpodien

Managing Director of the Federation of German Security and Defence Industries (BDSV e.V.)

The German naval industry extends a warm welcome to MS&D-participants

For more than sixty years, SMM has evolved as the leading international maritime trade fair in Hamburg, which, as Germany's major port, has proven to be the ideal venue for such a leading exhibition. At the same time, Hamburg has always been strongly connected with naval operations, but even more so with naval industries. Whereas Blohm+Voss used to display its famous brand on the banks of the River Elbe, Thyssenkrupp Marine Systems and NVL (Naval Vessels Lürssen) are now sharing these premises, not least with some of their naval business.

Subsequently, a number of sub-suppliers are also located in Hamburg or its surroundings. However, because of SMM's strong naval presence and Hamburg's own naval and naval industry legacy, another tradition that has proven to be quite successful is holding a parallel naval conference to SMM, which this year will even be fully integrated into SMM's appearance. The underlying idea of Hamburg-Messe is to make it as easy as possible for visitors of SMM to become part of MS&D, the naval conference.

The conference's well-known abbreviation "MS&D" stands for "Maritime Security and Defence". The conference has been planned by Hamburg-Messe, assisted by a number of senior experts and related institutions, among them Deutsches Marine Institut (German Maritime Institute), BDSV and VSM (Association of Shipbuilding and Maritime Industry). Tamm-Media Group (Mittler-Report Publishing Group) is acting as the leading media partner, while NVL has the

role as key sponsor. The primary MS&D themes for this year's event are „Challenges of Transition in the Naval and Maritime Domain,“ with an emphasis on current marine dangers, which can take the form of paramilitary or pirate assaults or hybrid warfare.

What these threats have in common is that persons and goods are immediately placed in danger, thereby also damaging our globalized cooperative economy, as well as our welfare and wellbeing across the globe. Therefore, it is even more crucial in 2024 to effectively counter such threats with the most advanced technologies – as shown in the SMM exhibition – by highly skilled and equipped naval forces – and also by taking part in the MS&D debates. Navies need to exchange views with industry and vice versa in order to ascertain the best possible use of naval forces worldwide by tackling and hopefully reducing any of the abovementioned maritime threats. In more concrete terms, you will find answers related to such challenges not only in MS&D's two-day conference programme, but also in the following contributions of this special Conference Magazine. On the security and defence industry side, SMM offers a strong presence of capable German, as well as international exhibitors who will be able to share valuable technological competence with their visitors. The maritime community within our Federation, at least, aspires to improve MS&D's 2024 debates and outcomes in this spirit. I wish all of our readers fruitful discussions during SMM and MS&D 2024. ■



Heiko M. Stutzinger
CEO, Hamburg Messe und Congress

Civilian and military shipping benefit from each other

Security and defence have become an even greater focus of the public debate in recent years – not least in the maritime industry. The background to this is the growing number of conflicts, which often have an impact on important shipping routes and free maritime trade: The Black Sea is affected by Russia's war against Ukraine; attacks by Yemen's Houthi rebels in the Red Sea threaten merchant shipping; and, finally, growing tensions between China and Taiwan could turn the South China Sea into a risk zone.

It is obvious that these complex situations will be prominent topics at the international conference on maritime security and defence (MS&D) at SMM in Hamburg in September. We have developed the programme in close cooperation with our new partner, the German Maritime Institute. MS&D brings together high-calibre international experts in the field of maritime security, including high-ranking naval delegations from all over the world. Current challenges for sea-based defence, strategies for asymmetric conflicts, trends in naval shipbuilding: The four panels on the two days of the conference, 5 and 6 September, will deal with important issues facing the maritime security community. The conference, which is open to all trade visitors this year for the first time, will benefit in particular from the close integration with the world's leading maritime trade fair SMM. Dual-use is the keyword: innovative propulsion systems, high-tech bridges, AI-supported navigation – at

SMM, more than 2,000 exhibitors from 70 countries will be presenting their latest technologies, many of which are relevant for both civilian and naval shipbuilding. In addition to the maritime energy transition, the topic of digitalisation is at the top of the agenda, with a separate exhibition area dedicated to promising maritime applications of artificial intelligence at the AI Center.

Numerous shipbuilding companies exhibiting at SMM, such as Damen and Lürssen/NVL Group, as well as technology companies such as ABB and Kongsberg, which are successful in both segments, show that civilian and military shipbuilding benefit from each other. They are also likely to benefit from orders for new ships in the coming years, such as the recent expansion of the German Navy's frigate programme by two units. In addition to the modernisation and reinforcement of naval forces, maritime sovereignty includes the ability of nations to protect their own critical infrastructure against threats such as cyber attacks in an increasingly connected world. The exhibitors at SMM and the panellists on the Digital & Security Stage will provide the right answers to related questions.

More security at sea! With this in mind, the SMM and MS&D teams are looking forward to in-depth insights and stimulating discussions with you! ■



Dr. Gaby Bornheim

President of the German Shipowners' Association (VDR)

Navigating global challenges: The indispensable role of the Navy

In an era of geopolitical volatility, the role of navies in securing maritime trade has become indispensable. As global tensions escalate, international sea routes face unprecedented challenges that threaten both stability and security. The navy stands at the forefront, crucial in addressing these complexities and ensuring the unimpeded flow of commercial vessels across oceans.

The conflict in Ukraine has significantly impacted the Black Sea, turning it into a hazardous area that severely hampers navigation and commerce. Also, in the Red Sea, activities by Houthi rebels targeting merchant ships have created a perilous environment, compelling shipping companies to avoid this vital waterway. Such disruptions not only endanger maritime safety but also disrupt the fluidity of global trade networks.

In East Asia, tensions between China and Taiwan, exacerbated by disputes in the South China Sea, amplify strategic concerns. With nearly half of global maritime trade passing through the Taiwan Strait, any escalation here would have far-reaching global implications, potentially disrupting vital supply chains and undermining regional security.

Naval forces play a pivotal role in mitigating these risks through vigilant patrolling of these vulnerable regions. They protect merchant ships from threats and ensure compliance with international maritime laws. During crises at sea, the navy's swift response is crucial for saving lives and

ensuring the safety of crews. Furthermore, in times of geopolitical flux, naval presence serves as a deterrent against state actors seeking to undermine the essential freedom of navigation for global commerce, sending a clear message that such attacks are unacceptable.

Moreover, the threat of piracy remains a persistent challenge in several maritime regions, notably off the coast of Somalia, in the Gulf of Guinea, and parts of Southeast Asia. Piracy not only jeopardizes the safety of seafarers but also disrupts trade routes and incurs significant financial losses. Naval forces are instrumental in combating piracy through coordinated international efforts, patrols, and escort missions that protect vessels from pirate attacks. These efforts have been crucial in reducing piracy incidents and ensuring the safe passage of ships.

Concerted collaboration among all stakeholders is crucial to fortify maritime security and stability. Given shipping's central role in supplying essential goods to global markets, collective efforts are essential to safeguarding maritime routes, benefiting not only the shipping industry but also the broader global economy.

Securing safe and stable sea routes requires sustained efforts and robust international cooperation. These endeavors are crucial to upholding shipping's role in the global economy, facilitating seamless and secure transport of goods worldwide. ■



Dr. Reinhard Lüken

Managing Director at German Shipbuilding and Ocean Industries Association (VSM)

Security and defence – a keyword for the future of the maritime industry

In a changing world, maritime security & defence concerns are taking centre stage ever more often. No maritime company can afford to ignore the increasing number of local incidents, regional conflicts and the rising geopolitical tensions. Sea routes become inaccessible, essential trade is impeded or disrupted altogether. While piracy as a form of criminal activity has been a menace for shipping already for many years, political conflicts are now increasingly affecting maritime activities.

At the same time, navies are more keenly following latest maritime technology trends to find new and more effective solutions.

In the military domain, new technologies allow adversaries to cause substantial threat and great damage without having access to any naval force of their own. The Ukraine has launched several successful attacks on Russian naval vessels with what could basically be described as home-made surface drones. Such rather inexpensive means

have largely removed an entire naval fleet from the battlefield. Similarly, the Houthi attacks in the Red Sea are appoint in case, and a threat factor to shipping affecting the logistics of countless businesses. The deterrent to these threats is partially highly cost intensive which can establish a mismatch over time.

That is why a technology fair like SMM is the ideal platform to bring new partners together to exchange information from different perspectives and to discuss solutions and prospects. ■

Content

Geopolitics & Security



12 Keeping focus: The enduring importance of securing underwater infrastructure
Lee Willett

20 US Navy moving forward on MUM-T: Manned-Unmanned Teaming as a force multiplier
Sidney Dean



26 The Aukus Security Partnership
Conrad Waters



34 Maritime piracy situation in the Gulf of Guinea in 2024
Jean-François Auran

40 Global power protection and the safety of sea routes
Nikolaus Scholik

Defence & Technology



45 Green shipping runs along with maritime security and defence
Mathias Pein

46 Future holistic acceptance process for naval design and construction
Christian Freiherr von Oldershausen





49 **Maritime know-how combined with state-of-the-art technology**
Carsten Löhmer

50

The evolution of naval integrated bridge systems
Jörg Dammrich



54

Key Focus:
Silent propulsion
Björn ten Eicken

58 **Increasing situational awareness in the maritime domain**
Daniel Esser | Sascha Krohmann



Rubrics

57 **3 Question to ...**
Malte Witowski,
Managing Director
Friesland-Kabel

62 **Periscope**
Conrad Waters

GLOBAL

Lessons from Naval Conflicts in the Black and Red Seas

GERMANY

Progress Towards "Vision 2035+"

AUSTRALIA

Formal Start to Hunter Class Frigate Construction

ASIA-PACIFIC

China: A Major Development in Carrier Aviation

AFRICA & THE MIDDLE EAST

Trends in Maritime Crime

EUROPE

European Naval Shipbuilding: Important Project Milestones Reached

THE AMERICAS

United States: Strengthening the Submarine Industrial Base

67 **Imprint**

**INTERNATIONAL
MARITIME NEWS**
website | newsletter | podcast



Lee Willett

Keeping focus: The enduring importance of securing underwater infrastructure

Political leaders may currently be focused on naval activities in the Red Sea, but NATO navies continue to meet a range of other critical tasks, including deterring threats to seabed infrastructure.

NATO navies are very busy across the Euro-Atlantic theatre. Two conventional conflicts underway within and just outside the theatre are keeping these navies occupied, from the High North down to the Eastern Mediterranean (nevermind interests south of the Suez Canal, across the Indian Ocean, and beyond). In the Euro-Atlantic theatre, the tasks preoccupying them range from humanitarian assistance in the Eastern Mediterranean to anti-submarine warfare (ASW) in the High North.

Across this operational task spectrum, deterring and defending against threats to seabed critical undersea infrastructure (CUI) encompasses maritime security tasks – namely, conducting sustained surveillance of key CUI nodes on the seabed – up to being a high-end deterrence task – namely, deterring conventional warfare threats to these nodes.

Although CUI security has been a long-term security risk well understood by navies and senior military and defence leaders, the issue burst onto the politico-strategic agenda in September 2022 with the explosions at the two Nord-stream gas pipelines in the Baltic Sea.

Yet just over a year later, in November 2023, the politico-strategic spotlight shifted dramatically to navies' air-defence

capacity to deter and defend against Yemen-based Houthi rebel attacks on commercial shipping in the Red Sea. This shift raises several important questions about NATO navies and the seabed warfare focus in the North Atlantic.

Is the seabed warfare issue dropping from the top of the politico-strategic agenda? If it is, is there an impact on NATO naval capacity to deter and defend against continuing threats to CUI in the North Atlantic? Even with varied other commitments, are NATO navies still able to do what they need to do about the CUI threat?

Domain shifts

The open nature of the maritime domain and the ability of navies to transit through national and international waters means the world's larger regional and global navies are often seen in political and societal terms as 'first responders' to the latest crisis.

Such crises can range across the spectrum of maritime tasks. Navies' roles can be, for example, providing a 'bridge' to deploy humanitarian assistance and disaster relief (HADR) aid to an island or isolated region. They can conduct evacuation operations, for example of people fleeing a

natural disaster like a volcanic eruption or an earthquake, as well as conflict areas. Navies can deploy to a region to provide collective response to an international crisis like piracy. These examples are maritime security matters; however, they are still below the threshold of deploying naval forces into higher-end crises, which encompass conducting deterrence and defence against military activity by an adversary.

The point is, whatever the circumstances, such naval forces are called to latest crisis point, bringing their inherent flexibility to shape the outcome of the situation in question. Indeed, the need for navies to bring flexibility in output is being demonstrated in circumstances above the threshold between lower- and higher-end operations. For example, as the Israel-Hamas conflict erupted in October 2023, several Western navies deployed high-level combat power around the region. The US Navy (USN) deployed two aircraft carriers: one to the Eastern Mediterranean; and one through Suez and around to the Gulf.

Underlining the importance of flexibility, when the Israel-Hamas war spilled over into a wider regional crisis, with for example the Houthis launching a campaign of attacking commercial and naval ships sailing along the Red Sea/

Piening Propeller 

Nonstop spinning to keep you moving forward

We, at Piening Propeller, make every turn for your individual solution and deliver environmental friendly and trendsetting equipment (PCP / FPP). Made in Germany with the experience of various applications.



SERVICE FOR ALL BRANDS OF CPP
Contact: service@piening-propeller.de

Visit us at SMM:
Hall A3 | booth 226

Bab-al-Mandeb/Gulf of Aden corridor, the naval spotlight was switched politically to the Red Sea, with extensive naval forces – including the USN carrier, “USS Dwight D Eisenhower”, that had been deployed to the Gulf – diverted from various other tasks in various other regions to provide deterrent and defence presence along that corridor.

At any conference, briefing, or other meeting of naval personnel, officials, academics, and analysts, the impact of the Red Sea shipping crisis suddenly – virtually overnight – became almost the only topic of discussion.

As well as diverting platform and other resources away from other regions, it also diverted attention away from other issues.

Critical issue

For more than a year prior to the outbreak of the Red Sea shipping crisis, the Russian threat to Euro-Atlantic CUI had been the headline in any conference, briefing, or other meeting. The September 2022 explosions at the two Nordstream gas pipelines in the Baltic brought to the

surface politically an issue that NATO’s naval and senior military leaders had been concerned about in fact for several decades – the Russian threat to CUI.

While no formal attribution of responsibility for the Nordstream attacks has yet been possible, the incident fitted a wider pattern of seabed warfare activity across the Euro-Atlantic that was coming to the fore just as Russia began pushing its security ambitions more visibly, culminating forcibly in the invasion of Ukraine in February 2022. Two other seabed warfare incidents of note had occurred prior to this, in November 2021 and January 2022: in these incidents, seabed communications cables were attacked off Svalbard, Norway, and seabed sensing cables were then attacked off Lofoten, Norway. The incidents occurred at the top and bottom of the Bear Island Gap, a maritime chokepoint that divides two critical submarine operating areas – the Barents and Norwegian seas (with these areas being Russian and NATO ‘home’ waters, respectively, for submarine operations).

Post-Nordstream, the seabed warfare issue sat right at the

Surface ships and submarines participate in NATO’s annual North Atlantic anti-submarine warfare (ASW) exercise ‘Dynamic Mongoose’, in 2022. For NATO, presence to detect underwater domain activity in the North Atlantic is central to CUI security. (© NATO)



top of military and political in-trays. Events in the Red Sea shifted the spotlight, with political leaders and media commentators focused increasingly on how naval forces could be used to keep the sea lines of communication (SLOCs) running through the Red Sea open and the global flow of maritime trade moving.

Yet the seabed cables and pipelines – which move data and power and oil and gas, respectively – are also strategic-level SLOCs, moving money and resources in an undersea network that is critical to keeping the global economy moving.

This raises the question of whether there should be concern that seabed warfare is no longer the top-level political and strategic focus that it was, especially when the risk of conflict with Russia is arguably higher now than it was in 2022, when Russian activity at sea around key

” **Naval industry is also playing a key role, developing innovative technological concepts for conducting seabed operations, both defensive and offensive.**

seabed CUI seems as high as ever, and when Russia has communicated clearly its capability to target CUI nodes. The Russian threat to such nodes may be ongoing.

In June 2024, for example, French, Norwegian, and UK maritime patrol aircraft (MPAs) conducted extensive surveillance operations off Ireland’s west coast, addressing – according to international media reports – the possible

presence of a Russian submarine. Several seabed cables make landfall on Ireland’s west coast.

Should there thus be concern that navies may be distracted by other commitments from what is still arguably a clear and present threat?

In fact, what now seems clear is that the seabed security, deterrence, and defence challenge is a very specific one, it requires bespoke platforms carrying particular capabilities, and it is





NATO mine warfare forces operate in the Baltic Sea. NATO countries resident around the Baltic are working individually and collectively to address the CUI risk there. (© NATO)

something NATO and its navies are moving to address by developing such platforms and capabilities.

Specific capability

This is demonstrated in the fact that NATO and its navies are now developing bespoke organisations, concepts, and capabilities to deal with the seabed CUI threat. In sum, they are developing some specialist tools to tackle an operational challenge that requires a degree of specialisation.

In the immediate wake of Nordstream, NATO moved quickly to construct a response mechanism, establishing in February 2023 the Critical Undersea Infrastructure Co-ordination Cell at alliance headquarters in Brussels, with its remit being to facilitate political-level engagement and co-ordination between industry, military, and civilian stakeholders. This was followed in July 2023 by the establishment of the Maritime Centre for the Security of CUI at NATO Allied Maritime Command (MARCOM) in Northwood, UK, with its remit being to facilitate opera-

tional-level engagement and co-ordination between navies, industry, and other seabed stakeholders. NATO is also developing a new concept designed in large part to help address the seabed threat. In a presentation at the Naval Leaders' 'Combined Naval Event 2024' ('CNE 24') conference in Farnborough, UK in May, a NATO official presented the vision for the Digital Oceans concept. It is designed to enhance maritime situational awareness (MSA) from seabed to space through the ability to orchestrate persistent, agile, adaptive capabilities bringing capacity to concentrate sensing and exploit data at the speed of relevance.

The vision is focused on delivering this enhanced multi-domain MSA by 2030, with such delivery enabled through using emerging disruptive technologies. Interestingly, the NATO official noted, the concept is designed to free conventional naval capabilities for high-end tasks.

The Digital Oceans vision was endorsed by NATO defence ministers in October 2023. In April 2024, more than 100 industry representatives attended an industry symposium. The next two steps – both set to be achieved in 2024 – are setting out a roadmap for delivering the vision, and then developing a capability delivery strategy that defines the principles and mechanisms to be employed.

Industry input

For CUI security, and understanding the risk and the challenges in meeting it, NATO navies' relationships with industry – principally, the commercial oil and gas sector – are crucial. In terms of being able to conduct sustained surveillance on the seabed and being able to respond to a problem, the oil and gas industrial sector has the equipment, experience, and expertise required.

Alongside NATO's engagement, individual countries and collective groups of countries are working directly with industry, too. Norway is one of the most high-profile exam-

ples of a country where the navy and industry are co-operating closely. With its significant offshore sector, Norwegian industry is an example of the fact that industry has capability capacity that navies can draw on to address the CUI threat. Speaking at the UK Royal Navy's (RN's) 'First Sea Lord's Sea Power Conference 2023', held in London in May 2023, Vice Admiral Rune Andersen – now chief of Norway's joint headquarters, but then chief of the Royal Norwegian Navy (RNoN) itself – said that, following the Nordstream incident, the RNoN contacted its national commercial oil and gas sector and discovered the sector owned up to 600 uncrewed underwater vehicles (UUVs).

Naval industry is also playing a key role, developing innovative technological concepts for conducting seabed operations, both defensive and offensive. Speaking at the 'Undersea Defence Technology' conference in London in April 2024, Dr Rogerio Ramos – a senior fellow and chief capability area lead for non-RF sensing at QinetiQ – discussed concepts for using seabed nodes fitted with

acoustic transducers that can be integrated in numbers to build a deployable, scalable underwater tracking range. Such sensing networks could play a key role in building the MSA picture for tasks including ASW and CUI protection. Indeed, NATO navies are increasingly looking at where and how underwater tasks like ASW, CUI protection, and mine counter-measures (MCM) overlap in CONOPS and capability requirements terms.

NATO and its navies continue to test CONOPS and capabilities for ASW, CUI, and MCM, and assess how they overlap in delivering effect. At the annual Portuguese Navy-led/NATO co-hosted 'REPMUS' (Robotic Experimentation and Prototyping augmented by Maritime Unmanned Systems) exercise, which takes place each September in Troia, southern Portugal, these CONOPS and capability requirements are tested routinely.

'REPMUS 23' included a CUI serial, with maritime uncrewed systems (MUS) operating in the air, surface, and sub-surface domains combining with each other and with



TURN UNCERTAINTY



INTO CONFIDENCE

For the maritime industry, this is more than a moment of change. It's a time for transformation. Never have the decisions it faces been so complex. Nor their consequences ever mattered more. As a trusted voice of the industry, we help decision-makers throughout the maritime world to make purposeful and assured choices. From selection of an appropriate assurance approach, regulatory compliance, next generation fuels, vessel and operational optimization, to in-depth advice and insight, explore our solutions.

Learn more: dnv.com/navy

crewed platforms to locate and survey a seabed cable that had been targeted by adversary underwater assets. For 'REPMUS 24', serials for tasks across the underwater battlespace – including ASW, CUI, and MCM – will be conducted.

Naval capability

Given the nature of the threat, and given that core capabilities are being spread over a wide range of geographical regions and operational tasks, several NATO navies are developing bespoke capabilities for conducting seabed operations.

Two countries are making notable progress, here.

First, the RN is continuing to prepare its lead multi-role ocean surveillance ship (MROSS), RFA Proteus, for operational deployment. The ship was purchased from the commercial offshore support sector in January 2023, and is being readied for service – including going through the RN's fleet operational standards and training (FOST) process, and trialling onboard systems that can be used for CUI security and defence. A key component of the RN's CONOPS for the vessel is to use it to test and evaluate

systems and capabilities that could be employed in seabed operations, but conducting such testing in regions of strategic significance, where this work could offer deterrence presence and response against the CUI security threat. Speaking at the 2024 iteration of the 'First Sea Lord's Sea Power Conference', in London in May, First Sea Lord Admiral Sir Ben Key said "Proteus ... will be there for us to test and trial new technologies [and] will be working alongside other navies and contributing to our understanding of what's on the seabed, and therefore being able to spot any changes."

Proteus has an aft deck and a separate ROV deck from where a range of remotely operated vehicles (ROVs) and autonomous underwater vehicles (AUVs) can be deployed. During visits onboard while Proteus was moored in London during the 'First Sea Lord's Sea Power Conference 2024', the RN displayed work-class ROVs operated by the UK defence ministry's salvage and marine operations team, and AUVs operated by the RN's Fleet Hydrography Unit (a Teledyne Gavia AUV) and Mine and Threat Exploitation Group (HII REMUS 100 and L3Harris IVER3 AUVs). The French Navy has not yet developed a bespoke ship, but is

Norwegian coastguard forces conduct patrols around an offshore platform, in November 2022. Norway's armed forces and oil and gas industry sector work closely together in securing the country's critical underwater infrastructure (CUI).
(© Norwegian Armed Forces)





“RFA Proteus” is a former commercial vessel the UK has purchased and equipped to focus on seabed operations.
(© UK Ministry of Defence)

instead using particular in-service vessels as the platforms around which to build its seabed warfare capability. Such ships include its auxiliary vessels FS Loire and FS Beateups-Beaupre. Like the RN, the French Navy is using these platforms to test and evaluate AUV and ROV capabilities, and is doing so in places of strategic interest to start building operational output and effect.

It is also working closely with national industry to build the required capability. For example, it uses regularly – in its Operation ‘Calliope’ seabed deployments – the Exail A18-D AUV. The navy’s capacity to use these capabilities onboard different platforms indicates it has developed a deployable capability. Speaking at the ‘CNE 24’ conference, Rear Admiral Cédric Chetaille – the navy’s deputy chief for operations, and director of seabed capability development – said France is aiming for initial operating capability (IOC) in 2026 for its initial seabed warfare set-up.

The German defence ministry’s latest force posture statement, published in March 2023, underlined the CUI risk in the Baltic amongst increasing underwater domain threats, the Deutsche Marine’s important role in multi-domain operations, and the increasing utility of uncrewed systems including for underwater sensing. Primary platforms for the navy’s future CUI protection capability include a dozen new MCM platforms and an array of uncrewed MCM systems. Underlining the importance of co-operation in developing seabed security, six northern European NATO coun-

tries are working with each other and with industry to start building improved focus on a capability for conducting CUI operations in the Baltic and North seas. Under the Northern Naval Capability Co-operation (NNCC) construct, Denmark, Finland, Germany, the Netherlands, Norway, and Sweden have established the Seabed Security Experimentation Centre (SeaSEC). In a presentation at ‘CNE 24’, Rear Admiral Paul Flos – a Royal Netherlands Navy officer who leads RNLN international co-operation and heads up NNCC – said SeaSEC aims to build regional MSA, to train using realistic scenarios, and to be a forum for both stakeholder interaction and co-operation on innovation. SeaSEC plays an important role for NATO as a CUI security test centre. In June 2024, SeaSEC ran an industry experimentation day at Scheveningen, Holland, including conducting a small exercise. SeaSEC will seek to build innovation engagement with industry, for example through conducting challenge activities.

Lee Willett

Dr Willett is an independent writer on naval, maritime, and wider defence and security issues. Previously, he ran the naval desks at Janes and RUSI, and was Leverhulme Research Fellow at Hull University’s Centre for Security Studies.

US Navy moving forward on MUM-T: Manned-Unmanned Teaming as a force multiplier

Sidney Dean

Networking manned and unmanned surface vessels of various size and configurations could create new synergies for naval operations, providing asymmetric warfare options to counter a numerically superior adversary.

Manned-Unmanned Teaming (MUM-T) – directly combining the capabilities of crewed and uncrewed (autonomous or remote-controlled) systems – aims to achieve operational results which are superior to those achievable by manned or unmanned systems alone. In the maritime environment, the uncrewed element can consist of unmanned surface, underwater or aerial vehicles, or a combination of these. Unmanned surface and underwater vehicles (USV/UUV) are being developed across the size spectrum, including aspirational future USVs of up to 90 metre length. Such large vessels are being designed for long-range autonomous missions. While nations in Europe and the Indo-Pacific are pursuing maritime MUM-T concepts, the US Navy is currently leading in this regard. This article will focus on US Navy MUM-T programs utilizing boat-sized USVs which operate more closely with manned vessels or human on-shore controllers.

Maritime MUM-T offers numerous potential advantages. The USVs can be equipped with sensors, communications relays, and/or weapons. The additional platforms permit naval squadrons to cover a greater area. This supports a distributed presence (including surveillance capability) in

peacetime. In wartime, MUM-T provides additional and more flexible options to find, fix and fight the enemy from multiple vectors, overwhelming the opposing force's defensive and offensive capabilities.

Advantages go beyond the purely operational. A large number of unmanned vessels is cheaper to acquire and maintain than manned systems which would add comparable mission capability. They can also be developed or upgraded quickly, permitting improved capabilities to be fielded within months rather than years. They can also ameliorate force structure issues such as the manpower shortage facing many navies. MUM-T will permit a smaller number of personnel to supervise and operate a large number of distributed platforms. The overarching goal is to provide additional warfighting capability and capacity to augment traditional combat forces, providing a greater range of capabilities and employment options to increase the fleet's tactical and strategic advantages.

Task Force 59

The first large scale US Navy exercise/fleet experiment fully integrating unmanned and manned platforms in real-world combat drills at sea was conducted in April 2021 off the California coast. Designated as Unmanned Integrated Battle Problem 21 (IBP21), the exercise involved 10 manned ships of various classes and 29 unmanned systems including circa 50 percent USVs. Among the successful scenarios of IBP21 was covert target identification and tracking via USVs, which enabled a destroyer to sink the target from beyond its own sensor range.

In September 2021 the Pentagon established Task Force 59 as the Navy's first Unmanned and Artificial Intelligence Task Force. The unit integrated unmanned systems and artificial intelligence (AI) with maritime operations in the US 5th Fleet/US Naval Forces Central Command (NAVCENT) area of operations in the waters of the Middle East. TF 59's mission was to evaluate available unmanned technology under realistic operational conditions in order to determine its suitability for military applications. A total of 23 different unmanned systems were tested, with an emphasis

A sensor-equipped Saildrone USV and an optionally armed T38 Devil Ray speedboat teamed with "USS Sioux City" (LCS 11) in the NAVCENT AOR. (© US Navy)



The 11-metre T38 „Devil Ray“ achieves top speeds of 80 knots and can be carried aboard most ship classes. It can be deployed as an armed escort for the parent vessel when transiting dangerous waters, or be sent forward to conduct reconnaissance and attack missions. (© US Navy)

on USVs. In addition to the vessels, other vital technologies including artificial intelligence and C3 systems (command, control, and communications) were evaluated for maturity. As personnel learned what worked and where individual systems had shortcomings, USVs were modified to enhance performance. In addition to demonstrating the USVs' capabilities, the exercises also helped refine tactics and strategies for their deployment.

Over a two year period the sophistication of the training scenarios increased, with the greatest effort being placed on establishing extended surveillance networks within the AOR's waters. By deploying large numbers of sensor-equipped patrol and picket vessels feeding data to manned ships, TF 59 was able to establish situational awareness over a much larger area without a significant increase in personnel. In September 2023 TF 59 integrated 12 different unmanned platforms with manned ships to conduct enhanced maritime security operations in the wa-

ters surrounding the Arabian Peninsula. Among the most significant successes was the ability to track Iranian Navy and Islamic Revolutionary Guard Corps Navy ships and small boats over several days during routine patrols in and around the Strait of Hormuz.

By autumn of 2023 the program was ready to progress to the next level of MUM-T, enhancing lethality at sea. The Digital Talon 1.0 and 2.0 exercises conducted in October and November 2023 were the culmination of TF 59's two-year extended experiment. Manned vessels paired with sensor and missile armed USVs as well as reconnaissance UAVs to form meshed networks sharing a single common operating picture and exchanging targeting data among the networked assets. During both Digital Talon events unmanned reconnaissance vessels identified and tracked simulated "hostile" targets which were subsequently destroyed by a missile-armed T38 Devil Ray high-speed USV. The scenario was repeated several times in each Digital

Talon exercise, with a 100 percent success rate, “[proving that] these unmanned platforms paired with our manned combat ships can enhance fleet lethality,” said Capt. Colin Corridan, TF-59 commodore, in November 2023.

Operationalizing MUM-T

The success of TF 59’s evaluation, testing and experimentation prompted the US Navy to establish Task Group 59.1 as a subordinate unit of the Task Force. It will focus on operational deployment of unmanned systems teamed with manned operators in order to bolster maritime security across the Middle East region. As described by the US Navy, this group represents a significant advancement in the service’s efforts to integrate unmanned systems into the fleet, ensuring seamless integration of new technology with operators while in theatre. The goal is to have a force of approximately 100 unmanned systems (surface and underwater) in the AOR, supporting not only the US Navy but also regional allies. The Manama, Bahrain based unit formally stood up on 3 January 2024.

Capt. Corridan said that the new task group “will be leading the way for the Navy in the hybrid fleet ecosystem.” This effort will include adapting acquisition models by forging a “[new] level of connective tissue between industry

” **The sustained presence of these unmanned platforms provides us with the endurance and reach necessary to compliment the activities of our manned platforms, freeing them up for other missions.**

partners and the end user operators”; TG 59.1 personnel will facilitate integration of new technology with the operational fleet, and provide feedback to industry to ensure unmanned systems are quickly upgraded or modified for improved real-world performance.

The model is now also being utilized in the US 4th Fleet /Naval Forces Southern Command (NAVSOUTH) AOR (the Caribbean and the waters surrounding Central and South America). While still considered experimental, the unmanned assets are fully integrated into the operation-

al fleet rather than segregated as a task force or group.

“We wanted to take a different approach rather than a task force this time because ... we’re integrating additional sensors into the battle space and we think this is another way to normalize it,” said the then Chief of Naval Operations,

Adm. Mike Gilday, in April 2023. The primary goal is to expand surveillance capacity without deploying additional manned vessels or aircraft to the region. “The sustained presence of these unmanned platforms provides us with the endurance and reach necessary to compliment the activities of our manned platforms, freeing them up for other missions,” added Navy Secretary Carlos Del Toro. Alongside the immediate operational benefit, the deployment permits the Navy to experiment with the unmanned systems

in a permissive environment, develop Tactics, Techniques, and Procedures (TTPs), and refine manned and unmanned Command and Control (C2) infrastructure, all designed to advance the Navy’s transition to a hybrid fleet.

Since September of 2023 MUM-T is being employed to bolster fleet capabilities to

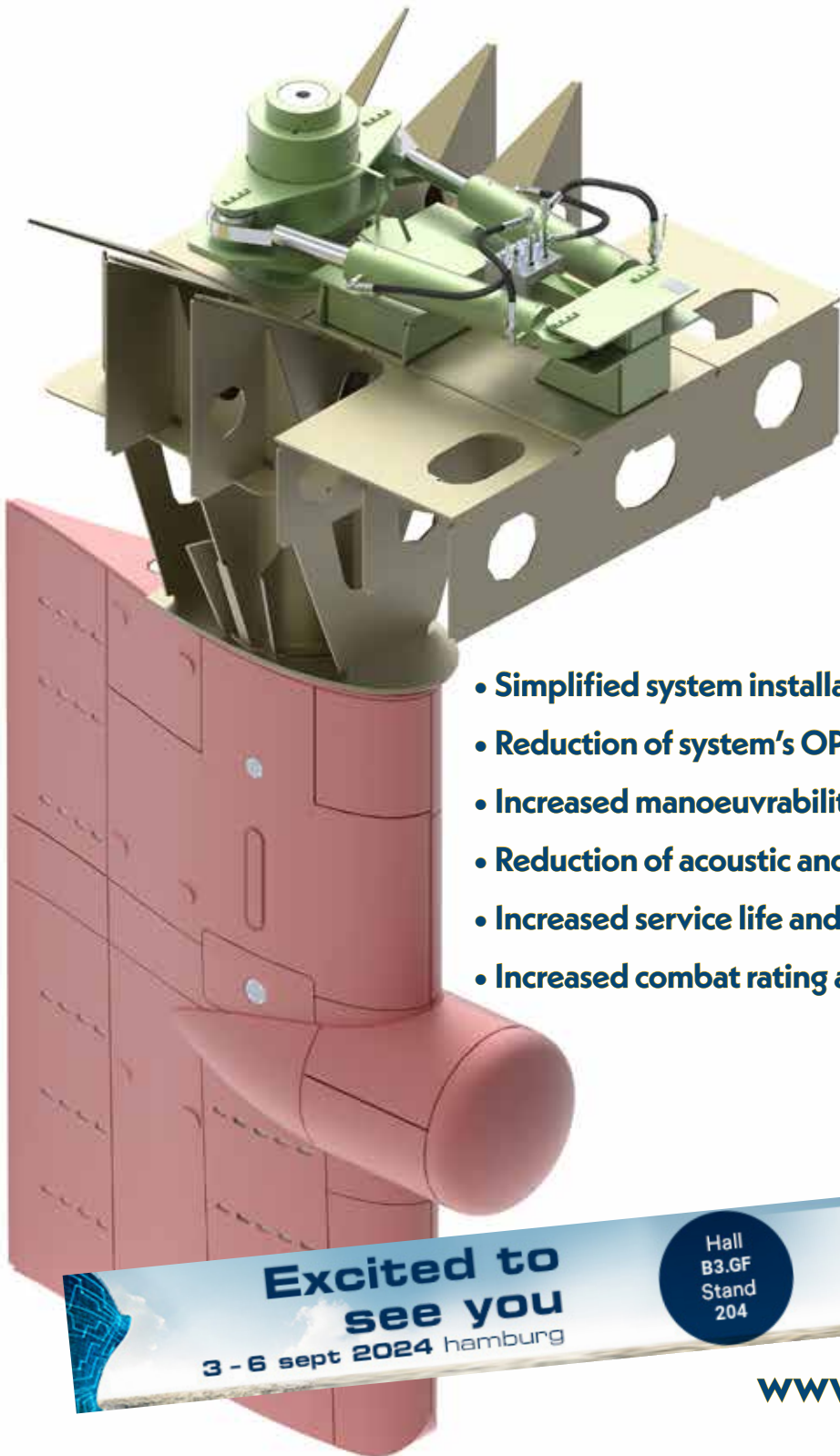


A Lethal Miniature Aerial Missile System launches munitions from a MARTAC T-38 Devil Ray USV during Exercise Digital Talon in the Arabian Gulf, Oct. 23.

(© US Navy)

NAVY ES/MS-Opt for naval vessels

You only get the best customised manoeuvrability technology for naval units if you don't let just anyone take the helm



- Simplified system installation & simplified maintenance
- Reduction of system's OPEX costs
- Increased manoeuvrability of units in operational use
- Reduction of acoustic and vibration signature
- Increased service life and redundancy
- Increased combat rating and performance

Excited to see you

3 - 6 sept 2024 hamburg

Hall
B3.GF
Stand
204



www.loewe-marine.com
Bremen | Hamburg

detect and combat drug trafficking as well as illegal fishing operations by Chinese trawlers. As was the case in the 5th Fleet AOR, 4th Fleet is working to integrate regional allies into the MUM-T network. Designated as Operation Windward Stack, the fleet's unmanned integration campaign began with 10 contractor-operated Saildrone Voyager long-endurance USVs operating from Naval Air Station Key West in Florida. The solar-powered drone operates at three knots per hour, but can remain at sea for up to one year to conduct surveillance and hydrographic reconnaissance with an array of sensors. The Saildrones are now being augmented by 24 Greenough Advanced Rescue Craft (GARC) which reach top speeds of 35 knots, making them suitable for pursuit of suspicious vessels until manned units can respond.

USVRON 3

On 17 May 2024 the US Navy stood up yet another USV unit. Unmanned Surface Vessel Squadron (USVRON) 3 is subordinate to Surface Development Group (SURFDEVGRU) 1, which is responsible for the navy-wide maintenance, training, and manning oversight for unmanned surface vessels (USV) as well as Zumwalt-class guided missile destroyers. The San Diego based USVRON 3 will operate a fleet of small, unmanned surface vessels (sUSV) designated as the Global Autonomous Reconnaissance Craft (GARC), a derivative of the Greenough Advanced Rescue Craft. The five metre long USVs are developed by Maritime Applied Physics Corporation (MAP-C) and will serve as research, testing, and operations platforms to support USV integration throughout the operational fleet including affiliated maritime services such as the US Coast Guard or

Marine Corps. In addition to technology, the unit will also evaluate current and future concepts of operation and suggest changes where appropriate.

Notably, USVRON 3 enlisted personnel will include the US Navy's newest rating, the robotics warfare (RW) specialist. Establishment of the rating was announced in February 2024. As defined by the Navy, these specialists will conduct Robotic Autonomous System (RAS) operations and maintenance, serve as subject matter experts for computer vision, mission autonomy, navigation autonomy, data systems, artificial intelligence, and machine learning on the RAS platforms. Creation of the RW specialist rating underscores the determination to maximize MUM-T into the operational fleet as expeditiously as possible. "There are currently no boundaries, and we have an incredible opportunity to determine what right looks like within our sphere of influence," said Capt Shea Thompson, commodore of SURFDEVGRU 1. "And the SURFDEVGRU 1 and USVRON 3 teams are [...] making considerable strides in validating small USV capability while laying out a clear path to achieving full operational capability by a timeframe that matters."

On course

In October 2023 the 4th Fleet hosted its annual Hybrid Fleet Campaign Event (formerly designated the Fleet Experimentation Program) in the waters off Florida. The event provides the Office of Naval Research an opportunity to present progress and capabilities of unmanned technologies, and evaluate their suitability for future operations. The October 2023 presentation focused on the evaluation of unmanned systems in advanced kill chains, contested littoral operations, survivability, and sustainment at

A sensor-equipped L3 Harris Arabian Fox MAST-13 USV transits the Straits of Hormuz alongside a US Coast Guard cutter and the destroyer "USS Paul Hamilton". (© USCG)





Two GARC USVs at Coronado.
(© US Navy)

Saildrone Voyager USVs ready to deploy
from NAS Key West as part of Operation
Windward Stack. (© US Navy)



sea. Technology evaluation events such as NAVSOUTH's Hybrid Fleet Campaign Event "push boundaries and risk failure in order to allow us to evaluate unmanned technology and then move to operationalize that technology to inform the hybrid fleet," said 4th Fleet commander Rear Adm. Jim Aiken in October 2023. Even systems that fail provide a learning experience which will permit the Navy to push forward "at the speed of technology" to implementation if the integrated manned-unmanned force, Aiken said. While the Navy's fleet structure plans have called for incorporating 150 medium and large USVs and UUVs by 2045, the concept of the hybrid fleet goes much further, envisioning thousands of smaller systems integrated with the manned force. Speaking at the Surface Navy Association symposium in January 2024, Navy Secretary Del Toro declared that the hybrid fleet is "not a distant vision anymore," echoing statements by other leaders that the transition could be achieved by the end of the decade. Both

he and Chief of Naval Operations Adm. Lisa Franchetti emphasized the need to incorporate the "disruptive" capabilities of unmanned systems to, in Franchetti's words, "round out that warfighting ecosystem that is going to be what helps us deter, defeat, integrate with the joint force and our allies and partners to really get after the challenges that we see.[...] We are on the cusp of technological breakthroughs that are going to define future conflict."

Sidney E. Dean

Dean is a freelance writer and editor specializing in strategic studies, military technology and military history. He serves as North America correspondent for the publications of the Mittler Report Verlag.

Conrad Waters

The AUKUS Security Partnership

Three years after the AUKUS partnership was announced, rapid progress has been made on its core objectives, including a clear framework for Australia's nuclear-powered submarines. While early steps are promising, sustained commitment over decades is essential to achieve its full ambitions

On Wednesday 15 September 2021, the leaders of Australia, the United Kingdom and the United States of America published a joint statement announcing the creation of an enhanced security pact called AUKUS. Promoted as having the objective of helping to "...sustain peace and stability in the Indo-Pacific region", the partnership placed deepened technical collaboration on a range of security and defence capabilities at its heart. The first of these was a commitment to support the Royal Australian Navy (RAN) to acquire a new, nuclear-powered (but conventionally armed) submarine capability. Further trilateral cooperation across a range of other technologies was also envisaged. Now nearly three years on from that momentous event, it remains clear that AUKUS holds out the prospect of significantly enhancing the ability of the United States and its allies to deter an expansionist China across the Asia-Pacific region. However, it is a long-term project that will need to overcome many challenges if it is to withstand the test of time.

Background to the partnership

The fundamental driver behind the agreement of the AUKUS security partnership has been growing concern over the actions of an increasingly powerful and assertive China. China's rapid rise to the position of a global economic

superpower has been accompanied by the development of much greater military and, particularly, naval capabilities. This capacity has included the creation of a powerful anti-access/area denial (A2/AD) capacity over waters close to the Chinese mainland. Moreover, China's People's Liberation Army Navy (PLAN) has developed an embryonic ability to project power more widely into the Asia-Pacific through investment in aircraft carriers and associated shipping. Equally importantly, China has also become steadily more assertive in pushing its regional maritime claims in areas such as the South China Sea. It has often utilised so-called 'grey zone' activities – aggressive actions that fall short of war – to advance its interests. This stance has increasingly challenged the so-called 'rules based order' sponsored by the United States and its allies. Accordingly, current American strategic guidance sees China as its key strategic competitor and pacing challenge despite the more immediate threat posed by Russia. All this has served to drive the United States to strengthen its network of regional alliances.

Australian perspectives of China's growing might have also shifted in recent years. Although a major supplier of raw materials to the Chinese economy, its attitude has hardened as China's attempts to expand its influence across the region have grown. However, a major question for Australia has been how best to deter this expansion given its geographical position towards the region's southern extremity. This has tended to emphasise the development of its own capacity to project power through the acquisition of long-range missiles and an expanded RAN. The latter objective resulted in plans to construct a class of twelve diesel-electric, Attack class submarines to the French Naval Group's 'Shortfin Barracuda' design, doubling the size of its underwater flotilla. However, the increased speed, endurance and flexibility provided by nuclear propulsion compared with the more incremental improvements offered by the Attack class saw a steady erosion of the arguments supporting this approach. As such, building a new fleet of nuclear-powered submarines gained traction as a key strategic objective.

From the United Kingdom's perspective, much of the driver for AUKUS can be traced to the aftermath of the 'Brexit' decision to exit the European Union. This promoted the then Conservative government to pursue an alternative foreign relations policy that prioritised the develop-

ment of closer ties with the fast-growing economies of the Indo-Pacific. This approach was exemplified by the goal set out in the 2021 Integrated Review of Security, Defence, Development and Foreign Policy for Britain to be "...the European partner with the broadest and most integrated presence in the Indo-Pacific." The partnership also reflects the Anglo-Saxon heritage of close links with both Australia and the United States, perhaps best typified by all three countries' participation in the existing 'Five Eyes' intelligence sharing arrangement. Finally, the RAN's need for new, nuclear-powered submarines accorded well with the British Royal Navy's (RN's) own planned re-equipment programme.

AUKUS objectives

The announcement of AUKUS by Prime Ministers Scott Morrison and Boris Johnson together with President Joe Biden in September 2021 reflected these underlying objectives. First and foremost in the announcement was the commitment to support the RAN's new nuclear-powered attack submarine (SSN) programme. Practically, this initially involved the start of an 18 month long 'pathway' to determining how best this objective could be achieved. At the same time, the previous programme to build the French-designed Attack class was abandoned. There was immediate diplomatic fall-out in terms of Franco-Australian relations. The then French foreign minister, Jean-Yves

Le Drian rather undiplomatically described the move as a "stab in the back" from Canberra. More broadly, the European Union lamented the lack of prior consultation with respect to the announcement, suggesting it presented a negative image of a divided West. However, it seems that the broader diplomatic fall out was limited as tempers quickly cooled.

Whilst reporting largely focused on the new submarine programme, the scope of the AUKUS agreement reflected the security partnership's wider objectives. Notably the September 2021 announcement noted four additional advanced capabilities that would form the basis of further trilateral collaboration. These encompassed:

- Artificial intelligence
- Cyber capabilities
- Quantum technologies
- Undersea capabilities (additional to the new submarines)

President Joe Biden (centre), British Prime Minister Rishi Sunak (right) and Australian Prime Minister Anthony Albanese (left) speak at the AUKUS bilateral meeting held in San Diego, California on 13 March 2023 at which the pathway to Australia's acquiring nuclear-powered submarines was revealed. The meeting followed the initial announcement of the AUKUS strategic alliance on 15 September 2021. (© US Department of Defense)





A computer generated image of the SSN-AUKUS design that will be built for both the British Royal Navy and the Royal Australian Navy as a result of the so-called 'Pillar 1' of the AUKUS strategic partnership. (© Crown, 2023)

These capabilities have become known as 'Pillar 2' of the AUKUS agreement, the submarine acquisition programme being known as 'Pillar 1'.

Predictably, China reacted negatively to the agreement, correctly perceiving – although it was not expressly named in the AUKUS announcement – that it was the main target of the pact. China's foreign ministry spokesperson stated that the partnership "...seriously undermined regional peace and stability". The strength of this reaction likely demonstrated that the partnership had served its core underlying objective of strengthening deterrence against Beijing's ambitions of regional ascendancy. This was also reflected in positive statements from Japan and the Philippines, which both see themselves as being in the cross hairs of Chinese expansion. Other regional powers – fearful of future Chinese hegemony but still seeking to maintain vital trading links – were more nuanced in their response.

Early progress

The period since AUKUS' initial announcement has been dominated by news of progress with the 'Pillar 1' submarine acquisition. In general terms, this has been marked by a commendable sense of urgency that is often seemingly lacking from major defence programmes and which may reflect the extent of partner concerns

with what is widely regarded as a deteriorating global security situation. Notably, on 13 March 2023, a further joint announcement by the nations' leaders – two of whom had changed since AUKUS was first agreed – set out how the Australian SSN programme is to be achieved. This essentially involves a phased approach that commenced immediately but stretched forward into the 2040s and beyond. Key elements include:

- From 2023 onwards, Australian military and civilian personnel have started to be embedded in partner navies and their respective submarine industrial bases. This has been accompanied by an increase in the frequency of American and British submarines to Australian ports.
- From 2027, US Navy and RN submarines will be forward deployed to establish a rotational presence in Western Australia to be known as Submarine Rotational Force-West (SRF-West). Australia will establish the necessary infrastructure to support SRF-West, with RAN sailors gaining experience on the submarines and maintenance personnel supporting the boats.
- From the early 2030s, Australia will acquire three American Virginia (SSN-774) class submarines, with the possibility of buying two more if needed. This will ensure there is no capability gap as the current generation Collins class diesel-electric submarines retire.

<CONDOK>

The Systems House for Technology and Logistics



\$1000D IETD
LCCM **\$2000M** **PME**
SYSTEM SAFETY
IT SECURITY **LSA**

Kiel - Koblenz - Hamburg

www.condok.de

- From the early 2040s, Australia will bring into service SSN-AUKUS, a trilaterally developed submarine based on the United Kingdom's next generation design but incorporating American submarine technologies.

Significant steps have already been taken to implement the early stages of this pathway. In addition to relevant personnel transfers to the RN, Australia has approved AUD 1.5 billion (USD 1.0 billion) to commence work at the HMAS Stirling naval base in Western Australia to ready it for SRF-West deployments. Importantly, approval of the US National Defense Authorization Act for FY2024 in December 2023 provided the Biden administration with the legislative framework needed for the US to carry out its part of

the deal, including the training of RAN personnel and the future Virginia class SSN transfers. In addition, much work is already well underway on SSN-AUKUS, the final part of the critical pathway towards giving Australia a sovereign SSN capacity. Although some two decades in the future, the massive industrial enterprise involved in designing and constructing a new submarine mean that the delivery timescale is a relatively short one.

SSN-AUKUS

The foundation for the SSN-AUKUS is the previous British Submersible Ship Nuclear Replacement (SSNR) programme. Conceived to replace the current RN Astute class, this project started to gain momentum in September 2021 with the award of contracts to BAE Systems and Rolls-Royce Group to undertake conceptual studies for, respectively, the submarine platform and its nuclear propulsion system. The March 2023 agreement means that SSN-AUKUS will build upon this initial work, becoming the next generation submarine for both the RN and its Australian counterpart. It seems that five of the class will be built for the RAN but details of the United Kingdom's requirement have yet to be publicly announced. The new boats will also incorporate US Navy submarine technologies encompassing elements of the propulsion plant, vertical launch systems, and weapons. It appears that the combat management system will be evolved from the AN/BYG-1 system used aboard both the Virginia and Collins classes. Whilst SSN-AUKUS is essentially based on a British design, construction of the submarines for the two navies will take place in their respective home countries. Assembly of the British submarines, which will begin earlier than their Australian sisters to meet a planned start of deliveries in the late 2030s, is being entrusted to BAE Systems' Barrow-in-Furness shipyard. The company was the primary beneficiary of GBP 4 billion (USD 5 billion) of contracts signed on 1 October 2023 under a five-year 'Detailed Design and Long Lead Items' (D2L2) phase that will ultimately see the start of work on the new boats. Meanwhile, the Australian members of the class will be built at a new Submarine Construction Yard at Osborne in South Australia, which is the



The US Navy launches a hypersonic missile during a Navy Strategic Systems Programs and Army Hypersonic Project Office test from the NASA Wallops Flight Facility in Virginia on 26 October 2022. Hypersonic and counter-hypersonic technologies have been brought within the advanced capabilities being explored under 'Pillar 2' of AUKUS. (© US Navy)



Sailors assigned to the Los Angeles class fast-attack submarine USS Springfield (SSN-761), participate in a weapons handling exercise at the Royal Australian Navy's HMAS Stirling base on Garden Island off the coast of Perth, Australia in April 2022. From 2027, American and British submarines will be deployed to Stirling as part of Submarine Rotational Force-West. (© US Navy)

focal point of much of the country's existing naval industry. Under an arrangement announced in March 2024, it has been decided that that ASC Pty Ltd – builders of the Collins class – and BAE Systems will work in partnership to deliver the new submarines. This arrangement will leverage BAE Systems' work on the British arm of the project and also reflects its current presence at Osborne through its leadership of the RAN's Hunter class frigate programme. Although the Royal Australian Navy's AUKUS submarines will be built in Australia, manufacture of all SSN-AUKUS nuclear reactors will be entrusted to Rolls-Royce in the United Kingdom.

Whilst SSN-AUKUS has inevitably been the focus of the partnership's efforts, work has also commenced on a number of the capabilities that form Pillar 2 of the agreement. For example, an AUKUS Undersea Robotics Autonomous Systems (AURAS) project is seeing collaboration on autonomous underwater vehicles that are intended to act as a significant force multiplier for the partner nations' maritime forces. It has also been announced that Pillar 2 has been expanded to cover four additional areas encompassing electronic warfare; hypersonic and counter-hypersonic technologies; information sharing; and the rather generic field of innovation.

Opportunities and challenges

The AUKUS security partnership holds out the potential of accruing considerable benefits for all three members. From an American perspective, it marks a major step forward in its strategy of building regional alliances to counter Chinese influence and helps ease the increasing strain that is associated with maintaining a 'Pax Americana'. Meanwhile, the

arrangement promotes the United Kingdom's objective of expanding its influence in Asia in the aftermath of Brexit and helps fund its own naval rearmament in an increasingly threatening world. However, it is arguable that it is Australia that has the most to gain if the partnership's promise is fully achieved. In essence, delivery of AUKUS will cement Australia's position as a leading provider of security across the Asia-Pacific, increasing its regional influence whilst materially strengthening its own defences in an uncertain age. It will become one of the very few countries with the capacity to operate a flotilla of SSNs, providing an almost unrivalled maritime capacity to deter potential enemies and favourably influencing the regional balance of power. In short, Australia will become a more valuable ally and a more threatening opponent.

However, the argument is not all one-sided. The Australian nuclear submarine programme alone has been estimated to cost, including contingencies, up to AUD 368 billion (USD 250 billion) over the next three decades; a colossal figure that will likely impact not only the rest of the military but also the wider economy. A project of such magnitude is truly a national endeavour that will require a sustained commitment over a lengthy period to achieve its objectives. As such, AUKUS still faces considerable challenges in the years ahead if it is to realise its potential. The following are just some of the hurdles that will need to be overcome:

Political change: AUKUS requires ongoing political resolve from its trilateral partners. However, Australia's Scott Morrison and the United Kingdom's Boris Johnson, two of its principal architects, have already departed the political scene. To date this has not had a material impact. Importantly, Australia's replacement Labour Albanese

administration has remained firmly wedded to the deal first agreed by its Liberal opponents. Equally, despite past criticism of Johnson's 'Indo-Pacific tilt', Keir Starmer's newly elected British Labour government specially affirmed its commitment to AUKUS in its election manifesto. A more significant challenge may be posed by the forthcoming American presidential election if the Biden administration is replaced by a more 'transactional' second Trump regime. In any event, political change is likely to buffet the AUKUS partnership as it progresses towards its objectives.

Infrastructure: On a practical level, realisation of Pillar 1 of AUKUS is going to require a major programme of capital investment to deliver the new generation of submarines envisaged. It has been reported that Australia will provide USD 3 billion to the United States in coming years to help ease bottlenecks in America's own submarine construction infrastructure. However, much larger sums will be required to restore the United Kingdom's much-eroded submarine manufacturing base whilst providing Australia with an entirely new capability. For example, BAE Systems is doubling the size of its Barrow-in-Furness shipyard's facilities to around 160,000 m² to accommodate Royal Navy SSN-AUKUS production and a similar quantum of expansion is envisaged at the Rolls-Royce factory in Raynesway, Derby that will build the nuclear reactors for all the class. In Australia, it is estimated that up to 4,000 workers will be required just to design and build the new infrastructure at Osborne that will ultimately assemble the new submarines. Whilst it seems that there is the willingness to make this investment, the upgrades will need to be implemented smoothly if SSN-AUKUS construction is to progress to time.

Skills development: The capital investment required by Pillar 1 is only one part of the picture. A further significant challenge is the necessity of finding and developing the people needed to build, operate and sustain the new submarines. Having reduced to fewer than 5,000 employees in the Cold War's aftermath, BAE Systems' Barrow-in-Furness yard has steadily increased its rollcall to around 13,500 but will still need to find a further 4,000 workers to support peak SSN-AUKUS production. The challenge for Australia is greater, with perhaps as many as 5,000 new shipbuilders required to realise its part of the project; not to mention additional workers needed for ongoing sustainment. American submarine builder Huntington Ingalls Industries has partnered with the United Kingdom's Babcock – which is responsible for sustaining the RN's existing submarines – to offer a comprehensive programme to promote and grow a skilled sovereign nuclear workforce in Australia. In

June 2024, a new company named H & B Defence was formed to carry out this task. Whilst the experience the two companies bring could prove crucial, it is hard to underestimate the magnitude of the requirement. Moreover, recruiting the skilled personnel required to crew the new Australian boats will be another hurdle given a track record of problems meeting the much lower crewing levels of the existing Collins class.

Expanding the partnership: Looking beyond the SSN-AUKUS submarines, implementation of the partnership's Pillar 2 poses more questions. The wide-ranging nature of the capabilities being addressed under Pillar 2 suggests that some may be achievable more quickly than the long term submarine project. Additionally, they offer the prospect of enlarging at least some elements of AUKUS to involve additional friendly nations. Canada and New Zealand – the two other Five Eyes partners that form part of the broader 'Anglosphere' have often been named in this regard, as have Japan and South Korea. Some of these countries could bring additional technological capabilities to the partnership and all would align with the American strategic objective of strengthening its network of alliances. However, there seems to be some reluctance on the part of Australia and the United Kingdom to extend what is already an ambitious endeavour at a relatively early stage, suggesting potential frictions in the partnership in the future.

Conclusion

Work on implementing AUKUS' core objectives has proceeded at a rapid pace since the strategic partnership was first announced some three years ago. In particular, a clear framework has been established for delivering Australia's planned nuclear-powered submarines and important early steps have been taken to lay the foundations for the programme's realisation. However, delivery of the AUKUS endeavour will require sustained commitment over many decades if the full extent of its ambitions is to be achieved. Whilst the initial signs are encouraging, there is still much work to be done.

Conrad Waters

Waters is Editor of *Seaforth World Naval Review*, Joint Editor of *Maritime Defence Monitor* and a regular contributor to other *Mittler Report* publications.



MPV 120



Military RHIBs



**PERFORMANCE
AT SEA**

Ships | Boats | Service
www.fassmer.de



FCC 17 Alligator

Jean-François Auran

Maritime piracy situation in the Gulf of Guinea in 2024

The Gulf of Guinea is one of the world's most dangerous maritime areas. Piracy and other forms of maritime crime pose a threat to global shipping and free trade, to the safety of seafarers and to the stability of the regions concerned. After a worrying increase in the number of cases, the phenomenon is on the decline.

Security situation in the Gulf of Guinea

In 2024, when we talk about maritime piracy, it is no longer the waters off the Horn of Africa that immediately come to sailors' minds, but rather the waters of the Gulf of Guinea. In recent years, this region has been the scene of regular attacks reported by media worldwide. In East Africa, the starting point for piracy was Somalia; but it began in Nigeria on the west coast of Africa. In the early 2010s, Gulf of Guinea maritime piracy expanded significantly. It picked up speed in 2017 before peaking in 2020. The growth of this phenomenon has pushed the navies of many countries, especially Western ones, to increase their presence in the area. But it has also resulted in the strengthening of local navies against the pirate threat. Following a few years of relative peace, an upsurge in maritime robberies and piracy in the Gulf of Guinea occurred during the first half of 2023. The Gulf of Guinea is a strategic area at the crossroads of major maritime routes, rich in fishing resources, hydrocarbons, and precious minerals. Oil and gas are, therefore, the two natural resources whose exploitation gives the Gulf of Guinea this geostrategic dimension. Nigeria is

the main hydrocarbon producer on the continent, sharing first place with Angola. Illegal, unreported, and unregulated fishing (IUU) constitutes the second scourge affecting this area. If left unaddressed, it would have caused the loss of more than 300,000 artisanal fishing jobs in the region and a loss of annual income estimated at USD 10 billion. Among the problems, we must not forget marine pollution, drug trafficking and illegal population movements. The increase in acts of piracy has also reignited the debate around private security actors. They have developed a full range of services capable of covering all the needs of maritime stakeholders: escorts, training, logistical means, or advice, intended both for shipowners and for States wishing to outsource the protection of ships.

Piracy patterns

Most sovereign states consider the modern definition of piracy as defined by the United Nations Convention on the Law of the Sea (UNCLOS). Article 101(a) stipulates four conditions that an occurrence must meet to qualify as an act of piracy. Maritime piracy comprises: (1) an illegal act of violence or detention; (2) committed for private ends; (3) on the high seas; and (4) by one ship on another ship.

When maritime piracy first began in the Gulf of Guinea, the main tactic used by pirates was to pillage ships and then flee with the stolen goods. Most successful operations up until the middle of the 2010s occurred in the form of hijackings of oil tankers, which were then carried to prearranged places onshore. From 2016 to 2021, pirate groups in the region changed their modus operandi, favouring instead "kidnapping for ransom". The 2022 United Nations Secretary-General report on piracy estimated that armed robbery and piracy in the Gulf of Guinea cost the region over USD 1.9 billion annually.

Pirates target oil production, including gas platforms and tankers, many of which are in the area, but all types of vessels, including cargo ships and fishing boats, can be attacked. Piracy is also becoming more common outside of the exclusive economic zone (EEZ) because it is far more difficult to provide help and intervene in international waters than national waters. Piracy attacks still largely follow a seasonal pattern, with favourable weather conditions leading to more attacks in the November to April period. Examining offshore maritime piracy acts by month over the past five



Operation Corymbe's French crews carry out training missions supporting the TICA regional maritime school in Equatorial Guinea. (© Marine Nationale)

The Ghana Navy ship "Volta" (P 40) and the Lewis B. Puller-class Expeditionary Sea Base USS Hershel "Woody" Williams (ESB 4) transit through the Gulf of Guinea.

*(Photo by Petty Officer 2nd Class Ethan Morrow
U.S. Naval Forces Europe-Africa/U.S. Sixth Fleet)*

Gulf of Guinea

The broader vision determines that this area extends from Senegal to Angola, i.e., 5,700 km of coastline. This region is complex since it is bordered by French-speaking, English-speaking and Portuguese-speaking countries, all endowed with immense wealth (notably in hydrocarbons),

but where the populations suffer from poor economic and environmental conditions, which pushes some to turn towards carrying out robbery and attacks, even hostage-taking. The states of the Gulf of Guinea present substantial differences in terms of geographical dimension and economic weight. Along the coast of the Gulf of Guinea, there are many large and medium-sized cities; 80% of the economic activity of these countries is concentrated in these metropolises: Abidjan, Accra, Lomé, Cotonou, Lagos, Douala, Libreville and, by extension, Luanda.





A Senegalese sailor participates in a visit, board, search and seizure training scenario aboard the Gambian Navy's Kuntah Kinteh.

(© U.S. Navy photo by Mass Communication Specialist 1st Class Ryan U. Kledzik/Released)



Ghana Navy and Sierra Leone Armed Forces personnel move in formation up a ladder on Cutter-class patrol ship "Anzone" (P 30) while conducting a maritime interdiction and detention scenario at Obangame Express 2024.

(© U.S. Navy photo by Lt. j.g. Daniel Ehrlich)

years provides a picture not only of favourable weather for pirates, but also of months of international activity. There are also different interpretations of the possible links between the widespread phenomenon of sectarianism, piracy, and maritime crime. Finally, the pirates' negotiators also seem to have become more professional, having learned lessons from numerous kidnappings. However, incidents of piracy have been observed despite the external military presence, including on 26 March 2018 within Ghana's waters during the US-led Obangame Express exercise. The fishing vessel Marine 711 was hijacked offshore Cape Saint Paul, Ghana.

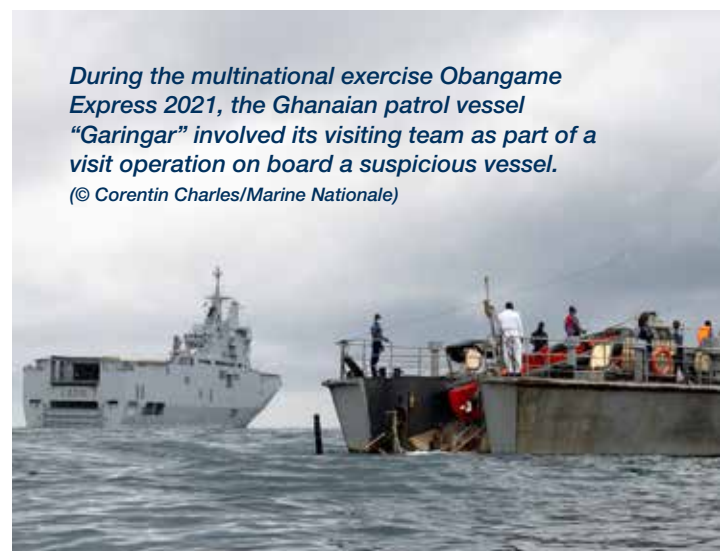
Lack of judicial treatment

Although piracy has been a recurrent phenomenon in the Gulf of Guinea for several years, the number of convictions for piracy in the region has been limited, partly due to the lack of adequate national legal frameworks, which have been under development in recent years. Nevertheless, piracy's criminalisation and the establishment of universal jurisdiction for the prosecution of piracy is progressing, especially in the western part of the Gulf of Guinea, such as Cabo Verde, Senegal, Liberia, Togo, and Nigeria. The Gulf of Guinea region has a long history of socio-economic underdevelopment – in contrast to the vast oil and gas wealth concentrated in the hands of foreign oil majors, regional companies, and political elites. There are also alleged ties between hackers and high-level actors in powerful political positions. This very juxtaposition was a major motivating factor for early militant groups operating in the region, including the Movement for the Emancipation of the

Niger Delta (MEND) and the Niger Delta Avengers (NDA). However, many socio-economic circumstances remain unchanged despite efforts to prioritise the development of coastal communities.

The response of African countries

The emergence of piracy in the Somali basin has raised awareness of the vulnerability of all African countries in this area. In 2013, leaders of the Economic Community of West African States (ECOWAS), the Economic Community of Central African States (ECCAS) and the Gulf of Guinea Commission (GGC) laid the foundations for a joint regional maritime security strategy at a summit in Yaoundé, Cameroon. Under UN auspices, the members of the three



During the multinational exercise Obangame Express 2021, the Ghanaian patrol vessel "Garingar" involved its visiting team as part of a visit operation on board a suspicious vessel.

(© Corentin Charles/Marine Nationale)

main regional organisations committed to building a regional structure with African responses and adopting common rules and a code of conduct. The so-called Yaoundé architecture includes the Interregional Coordination Centre (CIC), which ensures information exchange and coordination between the Central African Regional Maritime Security Centre (CRESMAC) and the West African Regional Maritime Security Centre (CRESMAO). The coastal area is subdivided into five operational maritime zones, whose activities are coordinated coordination centres (CMC). Every country agrees to set up a maritime operation centre (COM), allowing interservice coordination.

Thanks to the Yaoundé architecture, African navies exchange operational information more fluidly. The coordination put in place makes it possible to go beyond national interests alone and to pursue a vessel beyond one's own waters. Patrols and the exchange of information help to reduce tensions and often help fishermen in difficult times, even if countries such as Congo and Angola regularly accuse their neighbours of illegal fishing. They also carry out exercises and seminars within the framework of the Yaoundé architecture. On its 68th anniversary, the Nigerian Navy organised an international maritime conference in Lagos from 30 May to 1 June, entitled "Promoting Africa's Blue Economy through International Security Cooperation" and a regional maritime exercise. Since its inception, the Yaoundé process has received support from many partners, including the UN, the African Union (AU), the USA, France, the United Kingdom, Brazil, and particularly the EU. Most African nations have strengthened their navies to counter this threat. Nigeria's Navy is the sixth largest in Africa, behind Egypt, Algeria, Morocco, and South Africa.



ProfiSeal®

Worldwide unique – our fireproof bulkhead seal

Approved up to
500 mm shaft diameter



Your reliable propellershaft seal solution - since 1995

ProfiSeal is your specialist for sealing and bearing technology in commercial and recreational shipping. Our main activities are in the segments of workboats, government vessels and yachts.



3.-6. September 2024
Visit us at SMM
hall A3, booth 408



www.profiseal.com

Another example is the Senegalese Navy, which has seen a remarkable increase in strength. Three offshore patrol vessels (OPV58S) with an endurance of 4,500 NM and Marte MK2/N anti-ship missiles were built for Senegal. The flagship OPV190, “Admiral Foulalou”, was also delivered by the French shipyard OCEA. It is one of the largest aluminium OPVs ever built in Europe at 58 metres long and 9.4

Types of pirates:

■ **Deep Offshore Pirates** are capable of operating far from the coast of West Africa and targeting international shipping traffic. Deep Offshore pirate groups have become increasingly more sophisticated, as seen for example in their ability to take more hostages per attack. These groups have expanded their geographic reach further into the Gulf of Guinea when incidents were previously concentrated in Nigerian waters. The number of Deep Offshore pirate groups is estimated to be between four and six.

■ **Coastal and Low-Reach Pirates** operate up to 40 NM from shore, primarily targeting local vessels. These groups usually operate close to their hideouts or bases onshore and have a limited operational range capacity. The targets are mainly fishing vessels operating along the coast, oil and gas support vessels, cargo vessels, and tankers engaged in cabotage operations. Their modus operandi includes looting, racketeering, and kidnapping for ransom, focused more on local crews than on foreign seafarers.

■ **Riverine Criminals** are often referred to locally as ‘pirates’, though their criminal activity does not fall under the UNCLOS definition of piracy, as they operate in the waterways deep within the Niger Delta, where they target local passenger vessels, as well as engage in other crimes. Some arrests of ‘pirates’ reported by Nigerian agencies and media are highly likely of Riverine Criminals and illegal oil ‘bunkerers’ (hacking into pipelines), arrested in the creeks of the Niger Delta. These groups pose a more immediate security threat to local populations in the Niger Delta region than to international vessels and their crews.

Source: Global Maritime Crime Programme of UNODC.

metres wide. In addition to its navigation and surveillance radars, the “Fouladou” is equipped with a Vigy Observer optronic system in its mast, which enables precise geo-location thanks to laser telemetry, as well as the observation and identification of targets at sea, day, and night. Being built of aluminium, its operating costs are lower than a steel-built vessel. For coastal patrols, the Senegalese Navy’s fleet also includes three Israeli Shaldag MK IIs. The Ivorian Navy, meanwhile, operates six patrol vessels; the OPV 45 “Espérance” was built in Israel and is now nearing the end of its operational preparations. Several years ago, Côte d’Ivoire received the P400 patrol boat Contre-Admiral “Fadika” from the Piriou shipyards. Cameroon operates the CNS Dipikar (P107), the former French patrol vessel “Grebe”, and ten years ago, took delivery of two newly built Chinese OPVs, known as P108 and P109, built by Poly Technologies. Their maintenance is carried out at the Douala naval base, which continues to be supported by the Chinese partner. These two vessels have participated in numerous activities, including an Atlantic crossing in 2022 to Natal and Rio de Janeiro. While Cameroon and Brazil maintain close naval cooperation, Angola is also a country that has reinforced its naval capabilities. The Marinha de Guerra Angolana (MGA) already has two patrol boats built by Damen, initially dedicated to the Ministry of Fisheries. After acquiring three 32-metre HSI-type interceptors capable of reaching speeds of 45 knots and three 42-metre trimaran patrol boats of the Ocean Eagle class from the Constructions Mécaniques de Normandie (CMN) of Cherbourg, she will receive three corvettes BR71 Mk II from the United Arab Emirates.

The rest of the world’s contribution

Through Resolutions 2018 and 2039, since 2011, the UN Security Council (UNSC) has adopted what is a militarised approach to dealing with the menace of piracy in the region, as in the Gulf of Aden. In 2022, a new UNSC Resolution (2634) was adopted following a Norwegian and Ghanaian initiative. The Security Council calls on all partners to strengthen cooperation on maritime safety and security in the region. The United Nations Office on Drugs and Crimes (UNODC) manages a Global Maritime Crime Programme (GMCP) with activities in counter-piracy, maritime capacity building, and combating maritime crime, including the trafficking of illicit substances by sea. The big powers, mostly Europeans, have long had an interest in the region with European vessels regularly patrolling these waters to protect fishing companies and European tanker traffic.

In addition to regular maritime deployments, it appeared necessary to have bodies for exchanging information and monitoring traffic. The Maritime Information Cooperation & Awareness Center (MICA Center) was created in 2016 to monitor maritime traffic on a global scale and identify events affecting maritime security. Staffed by around 30 personnel from the French Navy and partners, it monitors maritime traffic 24/7. The MICA Center also relies on the Franco-British cooperation agreement of Maritime Domain Awareness for Trade-Gulf of Guinea (MDAT-GoG) for the Gulf of Guinea. This agreement enables the voluntary exchange of information to benefit the shipping industry and merchant vessels of all nationalities. It is thus a contribution to maritime security in the region in support of the structures of the Yaoundé process.

” **The 2022 United Nations Secretary-General report on piracy estimated that armed robbery and piracy in the Gulf of Guinea cost the region over USD 1.9 billion annually.**

European countries

In 1990, France launched Operation Corymbe with one or two ships, supported by a maritime patrol aircraft, permanently stationed in the Gulf of Guinea. From Senegal to Angola, one ship usually carries out surveillance missions at sea, information exchange, boarding operations, and exercises with neighbouring navies. In 2024, OPV FS Commander Birot was deployed for almost three months. After calling at various African ports, the crew participated in training sessions aimed at students attending the inter-regional naval school of Tica (Equatorial Guinea). French personnel are also deployed as trainers or advisers to assist partners. This deployment is also in line with the concept of a Coordinated Maritime Presence (CMP) launched by the European Union. Other countries, including Denmark have joined the initiative (Maersk, the world's largest shipping company, is a Danish company). India is also joining the fight against piracy. In October 2023, the European Union and India conducted their first joint naval exercise in the Gulf of Guinea. The exercise followed the third EU-India Maritime Security Dialogue meeting on 5 October in Brussels.

US initiatives

The United States has always worked to secure the seas. The US Navy and the US Coast Guard participate in cooperation programmes with African countries. United States

Naval Forces Europe and Africa Command conducts Africa Partnership Station (APS), a programme that seeks to improve capabilities with partner naval forces using four “pillars” to increase maritime safety and security through a regional and comprehensive approach. The first one is to develop maritime domain awareness to maintain a clear picture of the maritime environment. The others are to build maritime professionals, establish maritime infrastructure

and develop response capabilities while building a regional integration programme. There is also the Africa Maritime Law Enforcement Partnership (AMLEP) that aims to enhance the maritime enforcement capabilities of African partners.

We can also mention the G7++ Friends of the Gulf of

Guinea, a multilateral coalition of regional countries and international partners; this political forum actively works with the International Maritime Organization (IMO).

Training and exercises

Joint training and major international exercises are regular opportunities to increase interoperability and develop the capabilities of local navies. For example, the FS Commander Birot participated in two major multinational exercises; the US-organized Obangame Express 2024 and the French-led MEGALOPS. There is also the African Nemo series designed and conducted by the French Navy.

To conclude, the highly fungible nature of maritime security threats means that this challenge cannot be addressed solely by individual states but requires cohesive regional security cooperation. The recent decline in piracy in the Gulf of Guinea is supported by a range of factors, such as the positive impact of piracy convictions in Nigeria and Togo in July 2021 and the deterrent effects of increased naval patrols of the Nigerian Navy associated with strengthening cooperation with regional partners.

Jean-François Auran

Auran was an officer in the French Army before becoming a defence researcher. He holds a Ph.D. in history and regularly contributes to French and European defence magazines.

Nikolaus Scholik

Global power protection and the safety of sea Routes

More than any other political or economic issue, people are concerned about security of supply and local, or at most regional, peace.

Since the end of the last World War, geopolitical events have been occurring at an ever-faster rate than in previous centuries.

These events are dominated by two key factors, namely global population growth and the associated decline in global environmental conditions. However, as long as the first two dimensions, namely supply security and peace, are guaranteed in our own region and without repercussions, no threat or obvious degradation will be felt. Problems, on the other hand do occur, but people are all too happy to believe that they will be solved "somehow".

The changes in the global system – politics, economy, environment, wealth distribution and growth – which began with the collapse of the Soviet Union and later with 9/11, have taken on a different dimension and dynamic and today present a completely changed picture of the global political and economic situation. However, the realisation that global problems also require global solutions has still not really taken hold and is at best rudimentary and partial when viewed in the most favourable light. This essay addresses the foundations, effects and circumstances of the maritime conditions that are irreplaceable for global trade and thus global prosperity – the free use and security of the sea lanes.

Global "order"

If one follows the history and school of political realism, the cornerstones of that development from Thucydides

to Hobbes, Mackinder to Morgenthau, and then Waltz to Mearsheimer today, must still be taken into account. Rather than being exclusive, this is a clear and fundamental choice for this essay.

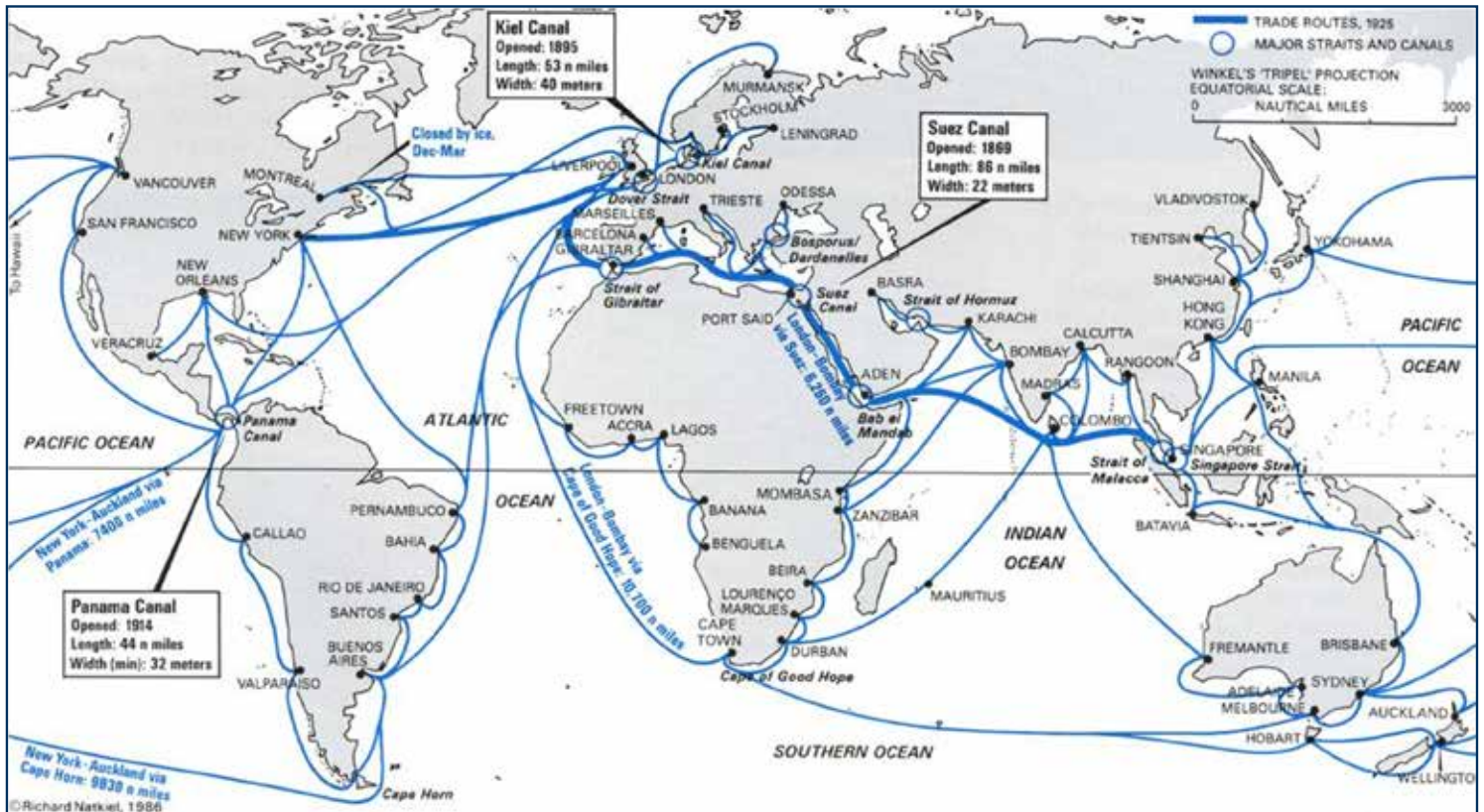
In the harsh world of political-military power, based on the undeniable primacy of the "normative force of the factual" (G. Jellinek) and sole, national interests as the main factor of political thought and action, there are few if any alternatives available as a solid theoretical basis. Problems of global significance must therefore be solved on the still irrefutable basis of Waltz's anarchic state system, without a higher, enforceable order. The contradiction to consensus and reason-orientated thinking and action is obvious and cannot be bridged. All attempts after the failure of the League of Nations (1920–1946) to establish a suitable basis for a peaceful international order from the successor organisation United Nations have clearly failed thus far. And today, after a brief phase of hegemony by the United States (1991–2001), there is no clear dominance recognisable, no

system, either bi- or multipolar, even a struggle for system and leadership between several major powers as the only constant of the international "order". These are extremely difficult conditions for efficiently solving the imminent global problems.

It is also clear that the role of US leadership in the international system is being openly questioned by China (PRC/Thucydides' trap). The agreement of the so-called Global South (an informal group of developing and emerging countries) against the democracies of the West (G7, an equally informal organisation with Germany, France, Great Britain, Italy, Japan, Canada and the United States; the European Union is represented at all meetings), which only exists on paper, does not fit into any scheme, let alone an institutional order. Anarchy, i.e., global disorder, is and remains the structure of the international system.

Geography and sea power

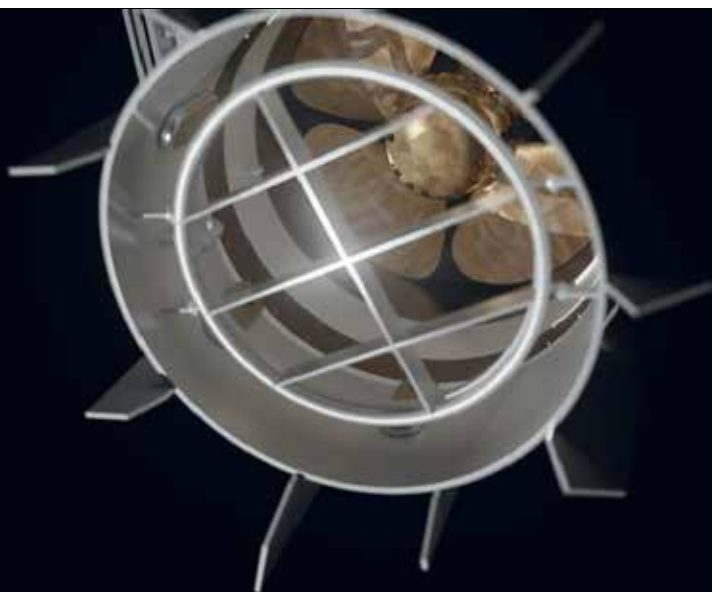
70-80-90: these three figures provide a quick and easy introduction to the importance of geographical facts. A total of 70% of the Earth's surface is covered by water, 80% of global trade (goods, raw materials, food, etc.) is conducted via the oceans and 90% of humanity lives in a belt that extends from the coastlines inland, i.e., with very close contact to the seashore. The resultant importance of the



Sea Lanes of Communications/Slocs and Choke Points (© Richard Natkiel)

sea and the ways in which it can be utilised is thus sufficiently defined. All the consequences to be drawn from this are therefore of significant importance for humanity, regardless of political, economic or social systems. Since 10 September 1982, with the deposit of the 60th

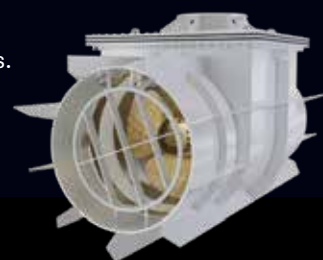
ratification agreement (today over 160 states), the safety of sea routes has been regulated by the UNCLOS treaty system for international maritime law. The decisive factor is that the national, geographical-terrestrial rights are defined and accepted with the 12 nautical mile zone – with



SILENCE NEVER SOUNDED SO POWERFUL

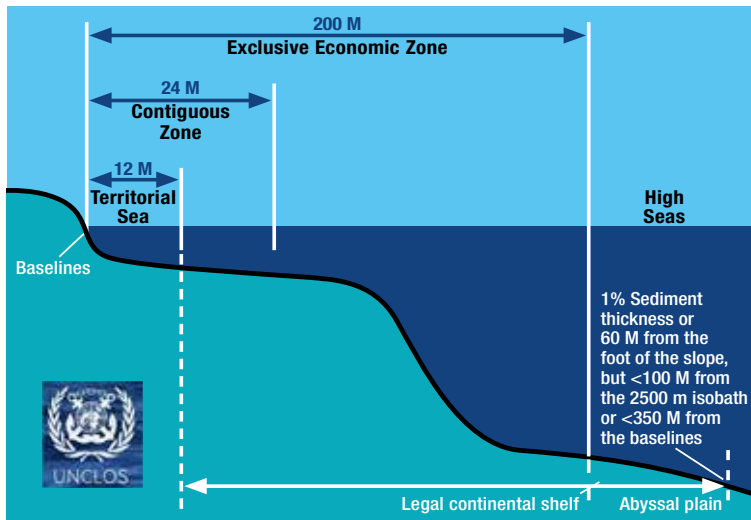
The design of a transverse thruster influences its efficiency – and the noise emitted by the drive. In the design of our low-noise thruster, we rely on Active Noise Reduction and Passive Noise Reduction. The result is impressive: It is oh so quiet.

We are a Hamburg-based manufacturer of marine propulsion and control systems. Contact us at sales@jastram.net or visit our website jastram.net



Meet us at the SMM – Hall A3, Stand 200





UNCLOS Maritime Zones

one exception: although China co-negotiated and ratified UNCLOS, it rejected its judgement regarding territorial claims in the South China Sea following a lawsuit brought by the Philippines before the International Tribunal for the Law of the Sea in Hamburg (ISGH/2016) and declared both the tribunal and the judgement “null and void”. The difficulties arising in this area, on the northern border of which lies Taiwan, one of the major neuralgic points in terms of safe sea lanes, have been a cause for sincere concern ever since and are a prime example of international disorder. China simply does not recognise an international ruling, thus creating an example for many states with similar political systems (authoritarian to totalitarian) and a similar understanding of the law that is unfortunately worthy of emulating. Maritime power must therefore recognise and secure international trade and the use of sea lanes based on a recognised principle of order (UNCLOS). The actors in the international system of states that are politically and militarily capable of doing so must in turn be able to realise their rights with regard to the system, either as partners or individually. Either diplomatically and peacefully or, in the opposite case, militarily.

The rules of realism for behaviour in the international anarchic state system demand that precautions must be taken, especially by states with a claim to leadership and corresponding military potential. To this end strategic planning and corresponding military potential must be created and kept ready in addition to an assessment of the geographical conditions. This is not possible at this level without a grand strategy – too many components, precautions, foundations and technological and industrial capabilities need to be defined, developed and centralised in order to

provide the necessary instruments and keep them operational: a military blue navy with global projection capability. This navy must have aircraft carriers, organised into battle groups, with all the necessary subsystems for combat on, above and below the water and into near space. The general mission requires the equipment and ability to carry out tasks on the oceans: patrolling, supplied locally from its own national bases, equipped, and led accordingly. From friendly visits to conducting aid missions during natural disasters to combat missions of various depths, all on a global scale and, if necessary, at several crisis points simultaneously. Only carrier strike groups (CSGs) are capable of this, and to put it clearly and directly, only the US Navy (USN) is currently militarily strong enough to do this, and this is foreseeable for one to two decades to come.

Apart from the basic elements necessary for the security of the CSG itself on, under and above the water, the composition is determined by the deploying fleet. USN fleets are not maritime combat units per se as in the past, but an organisational command; for example, this is the case in the Indo-Pacific region with the US Indo-Pacific Command’s the 5th and 7th Fleets. These then assemble the elements required to fulfil a mission in accordance with the assignment (US Navy Command) and integrate them into a CSG – for example amphibious capabilities, corresponding drone systems (observation-reconnaissance-combat elements) and special equipment/operational units. In addition to USN elements, USMC (US Marine Corps) resources are also taken into account. This form of organisation adapts to the task and corresponds to a flexible distribution and preservation of the resources available to the USN – for decades. However, the prerequisite is to have the hardware, software and trained manpower available and ready for deployment at all times and in the appropriate quantity and quality.

A secure supply depends primarily on free and open sea routes on two main axes: the transatlantic New York to the European west coast, and the Indo-Pacific via the Straits of Malacca, Babel-Mandeb, Suez Canal, Straits of Gibraltar and also primarily to the harbours on the European west coast. This applies both to certain raw materials, but above all to goods and commodities from the Indo-Pacific region to Europe and also, albeit to a lesser extent, to European exports in the opposite direction. While the use of the sea lane of communication (SLOC) is legally secured by the UNCLOS agreement of the United Nations in times of peace and can therefore be assumed to be de facto free and secure, this does not apply in times of tension or

armed conflict. These can also affect the so-called choke points, “geographical sore points“ of globalised world trade and the method of organised supply chains, which require production, transport and timely delivery as a sine qua non. The case of a freighter that ran aground in the Suez Canal quickly and clearly demonstrated the negative consequences of any “peaceful“ technical problem or even human error in a canal or in the vicinity of choke points.

On the other hand, the crisis in the Red Sea during the Israeli–Palestinian conflict demonstrated the skilful use of a choke point by a neighbouring state in disintegration (Yemen, civil war) at the military level: with cheap drones and smaller missiles, mainly supplied to the Houthi rebels by Iran, traffic through the Red Sea was severely disrupted. Only military-maritime forces could be deployed here. And even that, albeit primarily for political reasons, was only at the lower end of the possible deployment spectrum. As was to be expected, the focus was on the United States, which deployed the aircraft carrier battle group CSG 2/ Eisenhower to the Red Sea on 23 November 2023.

The players and their potential

Of the five permanent members of the United Nations Security Council (with veto power), all have aircraft carriers CV/CVN (carrier vessel/carrier vessel nuclear) and CSG, with profoundly different strengths and capabilities. Even with a drastic catch-up programme (China, maritime), Beijing is well aware that no real global power projection can be achieved from now until around 2035/40. Accordingly, China must measure its ambitions for world leadership, which is not necessarily only sought through military action, against this lack of potential. Strict procedures and money alone will not be sufficient to establish the required military system. The world has now also recognised the true intention of the One Belt One Road initiative (OBOR), which Beijing presented from the outset as a purely economic action linked to aid programmes. Although enormous resources were used, the lack of naval power and protection of Chinese maritime interests on the high seas were only partially compensated for by a significant development of local bases, particularly harbours on vital sea routes and choke points for China. Two European powers (though not the Union) have one CVN/France and two CVs/United Kingdom, i.e., one and two CSGs, respectively. According to the old carrier rule “one is none, two/three are one etc.“, projection tasks are therefore only feasible to a very limited extent. The only Russian carrier is barely operational due to its age and technology, and Russia is clearly categorised

as a land power; from a qualitative and quantitative perspective, only hunter-killer and ballistic missile submarines are operationally available, but can in no way replace an ocean-going fleet.

Secure sea routes are of crucial importance for all powers/major powers, as today’s global economy is governed by different rules than in the past. Availability via scheduled production chains, delivery on demand and production on demand require free sea routes and punctual deliveries – for all parties involved. A crisis in the South China waters, in which commerce is threatened or perhaps halted, would create immediate challenges for all users of this sea route that could not be quickly resolved.

The United States alone (with the help of its allies) is still in a position to protect global sea routes or influence maritime

SI SCHIFFSTECHNIK

INNOVATIVE PROPULSION SYSTEMS FOR MANY TYPES OF NAVY VESSELS – FROM SMALL TO LARGE

HamiltonJet

BRUNVOLL
PRECISION IS OUR PASSION



Waterjets are used when high speed, high acceleration, agile manoeuvrability or use in shallow water is required. Jets are optimized for a top speed of approximately 60 knots.

Brunvoll is trusted for shock qualified naval manoeuvring thrusters. Elastic deformation, resilient mounting and rubber isolation provide shock absorption in compliance with naval specifications.

SI Schiffstechnik GmbH & Co. KG is the exclusive representative the high-profile ship equipment manufacturers HamiltonJet and Brunvoll AS.

SI Schiffstechnik GmbH & Co. KG

Robert-Bosch-Str. 7a
23909 Ratzeburg • Germany

Phone: +49 4541 80 261-0
Email: info@si-schiffstechnik.de



www.si-schiffstechnik.de

Visit us at SMM in hall B7, booth 128.

trade through blockades. The reason for this is simply the availability/deployability of the necessary military, logistical and, in terms of operational capability, maritime resources. China must continue to make enormous efforts in this sector if it wants to claim global leadership and be able to prove it militarily. However, the United States has no intention of reducing the existing gap through its own inactivity. There is no doubt when it comes to assessing the major region defining the era – the Indo-Pacific region. Economically, politically and in terms of all statistical parameters, this is the current global focus and will remain so well into the rest of the century. All players need to accept this. For China, the challenging power, the fundamental question arises regarding the approach: based on political experience, regional leadership must first be achieved before global leadership can be considered. This requires not only a clear and existing confrontation with the United States, which remains the dominant nation, at least militarily, but also consideration of the three other major players – India, Russia and, at least economically, the European Union. Although in some areas, cooperation partners, following the age-old formula “the enemy of my enemy is my friend” and seeking and finding selective political alliances and mutual support, the question of how to deal with Indian and Russian ambitions remains unanswered, either in addition to, or before achieving world leadership. Permanently embroiled in petty warfare with India along their common border, with Russia in the Ussuri border region, where “border difficulties” also had to be settled militarily in divisions ... no clear line is yet recognisable here. The United States, on the other hand, must be clear about its role with its partners in the region and would be severely weakened by a lack of commitment or even neglect of partnership obligations due to the loss of face that counts so much in Asia. In this context, the role of the European Union must be briefly addressed. A strong economic union has failed to take the required steps toward political unity after economic unification in a timely and purposeful manner. The Union’s current global position is that of a vassal, almost totally dependent on American security guarantees, unable to organise and guarantee its own security. The current international naval situation, Russia’s war of aggression in the east of the Union and the difficulties with migration flows, the renewed flare-up of war in the Middle East, Iran’s regional naval ambitions and the counter-coastal problem with a steadily growing African continent producing ever increasing migration raise fears about the worst-case scenario for Europe’s security. Only France, the Union’s only remaining nuclear power, is

constantly striving to work on European security in concert with Germany – though so far in vain.

Epilogue

The connection between production and supply security and free, global sea routes can neither be denied nor ignored. Neither should the connection between security, political will and the creation, readiness and timely deployment of military potential be necessary. Looking at and assessing the current global situation, the shifts and ongoing changes in decisive issues such as population growth, climatic changes, positions of power and disrespect for international law, mean that further uncertain times lie ahead. In addition, ever larger state groups are acting exclusively in their own interests, rendering solutions and even sensible approaches increasingly difficult. Historical examples, especially from the last two centuries, have taught us that wars were very often the only answer. Again, history has taught us that the remedy of “war”, seemingly the last resort after endless, exhausted attempts has only ever led to new, more terrible wars and is therefore not an option. And history also teaches us that giving in and giving up one’s own position and strength for the sake of peace has only ever served the opposing position of insisting on injustice. The United States and its democratic allies must take these circumstances into account and seek and apply solutions by utilising and applying their own strengths – within the framework of the law. To do so, as democratic states, they require the consensus of their citizens. Informing them correctly and having them realise that this policy alone can guarantee their freedom- and self-determination is and has always been the greatest and most challenging task of democracy. Holding up signs that read: “We have values” is no meaningful response to an attack. Our true freedom and self-determination begins and ends with the unhindered and free use of global sea routes.

Nikolaus Scholik

Scholik is a Doctor of Political-Sciences serves since many years as Senior Adviser and board-member at the Austrian Institute for European and Security Studies, AIES, Vienna. His main research areas of interest are Political Theory, International Relations, Maritime Strategy, the European Union and the geopolitical developments in the Indo-Pacific Region.



Mathias Pein

Green shipping runs along with maritime security and defence

Naval vessels show that environmental protection and maritime safety are compatible. A new trend is the use of oil-free, water-hydraulic controllable pitch propellers. Piening Propeller has already equipped several naval vessels with these environmentally friendly systems.

Smaller and larger ships whose task is maritime security and defense nevertheless have environmentally friendly characteristics, making it clear that environmental protection and maritime safety can be in harmony. In contrast to commercial ships, naval vessels, in particular, have a much higher proportion of propulsion systems with water-lubricated stern tubes. With these ships, there is no risk of environmental pollution due to leaks in the sealing system of the shaft systems, and thus no leaking oil. There is currently a recognizable trend for these ships to operate their controllable pitch propeller systems as well as their stern tubes without oil.

Back in 2016, Piening Propeller developed a controllable pitch propeller in which the hydraulic adjustment of the blades can be operated completely oil-free using water hydraulics. This is a much clearer step towards environmentally friendly systems than what could be achieved in the past by using biodegradable oils.

Piening Propeller has already equipped various navy ships for which this special safety is important. Beyond the environmental aspect, other factors favor a controllable pitch propeller system with water hydraulics.

The use of biodegradable oil in controllable pitch propellers can have the effect of attacking metals and resulting in more rapid wear between the components. This often leads to extensive welding and machining work on hub and blade carriers, as Piening has already per-

formed for different customers on various brands of CPPs. The solution in the design of the Piening Controllable Propeller (PCP) involves the use of composite components in all highly stressed bearings. This means the reconditioning of hubs and blade carriers is not required; only the components need to be replaced. It is no longer necessary to remove the hub completely to undertake service work. Reducing reconditioning costs is most important in the shipping industry, which in turn lowers dock times, dock costs, and downtime.

Even if the customer cannot decide from the beginning on a PCP with water hydraulics and prefers an oil-hydraulic system or must adhere to internal regulations, it is possible to switch from an oil-hydraulic driven PCP to a water-hydraulic driven PCP later on, simply by changing the hydraulic equipment in

the engine room. One of the major references for Piening Propeller in this market is the four OPVs from the German Federal Police, each with a length of 86 meters, delivered by Fassmer shipyard from 2018 to 2022.

Some boats of the German Federal Police are running with Piening controllable pitch propellers

(© Piening / Fassmer)



Mathias Pein

CEO and COB at Otto Piening

Christian Freiherr von
Oldershausen

Future holistic acceptance process for naval design and construction

Naval vessel capabilities are increasingly complex, demanding greater mission adaptability and flexibility. Advanced technologies like system integration, cybersecurity, Digital Twins, and autonomous systems are essential for creating versatile, long-lasting platforms.

The requirements concerning the capabilities of naval vessels are getting more and more complex. Most importantly, they show a significant increased need for agility regarding mission adaptability. Safe and reliable high-performance platforms, providing the flexibility and ability to adapt to both rapidly changing functions and tasks as well as future demands is a key feature in this respect. A sound and modern assurance framework covering a wide range of state-of-the-art simulations, assessments and supporting design Rules is key to meet the goal of a versatile naval platform with a long service life, as illustrated in figure 1. Following the dynamic development of weapon systems and the common trend towards digitalization, topics like system integration, cyber security, Digital Twins and autonomous systems are high on the agenda.

However, the more traditional aspects such as structural safety and reliability, noise & vibration, shock resistance, fire safety as well as future upgrade capabilities are still decisive for the quality and life cycle performance of a platform. Not to forget the energy efficiency and the seakeeping behavior – irrespective of whether the objective is increased range

or an increased operational window - must be considered when it comes to the overall performance of a platform.

Stakeholders in naval shipbuilding agree that the effectiveness of delivering technical assurance activities for various seagoing defence assets should be increased. The current

practice of approval and acceptance in naval shipbuilding is laborious, incomplete, and lacks a holistic approach. A comprehensive methodology could minimize technical risks and enhance efficiency substantially.

After all, it is the verification framework, whether being a traditional ship classification regime or a dedicated naval technical assurance approach, which is fundamental in being able to accomplish the task in a structured, transparent and guaranteed way, but without compromising on the required flexibility and adaptability. Ultimately, it is the seamless interaction of simulations, calculations, assessments and the framing Rules and Standards, which are decisive for the desired and to be achieved quality and performance of a naval capability.

DNV as the world's principal assurance provider in the maritime domain and leading provider of verification services for naval ships and submarines is advocating the use of a comprehensive verification process. Such a process reduces

technical risks, costs, and construction times. At the same time, it stimulates modern, cost-effective, secure, and sustainable naval shipbuilding. The suggested process consists of two elements:

Pre-Contract Measures

The pre-contract measures refer to actions taken before the General Contractor, entrusted with the design and building of the naval capability, signs the contract:

1. The Creation of a Standards Plan and Gap Assessment before contract signing establishes a clear verification and certification reference between Arms Procurement Organisation and the General Contractor. This ensures safety, establishes applicable regulations, and minimizes risks during the design and construction process.

A key problem that has been observed in many recent naval procurement projects is an insufficiently defined certification basis at the time of contract signature. The lack of a fully defined verification and certification reference indicates that there is no understanding of errors/gaps in the acceptance process regarding the fulfilment

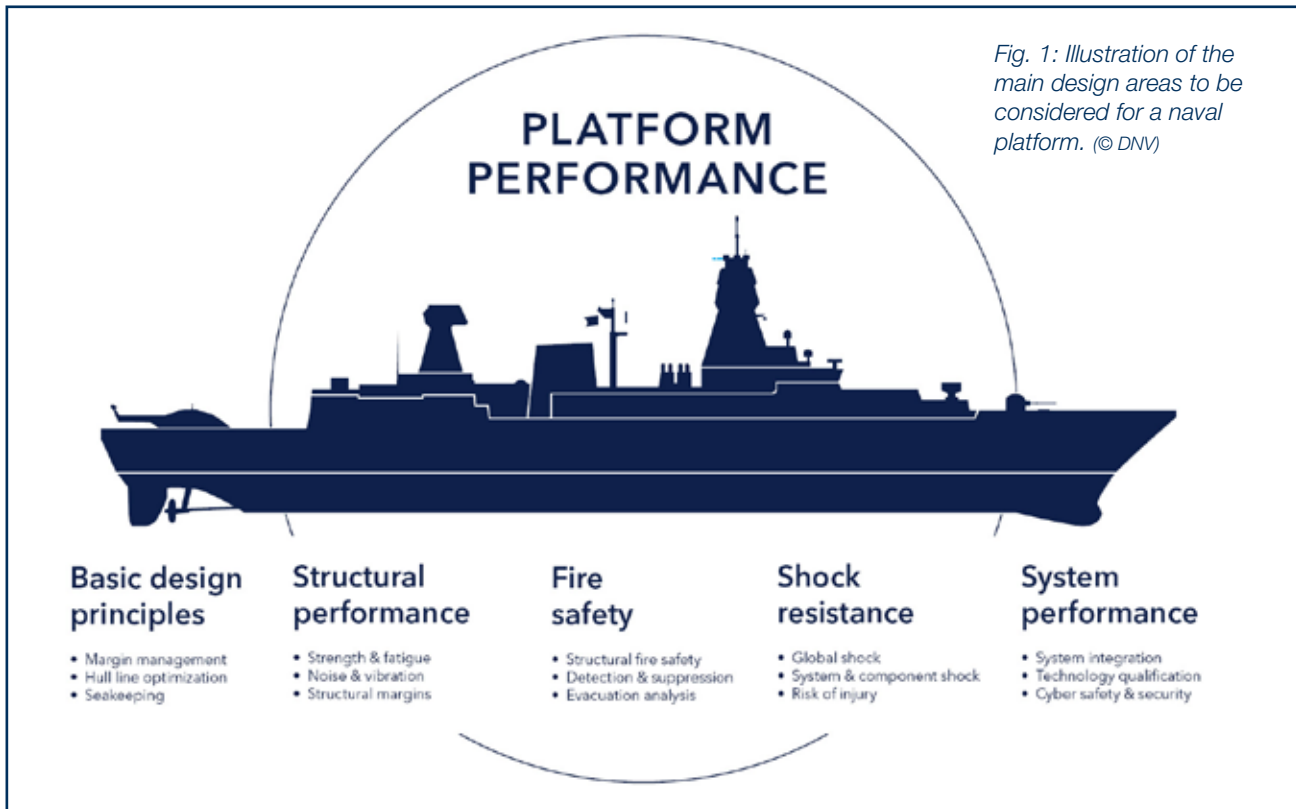


Fig. 1: Illustration of the main design areas to be considered for a naval platform. (© DNV)

of the minimum safety requirements. As a result, the technical regulations to be considered are only incompletely known from the design phase to the acceptance of the vessel through to the operation of the vessel. This harbors considerable risks in terms of safety, compliance and costs. Without a clear and thorough verification basis, which is anchored in the contracts between the Arms Procurement Organization and the shipyard, the effectiveness of the acceptance process in terms of technical safety is severely impaired. The definition of the certification basis enables the development of a customised standards plan and a certification matrix before the contract is concluded with the shipyard/general contractor. DNV therefore considers it necessary for the Arms Procurement Organization to commission the development of a certification basis in advance of the contract.

2. The so-called Approval in Principle (AiP) in combination with technology qualification is a critical step in the certification process. It allows technology developers to create a roadmap for full regulatory compliance by focusing on key issues.

As soon as the certification basis has been drawn up, DNV recommends that an AiP is carried out to obtain an overview of all operational and safety-related performance objectives before the contract is signed with a shipyard. The scope of this AiP can be tailored to the specific

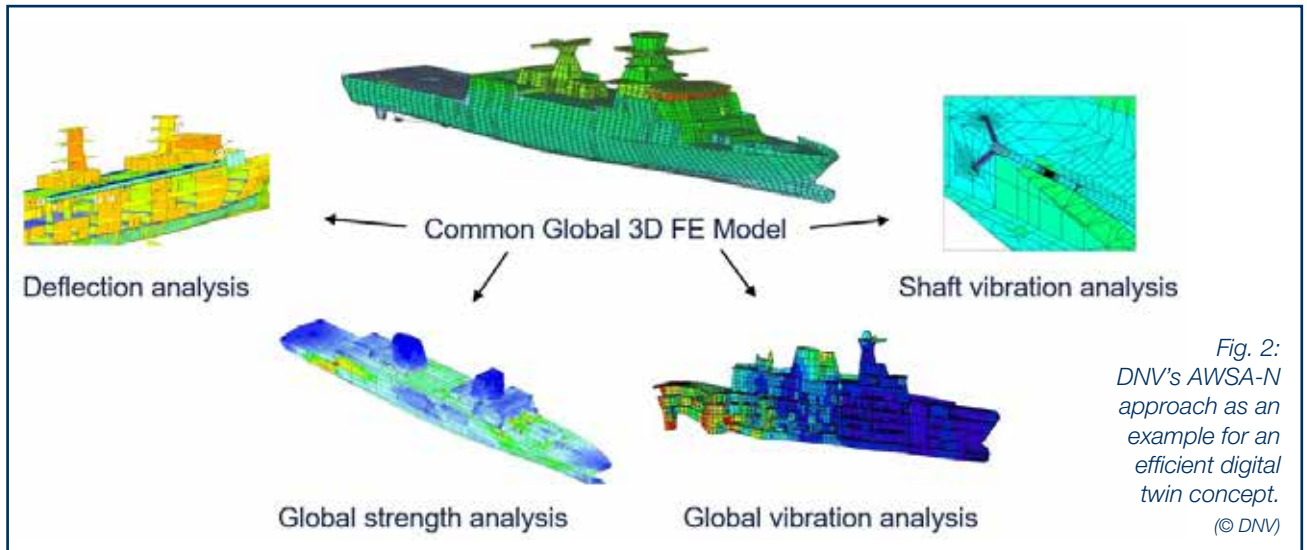
concerns and can be completed within a few weeks of receiving the required information.

3. The ensuing Assessment of Design Margins and Platform Capability ensures that all relevant investigations, assessments and simulations are carried out independently and prior to contract signature, with the aim that all relevant modelling is completed and available for use throughout the life cycle. This will add tremendous value throughout the life of the vessel, support extended life considerations during the advanced life cycle etc. and ensures a future-proof design. This helps creating relevant models (Digital Twins).

Digital Twins

Use of Digital Twins, as exemplarily shown by means of the AWSA-N approach in figure 2, and associated technologies during Project Execution which leads to significant improvements in efficiency and quality of naval project assurance. The benefits of using Digital Twins are:

1. The system's capability and functionality can be modeled in advance through simulation before physical implementation.
2. Structured information for the verification process provides all relevant data.
3. Early error detection allows efficient error correction during the design phase, minimizing delays during construction.



4. The Digital Twin enables efficient simulation of design and operational changes as well as the actual condition during operation.
5. A Digital Twin allows data-driven monitoring of ship structures and onboard systems during the operational usage, offering significant benefits for maintenance.

To ensure future viability and accommodate the dynamic development of Digital Twin technology, a modular concept is essential. Compatibility with industry standards and other stakeholders is crucial. Strictly maintaining intellectual property separation is vital for the relevance and success of Digital Twins, necessitating data supplier agreements with involved OEMs.

The solutions recommended are leveraging open data formats like OFX and OCX, as well as technologies such as DNV's STC for seamless integration of various Digital Twins. The verification of simulation models regarding congruent behavior and strict separation of Intellectual Property (IP) is crucial for the relevance and success of the Digital Twin. Given the current state of Digital Twins in maritime applications, a pragmatic approach involves gradual inclusion of established systems, starting with the structure, see Fig. 3, and subsequently linking other systems. Ideally, simulations and their associated verifications or tests should not only reside within a single Digital Twin but also be interconnected. In this context, the digital concept of "3D Approval" of design drawings plays a central role. Beginning with the "3D Approval" of the structure, future expansion to various onboard systems, including their control, is a pivotal step toward a comprehensive Digital Twin.

However, the above-described approach does currently

not yet exist. A system capable of managing diverse and technologically distinct information artifacts that collectively constitute the Digital Twin is not yet available. While DNV's STC can handle time-domain simulation models in the form of FMUs (the so-called "Model Library"), comprehensive management of "all possible" artifacts require a system leaning more toward Product Data Management (PDM) or Product Lifecycle Management (PLM). Various major software providers (such as ARAS, Siemens, EPLAN, etc.) are already establishing themselves in this space.

Nevertheless, a holistic view of the acceptance process is key to ensure the seaworthiness and safety of naval capabilities in an efficient way. DNV therefore is highly recommending the use of the earlier mentioned pre-contractual measures, which refer to work carried out towards the Arms Procurement Organization before a new naval vessel is signed with a general contractor.

As background to these suggestions, and to demonstrate one of the reasons why DNV is one of the preferred providers of technical assurance in the defence sector, it is recommended that the readers familiarise themselves with DNV's service specification DNV-SE-0555 Naval Technical Assurance. DNV-SE-0555 represents DNV's holistic yet flexible approach to technical safety from cradle to grave in the marine industry and provides a robust solution for the operational safety of naval vessels.

Christian Freiherr von Oldershausen,

Dipl.-Ing., Vice President – Business Director
Navy, DNV SE

Maritime know-how combined with state-of-the-art technology

Carsten Löhmer

Turnkey supplier optimises naval manoeuvring technology with customised solutions

In order to tailor the manoeuvring technology (rudder system and steering gear packages) specifically for the use at floating military platforms, LOEWE MARINE established a rudder system-focused approach but also an holistic development procedure. This made it possible to increase system and combat endurance, maximise unit manoeuvrability and reduce fuel consumption as well as rudder-induced cavitation, which generates a significant additional positive signature effect. With this technology, developed specifically for surface ship applications, it is possible to additionally tailor the design, system optimisation, structural integration into the ship's hull and installation according to the given operational scenario and the marine-specific requirements of floating naval platforms. An example of this is amongst others, the perfect positioned and propeller-slipstream adapted rudder with fully twisted leading edges and, depending on the requirements, also with fully twisted trailing edges. Compared to a non-twisted rudder, the twist of the water induced by the propeller is countered by considerably reduced angles of attack.



the propeller is untwisted downstream, energy consumption is reduced, but above all, manoeuvrability and signature, which are so important for warships, are positively improved. In short, LOEWE MARINE's overall rudder system

optimisation technology "NAVY ES/MS-Opt" achieved the following positive results:

- Simplified system installation & simplified maintenance
- Reduction of system's Opex costs
- Increased manoeuvrability of units in operational use
- Reduction of acoustic and vibration signature
- Increased service life and redundancy
- Increased combat rating and performance

Rudder for MEKO frigates

LOEWE MARINE's newly developed "NAVY ES/MS-Opt" rudder technology was adapted up to now for four MEKO200 and four MEKO100 units actual under construction. About four

years ago, TKMS commissioned the LOEWE MARINE team to design and build four pairs of full-spade rudder systems with "plug-and-play rudder trunk sections for installation in four MEKO 200 frigates being built in Germany and abroad for a foreign navy. On the strength of their excellent performance on the MEKO 200 rudder orders, LOEWE MARINE has been commissioned to design, build and deliver eight special full-spade rudder systems for four defence vessels for the Brazilian Navy programme. Equipped with special LOEWE MARINE "NAVY ES/MS-Opt" rudder systems complete with eight differential-cylinder steering gears. Amongst others the complete rudder systems will deliver maximum possible energy efficiency and signature optimization for naval applications.

Customised Full Spade Rudder with full s-shaped twisted leading edge, based on MS/ES AftOpt technology.

(© LOEWE MARINE)

Homogenised pressure curve

This results, among other things, in a considerably homogenised pressure curve over the entire height of the rudder blade, even in the neutral steering angles. The improved pressure curve reduces the drag of the rudder, and, since

Carsten Löhmer

Dipl.Ing. Managing Owner & Product Development Manager Naval Systems of LOEWE MARINE



Example of a SYNAPSIS NAVAL Warship Integrated Navigation and Bridge System (WINBS). © Anschütz

Jörg Dammrich

The evolution of naval integrated bridge systems

Since the first integrated bridge systems entered service on naval vessels, both operational requirements and technological capabilities have evolved. Anschütz provides an overview of the capabilities of modern naval bridge systems, the role of lifecycle services, and autonomous solutions in the future.

Seventeen years ago, the first Commanding Officer stepped onto the bridge of the corvette “Braunschweig”, the German Navy’s newest ship at the time. “Technological madness” was his comment on the first Integrated Navigation and Bridge System (INBS) the German Navy had put into service.

The INBS of the “Braunschweig” was developed and built by Anschütz. This was followed by INBS for the UK Royal Navy’s Type 45 Daring Class Destroyers and, over time, numerous other naval vessels for German and International navies. Today, INBS are state of the art and standard in naval vessel specifications, and Anschütz has established itself as a technologically leading supplier and integrator of customised navigation and bridge systems for this type of vessel.

A comprehensive set of requirements has evolved for NATO country modern surface combatants. These capability requirements result primarily from the common mission scenarios of these ships, which can range from

traditional warfare, reconnaissance and surveillance to convoy and escort protection or support for humanitarian missions. They also include global readiness and a high degree of autonomy, enabling extended missions without shore support.

In addition to combat and defence capabilities, the main requirements for ship equipment are high operational availability, flexibility and adaptability to support different missions, and interoperability.

Requirements for naval vessels

The specific requirements for INBS for naval vessels result from a combination of capability requirements and technological progress.

High operational availability requires a high degree of maturity of the technologies used including security and stability under intensive use. This includes the management of built-in redundancies and fail-safe mechanisms.

Similarly, reliable and accurate data from on-board navigation sensors must be available for accurate and safe sailing. INBS on naval vessels must also always comply with current IMO regulations and IEC standards for on-board navigation and communication systems. The following trends in requirements are also emerging:

High level of integration and interoperability

Seamless integration of all navigation, communication, surveillance and combat management systems (CMS) enables collaboration, joint mission planning, and coordinated, effective decision-making. Integration provides the crew with an accurate, real-time picture of the situation enhancing situational awareness and enabling correct decision-making from any workstation on the bridge and, if necessary, in conjunction with other vessels.

Fleet commonality

Fleet commonality standardises systems and sensors and reduces costs through a standard in-service logistics chain including infrastructure, training, spares and maintenance. Furthermore, interoperability and an increasing operational readiness of the fleet can be achieved. The ability of the INBS to integrate with existing customer fleetwide sensors, systems or IT infrastructure further enhances this capability.

Cyber defence and network security

As the importance of high-performance communications and data networks grows, so too does the need for cyber defence and network security. This includes solutions to detect and prevent cyber-attacks, protect data and information, and maintain or restore functionality in the face of threats. Customer-specific requirements are identified during requirements analysis prior to system design. Experienced engineers and programme managers work with the customer to select the best available technology to design the optimal solutions and guide the customer through the programme to completion. Customization and industry participation are also part of the design process.

Anschütz has developed Synapsis Naval, Warship Integrated Navigation and Bridge System (WINBS) with these requirements in mind to ensure the WINBS meets the requirements of today whilst being flexible to future technology refresh and inserts.

An example of a state-of-the-art WINBS

The traditional naval dockyards of Govan and Scotstoun, part of the British defence group BAE Systems are situated on the River Clyde, Glasgow, Scotland. HMS Glasgow, the

first ship of the Royal Navy's new Type 26 class, is currently being built there. HMS Glasgow is nearing completion and will be one of the most advanced warships in the world. The latest evolution of Synapsis Naval is currently being installed on board, setting a new standard in navigation and ship control capability.

Synapsis Naval combines standardised and proven navigation technologies with systems for tactical operations, area surveillance and combat to provide customers with an advanced and reliable naval bridge system that meets and exceeds their operational requirements.

Synapsis Naval complies with the IMO performance and IEC test standards MSC.252(83) / IEC 61924-2) for integrated navigation systems and is continuously adapted to the latest standards, such as the new presentation standards according to IEC 62288 Edition 3 and the future S-100 standards for (warship) electronic chart display and information systems ((W)ECDIS).

Synapsis Naval uses a unique, open-architecture infrastructure software framework as an integration platform for all data and systems in the naval bridge area. To ensure reliability and integrity, central services provide configuration control, user management, security information and event management, health monitoring, redundancy management and backup management.

A multi-redundant data distribution service ensures that data, information and alarms are presented and processed consistently throughout the system. By intelligently integrating and validating all available data, Synapsis Naval computes interoperable situation analyses and situational pictures of the environment in real time. Information can be shared with other vessels and shore stations.

Multi-function workstations allow the bridge crew to control and operate any function from anywhere. The consoles are scalable in function and can be freely configured via software, allowing users to easily switch between navigation and tactical functions. Modules can be easily added to flexibly adapt the ship's capabilities to operational requirements. Synapsis Naval has already been seamlessly integrated with many types of CMS and platform management systems.

Anschütz systems meet all the current security standards for products and services. Customised cyber security solutions that go far beyond the general requirements for software, hardware and network infrastructures can also be implemented together with the customers security team. These solutions are designed to the highest standards of system safety and security, are IMO and ANEP-77 com-

WINBS in Factory Acceptance Test at Anschütz.



© Anschütz

pliant and adapted to the individual requirements of each navy.

Key applications for navigation and steering control

The bridge applications have a standardised, clear and easy-to-use human-machine interface. Key applications and systems include:

■ WECDIS for tactical navigation

A fully compliant, type-approved, German-made WECDIS enhances mission effectiveness by improving safe navigation, situational awareness and tactical operations. In compliance with STANAG 4564 Ed. 3 (April 2017), it offers modular features such as tactical overlays, water space management and anti-submarine warfare.

■ Naval radar for navigation and surveillance

An effective radar application combining navigation to surveillance tasks within a single, intuitive user interface. Tailored software modules include area and zone management, intrusion detection and interception and helicopter guidance. Naval radar is type-approved with various radar sensors including Terma's SCANTER radars.

■ Steering control systems

Anschütz steering control systems provide direct steering and FU bus control with the highest level of performance. All systems are IMO compliant and tailored to the customer's safety and environmental requirements. This includes the use of shock resistant enclosures, safety switches and special interfaces to other systems such as platform management.

Technical support offerings

Stable and secure systems also require professional in-service support (ISS), optimal spare parts management and proactive system maintenance. Technical support of ships between and during operations has a considerable influence on the smooth and successful execution of missions. In-service solutions fully support navies with logistical and technical challenges.

Manufacturers, such as Anschütz, are long-term partners who effectively support navies, for example through ISS contracts, obsolescence management and insertion of updates and upgrades. Anschütz has been providing comprehensive in-service-support to the UK Type 45 destroyers since 2009 and is now extending this service to other ships and navies.



Type 26
(Artist Impression, Source: BAE Systems)

Through tailored in-service support and WINBS technology, Anschütz navigation and bridge systems make a decisive contribution to the efficiency, superiority and operational readiness of naval vessels.

Looking to the future

Demographic change has made the availability of qualified personnel to become more challenging. The increasing scarceness of human puts the onus on technology for mission success of naval vessels.

Modern technologies can already help to make basic processes more efficient and automate tasks to reduce the workload of personnel on board. Integration and simplification can also help reduce crew sizes or streamline training. With increasing automation on the bridge, powerful communication links and high standards of cyber security, autonomous solutions are becoming a reality.

Technologies for remote monitoring and control of unmanned platforms are being rapidly developed and tested. In addition to navigation and control functions, cameras, sonars and other sensor systems are being integrated to gather new information and add value, for example through AI-based object recognition. All data is continuously fused and distributed to provide comprehensive and mission-specific situational awareness. Concrete applications already exist in critical infrastructure surveillance, reconnaissance and mine hunting capabilities.

Technology roadmaps are evolving towards autonomy due to the driving factors of crew shortages, safety and efficiency. Anschütz is already heavily involved in research and customer projects in this field.

Jörg Dammrich

Head of Business Unit "Naval Surface Combatants" at Anschütz.

HANSA .news *global*



INTERNATIONAL MARITIME NEWS

website | newsletter | podcast



www.hansa.news

Björn ten Eicken

Key focus: silent propulsion

With the geo-political landscape unpredictable and continuing to evolve, the challenge for modern navies is a complex one. The Norwegian technology company Kongsberg Maritime stands ready to provide its naval customers with the future proof technology to match the demands of the future battlespace.

Threats are becoming more sophisticated, and navies are under pressure to do more with less. In this demanding scenario, navies need industry partners who can provide the latest mission critical technology, integrated solutions, and in-service support. This is where Kongsberg Maritime comes in, and our commitment to naval excellence goes beyond just providing a catalogue of products.

Kongsberg Maritime offers a wealth of expertise and support services to ensure our partners get the most out of our technology. Our team of highly qualified engineers has an in-depth understanding of naval operations and can work with shipbuilders and navies to develop customised solutions that meet their specific requirements.

In addition to Kongsberg Maritime our company applies expertise across four business areas (Kongsberg Digital, Kongsberg Discovery, Kongsberg Defence and Aerospace) to engineer solutions from the ocean depths to outer space and we work together to solve the safety, environment and climate challenges facing the world. That's because everything we do is about creating security. It's all about protecting people and the planet to secure future generations. We are an integrator in the naval market and have extensive experience in integrating multiple products on

board ships, and we understand that successful mission integration is crucial for modern navies.

Our team works collaboratively with shipyards and system integrators to ensure seamless integration of our products and systems with existing onboard technologies. This

collaborative approach minimises technical risks and means we develop customised solutions that meet our customers' specific requirements, providing optimal performance of the entire naval platform.

In today's complex maritime environment, navies need partners who can offer a holistic approach. So, at Kongsberg Maritime, we are not just a technology provider; we are a trusted advisor, integrator and a long-term partner. We offer a comprehensive range of products, systems, and technologies, all backed by our commitment to innovation, expertise, and support.

The foundation for the success of our naval propulsion range is the Kongsberg Hydrodynamic Research Centre, located on the shores of Lake Vänern, Sweden. The Hydrodynamic Research Centre (HRC) is one of the world's leading marine research facilities, specialising

in the development of marine propulsion systems including the design and testing of propellers and water jets.

Having this facility, together with decades of hydrodynamics expertise, we can draw from an unrivalled data set when developing bespoke naval propulsion systems. The propellers we produce for navies are bespoke items, and not off-the-shelf solutions as is sometimes the case in the commercial shipping environment.

The propeller design is adapted to the size of the ship, its speed. We consider noise and vibration requirements and whether it needs to be able to go through ice. For navies, the sound signature of the propulsion system can be a key factor, but also the speed requirements. Often, there is a need to finely balance these requirements and we work very closely with our naval customers to develop propellers that match their mission requirements.

For navies, a key focus is silent propulsion, and this is particularly crucial in Anti-Submarine Warfare (ASW) operations. Here, minimising a vessel's acoustic signature becomes paramount for remaining undetected by enemy submarines. Traditional propellers can generate significant noise through cavitation, the formation and collapse of bubbles around the blades. We understand this challenge

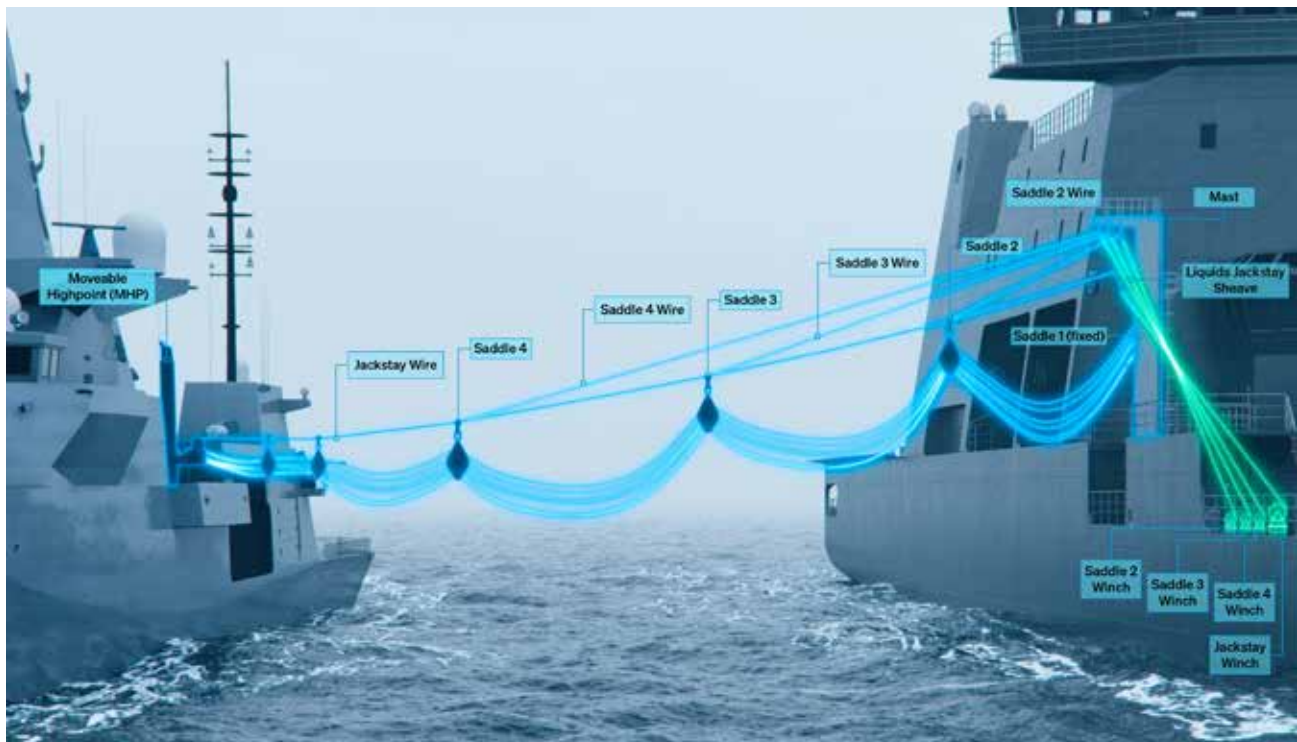
well and tackle it through meticulous propeller design. Our hydrodynamicists utilise advanced computational fluid dynamics (CFD) software to analyse and optimise blade geometry. This allows for smoother water flow, minimising cavitation and significantly reducing noise emissions.

But our commitment goes beyond virtual simulations, and we leverage the expertise of our world-renowned HRC. Here, our propellers undergo rigorous model testing in state-of-the-art cavitation tunnels. These tunnels replicate the demanding underwater environment, allowing us to validate the effectiveness of our noise reduction strategies and ensure optimal performance in actual operating conditions. The result of this combined approach to product

development are propellers that deliver exceptional performance without compromising on stealth. This translates to a significant tactical advantage in ASW scenarios. Navies can operate closer to enemy submarines undetected, increasing the effectiveness of their operations. Beyond noise reduction, our propellers are renowned for their efficiency. This translates to extended range and reduced fuel consumption, crucial factors for long-range ASW missions. Many navies use our CPP technology to achieve their ASW tactical requirements. Recent programmes to select Kongsberg Kamewa CPPs include the German F126, the UK Royal Navy's Type 26, and Damen's new ASW frigates for the Netherlands and Belgium.

In essence, our propulsion systems empower navies to operate with greater tactical flexibility, lower operating costs, and a distinct edge in the critical underwater battlespace. Kongsberg Maritime is unique in that it is the only propulsion manufacturer to have its own in-house research facility. This gives us a number of advantages that are popular with commercial and naval customers alike. We can take close control of the full testing regime we can react quickly to design changes and it gives us an additional form of verification.

The HRC puts us at the forefront of marine technology research and makes a significant contribution to the efficiency and mission-critical performance for many of the world's navies. We host dozens of naval delegations every





Mission Bay Handling system was developed in response to this growing need for ships to be versatile (© Kongsberg)

year, and we find our customers appreciate the fact that this is an in-house facility, where we can provide a secure environment where they can discuss specific mission requirements and together, we push the boundaries of what's possible.

The HRC features two cavitation test tunnels, where water is circulated to assess the performance of a ship's propulsion system. The tunnels simulate a wide range of vessel operating conditions, replicating different sea parameters, water flows and situations for the propulsor.

We have developed and tested over 1,500 propeller designs, for commercial, governmental and military vessels. Such is the computing power available at the HRC, propellers can be modelled in minute detail and in combination with the hull form and operating profile of any ship.

In addition to propulsion systems, we also offer handling systems, steering gear, rudders and stabilisation systems. One of the most important tasks of any Naval vessel is Replenishment-At-Sea (RAS). It is a force multiplier that extends the range and time at sea of both surface combatants and amphibious vessels, especially during multi role operations, when vessels go through munitions, food, and fuel at exponentially faster rates.

While traditional hydraulic RAS equipment is under high pressure during operations and that risks leaks and spills during mission critical evolutions, Kongsberg Maritime has developed electrical RAS equipment. Electrical RAS systems can also be deployed quickly and are significantly more reliable than hydraulic systems when installed in an open deck marine environment. They require less maintenance and overhaul periods in service, which also reduces overall lifetime costs of the system. The marine environmental risk of volume oil spillage is also eliminated. Modularity is the buzzword we hear the most from navies. The one thing they all want is modularity. Navies want platforms that can easily be transformed to meet the mission

requirements, so the days of ships that are dedicated to a small range of tasks are over.

Our new Mission Bay Handling system was developed in response to this growing need for ships to be versatile. Requirements to broaden the scope of naval operations, such as seabed surveillance, are driving demand for multi-purpose ships which can quickly adapt, whatever the mission, and this innovative new system could be the answer. Getting those assets from and to the mothership in a way that's quick, safe and effective, is at the core of the thinking behind our new Mission Bay Handling system. Suited to a wide range of naval ships, and fully adaptable to suit the size of the mission bay, the new system comprises three elements: a frame system, and overhead crane system; and stand-alone cargo handling solutions.

The global security arena is changing, and navies must be ready to adapt quickly. Areas like underwater surveillance and the monitoring of seabed utility assets like pipelines and cables, is an urgent requirement. Modern ships need to be multi-role, and that means carrying a growing suite of newer, high-tech in-sea assets.

Today, we're providing equipment to some of the most advanced naval programmes. We're very proud to see our technology being selected for these mighty ships and we're dedicated to delivering highly capable and reliable products, supported by exemplary in-service support.

As a technology leader, Kongsberg drives innovation and our promise is protecting people and planet. Those 70 navies that put their trust in us, do so knowing that we understand their mission, and our message to them is simple – your mission is our mission.

Björn ten Eicken

Vice President Naval at Kongsberg Maritime

3

Questions to ...

Malte Witowski,
Managing Director, Friesland-Kabel



1 *Friesland-Kabel has various products in its portfolio. Which cables for which areas do you offer for naval shipbuilding?*

Cables are crucial in maritime military operations. Cables for military usage, according to VG standard, are at the core of secure communication and energy supply on ships and boats, including for the German Navy. In an environment where precision and reliability are critical, our VG 95218 standard compliant military ship cables offer unparalleled quality and shielding. They ensure fault-free signal transmission and robust performance even in the harshest conditions at sea. Whether you need data transmission or energy supply – our VG cables meet the highest requirements and support the Bundeswehr, among other Navies, in carrying out military missions successfully and safely. The military ship cables can meet many individual requirements. With Friesland-Kabel, you have a strong partner at your side who implements customer requests quickly and efficiently.

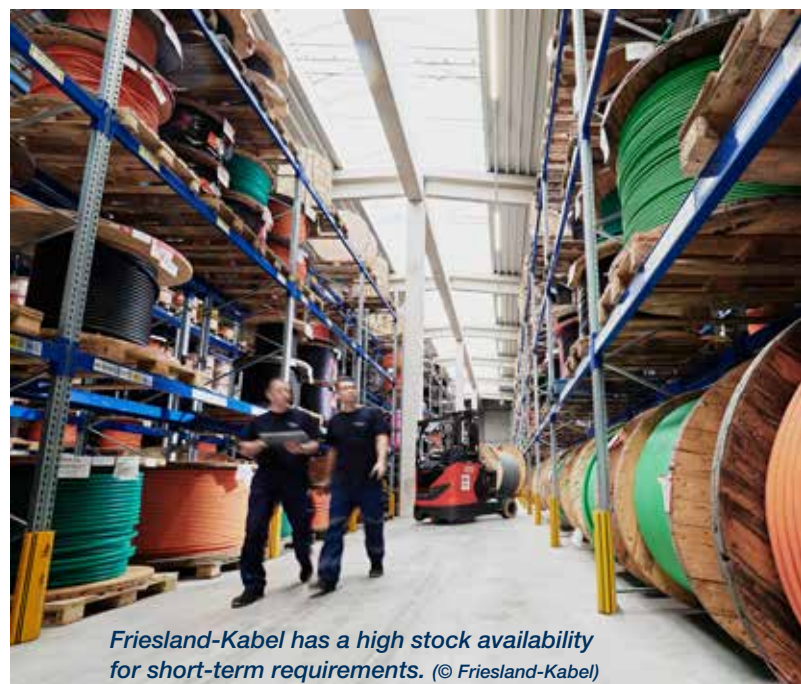
2 *Why are your products particularly suitable for the naval sector? What sets them apart from the competition?*

Our cable assortment is certified for military precision and reliability (according to VG 95218 standard) in line with the Bundeswehr's defence equipment standards (VG standards). Our cables meet all requirements to ensure optimal energy and signal transmission, even under harsh conditions at sea. The cables have been extensively tested according to the VG standards. In general, we offer from stock two major sections of cables; these are communication and power cables.

Our specialised communication cables are key for maritime data infrastructure. Developed in accordance with the strict VG standard 95218, these cables allow for secure data transfer and storage. Each cable ensures performance you can rely on, forming the bridge for efficient use and communication on the high sea, and is used by the German Navy and other Navies.

3 *Can you name a current naval project? Which products did you supply for this project?*

Due to confidentiality agreements and military security reasons, we cannot provide detailed statements on this matter. However, we are pleased that our product portfolio, core expertise in managing large shipbuilding projects, and high stock availability for short-term requirements are highly valued by our partners both domestically and internationally.



Friesland-Kabel has a high stock availability for short-term requirements. (© Friesland-Kabel)

The Autonomous Surveyor USV can be seen towing an inflatable craft during the Baltops 2024 exercise
(© Subsea Europe)



Daniel Esser | Sascha Krohmann

Increasing Situational Awareness in the Maritime Domain

Using Intelligent Surface and Underwater Platforms

The sabotage of the Nord Stream gas pipelines on September 26, 2022, marked a significant escalation in maritime threats to offshore facilities. This attack on three of the four gas lines carrying methane from Russia to Europe caused major energy supply disruptions, environmental damage, and economic shockwaves. Investigations revealed that underwater drones with high-explosive payloads remotely detonated along the pipeline were used. This incident, the most severe assault on maritime energy infrastructure since the 2019 Strait of Hormuz tanker attacks, highlights the need for enhanced security to protect offshore facilities from advanced threats.

Today, the availability of low cost, highly capable remote-controlled maritime and aerial drones compounds the issue above the surface, on it, and below it. The risk must be addressed alongside other threats such as sabotage, either state-sponsored or by terrorist groups, and criminal activity like drug or people trafficking. In the current dynamic geopolitical environment, it is essential for operators of critical national infrastructure—such as offshore wind farms, power stations, and port terminals—to implement procedures to mitigate these threats.

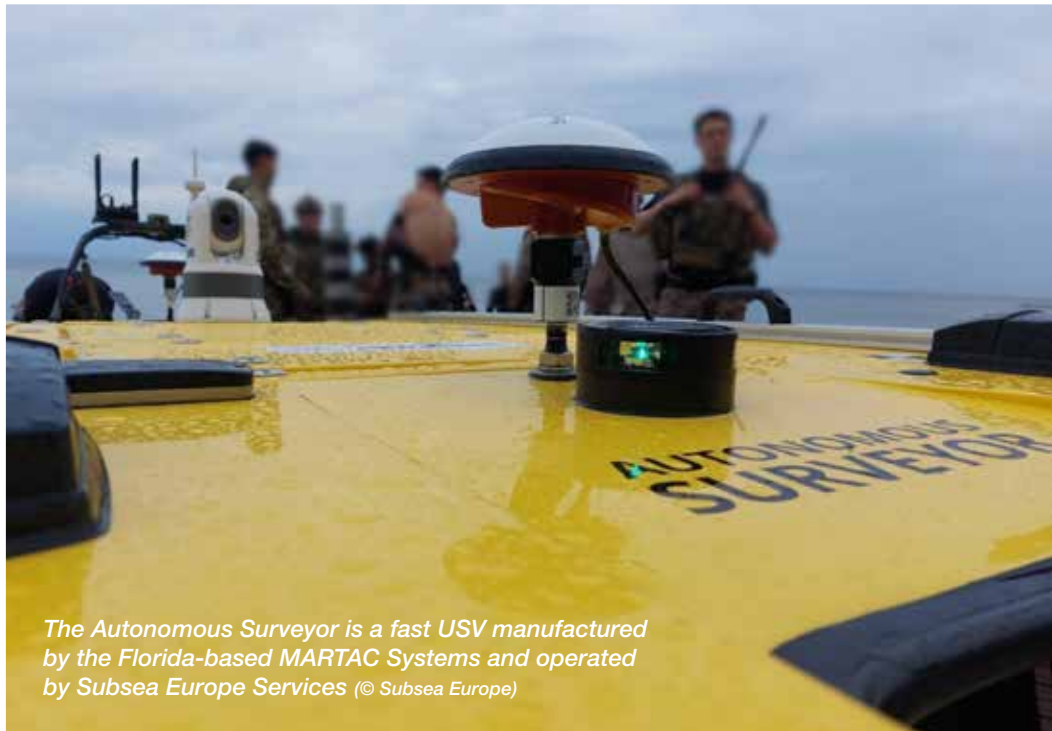
Drones that protect

While drone technology can enable attacks, it can also be deployed to augment situational awareness across the maritime domain at a lower cost than deploying crewed

vessels to perform the same, potentially dangerous functions. The potential for operating without a human-in-the-loop comes from developments in uncrewed vessel autonomy controllers. These usually AI powered systems enable safe operation according to a 'level of autonomy', as per these widely accepted definitions:

- **Level 0** (No Autonomy): Entirely controlled by human operators.
- **Level 1** (Limited Autonomy): Equipped with basic automated features like GPS navigation and radar.
- **Level 2** (Semi-Autonomous): Advanced automated features such as route planning and collision avoidance.
- **Level 3** (Conditional Autonomy): Operates independently in certain conditions but requires human oversight.
- **Level 4** (High Autonomy): Operates on its own in most conditions with human oversight.
- **Level 5** (Full Autonomy): Fully capable of operating without any human intervention.

The controller works by building a real-time picture of its surrounding environment using various sensors, such as radar, video, thermal imaging, sonar and inertial navigation. This 'sensor fusion' allows the creation of a real-time model of the vessel's surroundings, which the AI can act upon according to its mission parameters. Uncrewed Surface Vessels (USVs) are designed to operate on water with at



The Autonomous Surveyor is a fast USV manufactured by the Florida-based MARTAC Systems and operated by Subsea Europe Services (© Subsea Europe)

least some level of intelligence. To be recognised as a USV, the platform should be able to operate at level 2 autonomy at the minimum; this is the point where human interaction in navigation and operations can be reduced. Higher levels of autonomy unlock significant new efficiencies for maritime security, enabling extended monitoring coverage with significantly fewer human operatives, which saves time and money across training and crewing.

Autonomous Underwater Vehicles (AUVs) are torpedo-shaped platforms used to monitor and survey areas from shallow water to full ocean depths. They range from small, man-portable units with limited endurance to extra-large (XLAUV) vehicles with expanded payloads and weeks-long duration. Recently, Hovering AUVs (HAUVs), which resemble traditional Remotely Operated Vehicles (ROVs) but operate without a physical tether, have gained traction. These HAUVs are more suitable for maritime security applications at level 4 autonomy.

New attack vectors

Oil and gas platforms and pipelines, as well as wind turbines and associated infrastructure, are often in remote locales, making effective protection from terrorist groups, hostile states, or criminals both demanding and costly. The Nord Stream pipeline explosions, carried out far offshore and in water depths of around 80 metres, underscore the risks and vulnerabilities, demonstrating the need for robust

security measures and contingency plans. Maritime Domain Awareness is crucial for mitigating threats by understanding activities, threats, and opportunities in the maritime environment. It involves collecting, integrating, analyzing, and disseminating information to provide a comprehensive maritime picture, enabling informed decisions on safety, security, and commerce. Situational Awareness in maritime security involves understanding and anticipating potential threats and hazards. It allows for early threat detection and timely responses through real-time data monitoring and continuous risk assessment.

Autonomous vehicles enhance Maritime Domain Awareness by increasing Situational Awareness above and below the surface. As European navies and border forces face downsized fleets and personnel, uncrewed platforms serve as force multipliers, enabling small specialist units to oversee many assets effectively. Uncrewed Surface Vessels like Subsea Europe Service's Mantis T12 require minimal oversight, operating safely to protect stationary assets like offshore wind turbines or ships underway.

Scaling up on security

It's possible to operate USVs in a coordinated swarm, without additional manpower for fleet management. At Level 5 autonomy, USVs become launch-and-leave units, with operators only needed to address anomalies or respond to a classified threat. This approach significantly reduces



The Autonomous Surveyor can be launched from a vessel, dock or on the beach. (© Subsea Europe)

operational costs and enhances efficiency. With the right sensors and reliable data links, advanced algorithms and machine learning can analyse data to identify, track and classify potential threats and reduce false alarms. For example, unusual patterns in vessel movements outside of the predicted course heading or underwater 'man-made' anomalies can be identified, enabling proactive measures. The application of uncrewed platforms in maritime security meets the needs of various commercial actors, from protecting offshore infrastructure, securing shipping lanes and ports, to countering maritime piracy. A USV can patrol the topside perimeter of a specific domain while an AUV – which can also be deployed and recovered from the USV – can simultaneously patrol underwater. In securing offshore facilities, shipping lanes and ports, autonomous vehicles provide continuous monitoring and rapid response capabilities, escorting high-value vessels and scanning for underwater hazards.

As offshore wind energy capacity expands and regional conflicts at sea increase, the risk of offshore wind farms being targeted by bad actors grows. Autonomous platforms can help to prevent attacks before they occur, remove personnel from danger, and reduce the environmental impact of securing offshore facilities. Their reduced manpower requirements keep operational expenditure low, while integrated swarms enhance domain awareness.

Applications and development continue

The use of USVs for maritime security is actively developed by organizations worldwide. In Germany, Subsea Europe Services is at the forefront, particularly with its participa-



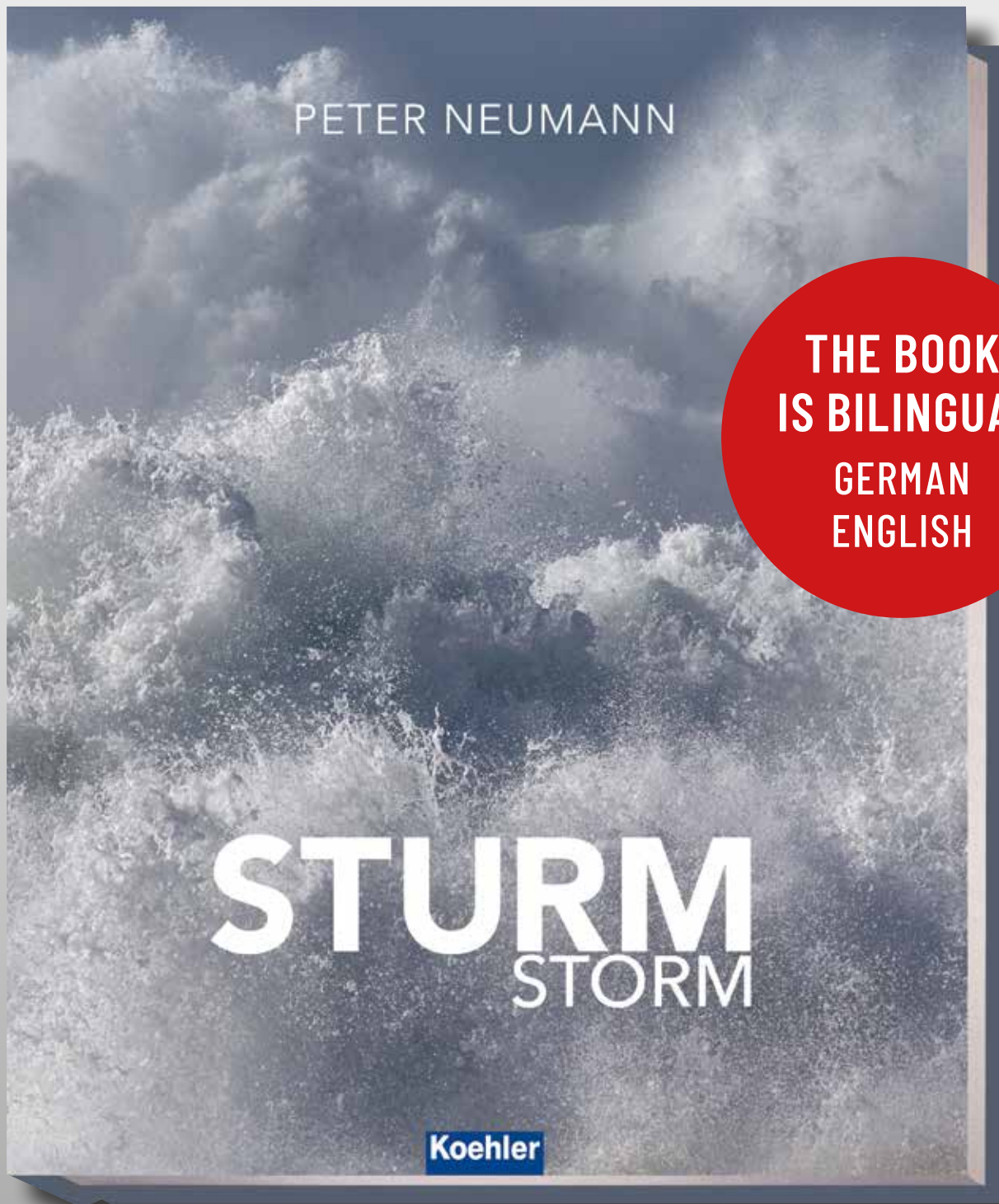
Monitoring USV operations during the Baltops 2024 exercise. (© Subsea Europe)

tion in BALTOPS, a multi-nation, multi-domain military exercise. From an undisclosed beach location overlooking the Baltic Sea, in collaboration with Maritime Tactical Systems (MARTAC), Inc. and allied marine forces, the team demonstrated the capabilities of autonomous platforms like the Mantas T12 USV in a multi-domain battlespace. Fraunhofer IGD has embraced autonomous technologies through its Digital Ocean Lab test area north of Rostock. This NATO DIANA testfield supports autonomous and remote vehicle testing and Unexploded Ordnance research. It operates year-round with a local energy, data infrastructure and a sensor network for environment and maritime monitoring, including weather, waves, currents, and ship tracking. The institute is expanding with Digital Ocean Lab II, set for completion in Summer 2024.

Industry commitment is supporting the strategic deployment of uncrewed platforms for maritime security at offshore wind farms and the potential to save millions of dollars throughout a facility's lifecycle is very real. These developments reflect that autonomous vehicles a crucial asset in modern maritime security, providing a cost-effective and operationally efficient solution to the evolving threats faced by wind farms and other commercial entities operating at sea.

Daniel Esser | Sascha Krohmann

Esser is Head of Business Development, Subsea Europe Services & Fraunhofer IGD | Krohmann is Head of Digital Ocean Lab & Fraunhofer IGD



Spectacular and unique images of the stormy seas and coasts around the world.

Peter Neumann, »STURM / STORM« / Hardcover

256 pages / format 26 x 30 cm / € (D) 39,95 / ISBN 978-3-7822-1326-4

ORDER YOUR COPY NOW

Webshop: koehler-mittler-shop.de / Mail: vertrieb@koehler-mittler.de / Phone +49 40 70 70 80 321

Maximilian Verlag, Stadthausbrücke 4, 20355 Hamburg

Also available in bookstores

GLOBAL

Lessons from Naval Conflicts in the Black and Red Seas

The ongoing naval conflicts between Russian and Ukrainian forces in the Black Sea and between Houthi rebels and a broad array of Western navies in the Red Sea continue to be analysed for lessons about the ever-evolving nature of naval warfare. Some of these lessons essentially reflect the potentially transformative nature of new technology. Others confirm long-established principles of maritime doctrine.

The over two year long war in the Black Sea has been notable for Ukraine's ability to neutralise the effectiveness of Russia's Black Sea Fleet without the advantage of possessing a conventional navy of its own. This capacity has served to protect its coastline from the danger of amphibious assault and allowed the continuation of its economically important grain trade with only minimal disruption. Significant attention has been garnered by Ukraine's extensive use of a wide range of numerous and relatively inexpensive drones as effective sea denial weapons to negate the Black Sea Fleet's apparently overwhelming advantage. It is, however, important not to overstate their importance. The Russian Navy has suffered from the overwhelming disadvantage of having to operate in heavily contested littoral waters and in circumstances where its main base has been within easy distance of attack from land-based systems. Its most costly losses have been to land-based missiles rather than the new generation of autonomous technologies (although drones have proved invaluable for targeting). Additionally, the Russian Navy entered the war with obsolescent equipment and seemingly inadequate training and doctrine. As



The US Navy destroyer Carney (DDG-64) pictured on 19 October 2023 in the course of an engagement against a combination of Houthi missiles and uncrewed aerial vehicles in the Red Sea. (© US Navy)

such, the setbacks it has suffered to date have been far from unexpected.

The maritime conflict in the Red Sea traces its origins back a decade or more. However, current hostilities essentially commenced with the US Navy destroyer Carney's (DDG-64's) interception of missiles and drones that had been launched towards Israel from Houthi rebel-controlled territory in Yemen on 19 October 2023. This initial engagement was followed in November that year by a campaign of largely unsuccessful attacks against merchant vessels transiting the Red Sea that have continued to the present time. As in the Black Sea, these attacks have included the extensive use of uncrewed vehicles and missiles, including ballistic weapons, against targets transiting confined waters. Their relative lack of success can be attributed to the seemingly lower level of sophistication and numbers of weapons used; the superior technology and training available to Western forces; and the availability of secure bases

from which these defending forces can be maintained and replenished.

Editorial Commentary: At first glance, it is easy to attribute the different outcomes of Russian littoral operations in the Black Sea and Western trade protection activities in similarly confined waters in the Red Sea to differences in the quality of equipment and training. Whilst this analysis contains more than a grain of truth, there is little reason for Western navies to be complacent. In addition to some well-publicised equipment failures aboard European warships, the Red Sea missions have revealed the difficulties, not to say expense, of sustaining magazine capacity during high intensity operations in a littoral environment. Whilst European and American forces have maintained a sufficient technological edge to avoid defeat, shipping has still been significantly disrupted. The criticality of maintaining naval superiority for economies that rely on maritime trade has been affirmed once again.

GERMANY

Progress Towards “Vision 2035+”

The German Navy took an important step towards achieving a major element of its “Vision 2035+” fleet structure plan in June 2024 with the exercise of an option for two additional F126 Niedersachsen class frigates. The plan envisages the creation of a larger and more capable fleet focused on 15 large frigates, six-to-nine smaller corvettes, and six-to-nine submarines that will be bolstered by significant numbers of uncrewed vessels. An important feature of the planned structure is the consistent use of a multiple of three for all force elements. This reflects the calculation that each deployable vessel needs to be supplemented by two additional units undergoing training or maintenance. In line with this objective, implementation of the options will increase the F126 class to a total of six vessels.

The initial contract for the F126 class was signed with Damen in June 2020. The ships are being constructed in sections at various German yards before final outfitting at NVL’s Blohm & Voss facility in Hamburg. First steel cutting for the lead ship took place at the NVL Peene shipyard in Wolgast on 5 December 2023 and was followed by a formal keel laying ceremony on 3 June 2024. Delivery is planned for mid-2028; a target which may be ambitious given recent delays with other German Navy construction. Displacing around 10,500 tonnes, the Niedersachsen class are the largest surface combatants built in Germany since the end of the Second World War. Equally, with a total cost approaching EUR 10 billion (USD 11 billion), the programme is reportedly the most expensive in the German Navy’s history.



Two additional F126 Niedersachsen class frigates have been ordered for the German Navy in line with the requirements of the “Vision 2030+” fleet structure plan. (© Damen)

AUSTRALIA

Formal Start to Hunter Class Frigate Construction



Construction of the first Royal Australian Navy Hunter class frigate is now formally underway.

(© BAE Systems)

The start of formal construction of the Royal Australian Navy’s (RAN’s) new Hunter class frigates was marked with a ceremony at BAE Systems’ Osborne shipyard on 21 June 2024. Although very much a formal event given previous statements that a number of previously constructed prototype blocks will also be used in Hunter’s assembly, the ship’s official commencement is a welcome sign of tangible fleet renewal following the previous uncertainty caused by Australia’s review of planned surface fleet structure. The Hunter class programme – which is based on the British Type 26 Global Combat Ship – was trimmed back from nine to six ships as a result of these deliberations, three of which are now under firm contract. Despite the progress now being achieved, it will be another decade before the lead ship becomes operational. This is around five years later than when the Type 26’s selection was first announced in 2018.

ASIA-PACIFIC

China: A Major Development in Carrier Aviation

On 1 May 2024, the Chinese People's Liberation Army Navy (PLAN) aircraft carrier "Fujian" departed China State Shipbuilding Corporation's Jiangnan Shipyard in Shanghai to commence a short period of maiden sea trials. The warship is second only to the US Navy's nuclear-powered aircraft carriers in terms of

size amongst the world's naval combatants, with a length of around 315 metres and an estimate displacement of over 80,000 tonnes. In contrast to the PLAN's previous Type 001 and Type 002 short take off barrier-arrested recovery (STOBAR) equipped vessels, the new, Type 003, vessel is fitted

with three electromagnetic catapults to assist aircraft launch. It has been reported that a J15-B variant of the existing Shenyang J15 strike fighter used aboard the existing carriers has been developed for use aboard the new ship until more advanced airframes enter service later in the decade.

"Fujian" has already embarked on further trials as part of an extensive period of tests that should likely see her enter operational service before the end of 2025. It has been widely reported that a further-evolved Type 004 aircraft carrier, possibly incorporating nuclear propulsion, is already under construction.

Editorial Commentary: "Fujian" represents another impressive achievement by a navy that has already made major steps in developing a credible naval aviation capability from a standing start. Inevitably, the development of this capacity is still very much 'work in progress' It will, for example, likely take many years before Chinese naval aviators achieve equivalence with the well-honed skills of their US Navy opposite numbers. Nevertheless, China's ambitions to create a means of global maritime power projection seem clear.

AFRICA & THE MIDDLE EAST

Africa: Trends in Maritime Crime

The International Maritime Bureau's (IMB's) Piracy Report for the first half (H1) of 2024 revealed a number of trends in the distribution of maritime crime in the African continent against a backdrop of a small decline to 60 from 65 in the comparative period in the total number of global incidents reported.

Positively, incidents in the Gulf of Guinea continued the marked decline seen in recent years as a combination of local and international attempts to build an effective deterrence and response capacity continued to make progress. Ten incidents of piracy were reported in H1 of 2024; down from 14 in H1 of 2023 and only a quarter of the 39 incidents experienced in H1 of 2020. Despite this, the IMB stated that, "threats to crew safety and wellbeing continue to be a cause of concern", noting that all 11 crew members kidnapped globally in the period had been seized in the region.

Of more concern is the situation in the waters off Somalia. Here there were eight incidents in H1 of 2024, including the hijacking of two fishing vessels and a bulk carrier. This follows a period of negligible piracy, with the upsurge being partly attributed to opportunist action against the backdrop of state-sponsored attacks against shipping in the Red Sea. Some vessels were targeted up to 1,000 nautical miles off the Somali coast. The IMB did, however, commend the timely and robust responses of naval forces policing the region. This again emphasises the necessity of appropriate deterrence.

The Italian patrol vessel Commandante Bettica pictured during capacity-building measures in the Gulf of Guinea.

(© US Navy)



EUROPE

European Naval Shipbuilding: Important Project Milestones Reached

The achievement of a number of significant programme milestones in recent months has illustrated the continued global relevance of the European naval shipbuilding sector in spite of the market's increasingly competitive nature.

On 17 July 2024, "Oostende" – the first mine countermeasures 'mother-ship' built under the Belgo-Dutch rMCM (replacement mine countermeasures) programme – commenced its preliminary sea trials from Piriou's shipyard at Concarneau, Brittany. Implementation of the joint programme has been entrusted to Belgium Naval & Robotics, a consortium comprising Naval Group and Exail, under a EUR 1.9 billion (USD 2.1 billion) contract signed in 2019. Each country's navy will receive six of the motherships and associated 'toolboxes' of mine countermeasures drones. These will be deployed from the host vessel at distance from the mined area. Physical completion of the ships has been entrusted to the Kership joint venture between Naval Group and Piriou. Programme completion is expected by mid-2030. Earlier that month, on 13 July 2024, Italy's Fincantieri celebrated the launch of Domenico Millelire, the seventh and – to date – final PPA multirole offshore patrol vessel ordered under the so-called 'Naval Law' of 2014. Constructed at the group's integrated shipyards

at Muggiano and Riva Trigoso, these modular vessels have been completed in various 'Light', 'Light Plus' and 'Full' configurations that incorporate progressively greater levels of weaponry and sensors. Despite their patrol vessel nomenclature, they are frigates in all but name. In March 2024, two of the vessels originally intended for the Italian Navy were sold to Indonesia under a EUR 1.2 billion (USD 1.3 billion) contract. It seems likely that replacement ships will be ordered to meet the Italian Navy's requirement. In addition, Fincantieri is continuing efforts to secure further overseas orders.

Editorial Commentary: This snapshot of recent European naval construction achievements illustrates various aspects of a dynamic and expanding industry. The rMCM project, for example, evidences the technological leadership being achieved by the sector in many areas, representing the first purpose-built application of the increasingly popular mine countermeasures mothership concept. The project's significance extends beyond the ships' actual hulls to the toolboxes of



Italy's seventh PPA type multirole offshore patrol vessel was launched at Riva Trigoso on 14 July 2024.

(© Fincantieri)

uncrewed and autonomous systems supplied by Exail; just one of a number of European companies with a strong presence in this field.

Meanwhile Fincantieri's successes with the PPA programme, notably the sale of two vessels of the type to Indonesia, demonstrate that European industry remains a significant international force despite ever-increasing competition. In addition to the sector's strengths in technology and innovation – reflected in the utility of the PPA type's modular and innovative design – the achievement demonstrates the success of efforts to sustain the naval construction sector during the difficult years that followed the end of the Cold War. These efforts are being rewarded as the deteriorating international backdrop puts naval rearmament to the fore.



The lead Belgo-Dutch rMCM 'mothership' "Oostende" seen returning to Concarneau in Brittany after her initial sea trials in July 2024.

(© Bruno Huriet)

THE AMERICAS

United States: Strengthening the Submarine Industrial Base



The nuclear-powered attack submarine "New Jersey" (SSN-796) is likely to be the only submarine commissioned into US Navy service during 2024.

(© Ashley Cowan/Huntington Ingalls Industries)

The US Navy took delivery of the nuclear-powered attack submarine "New Jersey" (SSN-796) from Huntington Ingalls Industries' Newport News Shipbuilding on 25 April 2024. She is the 23rd member of the Virginia class to be completed to date and the eleventh assembled at the Newport News facility. Construction of the class is shared between Newport News and General Dynamics Electric Boat at Groton Connecticut under an arrangement that dates back to the programme's commencement.

Whilst New Jersey will be a welcome addition to the US Navy's underwater flotilla after she formally commissions in September 2024, she is likely to be the only member of the class to enter service this year. Construction of the 'Block IV' Virginia class iterations of which this latest submarine forms a part is reportedly running around 36 months behind schedule, throwing a targeted delivery schedule of two submarines p.a. into disarray. The delay reflects the significant challeng-

es involved in increasing production of the Virginia class from the previous one boat p.a. rhythm that typified the earlier post-Cold War period whilst simultaneously renewing the flotilla of strategic submarines through construction of the new Columbia (SSBN-826) class.

It is clear that the US Government appreciates the significance of the problem. Investment of more than USD 7 billion has been authorised to strengthen the submarine construction and maintenance enterprise during the past two years and it looks likely that an additional USD 10 billion will be spent over the five years of the future years defense program (FYDP). In addition, the FY2025 defence budget proposes a temporary reduction in Virginia class orders to one boat during the current year to provide the space to get the programme back on track. However, it will inevitably take time to achieve the desired two submarine p.a. drumbeat given the current construction rate of between 1.2 and 1.4 boats each year.

Editorial Commentary: The delays being experienced by US Navy submarine production come at an inopportune time. The Cold War-era Los Angeles (SSN-688) submarines are being retired in increasing numbers as they reach life expiry. This is putting downward pressure on the submarine flotilla at a time when heightened tensions in the Pacific region are increasing the demand for their services. The major investment in infrastructure and workforce development that is currently underway should bring Virginia class production up to two submarines p.a. by 2028 but it will only be in the early 2030s that the underwater force starts to increase in size. It is also worth noting that a further ramp up in construction to around 2.33 submarines each year will be required in the medium term to reduce the accumulated backlog and provide capacity for the transfer of submarines to Australia under the AUKUS agreement. Sustained effort will be needed to meet this challenge.

MS&D magazine

Publisher

Prof. Peter Tamm †

Management

Peter Tamm

Editor-in-Chief

Hans Uwe Mergener
Tel.: +49 (0)228-35008-80
h-u.mergener@mittler-report.de

Editor

Anna Wroblewski
Tel. +49 (0) 40 70 70 80-209
a.wroblewski@hansa-online.de

After Sales & Ad Management

Markus Wenzel
Tel.: + 49 (0) 40 70 70 80 226
m.wenzel@mittler-report.de

Advertising

Achim Abele
Tel.: +49 (0)228-25900-347
a.abele@mittler-report.de
Susanne Sinß
Tel. +49 (0)40 70 70 80-310
s.sinss@hansa-online.de
Florian Visser
Tel.: +49 (0)228-25900-311
f.visser@hansa-online.de

Distribution- and Marketingmanager

Riccardo di Stefano
Tel. +49 (0)40 70 70 80-228
r.distefano@hansa-online.de

Layout

Barbara Winter
Tel. +49 (0)40 70 70 80-217
b.winter@koehler-mittler.de

Publishing House

Mittler Report Verlag GmbH
Beethovenallee 21, 53173 Bonn, Germany
Telefon 0228-3500-870
Telefax 0228-3500-871
E-Mail info@mittler-report.de

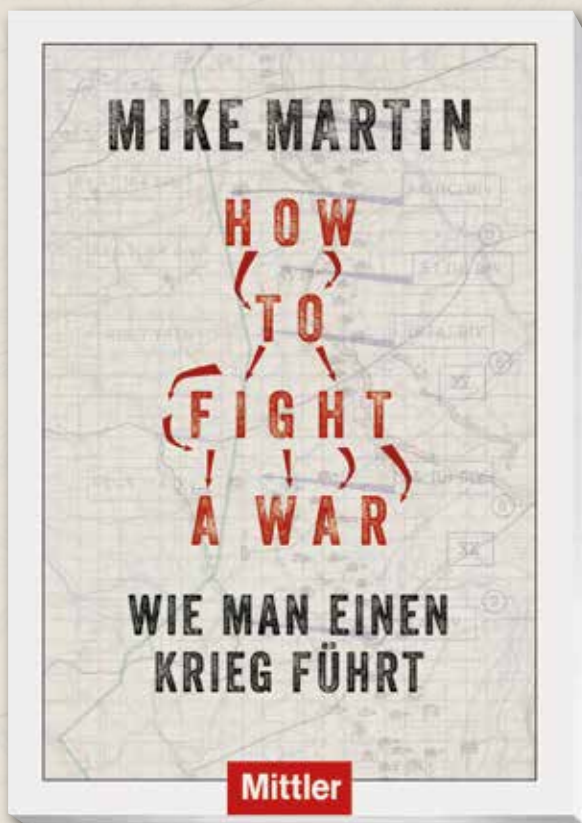
The client of advertisements bears full responsibility for the content of the advertisements. The publisher declines all liability. The use of advertisement cuttings or content for advertising purposes is prohibited. All correspondence should be addressed to the publisher named above. Unsolicited manuscripts will only be returned if return postage is enclosed. All rights reserved, in particular the right of reproduction, distribution and translation. No part of the journal may be reproduced in any form (by photocopy, microfilm or any other method) without the permission of the publisher. Articles identified by name do not necessarily reflect the opinion of the editorial team. The editors reserve the right to make changes to the manuscripts.

Cover:

A computer generated image of the SSN-AUKUS design. © Crown, 2023

Print:

Lehmann Offsetdruck und Verlag GmbH,
Norderstedt



The bestseller from England now in German

Mike Martin, »HOW TO FIGHT A WAR –
WIE MAN EINEN KRIEG FÜHRT« / Softcover
app. 320 pages / format 14,8 x 21 cm
€ (D) 24,95 / ISBN 978-3-8132-1136-8

ORDER YOUR COPY NOW

Webshop: koehler-mittler-shop.de / Mail: vertrieb@koehler-mittler.de / Phone +49 40 70 70 80 321
Maximilian Verlag, Stadthausbrücke 4, 20355 Hamburg – Also available in bookstores

WELCOME TO THE WORLD OF NAVAL COMMUNICATION

COMMUNICATION
SYSTEMS

SYSTEM
INTEGRATION

ANTENNA
SYSTEMS

MILITARY
MESSAGE
HANDLING
SYSTEM

ADVANCED
PLATFORM
COMMUNICATIONS
SYSTEM

INTEGRATED
LOGISTIC
SUPPORT

SURFACE
VESSELS

AEROMARITIME

SUBMARINES

You will meet us at our booth:

Marine Workshop 2024, Linstow, Germany, 23.-25.09.2024, Booth D04

EURONAVAL 2024, Paris, France, 04.-07.11.2024, Booth M52

EXPONAVAL 2024, Valparaiso, Chile, 03.-06.12.2024, Booth N-252

NAVDEX 2025, Abu Dhabi, UAE, 17.-21.02.2025, Booth B-041

IMDEX 2025, Singapore, Asia, 06.-08. 05. 2025, Booth Q15

AEROMARITIME Systembau GmbH
Ludwig-Erhard-Str. 16
85375 Neufahrn, Germany

info@aeromaritime.de
www.aeromaritime.de
Tel. +49 8165 6171 - 0