

# European Security & Defence

5/2016

*International Security and Defence Journal***COUNTRY FOCUS: NORWAY**

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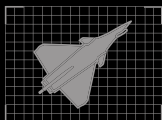


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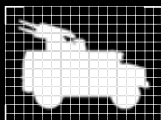
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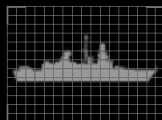
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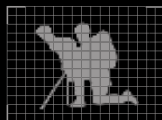
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# Turkish-Russian Rapprochement



A military coup in a NATO member state should have been a major wake-up call for the Alliance. But, at least as far as the public are concerned, the people who run NATO appear to be extraordinarily blasé about the whole affair. True, the governments of all the NATO member states did condemn the coup, clearly and without reservation, but special demonstrations of solidarity, such as were forthcoming in response to the terror attacks in France or Belgium, seem markedly lacking when it came to Turkey's President Recep Tayyip Erdoğan.

The fact that this reaction was regarded in Turkey as "strange" should have been obvious on reflection. But President Erdoğan, with his campaign of mass arrests directed against the judiciary, the press, the armed forces, the universities, and the schools, immediately after the coup failed, has triggered considerable mistrust among the western states.

In the hours after the attempted coup, Russia's President Putin was the first foreign head of state to declare his solidarity with Erdoğan and condemn the instigators. At the time it was still planned that Erdoğan and Putin should personally shake hands for the first time at the G-20 Summit. The fact that they have met earlier suggests that for both of them a closer relationship cannot come fast enough. The Turkish president wants to get close to Russia. Instead of the West, his orientation is literally to the East, and NATO does not like it. And, for the moment at least, there's not a lot NATO can do about it.

For NATO there is a lot at risk through the confusing attitude being adopted by Turkey. As a kind of outpost, directly on the fault line with the Middle East, the country is of enormous geopolitical significance. The USA is also concerned that if relations with Erdoğan deteriorate further they might have to give up the important Air Force base at Incirlik, from which international coalition airstrikes are launched against ISIS formations in Syria and Iraq. This means that President Erdoğan is unlikely to be faced with direct criticism from NATO headquarters. Externally the reaction is still reticent. Internally, the main NATO states have agreed not to use the Alliance for sideswiping Erdoğan and his purges after the coup, in order not to prejudice the existing co-operation. It looks as if here too President Erdoğan has the better leverage.

For Erdoğan, getting closer to Russia is important: with the political crisis having major economic repercussions on his country, he needs good news. As far back as June 2016, when Erdoğan apologised for shooting down a Russian warplane, Putin lifted the widespread sanctions against Turkish agricultural products. Now Putin and Erdoğan also want to revive the TurkStream pipeline project and push ahead with the construction of a nuclear facility in Turkey.

The government in Ankara is also hoping that Russian holidaymakers will start coming back in large numbers to the Turkish holiday resorts. Collateral damage outside the political sphere does not bother the Turkish president much, with regard to his pact with Russia; it can even be turned to his advantage. Erdoğan knows that NATO is very concerned about the new direction being pursued by its Turkish partner in the Alliance.

Recently, at the NATO 2016 Warsaw Summit, the Alliance described Russia and its aggressive president as one of the greatest challenges for security policy to address. The fact that a NATO member is now co-operating with Moscow is something the partners cannot afford to simply shrug off. The Alliance has to be aware that prolonged dissent with Turkey could, among other things, weaken NATO's deterrent measures against Russia in Eastern Europe, because Turkey plays an important part in this, being able to exert military pressure on Russia from the south. As well as these geographical aspects, and the enormous military resources at its disposal, Turkey is also important to NATO with regard to manoeuvres in the Black Sea and the Aegean, and in the fight against the so-called Islamic State. However, Turkey watchers doubt that there is going to be a new Turkish-Russian military alliance. Turkey profits from the security umbrella offered by NATO, and also from NATO's support in its struggles against Kurdish PKK separatists and IS terrorists; and with regard to safeguarding its borders the country is heavily reliant on the USA. On the other hand, Turkey wants to establish itself as a central power in the Middle East, and therefore wants to occupy a position between the blocs and the major powers, so as to be able to promote its own interests.

**Henning Bartels**





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Image: BAE Systems

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## ■ Armed BLACK HAWK

(df) Two systems presented by Lockheed Martin during MSPO were of high interest: the F-35 cockpit demonstrator and the armed BLACK HAWK battle support helicopter. This armed version of Sikorsky's



Photo: Lockheed Martin

Polish-built S-70i BLACK HAWK made its debut during the ANACONDA 2016 NATO exercises in Poland in June. Featuring a selection of latest-generation NATO missiles, rockets, guns and a targeting sensor, the helicopter on display aimed to show how PZL Mielec, a Sikorsky company, could meet the region's requirement for a multi-purpose, combat-proven helicopter that can defend itself or execute an armed assault mission in support of ground troops. Additionally, it can carry troops and cargo, perform Combat Search and Rescue, customs and border protection, marine surveillance and support coast guard operations.

## ■ Commercial Bridges for Military Applications

(wg) At this year's MSPO Janson Bridging, the specialist company for modular bridging systems, presented solutions for



Photo: Janson Bridging

the military and for disaster relief. Bridging systems, which are easy to relocate and to emplace (up to MLC 80) and which have provided proof of their value in commercial applications for decades, are now being offered for sale and lease to military customers. They are cost-effective solutions to supplement military bridging systems, mainly in case of floods, military stabilisation operations and to cross water behind the front line. The Belgian Armed Forces have become the first military customer, and according to this contract Janson Bridging will provide bridging capacities within a timeframe of 24 hours from the initial call-out.

## ■ Gunnery Simulators for the German Armed Forces

(jh) The Federal German Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw) has awarded Thales Deutschland a contract for the modernisation of all hand weapon/anti-tank weapon gunnery simulators of the AGSHP series (Ausbildungsgerät Schießsimulator Handwaffen/Panzerabwehrhandwaffen). The contract has a volume of some €5M and comprises the software re-generation of all 185 AGSHP-type gunnery simulators, including the integration of dual-boot system. This system enables the use of the existing training scenarios as well as the new functional features of the SAGITTARIUS EVOLUTION software. Besides, the modernisation effort



Photo: Thales

provides the technical basis for the generation of a network integrating the stationary AGSHP simulation systems with mobile systems that have yet to be procured. The SAGITTARIUS EVOLUTION product family supports both basic gunnery training and tactical training including, for example, "Judgemental Training" of advanced trainees. The network capability of all variants of the product family offers the possibility for interactive training of different teams in complex missions. Apart from Germany, SAGITTARIUS operators include Botswana, Denmark, India, Ireland, Japan, Luxembourg, The Netherlands and Saudi Arabia.

## ■ Monitoring 100G Network Traffic

(df) Flowmon introduced their Flowmon Probe solution with the success story of the Swiss National Research and Education Network, that manages its high-speed network with Flowmon Probe, proving that it is capable of monitoring 100G networks. Introduced as "the most powerful" NetFlow/IPFIX exporter last year, the Flowmon 100G Probe is now being implemented by backbone network operators from across the globe. "When upgrading to 100G technology we were looking for a new flow-based monitoring technology to enable backbone-level network visibility," said Daniel Bertolo, Team Leader Global LAN at

SWITCH. "The number of vendors providing such a technology is very limited. Flowmon Networks is an experienced vendor of network monitoring solutions and its Probe provides us with superb performance and reliability." Flowmon Probes are high-performance devices that monitor network



Photo: Flowmon

traffic, delivering detailed statistics on network communication. This information is crucial for network and security engineers who must take decisive action to ensure reliability and fast service delivery. Especially in large-scale environments where the amount of data is growing exponentially as well as the customer requirements for security and quality of service. As a long-standing pioneer in the development of new technologies, SWITCH works on further enhancing Internet technology and increasing the security of the Internet in Switzerland. To fulfil this mission, SWITCH has implemented wire-speed Flowmon Probe to perform effective management and troubleshooting of its 100G network infrastructure. The project was designed and implemented by the EMITEC company, a Swiss specialist in network testing, monitoring and measurement and partner of Flowmon Networks.

## ■ France Selects HK416 as New Assault Rifle

(gwh) The French procurement agency (DGA) has selected the German assault rifle HK416 from Heckler & Koch to replace the 40 year old FAMAS weapon starting 2017. About 102,000 rifles and 10,700 grenade-launcher will be provided in the next ten to



Photo: PRT Meymaneh

fifteen years under an (estimated) €300m-contract including spare-parts as well as training and in-service logistic support for



30 years. HK416 is a gas-pressure driven rifle shooting NATO calibre 5.56 x 45 mm with rotating piston and cold-hammered barrel. Weight – depending on barrel-length – is about 3.02 to 3.89 kg (without magazine). Four Picatinny rails provide space for add-on accessories (i.e. day-, IR-, thermal optics, rangefinders, grenade launcher). The telescopic butt stock allows for adaption to the soldier's size, or for use in close quarters. The large "winter trigger" enables handling with gloves. Maintenance accessories may be stored in a storage space in the butt. Germany is also considering the procurement of a new assault rifle as the G36, after 20 years in use, has fallen into disrepute within the administration.

#### ■ SAFEmail for Military Forces and Homeland Security

(df) QinetiQ's data security company Boldon James announced the launch of SAFEmail version 3.8 SR1. With this SAFEmail release, military forces, defence and homeland security organisations will have full support for the latest Microsoft Windows and Messaging environments, including Office 2016, Exchange Server 2016 and Windows OS 10, according to the company. SAFEmail v3.8 SR1 also provides extended support for IETF standards, including the military communication standard RFC6477. In addition SAFEmail has been extended to support the RFC7444 standard in the form of a header field, SIO-Label, which conveys the sensitivity of the message. This header field may carry a textual representation (a display marking) and/or a structural representation (a security label) to denote the sensitivity of the message. Support for this feature provides much improved interoperability for both inter- and intra-organisational and national messaging solutions, ensuring adherence to the latest SMTP email messaging protocols.

#### ■ Combat-Proven NANO UAV

(df) Prox Dynamics is a Norwegian company which develops, manufactures and markets the PD-100 Personal Reconnaissance System (PRS) and the BLACK HORNET Nano UAS (NUAS), the world's smallest and operational UAS. Hailed as a game-changer and life-saver the PD-100 PRS is combat proven in Afghanistan and in use with more than 15 nations worldwide. The PD-100 PRS provides dismounted troops



Photo: Prox Dynamics

with Immediate Situational Awareness from the palm of their hand. This unique

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system uses two inherently-safe BLACK HORNET NUAS weighing only 18 grammes each. The NUAS' autopilot provides for a very stable sensor platform making the system extremely easy to operate. The NUAS can be equipped with EO/IR sensors or a combination of EO/IR sensors. BLACK HORNET nano air vehicles are inherently safe, organic and covert, providing users with imagery day and night whilst remaining undetected. With these features the PD-100 PRS bridges the gap between aerial and ground-based sensors, significantly enhancing Situational Awareness during both dismounted and mounted operations. With a total system weight of only 1.3kg the PD-100 PRS is compact and easily integrated with an operator's personal equipment.

Photo: Orbital ATK



precision guidance kits (PGK). PGK-fused projectiles allow battlefield commanders to employ artillery more safely with greater accuracy and less risk of collateral damage. Orbital ATK produced 4,779 PGK fuses under the low-rate initial production contract and has transitioned to full-rate production to support the current programme needs. PGK combines guidance and fuse function for 155mm conventional artillery projectiles into one device. By simply replacing a standard fuse with Orbital ATK's guidance fuse, artillery projectiles are reliably delivered to within 30 metres (or closer) of the

intended target. This degree of accuracy greatly reduces conventional artillery dispersion which can be 200 metres or more.

## ■ Reliable Military Laptop-Server LIZARD RW11

(df) Nowadays military operations are likely to take place in areas with no or not very reliable infrastructure. The military therefore depends on bringing its own IT into an area of operation. Reliability in harsh surrounding is just as crucial as high mobility and easy setup, from network setup to command & control systems and big data stor-

Photo: roda



age. To meet these demands roda has (further) developed the LIZARD, which is now also a modular server integrated into a rugged laptop, the LIZARD RW11. This LIZARD weighs less than 5 kg. The LIZARD RW11 has launched with an Intel-Core-i7-Quad-Core-Processor that pulses with 3610QE Gigahertz. Furthermore it is upgradeable to 32 Gigabytes of memory and up to 4x 1 TB Flash-SSD for RAID storage option. The 15.6" full HD Display (1920 x 1080) is sunlight-readable. Further standard equipment includes 2xGbit-LAN-Interfaces, 3x USB-Ports (2x 3.0, 1x2.0), 4x Serial 9-pin-D-Sub-Interfaces, 1x Display-Port, 1x VGA (all executable as military round plug) WLAN and Bluetooth as well as an adequate keyboard with LED backlight. The company has stated that the modules will be available as 8-Port LWL- and RJ45-Switches as well as AC/DC-(DC/DC)-Power-Panel with integrated UPS. RW11 is therefore able to take over up to 7 functions: Server, Display Unit, Workstation, RAID, UPS, Input Device (Keyboard) and with the mission modules as a server rack. Combined with the laptop server the total system weighs just 17kg.

## ■ Saab Equips LEOPARD 2 with Vehicle Electronics

(df) Saab has received an order from Krauss-Maffei Wegmann regarding development of new vehicle electronics for the LEOPARD 2 tank, valued about €14M. Deliveries are expected between 2018 and 2022. Krauss-Maffei Wegmann is a primary supplier of the LEOPARD 2 tank to the Swedish Defence Materiel Administration

## ■ Artillery Precision Guidance Kits for the US Military

(df) Orbital ATK has received a €62M contract that exercises a second option from the US Government to produce artillery

## ■ US Defence Contracting & DFARS Compliance in Europe

With a budget of nearly US\$600Bn for military expenditure in 2016, the US is by far the largest market for defence companies. Securing a contract with the Department of Defense (DoD) can lead to years of success, steady payment and growth for everyone within the supply chain. In order to be in the running for one of these highly lucrative contracts, companies need to stay on top of the latest changes to DFARS and ensure their contracts, systems and processes reflect new requirements. Cyber security is at the forefront of concern for governments worldwide. In order to better protect technology, the USDoD recently published the new Network Penetration Reporting and Contract for Cloud Services interim rule. By December 2017, companies must, at a minimum, meet the National Institute of Standards and Technology (NIST) Special Publication (SP) 800-171 standards or have an alternative security system approved. At the same time, the new Better Buying Power (BBP) 3.0 is being finalised. The US government is looking to get the best return for its money. As currently written, along with other changes, this new version of BBP will increase the burden on companies in getting Independent Research and Development (IR&D) and Contracted Research and Development (CR&D) projects approved along with other changes. Those that want to win new contracts need to have an action plan in place to compensate for these upcoming changes – or get left behind. The benefits of a DoD contract can simply vanish, without strict compliance to the Federal Acquisition Regulations (FAR) and Defense Federal Acquisition Regulations Supplement (DFARS). Foreign companies that are part of DoD contracts must juggle various accounting standards from multiple countries, meet the requirements of the Truth in Negotiations Act (TINA) and flow down FAR and DFARS clauses to sub-contractors. Anything less than meeting the high standards of the Defense Contract Management Agency (DCMA) and Defense Contract Audit Agency (DCAA) can lead to suspension of payment and hefty fines. Preparing for DCMA or DCAA audits is essential for any company contracting with the US Department of Defense. The focus of an audit will vary and one needs to be prepared for anything. An opportunity to find out how to meet changing FAR and DFARS requirements and successfully pass a DCAA audit will be presented at C5's 5th Advanced Forum on US Defence Contracting and DFARS Compliance in Europe. Anyone involved in dealing with these requirements can learn more about how to deal with them and hear best practice from C5's experts at the two-day conference on 19-20 October in Oslo. C5 is also offering a 15% discount to all readers with the code EUSED17. For more information visit [www.c5-online.com/dfars](http://www.c5-online.com/dfars)



and the Swedish Army, where the tank is designated as STRIDSVAGN 122. The order encompasses design and development



Photo: Saab

of vehicle electronics, delivery of vehicle electronics units and cables, as well as training and documentation. The order also enables the tank to be integrated with the Swedish Battalion Combat Management System. "This order shows that we are a long-term supplier in the field of vehicle electronics," says Jonas Hjelm, head of Saab business area Support and Services. "It's important that the tank is integrated into the Swedish Battalion Combat Management System," says Jonas Hjelm, Head of Saab business area Support and Services. "The order reinforces our role both as a supplier for the Battalion Combat Management System and as a supplier and partner of the Swedish Army and the international defence industry."

#### ■ UVision's HERO-30 System for South Korea

(cf) UVision Air Ltd. has partnered with Firstec to market and sell the company's short-range HERO-30 Lethal Loitering Systems to the South Korean market. "We are pleased to announce our cooperation with Firstec, a leading and long-established Korean manufacturer in the areas of aerospace and aviation", said Noam Levitt, UVision Chief Executive Officer. "South Korea is a strategic market for us for two main reasons. First, we have identified a need in this market for systems such as our HERO-30, which can effectively meet the complex and evolving threats faced by South Korea. In addition, we see it as a technology leader in the area and, as such, a starting point for the entire Asian market." The HERO



Photo: UVision

30 – the smallest of UVision's HERO family that consists in total of six smart loitering systems – is designed to deliver short-range pinpoint strikes in remote locations or in populated urban areas where speed

of response to targets of opportunity and minimising collateral damage are of prime importance.

#### ■ AZCAN Launches New Line of Armoured Vehicles

(sb) AZCAN Defense Solutions is a joint Azerbaijani-Canadian Manufacturer specialising in the production of armoured vehicles for private, commercial and military purposes. The company unveiled its full range of innovative armoured vehicles at ADEX 2016 in Baku, Azerbaijan. The new lineup of AZCAN armoured vehicles includes APCs



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Photo: AZCAN

armoured vehicles that provide maximum protection for their operators and passengers. Due to first-class assembly standards, certified armour and modern electronic components these vehicles meet the highest international standards. AZCAN offers special applications and tactical equipment for its armoured vehicles, including wide-spectrum chemical protection, integrated remote weapon control systems, advanced drone and fire detection devices as well as remote explosives, active ESM (jamming) and more. AZCAN is a joint venture representing both Azerbaijan and Canada. AZCAN delivers security solutions to its global clientele in the form of armoured vehicle manufacture and deployment, per-

sonal security products and services, and one-to-one security consultations for private, commercial and institutional clients. The company's product line comprises ballistic apparel, protective items and military-grade mobile electronic systems as well as armoured vehicles.

## ■ Two Major Milestones for the PREDATOR

(df) Two milestones were recently achieved by General Atomics Aeronautical Systems, Inc. (GA ASI) and their PREDATOR remotely piloted aircraft system (RPAS). First, their Network Centric Communications Pod (NCCP) successfully demonstrated the ability to provide a robust communications data link between an Unmanned Aircraft System (UAS) and US Marine Corps (USMC) ground and air forces during an exercise held at the Marine Corps Air Ground Combat Center (MCAGCC) in California. Integrated aboard a company-owned PREDATOR B Block 5 and operated by a company-owned Block 30 Ground Control Station (GCS), NCCP provided Adaptive Networking Wideband Waveform (ANW2) retransmissions and Tactical Targeting Network Technology (TTNT) availability while simultaneously providing C-band Remote Operational Video Enhanced Re-

ceiver (ROVER) full-motion Video (FMV) to advantaged users who possessed highly sophisticated connectivity and communications equipment, as well as disadvantaged users on the battlefield who were equipped with Kinetic Integrated Low-cost Software Integrated Tactical Combat Handheld (KILSWITCH) tablets.



Photo: GA-ASI

The second milestone was that the PREDATOR-series RPAS exceeded four million flight hours, with 291,331 total missions completed and 90% of all missions flown in combat. "Amassing four million flight hours is a testament to the reliability of RPA systems that are designed, built, and maintained by a dedicated group of skilled and innovative professionals," said Linden Blue, CEO, GA-ASI. "We are proud of our fleet's contributions in providing round-the-clock ISR capabilities for our customers worldwide."

## WELP Armouring Presented its Latest Armoured Special Police Vehicle at Sobra 2016

(pb) The new F2-TLC produced by WELP Armouring was specially designed for police and special forces and was exhibited at the Sobra 2016 exhibition (22-24 September 2016) in Gornja Radgona/Slovenia.

This vehicle provides new application possibilities thanks to tactical and functional options such as a quick-opening roof escape hatch, leg protection in the doors, armoured glass with integrated gun ports, tactical interior lights, camera monitoring systems and several special options.

"Slovenia's special forces were favourably impressed by our vehicle, after performing several test-drives, not least because of its outstanding driving dynamics despite the increased kerb weight", declared the company.

Apart from highest ballistic safety standards for the vehicle construction, WELP Armouring offers worldwide after-sales services including driver training with its experienced driving instructors, spare parts supply, repairs, inspections and acceptance tests on-site. The presentation of the brand-new ballistic certification movie of the F62-NPC700 based on the Nissan Patrol Y62 emphasises WELP Armouring's focus on safety and high quality standards.

"We are grateful to have made new and interesting contacts", outlined the company as conclusion of its participation at Sobra.

Photos: WELP Armouring



[www.welp-armouring.com](http://www.welp-armouring.com)





# The 24th MSPO – The Defence Industry as a Driving Force for Poland's Economy

The 24th MSPO exhibition in Kielce, Poland, hosted a record-breaking number of 614 industrial exhibitors with representatives from 30 countries. As an annual event, MSPO 2016 was held under the auspices of the President of the Republic of Poland, Andrzej Duda, who honoured the event through his presence at the opening ceremony. MSPO 2016 was accompanied by the 22nd LOGISTYKA international logistics fair. Both events hosted 50 official delegations from 46 countries as well as more than 22,000 visitors.

## Important Guests of Honour at MSPO

MSPO 2016 could take advantage of the presence of numerous state authorities and officials. On 09 September 2016, the last

President of Targi Kielce, Andrzej Mochoń PhD, and the county commissioner of the Świętokrzyskie Voivodeship, Agata Wołosz, on the world-class organisation of the International Defence Industry Exhibition. The defence expo also hosted the National Defence Minister, Mr. Antoni Macierewicz. Not only did the minister make a tour of the exhibition, he also announced decisions related to major technical modernisation programmes, e.g. issuing the request for quotation for the PATRIOT air defence system as well as appointing PGZ as the supplier of the ROSOMAK BMS system. The Deputy Defence Minister Bartosz Kownacki and the Secretary of State Andrzej Szatkowski, together with the Minister of Development Mateusz Morawiecki and the representatives of the armed forces and industry, participated in conferences

tems, Boeing, Leonardo, MBDA, Raytheon, Rheinmetall and Thales. This underscores MSPO's prestige and importance. Multinational organisations showcased the latest helicopters, combat vehicles, missile systems and weapons.

## Under the Banner of the Polish Defence Industry and Contracts

Poland has been the leitmotif of this year's MSPO. The country was represented with over 325 exhibitors – public and privately owned companies. The Polish Armaments Group (PGZ) presented the most extensive and diversified exhibition. PGZ is MSPO's strategic partner. The Polish Armaments Group's companies concluded several important agreements. PGZ and Thales



Photos: MSPO

day of the exhibition, the Polish President Andrzej Duda visited the stands of Polish exhibitors and the Armed Forces. "Now that the Polish Army is being modernised I have observed the exhibition with particular interest; not just as a man but first and foremost as the Commander-in-Chief of the Armed Forces. I expect that Polish Army programmes and our obligations to our allies will be carried out and taken care of effectively. (...) I want the [Army to be equipped with] the best equipment available, of adequate value for money so that it serves the purpose of securing the safety of Polish soldiers", said President Andrzej Duda at the closing ceremony. The President congratulated the Mayor of Kielce, Wojciech Lubawski, the

on Polish defence industrial topics. "The Polish Armed Forces' Technical Modernisation – Priority Directions for the Years 2017-2019" and "Opportunities for the Polish Armaments Group's Involvement in the Implementation of the Priority Tasks of the Armed Forces' Technical Modernisation" were only the two most important among numerous workshops and panels held within the scope of MSPO.

## The Defence Expo's Prestige and Significance

MSPO 2016 was graced with the presence of the President, national and foreign ministers, it also hosted global defence industry giants like Lockheed Martin, BAE Sys-

signed an agreement with Mesko, in the scope of which the companies will cooperate on the production of cutting-edge air-breathing missiles in Poland. These are designed for the domestic and export markets. PGZ also signed a letter of intent with Leonardo. The MEADS International consortium received a letter of intent from PGZ addressing cooperation within the framework of the OPL WISLA programme. These documents show that Poland's defence industry expands its international presence. The words of Defence Minister Antoni Macierewicz may serve as the best recapitulation of MSPO 2016: "I would like to express my gratitude to the organisers of this magnificent defence Exhibition, for everything Poland can boast owing to your efforts."

# The Enhanced Role of Frontex

Photos: Frontex



## Interview with Berndt Koerner, Deputy Executive Director of Frontex

model was one of the starting points of Frontex and this has been constantly developed. So evolving and adjusting our focus is a common process for Frontex, implemented from the start and constantly ongoing since then.

**ESD:** What does the Frontex analysis say about the task of illegal migration?

**Koerner:** Migration has of course our main attention. Currently, as we all know, the main focus is in the Mediterranean Sea and there we have two main migration flows, the Eastern Mediterranean Route and the Central Mediterranean Route. The Eastern Mediterranean Route goes

mainly through Turkey towards Greece and then – in the past – upward to the Western Balkan countries, nowadays as a parallel route also through Bulgaria, Serbia and Hungary. But I need to mention at this point that the main causes for this Eastern Mediterranean Route are by no means originated in Turkey. They go much further beyond. You have Syria. You have Jordan. You have Lebanon. You also have the critical situation in Afghanistan. You have migration in Pakistan. So this is an international phenomenon.

Regarding the Central Mediterranean Route, this is to a large extent the well-known route from Libya to Italy. But to an

**ESD:** Frontex was founded in 2004: has the world changed since then?

**Koerner:** I think the world has changed most dramatically since 2004. Frontex was founded in the middle of the EU enlargement process – meaning also the Schengen enlargement process – with the new member states getting ready to join the Schengen process, so our main goal was to help them implementing all the Schengen evaluations and to assess their Schengen readiness.

Since then we had to deal with irregular migration and had to face constantly changing threats and risks, so I really think the world by no means looks the same as it was back then.

**ESD:** How did Frontex evolve and has your focus shifted since the beginning?

**Koerner:** Our focus – or the main point of attention – is more or less constantly shifting. We have the rule that we always try to make informed decisions. This means one of the basic elements we have focused on since the very beginning is what we call risk analysis. So we always analyse where are the risks, the threats, where are the migration flows, where do we have increases, where do we have decreases and how do we need to adjust our strategies and our procedures to remedy shortcomings. So we always analyse in order to support or assist member states in combating certain phenomena.

This was our approach from the very beginning. The common integrated risk analysis



**FRONTEx** headquarters in Warsaw, Poland



increasing extent – like the tragic events during the last weeks have shown – it is the route from Egypt to Italy and also to a certain extent bypassing Libya on the western side from Algeria and Tunisia.

As with the Eastern Route, the main causes for the Western Routes do not lie in the countries I have just mentioned. They go much further down the sub-Saharan region. There the reasons may be again terrorism, they might be environmental problems, they might be starvation, economic reasons, political instability.

There are lots of international root causes for migration that are currently influencing our focus to a great extent.

**ESD:** When the origins for migration are far beyond European borders, does Frontex also have to extend its area of operation?

**Koerner:** Definitely. If you want to perform border management properly and support the member states in fulfilling their tasks, you need to go much further on the international level. You need to cooperate with international entities and you need to extend your views to consulates, to different diplomatic missions, to international areas in order to get a good complete situational picture that enables you to really draw the right conclusions.

At the moment we are working along the so-called Integrated Border Management Model, which consists of three different components. One of them is international cooperation. This Integrated Border Management Model will for the first time be clearly stipulated in the new regulation that will come into force on 6 October 2016.

**ESD:** So did migration change the face of Frontex?

**Koerner:** The face of Frontex is not a stable or standing issue. We constantly need to adjust and see where pressure comes from in order to manage our competencies and tasks sufficiently. These tasks include being available and supporting the member states in their efforts to manage their external borders correctly, meaning checking everybody who comes across. And in case of irregular migrants coming across, to do the fingerprinting, the screening, the debriefing, storing the information

in the relevant databases and completing the necessary security checks so whoever comes across the border – no matter what reason – does not enter undetected. If a person is to be referred for asylum it is our obligation to make that referral. If a person correctly wants to enter but maybe does not fulfil the entry requirements there might be a refusal of entry. If a person does not have the right to stay – whatever reasons might be the background – there will have to be a return decision to be issued by the respective member states. In this case we also offer support for the voluntary or forced return of this person.

**ESD:** Has Frontex been successful so far?

**Koerner:** This year we managed to achieve good results. For example the return operations show our enhanced role. If member states, who are still in charge of the return decisions, want to have our assistance in conducting return operations to the countries of origin we stand ready to support by offering transportation, organisational help and also financial assistance. We had 35 so-called joint return operations up to August last year. This year we expect to have over 200. This shows how much support we offer to the member states and how established our help is already.

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I think we have made good progress there. We still have a long way to go in order to achieve the results that are commonly expected from us.

**ESD:** On 6 October 2016 Frontex will become the new European Border and Coast Guard Agency. What impact will this change have?

**Koerner:** The impact is multi-faceted. First of all it means an increase in personnel. We are currently around 400 and by 2020 we are supposed to be 1,000. The effects of this increase on our organisational structure and also on our premises and working environments are quite obvious. In addition to that, our relationship with the member states will also change to a big extent. We will have the new so-called "vulnerability assessment", where on an annual basis we will conduct assessments with all member states in order to find out where their vulnerabilities are. With this we want to see at a very early stage where potential problems, crises or critical situations might arise. Then we want to respond to those issues at an early and common stage in order to remedy shortcomings or critical situations.

We will also have a much bigger role in responding to critical situations at the border sections where external border countries are under particular pressure. Here I am referring to the Rapid Reaction Pool where we will have a standing force of around 1,500 clearly-nominated border guards from all member states. This Rapid Reaction Pool should and will be ready to immediately go to those countries under pressure in order to support and remedy any shortcomings or critical situations. They will assist in tightening and enforcing border management in these countries.



**On 29 December 2015, POSEIDON RAPID INTERVENTION replaced JOINT OPERATION POSEIDON SEA with a higher number of officers to assist the Greek authorities in border surveillance, identification and fingerprinting of arriving migrants.**

We will also have additional competencies in the form of so-called coast guard functions where we will work much more closely with other agencies in the maritime domain in order to take care of synergies and cooperation, both in the field of water pollution and fishery control and in irregular migration. To be brief, in the future everybody will look more after everything. And we will not focus on each one's competencies like we have done in the past. Multi-purpose operations are already running as part of the project and we intend to enforce that.

Then there will also be more tasks and more possibilities and opportunities in the area of personal data exchange and the collection of personal data. According to Europol over 90% of irregular migration is organised. We need to enforce our tasks to get the networks behind the migration in order to dismantle them because there are criminals making an awful lot of money on the shoulders of the irregular migrants. Data exchange and personal data collection will help in getting our hands on these criminal networks.







**ESD:** Some of these enhanced tasks also need some hardware, will Frontex – in the future – also procure bigger systems like ships?

**Koerner:** This is an ongoing process where we will also have an enhanced role under the new regulation. But we also have to be very careful because whatever funds are available to us it is our sincere obligation to manage the financial means properly and according to the rules. If, for example, you acquire a ship you always need to be aware that the acquisition also means you have to be ready for the maintenance costs. The same goes for aircraft and all the other systems. So what we are currently working on is a step-by-step,

very careful evaluation of the situation in order to procure with a good result also from the financial aspect.

Procuring is not always the best choice. To give an example, in border management we also have an airborne component for area surveillance. We already have the framework running where we have procured the services, so somebody or a group of companies runs the aircraft; they are on call and then undertake the surveillance with their resources, with their equipment but according to our rules in our operational areas. We pay them to be available but they take care of their own assets and the maintenance of their own equipment.

We also have some pilot programmes in preparation in the area of ships. We might have a member state who might make a vessel available to us long-term. That member state would take care of the maintenance. We would then have a mixed international crew, with one member state properly running the basic structure of the vessel and other internationals volunteering to participate in special missions. This mixed international team would be composed of members of the different Schengen states and run the vessel according to an international plan. We are working on that.

Where we will probably have to go further is communication, meaning laptops, radios and so on. Communication is one of the core backbones that we have to support in the future.

We will also have to enforce mobility because very often we run into certain smaller problems regarding mobility on the ground. Now, with our enhanced possibilities, we will also expand in this area.

**ESD:** What will be the main challenges European border security will face in the next years and are you prepared for them?

**Koerner:** Please allow me to slightly amend this question. Since we are coordinating the measures of the member states the question has to be: Are we prepared for this? Because we rely on the pledges and the deployment of member states and the more the member states put us in a position to respond, the better we are able to respond.

Secondly, if you look at today's world we have to be aware that our prime target has to be reaching a point where we can better manage migration. The idealistic approach, that we could stop – or should be able to stop – irregular migration, is something we will not achieve. Because we live in a world of political instability. We also have demographic questions, we have environmental questions, and these questions go far beyond the possibilities that can be managed through border control or border management.

We have to constantly adjust and prepare ourselves in order to respond properly. We are now facing challenges that we were unable to imagine ten years ago. I think there will be new challenges coming that we, maybe, cannot even think of today.

But I am sure that we have to look far beyond our borders. We have to be at home on an international level in order to understand the movements, in order to have the necessary contacts and in order to have the necessary links to different countries so we can really perform these tasks. We are working on this. And we are out there to fulfil those tasks that are given to us. ■

**The interview was conducted by Dorothee Frank.**

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**LÜRSSEN**

# Perspectives for Ukraine's Long-Term Security

Iryna Solonenko

After the Revolution of Dignity, Ukraine had a unique chance to interrupt the vicious circle of partial reforms and make a breakthrough towards a new social contract. This happened due to the fact that the Ukrainian society, or at least the most active part of it, proved that it is an actor and that it can shape the course of events in its country.

If it were not for the ability of the people to stand up for their dignity, developments in Ukraine would have continued to be determined by autocratic leaders, like its former president Viktor Yanukovich together with some oligarchs, or Russia's imperial ambitions.

reached the critical mass to overhaul the old social contract or old system of governance – that of a postcolonial captured state, which Ukraine has been ever since it gained independence in 1991.

Until now, Russia's leverage in Ukraine has rested upon non-transparent and mutu-

presidency, which culminated in the refusal to sign the Association Agreement with the European Union in exchange for loan from Russia, were the prime example of this. Today, after the Revolution of Dignity, Ukraine is gaining its true independence and it comes at a great cost – that of thou-



Photo: dpa

**On 5 December 1991, the Ukrainians voted overwhelmingly to secede from the Soviet Union and elected Leonid Kravchuk president of independent Ukraine.**

The Revolution of Dignity has so far achieved the transition of power by holding new elections for key political institutions. It has also resulted in the reform momentum, which was unseen before. Nevertheless, these reforms have not yet

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Photo: Gazprom

**After the Revolution of Dignity, Ukraine has significantly reduced its dependence on Russian gas.**

ally beneficial arrangements with Ukrainian political and economic elites. These elites preferred dependence on Russia (be it cheap gas, loans or political support), which allowed them to maintain the system of limited access to public resources and decision-making and extract their rents at the expense of the majority of society. In exchange they adopted decisions that undermined Ukraine's sovereignty and security, such as allowing Russia to preserve the monopoly in gas supply, prolonging the lease for the Russian Black Sea Fleet in Crimea or leaving the eastern border of Ukraine unprotected. In other words, the system of state capture has enabled the persistence of Ukraine's postcolonial condition. Four years of Viktor Yanukovich's

sands of lost and ruined human lives. By now, Ukraine has succeeded in getting rid of some characteristics of its postcolonialism, largely as a reaction to Russia's military aggression. Yet, until Ukraine dismantles the captured state, it will remain vulnerable to Russia exercising its leverage over Ukraine's transformation. While it is important to withstand Russian military aggression in the short run, Ukraine needs to undertake reforms that will turn it into a state based on open access order in order to guarantee its long-term security and resilience to destructive external interference. For such reforms to succeed it means to ensure implementation and enforcement of the new rules of the game that have already been adopted as laws. Most re-





Photo: wikipedia commons

**Euromaidan rally on 8 December 2013: as a result of the Revolution of Dignity, Ukraine's postcolonial status has partially been eliminated.**

cent developments in Ukraine show that, although numerous legislative initiatives were introduced, the resistance to reform has been particularly strong when it comes to implementation and enforcement. This means that the new reform initiatives have failed to become the new functional rules of the game and therefore their irreversibility is not guaranteed.

## Eliminating Ukraine's Postcolonial Status

Looking back at Ukraine's transformation during the years since it acquired independence, it becomes clear that Ukraine has evolved as a country with a system of governance in which a small group of the powerful engage in rent-seeking behaviour and restrict competition and access to resources for the rest of society. In academic literature such a system is known as a 'captured state' or 'limited access order' (as opposed to 'open access order', where various societal groups and individuals have more or less equal opportunities in terms of access to resources and decision-making)<sup>1</sup>. Moreover, it is possible to argue that due to this system of governance Ukraine has remained a postcolonial country that has never acquired genuine independence. In the absence of developed channels of access to public institutions and resources for large parts of the society, which ensure checks and balances, a group of ruling elites remains vulnerable to external leverage that helps the elites to maintain power, but can be destructive for the country's sovereignty and security.

After the Revolution of Dignity, Ukraine has managed to eliminate some characteristics of its postcolonial condition. It concluded the Association Agreement with the EU, which ended the situation of ambiguous external

orientation and the balancing act between Russia and the West, which Ukraine had performed since becoming independent. Also, an important shift in public opinion occurred. The ambiguity in terms of choice between the 'Union with Russia and Belarus' (later Eurasian Economic Union (EEU) and the EU, which persisted for many years, was replaced by the overwhelming support for

gas. While Ukraine imported 45 bcm of gas from Russia in 2011, the figure fell to 6.1 bcm in 2016. Two factors contributed to this: the long-awaited gas market reform reduced gas consumption by 31% compared to 2013<sup>4</sup>, and gas import from the EU was launched in 2014. Ukraine has also significantly redirected its own export: in early 2016 Ukraine's export to the EU exceeded the export to Russia by 5 times<sup>5</sup>. Finally, in 2014 Ukraine unilaterally demarcated the border with Russia. Until late 2014 the state border between Ukraine and Russia, despite being one of the most important attributes of a state's sovereignty, did not really exist; its delimitation was delayed and it was never demarcated, nor has proper border infrastructure been developed. This was an important factor that enabled Russia to start the proxy war and supply fighters and weapons to Donbas (at this point in time, Ukraine has lost control over 400 km of its almost 2,000 km land border).

These changes have marked a significant shift in Ukraine-Russia relations and have

Photo: Verkhovna Rada of Ukraine



**The civil service reform was adopted into law by the Ukrainian Parliament in December 2015.**

the EU; by December 2015<sup>2</sup> 53% supported joining the EU, while only 17% favoured joining the EEU. The attitude towards NATO shifted as well: while in 2012 only 26% would vote for joining NATO, in 2016 support for NATO reached 78%<sup>3</sup>. Russian military aggression contributed significantly to this shift in public opinion. To add to this, Ukraine has reduced its dependence on Russian

partially eliminated Ukraine's postcolonial status. Yet, the very foundations of Ukraine as a captured and dysfunctional state have not yet been altered. When democratic institutions are weak or even non-existent, informal institutions and networks still play an important role in decision making, allowing privileged access to public resources for a handful of political and economic self-serving actors. It is this systemic problem that is responsible for the weakness of

<sup>1</sup> See Douglass C. North, John Joseph Wallis, and Barry R. Weingast, *Violence and Social Orders: A Conceptual Framework for Interpreting Recorded Human History* (Cambridge, 2009).

<sup>2</sup> See the poll conducted by the Kiev International Institute of Sociology in December 2015. <http://www.kiis.com.ua/?lang=eng&cat=reports&id=584&page=1>

<sup>3</sup> See the poll conducted by the Democratic Initiatives Foundation in May 2016. <http://dif.org.ua/article/2590>.

<sup>4</sup> Information by Naftogaz Ukraine.  
<sup>5</sup> State statistics of Ukraine.

the Ukrainian state and its vulnerability to external interference, most notably from Russia.

## Dismantling the Captured State

Dismantling the captured state can depend on many factors. This article singles out those that relate to the implementation and enforcement of reforms. The developments in the past 2.5 years in Ukraine have shown that exactly at this stage the resistance is particularly strong, which leads to imitation or even sabotage of reforms. After the Revolution of Dignity a lot of important reforms were finally initiated. A number of factors, such as a strong demand for reforms and pressure from civil society, external pressure based on conditionality, emergence of reform enclaves inside the public authorities, and new ways of thinking, especially among entrepreneurs free of paternalistic clichés, but based on a strong sense of self-responsibility, have contributed to this. According to many commentators, more reforms have been launched since the Revolution of Dignity than during all the preceding years of its independence. These reforms concern better access to information, transparency in decision-making and public finance, fighting corruption, elimination of some channels of privileged access to public resources, be the cheap domestic gas, the misuse of state-owned enterprises or state subsidies to selected economic actors. Many of these reforms do create the new rules of the game. Nonetheless, these rules have not yet been translated into practice. The implementation and enforcement of reform has remained weak, putting the success and sustainability of these reforms at risk.

Speaking about implementation and enforcement, professional and impartial civil service and rule of law stand out as important institutional safeguards that still need to be developed in Ukraine.

Civil service reform is an important area that ensures the successful implementation and sustainability of legislative initiatives. Basically, it is about the state's capacity to implement decisions and turn them into functional rules. So far there has been too much resistance for positive change to take root in this area. The respective bill had its first reading in April 2015. Despite broad consensus on the need to reform the civil service, MPs voted on the bill 20 times and it then received 1,300 amendments before it was finally adopted into law in late December 2015. The new law that came into force in May 2016 offers the opportunity to launch a new system of civil service with

new quality personnel. It separates political and civil service positions (the latter below the level of deputy ministers, ensuring institutional memory). It also includes a number of provisions that are supposed to ensure that civil servants will be professional and free of corruption. Thus, civil servants will be selected and hired through a rigorous and independent selection procedure and

to violation of traffic rules by drivers, it has not been able to fight criminality, which has grown due to economic crisis.

The reform of judiciary (and prosecution) has not yet succeeded. The long awaited amendments to the Constitution that concern the judiciary were finally adopted by the Parliament in May 2016. In the best-case scenario, the reform will come into



Photo: NATO

**Joint press point with NATO Secretary General Jens Stoltenberg (right) and the President of Ukraine, Petro Poroshenko, following the meeting of the NATO-Ukraine Commission at the level of Heads of State and Government during NATO's Warsaw Summit on 6 July 2016**

promoted based on transparent evaluation criteria. The total number of civil servants, which today exceeds 260 thousand, will have to be reduced to some 150 thousand, and their salaries should be increased. It is clear already that this reform is going to meet a lot of resistance since it will produce a lot of outsiders. Thousands of former civil servants that used to enjoy extensive social benefits will lose them, others will have to find new professional opportunities altogether. Ensuring that higher quality personnel can be hired for the remaining positions and can receive proper remuneration is another challenge that cannot be tackled easily.

Fostering rule of law, which concerns the reform of law enforcement authorities and judiciary and fighting high level political corruption, is crucial when it comes to enforcement the new rules of the game. It is not surprising that, particularly in these areas resistance has been strong.

Probably the most visible success was the launch of the new patrol police force, which came into existence in November 2015. Inhabitants of many cities and towns all over Ukraine could already sense the change as new police cars with new trained officers appeared in the streets. While this reform eliminated petty corruption related

force in autumn 2016 and will pave the way for the overhaul of the entire judiciary – both the system and the judges. Yet, until this happens, which might take some years, courts continue to be dependent on political whims or money. There have been a number of instances when some decisions of public authorities were ruled invalid by district courts and thus positive changes were blocked. In many cases, the dismissal of inefficient civil servants or judges (for instance, those that ruled against the protesters during the Revolution of Dignity) was not possible thanks to relevant court decisions that were guided by particularistic interests.

Fighting high level corruption has succeeded only partially. New important institutions have been established to take on this issue, most notably the Anti-Corruption Bureau, which is supposed to fight corruption at the highest levels. The Bureau has already shown that it is an independent professional body. It has investigated several high level cases, including those that concern people connected with the current authorities. Yet, the General Prosecutor's Office (GPO) has delayed following up on some cases and concerned individuals could flee abroad. In August 2016, the GPO even



broke into the premises of the Bureau, detained some of its employees and got hold of documents, thus provoking protests on the part of civil society. Another most recent example of resisting or even sabotaging reforms in this area has been that of electronic declaration of assets. This system will make officials, whose assets do not match their official income, face criminal responsibility. The electronic system, that was supposed to be launched on 15 August 2016, was launched, but the special state agency responsible for certification of the system failed to do so. This would free officials who fail to report their assets or hide them from criminal responsibility. Only after civil society's protests and pressure from the EU and IMF, which offer visa-free travel and financial assistance to Ukraine, could the conflict be resolved.

## Conclusions

Ukraine has made important steps in the direction of getting rid of its postcolonial status. The clear sense of direction towards European integration (as opposed to balancing between the West and Russia) both at the official level and that of public opinion are the indications of this. Yet, the dismantling of a captured state, which Ukraine has been since gaining independence, has not yet succeeded. Many important reforms establishing the new rules of the game have been initiated. However, problems with the implementation and enforcement of reforms show that resistance on the part of self-serving elites representing the old system remains strong. This situation endangers Ukraine's long-term security. A state in which various groups of society both at the national and local levels can influence decision-making and keep public authorities accountable, and where public institutions serve the national interests or society at large (as opposed to the interest of small groups of political and economic elites), is more resilient to destabilising external pressure. Ukraine has not yet passed this threshold of irreversibility in its transformation towards becoming an open access order, with a more inclusive and accountable system of governance. Both domestic reform oriented actors and international institutions that foster Ukraine's transformation should strengthen their focus on the implementation and enforcement of reforms. Numerous decisions and laws passed until now are not sufficient as long as they do not become widespread practice and ultimately an important safeguard of Ukraine's long term security. ■

## I/ITSEC Marks its 50th Anniversary

The United States and its Coalition partners today face what is probably the most diverse and unpredictable security environment in their history. From state and non-state sponsored terrorism, to cyber and other threats to critical national infrastructure, to climate change and natural disasters and the need to redirect and augment capabilities to meet near-peer challenges while maintaining readiness across the entire threat spectrum, the challenge is monumental. Add to this the fact that the US, and the West in general, face constraints on defence budgets which show no signs of abating.

Modelling, simulation and, increasingly, virtual reality are making an ever-more important contribution to meeting these challenges. The unique attributes of the technology include: saving time through the ability to repeatedly train for the same skill until it is mastered; saving money through using synthetic environments instead of costly live training; and saving lives through not only the results of the training but also the ability to place trainees in situations which could not safely be replicated in live environments. As processing power increases at a steady and cumulative rate, the capabilities of modelling and simulation will expand exponentially in the coming years, making the technology a critical element of national security.

The Interservice/Industry Training, Simulation and Education Conference (I/ITSEC) is by far the world's largest and most comprehensive modelling and simulation event. Simultaneously a conference and an exhibition, I/ITSEC brings together the entire global modelling, simulation and virtual reality communities to conduct business and explore in-depth the present and future promise of the industry and technology. I/ITSEC is constantly evolving to reflect and incorporate the latest developments in M&S as technology expands rapidly into new practice areas. As such, I/ITSEC makes a unique and indispensable contribution to the health and vitality of the M&S industry and community.

### Operation Blended Warrior

I/ITSEC 2016 will possibly be the most innovative, varied and important yet. This year's theme – „Pushing the Training Envelope: Live. Virtual. Constructive“ is reflected in Operation Blended Warrior, which will expand on the pioneering version from I/ITSEC 2015. The premise of the exercise, conducted across the I/ITSEC exhibit hall floor, is that integration of the various simulation methodologies has not matched the pace of advancement within those methodologies. By constructing a simulated war game during I/ITSEC 2016, involving 55 exhibitors, military and government organisations, the exercise will explore multi-level security/cross domain solutions, performance measurement, and long-haul live asset integration. The event will incorporate 7.5 hours of LVC vignettes spanning the four days of I/ITSEC.

Another groundbreaking event this year will be the second iteration of „Black Swan“. Low-probability, high consequence events of all kinds present challenges to planners that often can be most effectively addressed through modelling and simulation. Technologies including big data farming, agent-based interactions and digital humanity modelling will all be explored in this event at I/ITSEC 2016.

Two trends at I/ITSEC 2016 deserve additional note. One is the rapid diversification of M&S into a wide variety of new applications as the technology becomes ever more powerful. Today, M&S is a key element in healthcare and medical training and research; weather and climate analysis and prediction; public safety, emergency response and law enforcement; natural resource exploitation and environmental research; manufacturing, materials development and failure analysis; human behaviour, mental disorder treatment; and transportation, distribution and infrastructure development and improvement.

### Increasing International Relevance and Presence

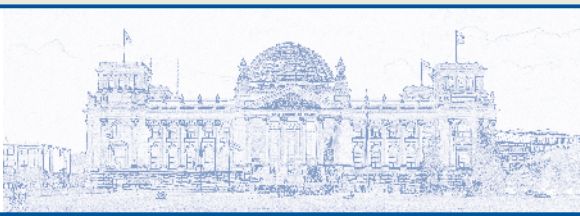
Second, the National Training and Simulation Association, the organising body for I/ITSEC, is placing increasing emphasis on international attendance and participation at I/ITSEC. Already, in recognition of the worldwide importance of the technology, approximately 20% of I/ITSEC attendees and exhibitors are overseas corporations, military and other government and research organisations. As the technology becomes ever more widely adopted, international participation is expected to increase steadily.

The US government has eased restrictions on travel for the armed services, and a very high level of military attendance at this year's I/ITSEC is expected. Similarly, industry exhibits are measurably more this year. As the organizers say, „If you are involved in modelling, simulation or synthetic environments, I/ITSEC 2016 is the place to be.“



### I/ITSEC 2016

28 November – 2 December 2016  
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## Viewpoint from Berlin



### 2016 White Paper on German Security Policy and the Future of the Bundeswehr

**Wolfgang Labuhn**

New security challenges in Europe and in Europe's immediate geographic neighbourhood led the newly formed German coalition government at the 50th Munich Security Conference in 2014 to take a new look at Germany's military role in the world. The tone of the debate was set by Federal President Joachim Gauck, who argued that Germany's Nazi and Communist past is no excuse for ducking international commitments. Following this lead, the newly appointed Defence Minister Ursula von der Leyen declared "Indifference is not an option for Germany" while Foreign Minister Frank-Walter Steinmeier remarked, "Germany is really too big to just comment from the sidelines." The 2016 White Paper on German Security and the Future of the Bundeswehr now outlines the new German position in greater detail. The document (the first German white paper on security since 2006) was published by the Ministry of Defence on 13 July having been approved by the German cabinet on the same day. However, following a lengthy process of partially public debate involving ten workshops with 150 experts and some 6,500 members of the public the 2016 White Paper remains somewhat vague, with the main message: "Germany is prepared to provide a substantial, decisive and early stimulus to the international debate, to accept responsibility, and to assume leadership." The chapter on threats to Germany's security paints a bleak picture of the world today. Transnational terrorism, cyber attacks, interstate conflicts, fragile states and poor governance, global arms build-up, proliferation of weapons of mass destruction, threats to supply lines, transportation and trade routes, climate change, uncontrolled and irregular migration, epidemics and pandemics – all are seen as challenges to German security. But listing Germany's strategic priorities in response to these challenges remains a low-key operation, with the most interesting priority probably being the "unhindered use of information and communication systems, supply lines, transportation and trade routes as well as the secure supply of raw materials and energy." As an export-oriented nation heavily depending on open trade routes it has taken Germany a long time to acknowledge co-responsibility to keep them secure. Germany's current maritime engagement in the Mediterranean (EUNAVFOR MED Operation "Sophia", NATO Maritime Group 2 in the Aegean Sea, UNIFIL)

and at the Horn of Africa (EU NAVFOR "Atalanta") proves that safeguarding maritime security has indeed become a major part of Bundeswehr missions abroad.

But in view of Russia's blatant violation of Ukrainian sovereignty, the most important task of the Bundeswehr has yet again become national and collective defence in the framework of NATO and the EU including defence against attacks on the territory of allies, defeating terrorism and defending against hybrid threats. International crisis management including conflict prevention, UN peace missions and the fight against transnational terrorism which dominated the 2006 white paper are not considered top priorities for the German armed forces any longer, whereas homeland security, crisis management for German nationals abroad, and subsidiary support inside Germany including contributions to counterterrorism operations within the (narrow) framework of the German constitution have moved up the ladder of importance.

Being a long-term strategy document, the 2016 White Paper does not present specific figures for defence spending. But for the first time in a quarter of a century the German defence budget is now growing again. Compared to the current budget it is set to rise by €2,3Bn to €36,6Bn in 2017 with further increases to be expected. According to Defence Minister von der Leyen, Germany is determined to meet the NATO target of spending 20% of the defence budget on equipment, although is a long way from spending 2% of its GDP on defence. However, to meet new demands the Bundeswehr will grow in numbers again to around 192,000 military personnel and some 60,000 civilian employees by 2023. The Bundeswehr will also develop new cyber capabilities. A completely new cyber force initially comprising 13,500 posts from 2017 is being set up as a force branch alongside Army, Air Force, Navy, etc.

The 2016 White Paper on German Security and the Future of the Bundeswehr underlines in rather general terms a significant change in German security policy with specific defence measures being taken at the same time. But being a compromise following intense discussions between Christian Democrats and Social Democrats in the Berlin coalition government, it is an important document that leaves all options open. ■



# Israeli-Turkish Relations: Coming Together but Going Alone

Eugene Kogan

Back on 2 April 2013 James Larocco, Director of the Washington-based Near East South Asia Centre for Strategic Studies (NESA), said that: "Relations between Turkey and Israel, which once enjoyed solid ties at all levels, are not expected to be as close as in the good old days. According to my own discussions with Turkish as well as Israeli officials over the past years is that they agree that Turkey and Israel can never go back to the same relationship which they enjoyed ten years ago."

Perhaps Larocco's statement was a bit far-fetched – particularly for saying that relations can "never go back" – nonetheless, it was not off the mark. The rapprochement between Israel and Turkey discussed below is based not on trust and sympathy,

sequences of the recent failed military coup in Turkey make a potential dialogue very difficult, if not impossible. Still, as presented below, politicians in the two countries are doing their best to mend broken relations and put them on a new footing. The article

the Turkish decision and the first positive signal of what has recently changed for the better in Israeli-Turkish relations. Zaki Shalom, a Senior Research Fellow at the Tel-Aviv based Institute for National Security Studies (INSS) said that: "What is really important is that the NATO decision demonstrates the warming of relations with Turkey, since this decision taken by NATO must be approved unanimously. If Turkey was not close to settling all its differences with Israel, I doubt that NATO would have published that statement on 4 May."



Photo: NATO

**Israeli President Reuven Rivlin (left) held a working meeting with Secretary General of NATO, Jens Stoltenberg, at NATO Headquarters in Brussels on 21 June 2016.**

but rather on diplomatic and political interests since economic ties between the two countries have remained intact. The defence and security agenda is not yet there and may be excluded for some time. The mistrust "between the leadership of the two countries is still too great, and the con-

will thus assess a wishful thinking in the two countries versus stark reality that politicians in both countries need to face.

It should be emphasised that Israel is a partner in NATO's Mediterranean Dialogue, along with six other countries: Algeria, Egypt, Jordan, Mauritania, Morocco and Tunisia. In September 2011, then Turkish Minister of Foreign Affairs Ahmet Davutoğlu told the Turkish media that: "Turkey succeeded in blocking an Israeli attempt to open an office at the NATO headquarters." It can be asserted that the decision made by NATO on 4 May 2016 to let Israel open a permanent office at its Brussels headquarters was a reversal of

## Reconciliation Agreement

After the positive outcome at NATO headquarters, the Israeli Prime Minister Benjamin Netanyahu and Turkish Prime Minister Binali Yıldırım met in Rome and signed a reconciliation agreement on 27 June 2016. It should be emphasised that the two countries have been at loggerheads since the famous World Economic Forum incident in Davos in late January 2009. At the time of the incident, Prime Minister Erdogan said to President Shimon Peres: "Mr. Peres, you are a senior citizen and you speak in a loud voice. I feel that your raised voice is due to the guilt you feel. When it comes to killing, you know very well how to kill. I know very well how you hit and kill children on beaches." The Davos incident was further aggravated by the Mavi Marmara incident on 31 May 2010, in which ten Turkish citizens were killed and several others were injured after clashing with IDF as the IDF soldiers attempted to board the ship, which was trying to break the Gaza blockade.

At the heart of the Israel-Turkey negotiations, which began in December 2015, was the amount of compensation to be paid to the families of those who died on the Mavi Marmara. This issue was resolved and

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Photo: Ashdodport



**According to the reconciliation agreement, all Turkish aid to Gaza will undergo security checks at Ashdod Port.**

Israel agreed to pay compensation to the Marmara victims' families. After the announcement of the Israeli-Turkish reconciliation agreement it was expected that the two countries would formally normalise relations and exchange ambassadors by the end of July. Even

copy, and then that copy was taken to the other country for officials there to sign. Subsequently, the agreement was ratified by the Turkish Parliament. President Erdogan ratified the agreement on 31 August, one day after submission! Still, an exchange of ambassadors is expected to occur once Is-

Turkey and will not prevent the passage of medical equipment and Turkish staff. Additionally, Turkey and Germany will build a power station in Gaza and Turkey will also build a desalination plant. All Turkish aid to Gaza will undergo security checks at Ashdod Port. In exchange, Turkey has withdrawn its demand that Israel lift the blockade on Gaza. The withdrawal of the Turkish demand is indeed very important to Israel, since the air and naval blockade over the Gaza Strip is also supported by Egypt, a country with which Turkey has strained relations.

Israel and Turkey will also recommence intelligence and security co-operation that was on hold since the Mavi Marmara incident. Israel has withdrawn its demand that Hamas operatives cease to operate on Turkish territory, while Turkey agreed not to permit Hamas attacks to be planned and supervised against Israel from Turkey.

By analysing carefully each and every point of the ratified agreement it can be said, for instance, that once the Turkish facilities are built in Gaza, they are likely to be used by Hamas as command and control centres in the case of a new outbreak of open hostilities between Hamas and Israel. As a result, Israel will be constrained from attacking facilities precisely because they were built by Turkey. That undoubtedly poses a dilemma for Israel. If Israel attacks these facilities, it would lead to the collapse of diplomatic relations. It should be emphasised that the Turkish government does indeed care for the Palestinians and it is not just paying them lip service.

There are also serious doubts that the proposed gas pipeline between Israel and Turkey makes commercial sense, and if extended to the EU it will compete with a similar project between Israel, Cyprus and Greece, countries with which Israel im-

Photo: UN



**The Erez checkpoint on the Israeli-Gaza barrier**

though Prime Minister Netanyahu said that "Ankara sent a message shortly after the attempted coup that it will not cast a cloud over the countries' reconciliation" the 15 July military coup in Turkey and the follow-up have changed the schedule. The Turkish Parliament has finally ratified agreement on 19 August. The agreement guarantees that Israel will be exempted from all legal and criminal proceedings that have either been opened against or could be opened against it in the future in Turkey regarding the incident.

Under the terms of agreement, there was a clear order of events. First, the agreement was announced, then the security cabinet approved it, then each country signed a

rael transfers US\$20 million to a fund set up for the families of Turks killed on the Mavi Marmara on 25 September.

The two countries also agreed on mutual visits, commitments by both countries not to work against each other in international organisations and the end of opposition to co-operation in international agreements. Co-operation will include joint military exercises and investments in energy and defence. In concrete terms, Israel and Turkey will begin formal talks to build a gas pipeline between the two countries through which Israel might sell its natural gas, with Turkish assistance, to the EU.

Regarding Gaza, Israel has agreed to allow construction of a hospital financed by



proved relations. Both Cyprus and Greece view improvements in relations between Israel and Turkey with suspicion and apprehension and their apprehension should be seriously weighed by the Israeli government. After Erdoğan apologised to Putin

the office. As a result, the Israeli defence establishment have fewer like-minded colleagues in Turkey than before.

Eiland further said that: "By nature, this will be a very cold agreement; an agreement of convenience, but nothing of a deep dia-

– again, this is altering the quotation, but otherwise it doesn't make much sense. It is too early to tell what Turkey wants to achieve in this region and whether its interests are compatible with our own."

The former members of the Israeli defence establishment see a very unstable situation in Turkey, accompanied by a sense of paranoia, with the continued arrest of military officers and grave uncertainty. As a result, their assessment as presented above remains cautious and apprehensive.

In the light of the difficulties presented above, the act of coming together between Israel and Turkey should be perceived as a long-term initiative that, as a result of the unfolding events in Turkey, is hard to forecast. There is also a risk that Israeli-Turkish relations can deteriorate due to the uncertainty of developments in the Gaza Strip and in Israel-Palestine relations. As a result, Israel's growing alliances with Cyprus and Greece and its robust relations with Egypt should be strengthened further. It should be remembered that Greece, together with Bulgaria and Romania, substituted Israel for Turkey as partner for joint aerial and naval exercises. Cyprus, with its Russian-built S-300 based air-defence system, provided the Israeli Air Force with a possibility to learn about the system that Russia has finally begun to deliver to Iran.

To conclude, the act of coming together requires mutual trust that currently does not exist, a clear understanding of each country's strategic costs and benefits that remains out of reach, and a wish to improve and enhance diplomatic and political relations that is yet to be fulfilled. As long as Turkey goes through domestic turbulences, the required conditions are not there. As a result, Israel's going alone and fostering its relations with Cyprus, Egypt and Greece remains a priority. ■



Photo: IDF

**Israeli, US, Greek, Polish and Italian air forces participated in the Israeli Air Force combat exercise BLUE FLAG at Ovda air base in southern Israel in November 2013.**

for the shooting down of the Su-24 fighter jet by the Turkish Air Force, it remains to be seen whether or not the Turkish government remains interested in constructing a pipeline from Israel to Turkey. The renewed discussion of building the Turkish Stream pipeline from Russia to Turkey may delay or cancel the proposed construction of a pipeline from Israel to Turkey. Thus, the Israeli government should weigh carefully all the pros and cons of their proposal.

The agreement is also unlikely to trigger, near-term resumption of defence trade or bilateral military co-operation including military exercises and intelligence co-operation. On the contrary, officials and experts in Israel warn that strategic co-operation, if and when it resumes, will be focused on regional stability and safety measures to be conducted primarily in the context of the US-Israel and/or NATO Alliance. Giora Eiland, a retired Major-General and former National Security Adviser, said that: "The good relationship would not return, at least not in the foreseeable future, for the simple reason that the Turkish security establishment that once saw itself as operating in harmony with Israel no longer exists." Furthermore, after the recent failed military coup, a large number of Turkish generals and admirals (about 44 percent of the entire command structure) that knew their Israeli counterparts were removed from

logue and strategic partnership we once had." Shaul Mofaz, a former Minister of Defence and former IDF Chief of Staff, said that: "It was important for the two countries to normalise ties, but that resumption of security co-operation would have to evolve and be tested over time." Yosi Ben-Hanan, a former Director of Defence Exports and International Co-operation Department at the MoD, noted that: "Today, given Turkey's pro-Islamist policies and ongoing tensions with Egypt, Jordan and many Arabian Gulf States it remains to"

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# NATO Summit 2016 and the Issue of Missile Defence

Debalina Ghoshal

**NATO's Warsaw Summit (8-9 July 2016) explicitly stated its aim to "bolster the Alliance's deterrence and defence."**

Beyond NATO's role in Afghanistan, counter-terrorism, cyber security and many other security challenges, the summit also addressed the question of missile defence. Missile defence is a component of the European Phased Adaptive Approach (EPAA) which was initially to feature four phases. Owing to Russian concerns that the missile defence system would negate their nuclear deterrent capability, the fourth phase, dealing with the interception of Inter-Continental Ballistic Missiles (ICBM), was cancelled by the Obama administration. During the summit NATO leaders declared the Initial Operational Capability of NATO's Ballistic Missile Defence (BMD), consisting of AEGIS-equipped US Navy BMD warships at Rota, Spain, radars in Turkey and the interceptor site in Romania. In the run-up to the summit, France had requested placing the system under NATO, not US, control. However, French concerns were alleviated to some extent by US Permanent Representative to NATO, Doug Lute's affirmation that post-Warsaw, the command and control of the missile defence system would be transferred from the US to NATO. In May 2016 the US fielded a ground-launched missile defence system housed at a US naval support facility in Deveselu, Romania, as a component of Phase 2 of EPAA. The AEGIS ships were declared operational by the US in the same month. At present, deployment of interceptors as a component of EPAA Phase 3 is planned at a new site in Poland; this site is expected to



Photo: TAF

**The early warning radar station in Malatya, Turkey, went into service in January 2012.**

be operational in 2018. Both Romania and Poland are reported to rely for their nuclear deterrence upon the SM-3 interceptor batteries supported by the X-band radars stationed in Turkey. This missile defence system in Eastern Europe is claimed to counter threats from incoming Iranian ballistic missiles and probably non-state actors in the region that could get hold of sophisticated missile systems or are already in possession of such systems. Additionally, in October 2016, Germany and the Netherlands will test joint operations of their PATRIOT air and missile defence systems in what could be a model for multilateral deployments to Poland or the Baltic states in the coming years. These states have been more and more apprehensive about Russia's military build-up in the Baltic region, especially post-annexation of Crimea, and they fear that Russia might flex its muscles and threaten their at their sovereignty too.

## Russian Concerns

The EPAA has been a concern for Russia, whose position is that the system clearly negates Russia's nuclear deterrent capability and causes strategic destabilisation. Moscow perceives the missile defence

shield as being aimed at Russia, especially as the Iranian nuclear 'deal' which came into force in 2015 has blunted Iran's capability to develop nuclear weapons. However, the US have justified their stance on the missile defence system by emphasising that Iran could equip these missiles with other weapons of mass destruction or conventional warheads and use them against NATO forces and US forward bases in Europe and the Middle East.

Russia has also warned that it could deploy its S-300 missile defence systems in Kaliningrad and Crimea. In May 2016, soon after the interceptor site in Romania was declared operational, it was reported that Russia plans to restore a missile attack warning station near Sevastopol in the Crimea as a response. Russia also announced its intention to develop new "strike weapons" that would be capable of breaking through the NATO missile defence shield. However, on declaring the Romanian site operational for inter-

Photo: US Navy



**USS DONALD COOK arrived at Naval Station Rota, Spain, on 11 February 2014 as the first of four ARLEIGH BURKE Class guided-missile destroyers designated for NATO's Ballistic Missile Defence.**

ception, NATO Secretary General Jens Stoltenberg clarified that the missile "does not undermine or weaken Russia's strategic nuclear deterrent".

Notwithstanding the Kremlin's concerns, it is less likely that the United States would slow down its missile defence programme in Europe, even though allies like France cautiously want to prevent further tensions with Russia.

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# Norwegian Defence Policy and Role in NATO

**Bjørn Domaas Josefsen**

In the early morning of 4 April 1940 the Norwegian coastal fortress Oscarsborg fired its main artillery guns and torpedoes at the advancing Nazi German flotilla. The Oscarsborg fortress, situated on a small island in the narrowest straits of the Oslo Fjord approximately 30 km south of Oslo, directed its fire at the 16,000 tonne, 203 m long heavy battleship BLÜCHER, the flagship of the Nazi flotilla.

**B**LÜCHER took direct hits from both the two old 28cm (11inch) guns and two torpedoes launched from a land based torpedo battery. The battleship sank within just a few minutes.

The sinking of BLÜCHER caused the invasion flotilla to turn around and head south again, delaying the invasion of Oslo. This delay gave the King of Norway and the royal family, the Norwegian government and parliament time to escape the German occupation forces. After several weeks on the run in Norway, the King and the Government finally headed for England, stating that the previously neutral, now Nazi-occupied Norway was joining the allied forces in the war against Nazi Germany.

When the Second World War ended in 1945, it was clear to almost every Norwegian that the old neutrality politics that had kept Norway out of the First World War were no longer a guarantee for not being attacked. In 1948 a Swedish proposal to Denmark and Norway to establish a Neutral Nordic Defence Union collapsed, and both Norway and Denmark joined NATO in 1949. Sweden remained neutral.

The decades after the Second World War were in many ways a golden age for the Norwegian Armed Forces. During the Cold War, enormous amounts of money, both from Norwegian taxpayers and from our NATO allies, mainly the USA, were spent on building a modern Norwegian navy, army and air force. In 1952/53 the Norwegian defence budget was approximately 30% of the national budget, or about 4.7% of the nation's gross product.

Initial compulsory military service for every male above the age of 19 had been es-

Photo: Historical Photo/ Norwegian National Archives



*The heavy battleship BLÜCHER just before sinking in April 1940*

tablished in the Norwegian constitution of 1814, but in the decades before World War II only a fraction of the conscripts were actually recruited. After WW II, recruitment for military service increased to almost 100% of the cohort, and after the minimum of one year of military service, every man under the age of 44 was kept in the military scrolls to be mobilised in case of war. At most, Norway with approximately 3.5 million people back in the 1960s, could mobilise an armed force of more than 350,000 troops.

When the Cold War ended in the early 1990s and the Soviet Union collapsed, Norway, like many other NATO countries, started to reduce defence spending, and in recent years only 30%-35% of the male cohort have been recruited for military service. In 2015 Norway introduced initial compulsory military service for both women and men, resulting in the percentage of the maximum cohort (both male and female) to be recruited to military service to range between 15 and 20%.

Today's Norwegian defence budget of approximately NOK42Bn (€4.5Bn) represents only 3.5% of the national budget, and only 1.43% of the gross national product (2015). In comparison, the defence budget in 1991 was approximately 6% of the national budget, and in 1980 almost 10% of the national budget.

## Norwegian Security Policy in the Cold War Area

The Norwegian membership in the North Atlantic Alliance has been a cornerstone of the country's security policy since Norway joined NATO in 1949. The geographical location of Norway as the northern flank of NATO in Europe and the Atlantic Ocean, and with a direct border to Russia, set Norway in a special position during the Cold War. On the one hand, Norway wanted a strong national defence with a close connection to our NATO allies to deter the Soviet Union from aggression. On the other hand, the geographical neigh-

## Author

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bourhood to the Soviet Union and its main naval bases on the Kola peninsula, and the importance of agreements regarding fishery resources (and later oil and gas resources) in the Barents Sea meant that Norway wanted a good relationship with the Soviet regime, avoiding unnecessary provocations towards the big neighbour in the east.

This situation led to certain national Norwegian restrictions regarding Norway's NATO membership, including:

- No NATO bases in Norway
- No nuclear weapons on Norwegian soil in peace time
- No joint NATO manoeuvres in Finnmark, the northernmost county in Norway with a border to the Soviet Union in the east.

These restrictions that Norway put up towards our NATO allies were under more or less continuous debate among Norwegian politicians during the Cold War. However, in retrospect, Norway managed to keep the northern flank and the Barents Ocean out of the "very high end" of Cold War conflicts, despite the strategic importance of the area. And even during the "coldest times" of the Cold War, Norway and Norwegian fishery experts managed to keep an open line to their Soviet counterparts settling fishing quotas for common sea areas in the north.

## Post Cold War, New Challenges

The first 10 years after the fall of the Berlin wall were in many regards a peaceful "window" in European history. But since the millennium this window has been closing, causing concern within all NATO coun-



Photo: Norwegian Air Force

**Increased Russian activity along the coastline of Norway: almost every week Russian aircraft are cut off from violations of the Norwegian air space. The picture shows a Norwegian F-16 escorting a Russian Tupolev TU 95 bomber.**

tries. The rise in Russian defence budgets, the total renewal of the armed forces, in term of materiel, organisation and training, and the obvious willingness of the political leadership in Russia to use military force to achieve political goals, have sent a wind of Cold War back into Europe. The culmination of this new geo-political line from Moscow so far is of course the annexation of the Crimean peninsula and the aggression against Ukraine.

For Norway, Russia's new military capacity has resulted in significantly increased Russian Air Force and Navy activities along the Barents Sea and off the coast of Norway, coupled with frequent violations of Norwegian air space.

The old Russian naval bases on the Kola peninsula are now being renewed, and in addition to surface vessels, the numbers of submarines are increasing. This comes at the same time as the Russian economy suffering a severe crisis, due to the drop in oil and gas prices and due to basic structural

flaws in the Russian industrial and business sector, and in the Russian society as a whole.

For the last 15 years the Russian economy has become more and more dependent on the Arctic, and the Russian government sees the Arctic areas as the nation's future resource base and a rescue line out of the economic crises.

In addition to this, global warming has reduced the ice cap on the North Pole significantly for the last 20 years. This has made it possible for transport vessels to take the northern route, north of Norway and Russia to East Asia, opening a future export route for Arctic oil and natural gas.

The economic interest in the Arctic area is supplemented by a more obscure and vague Russian superpower ambition, and the idea that a superpower does not have to act according to international law when claiming its interests. This idea makes it far more difficult to relate to Russia in negotiations, and to predict Russian political actions.

For Norway the new reality in the high north has caused extra concern as Norway's unique Cold War location within NATO, being both the northern flank and one of the very few NATO nations with a direct border to Russia, is not so unique anymore. The expansion of NATO has given the Alliance a number of member states with a direct border to Russia. And several of them are in a much more exposed position to a Russian attack than Norway.

Still, Norway is NATO's northern flank, and the Norwegian oil and natural gas fields are still of great importance to Europe and NATO. But NATO as a whole has taken on heavy military obligations in Eastern Europe, at the same time as the Alliance's total military capacity has been significantly reduced. The question that Norwegian politicians are asking, is whether NATO has the capacity to give Norway adequate military

Photo: FMS/Torbjørn Kjosvold



**KNM STEIL, one of the six Norwegian SKJOLD Class fast patrol boats (also designated "coastal corvettes") with a top speed of 60 knots. The main weapon is the new Naval Strike Missile (NSM) with a range of 180 km.**





support at the same time that several European countries are crying for help. In short, the answer in Norway is: we hope so, but we don't know for sure.

### Long-Term Plan for the Norwegian Armed Forces: More Money – But Not Enough?

In October 2015, the Norwegian Chief of Defence presented his long term recommendations for the Norwegian Armed Forces. In his document, the Chief of Defence recommended a total increase in defence spending to NOK175Bn (€19Bn) for the period from 2015 to 2034.

In addition, the Chief of Defence expected a rationalisation benefit of approximately NOK22Bn (€2.3Bn) in the same period, giving the armed forces a total of NOK197Bn (€21Bn) in extra budget means.

The Ministry of Defence presented its White Paper regarding the long term plan for the armed forces in June this year, to be considered in Parliament later this year. In the White Paper, the Minister of Defence proposes an increase in defence spending of NOK165Bn (€18Bn) over the 20 years to come. Also, the Ministry of Defence is planning significant cost reductions in the

coming years, making room for more investments in training and material.

The political debate after the Government presented the White Paper has so far focused on whether the total amount of extra money for the armed forces should be raised or whether the Minister of Defence should have set other financial priorities. A prominent argument calls for the reduction of the planned number of 52 F-35 fighter aircraft currently subject to procurement in Norway. None of the political parties, not even the very left wing socialist party that normally is very sceptical to defence spending, has declared that they want a reduction in the planned increase in upcoming defence budgets.

Several politicians from the opposition have made the point that the Navy and Air Force were well covered in the White Paper, but there was no plan for the Army. The White Paper states that the Ministry will present a more detailed plan for the Army later. As a result, some politicians from the opposition argue that the current plan and level of budget growth is not sufficient to maintain and develop a modern army.

Whether the Army will get enough money, or if the number of F-35s will be reduced and spending prioritised on other projects

Photo: FMS



**Norwegian soldiers training at Rena camp, 170 km northeast of Oslo**

remains to be seen. But the White Paper and the debate following the White Paper remain “changes in tide”. Even though challenges in the years to come have to be expected for the armed forces, the debate has shown a political will to significantly increase defence spending in Norway, for the first time in many years. ■



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# The Need to Reform and Strengthen the Norwegian Armed Forces



Photo: Torgeir Haugaard/forsvaret

## Admiral Haakon Bruun-Hanssen

In this article, I will discuss important security challenges identified as key drivers for the future development of the Norwegian Armed Forces.

**Admiral Haakon Bruun-Hanssen has been the Norwegian Chief of Defence since 2013.**

I will explain how these challenges need to shape and form our future military capabilities. I presented these views in a Strategic Defence Review (SDR) as input to a Government White Paper in October 2015. The Government finalised its White Paper on the future development of the Armed Forces in June, and we are now awaiting parliamentary approval.

## The European Security Environment

We are experiencing an increased and unprecedented complexity and variety in the European security landscape. The security situation has deteriorated significantly since the current Long-Term Plan was adopted by Parliament in 2012. New and old threats are interwoven, composing unpredictable and multifaceted challenges, both in Europe, close to our borders and beyond. The Ukraine crisis demonstrated that armed conflict in Europe is not a phenomenon of the past. On the contrary, we see old dividing lines and geopolitics re-emerging and new conflicts coming on top of them. In addition, we are witnessing a new emerging multipolar world order. Once again, state aggression towards another independent nation has taken place, with overt

and covert military means on European soil. Terrorism has struck at the heart of Europe several times in the present time, and the physical distance to areas of conflict is no longer a fundamental guarantee for state security. On the contrary, conflicts and state failures outside European borders may actually influence our own national security directly.

This shapes the context for why we need to reform and strengthen the Norwegian Armed Forces. We must face and stand up against the most important and challenging security threats. As a small nation, we are dependent on NATO to achieve this. We need NATO Forces sufficiently capable to deter any possible adversary. Norwegian Armed Forces must be capable of rapid armed response to confront any aggressor on Norwegian territory or sphere of interest, while awaiting allied reinforcements. As a NATO member, we also need to be able to reinforce allies with deployable and relevant military capabilities, when required. Allied and national defence plans form the basis for defining the capabilities required by the Norwegian Armed Forces in order to carry out our missions.

In the Strategic Defence Review (2015), I have emphasised the need for greater agility and responsiveness, increased preparedness and improvements in a number of key capacities in the Armed Forces. First, it is vital to ensure early warning concerning threats against Norway. To this end, I have given top priority to strengthening the Intelligence Service and ISR-capacities. An increased and strengthened military presence, visible in our northern-most region neighbouring Russia must also be prioritised. Furthermore, I recommend strengthening the organisation supporting the F-35 in order to make the new fighters a key weapon platform for a diversity of operations. There is also a need to reinforce protective measures for key infrastructure that is critical to Norwegian defence capabilities, and invest in submarines for the future.

## Current Condition of the Norwegian Armed Forces

Since the end of the Cold War Norway, like many NATO countries, has transformed its Armed Forces into a smaller, deployable and modernised force, with the equipment



Photo: U.S. Air Force

## Author

**Admiral Haakon Bruun-Hanssen**  
is the Chief of Defence, Norway.

**The weapons suite of the Norwegian F-35 LIGHTNING II will include the Joint Strike Missile from Kongsberg.**



Marine Systems

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Photo: Petter Brenni Gulbrandsen



**The acquisition of the ULA Class submarine fleet constitutes a major effort of Norwegian-German armament cooperation.**

and training necessary to address evolving security challenges both at home and abroad. This transition has been essential to adapt the Norwegian Armed Forces to an increasingly complex security environment. The main objective for the current long-term period has been to continue to develop a capable force and strengthen the Armed Forces' capacity to conduct required missions and tasks. Today, the Norwegian Armed Forces are well qualified at many levels: the personnel are highly motivated; we conduct high quality exercises frequently and train our forces regularly with high standards. We carry out daily operations in a satisfactory manner, with good evaluations from superior commanders in operations domestically and internationally. Despite these changes being both necessary and largely successful, they do not fully address what we today recognize as the long-term challenges facing Norwegian security. Further adjustments and reinforcements are needed rather urgently, with significant investments in intelligence, surveillance, survivability and combat power. These capabilities will strengthen Norway and NATO's ability to prevent and deter any hostile use of force or threats of such. Years of underfunding, combined with a high operational tempo at home and abroad, have created shortfalls in training, maintenance and upgrades that are no longer acceptable in the face of the emerging challenges mentioned. Ageing materiel poses another challenge to fulfilling missions in a satisfactory way. A maintenance backlog and a lack of replacement parts lead to reduced operational availability. The previous assumptions about necessary early warning have changed, necessitating

greater readiness, agility, responsiveness, presence and mobility. I have addressed all these shortfalls to the government in the SDR.

### Security Policy Trends and Developments with Impact on the Armed Forces

The Norwegian Armed Forces are continuously adapting to meet current and future changes in the security environment. At present, changes in areas adjacent to NATO's area of responsibility with direct and indirect impact on Norwegian and allied security are driving the developments. Norwegian security and defence policy

Photo: Torbjørn Kjosvold



**Border patrol forces operating with a RHIB.**

must recognise and adapt to these potential rapid changes in our security environment. Domestic and global technological, economic and demographic trends also represent both challenges and opportuni-

ties that must be taken into account in the development of Norwegian security and defence policy.

The international security situation, both globally and in Norway's immediate neighbourhood, has deteriorated significantly since the previous long-term plan. Global and regional power shifts may challenge the position of Western states in international politics. European cohesion is also under pressure due to a combination of demanding internal and external developments. These challenges to European, transatlantic and national security must be countered with increased cooperation, firmness and predictability. Our most significant and immediate security challenge is Russia's growing military capability and its willingness to use military force in the pursuit of its national interests. The military reform in Russia has resulted in modernisation and upgrading of Russia's conventional forces alongside with strengthening its nuclear capabilities. This challenges the military balance for Norway and NATO.

Russia's introduction of new maritime capabilities poses a particular strategic challenge to NATO. The development and fielding of such assets combined with advanced training and exercises make Russia increasingly capable of conducting anti-access/area denial operations into the North Atlantic. This has a direct impact on NATO's northern flank.

Even though Russia today does not constitute a direct military threat to Norway, the combination of military modernisation and the will to exert influence through military power place Russia as a central factor in Norwegian defence planning. Areas in

Norway's immediate vicinity are also central to Russian nuclear deterrence, and Russia's military presence and activities in the North have increased in recent years. In general, the High North continues to be character-





ised by stability and cooperation, and Russian strategies for the Arctic still emphasise international cooperation. At the same time, we cannot rule out the possibility that Russia, in a given situation, will consider the use of military force as a relevant and acceptable tool, also in the High North. Nor can we rule out that a conflict erupting elsewhere may directly affect us and demand a firm and timely military response.

The proliferation of increasingly advanced weapons and technologies represents a dual challenge. On the one hand, they have an impact on our threat environment. Such weapons and technologies have significant destructive potential. Long-range precision guided weapons can cause significant damage with little or no warning. Modern air defence systems can deny access to significant and critically important sections of air space. New capabilities in the cyber and space domains likewise create an evolving threat environment, where effective countermeasures are limited and attribution is difficult.

On the other hand, these technological advancements have far-reaching economic consequences. Countering technologically driven risks requires continued modernisation by even smaller forces. While new equipment represents a qualitative improvement from the systems and platforms being replaced, it costs, as a rule, more to acquire and operate. Despite increased use of off-the-shelf procurements and international cooperation, increasing costs can no longer be addressed simply by reducing the number of platforms and units, or by internal efficiency savings. We must incorporate this extra cost growth as an integral part of our defence planning.

### Key Measures in the Development of the Norwegian Armed Forces

As recommended in my SDR and the Government's White Paper, a number of measures are required for the development of the Armed Forces to a proper level to counter the described challenges.

The overall priorities for the Norwegian security and defence policy are outlined in the White Paper:

- **Strengthen our national defence**

There is a growing need to ensure and maintain situational awareness and our ability to conduct crisis management operations. Moreover, the Armed Forces must improve readiness levels, combat power and survivability. Within the NATO context, our Armed Forces must sufficiently deter any possible adversary. Consequently, we must ensure our national ability to receive

allied reinforcements. Allied and national defence plans form the basis for defining the capabilities required by the Norwegian Armed Forces in order to carry out their assignments. In addition, it is a priority for Norway to increase allied military presence and set the conditions for more frequent exercises and training.

ceive allied reinforcements remain a priority. These measures contribute to the ability of Norway and its allies to ensure a robust defence posture. Despite the security guarantees offered by the Alliance, Norway must also maintain an ability to respond to the early phases of a crisis or conflict independently. This is a central tenet of the



Photo: Sigurd Tonning-Olsen

*The Royal Norwegian Air Force operates one tactical transport squadron with four C130Js.*



Photo: Ole Sverre Haugli

*The Norwegian fleet of 103 CV9030 AIFVs is being upgraded, and 41 additional vehicles are being procured to replace the M113s in service.*

- **Strengthen NATO's ability for collective defence**

NATO and the transatlantic security community remain the cornerstone of the Norwegian security and defence policy. Norway needs close relations with its allies. The defence of Norway is based on allied reinforcements and on the ability to escalate defence operations seamlessly, if required. Host nation support and the ability to re-

North Atlantic Treaty, which commits the member states to maintain and develop their individual and collective capacity to resist armed attack.

- **Contribute to international crisis management**

The Norwegian Armed Forces currently participate in extensive multinational cooperation within the framework of NATO,



**The Norwegian Advanced Surface-to-Air Missile System (NASAMS), of which the RNoAF has two batteries with three firing units each.**



**Enhanced cooperation with commercial actors is to compensate for staff reductions in the Norwegian Armed Forces.**

the UN, the EU, NORDEFCO and other bi-/multilateral organisations. This cooperation encompasses joint participation in operations, joint procurement of materiel and close cooperation in education, training and exercises. This type of cooperation has yielded many operational and financial benefits, and should hold priority in the future as well.

Implementing burden sharing in NATO is increasingly important. We need to take on a greater responsibility to develop NATO's ability to meet the threats towards other parts of Europe. One element in promoting burden sharing is to increase the mobility of our forces. Deployable and interoperable agile forces will benefit the alliance.

### Investments in Key Capabilities

It is paramount to ensure relevant situational awareness in the northern region; this has a direct impact on Alliance security. NATO's maritime flanks are of overall strategic importance. Enhanced situational awareness, and modern and robust ISR capabilities are key priorities for Norwegian and allied forces.

My goal is that the Norwegian Armed Forces will continue to provide capable and modern forces, on the ground, at sea and in the air, able to address the full spectrum of conflicts. In my opinion, Norway must develop and maintain a number of core capabilities able to have an impact on the strategic decision of potential aggressors. These capabilities must be able to find, track and identify targets at a distance, defeat such targets if necessary, and survive in the face of advanced countermeasures. When utilised as part of the joint operational effort, these capabilities will make a swift and determined response possible against any use of force against Norwegian sovereignty and sovereign rights. One such capability is the F-35 Lightning II with a weapons suite that includes the Norwegian-developed Joint Strike Missile. The acquisition of 52 aircraft, with all the necessary equipment and infrastructure, will contribute efficiently to Norwegian and allied security and constitute one of the most potent deterrents.

Submarines represent another key capability. Norway plans to take delivery of new submarines during the latter half of the next decade to replace the current

ULA Class. Moreover, Norway will seek to replace its maritime patrol aircraft after the aging P-3C ORION is taken out of service. A credible defence posture relies heavily on situational awareness, intelligence and an ability to conduct crisis management.

A final key potential investment is a strengthening of Norway's ground based air defence. We should upgrade and enhance our current medium-range NASAMS II system. Additionally, new air defence systems, with long-range missiles and sensors, should be introduced.

In addition to these four strategic investments, Norway will strengthen its intelligence capabilities and make several smaller, yet equally important investments to ensure the continued modernisation of the overall joint force.

### Concentration of Bases and Establishments

The Norwegian Armed Forces are distributed across a substantial number of locations. Although it provides flexibility, this structure of military establishments is not cost-effective. Manning and maintenance costs of these establishments are increasing. Thus, the Armed Forces activity must be concentrated into fewer areas in the future.

### Continuous Need for Modernisation and Adaptation

Facing future challenges requires more than new investments and new capabilities. We need to increase the manning of operational units to improve readiness and availability. We will accomplish this by reducing staffs and administrative functions and by transferring people to operational units.

We need to adapt to new and modern logistics solutions. Enhanced cooperation with commercial actors is one way to achieve this. Expedient strategic cooperation with civil organisations will give us cost effective and operational acceptable solutions.

### The Way Forward

The Government submitted their long-term plan to the Parliament in June and I expect a final decision on ambitions, tasks, structure and funding to be ready later this year. If the Parliament endorses the plan it will constructively contribute to an appropriate and timely development of the future armed forces. ■





# “The annual budget for defence materiel investments is approximately NOK 13 billion.”

Following a re-organisation of Norway's national defence procurement functions the Norwegian Defence Materiel Agency (NDMA) was created and started operations in January of this year. ESD spoke with NDMA's Investment Director, Major General Dag Hugo Stølan.

**ESD:** At the beginning of the year the Norwegian Defence Logistics Organisation (NDLO) changed its name to Norwegian Defence Materiel Agency (NDMA). What were the reasons for this name change? Does it also imply changes to the organisation's structure and procedures?

**Stølan:** The Norwegian government identified the need for closer management and more direct lines of communication concerning acquisitions and materiel management. The objective is to increase quality and reduce the time spent on acquisitions and improved materiel management – with new and improved processes. The selected solution was to split The Norwegian Defence Logistics Organization (NDLO) into two separate entities, keeping the new NDLO with the Maintenance Division and the Supply Division still within the Norwegian Armed Forces, and establishing the new Norwegian Defence Materiel Agency (NDMA) directly subordinated to the Ministry of Defence. The following Divisions where moved from NDLO to NDMA:

- Land Systems Division;
- Naval Systems Division;
- Air Systems Division;
- CIS Systems Division;
- General Materiel Systems Division.

To achieve the objectives, there could be both structural and procedural changes in the near future.

**ESD:** Can you briefly elaborate on the role, organisation and duties of the NDMA? Is the NDMA comparable to other defence procurement organisations like the French DGA or the Swedish FMV?

Are there other organisations involved in defence procurement in Norway?

**Stølan:** The Norwegian Defence Materiel Agency's main assignment is to conduct planning, acquisition, management and disposal of materiel for the armed forces and other agencies in the sector. We conduct technical authority for materiel; assist partners in the defence sector with advice and expertise within the agency's responsibility. As a small fleet-size operator, international materiel collaboration is an important vehicle in order to reduce total ownership cost. Being the acquisition vehicle for the Ministry of Defence, the NDMA is the primary organisation involved in defence procurement in Norway.

NDMA assists the Ministry of Defence and the Armed Forces in planning future materiel projects, and is the approving authority for materiel in the defence sector, making sure the materiel is safe to handle and operate.

Photo: Simen Rudi, NDMA



**Major General Dag Hugo Stølan is the Investment Director at the Norwegian Defence Materiel Agency (NDMA).**

We support the armed forces throughout the life cycle of the different systems by formulating the necessary regulatory framework in order to certify, authorise and control technical issues. If needed, NDMA implements sanctions on deviations within acquisition, system management, equipment handling, system operation and maintenance, as well as disposal of materiel.

NDMA might be compared to the Swedish FMV, but the two organisations are not identical. For example, the FMV also conducts procurement of supplies.

**ESD:** To what extent does the NDMA assume responsibility for the R&D share of armament programmes? Do you have your own R&D personnel?

**Stølan:** There is an established strategy for R&D in the defence sector. The key of this strategy is to contribute to cost-efficiency and useful R&D for the armed forces. The specific needs of the Norwegian Armed Forces are always the most important in this matter.

We do not have our own dedicated R&D personnel. At the same time, one of the main goals for our personnel is to find new and cost-efficient solutions for the armed forces, and we conduct some experimentation and development. In addition, the collaboration with the Norwegian Defence Research Establishment and the defence industry is important within the acquisition of materiel.

Photo: NDMA



**The NDMA office building in Oslo**



## Strategic Partners for Norway's Future Submarines

*Text of the Norwegian MoD press release published on <https://www.regjeringen.no/en/aktuelt/strategic-partners-for-norways-future-submarines/id2482241/>  
Press release | Published: 2016-04-07  
| No: 21/2016*

Based on economic, industrial and military assessments, the Norwegian Ministry of Defence has concluded that the French company Direction des Constructions Navales Services (DCNS) and the German company ThyssenKrupp Marine Systems (TKMS) are the strongest candidates if Norway decides to procure new submarines. The Ministry of Defence has decided to focus our future efforts towards these two companies and their respective national authorities.

- France and Germany are amongst the largest nations in Europe. A submarine co-operation with one of these nations will secure that Norway acquires the submarines we need, whilst contributing to Smart Defence and a more effective cooperation on defence materiel in NATO, says the Minister of Defence Ine Eriksen Søreide. DCNS and TKMS are the largest manufacturers of submarines in Western Europe. They have extensive experience in building advanced submarines and a large industrial capacity. The submarine designs offered by these two companies will be a good starting point for Norway's future submarines.

- Norway's approach is to base an potential acquisition on an existing submarine design. We want to avoid a large development project with the risk, uncertainty and cost such a project entails. Our criteria is therefore that Norway's future submarines shall be built by a shipyard that has a long and continuous experience in building submarines, says the Minister of Defence.

The Norwegian Government decided in 2014 to investigate options for new submarines. This process is near its conclusion, and a recommendation is planned to be presented to the Norwegian Government during 2016. Pending governmental decision, a formal procurement program will be presented to the Norwegian Parliament for approval.

- It is important to emphasise that we are still in the planning phase, and we have yet to make a decision to go ahead with a procurement program, nor have we made a decision regarding a final supplier. Significant work remains before a procurement program can be presented to the Norwegian Parliament, says the Minister of Defence. The Ministry of Defence has for several years worked to achieve cooperation with other nations with the aim of reducing the acquisition costs and in-service costs for future submarines. In parallel with work towards the shipyards, the process of seeking cooperation with non-submarine building nations planning a submarine acquisition will continue, primarily towards the Netherlands and Poland.

Cooperation is very important to secure a robust capability and enable burden sharing on in-service support and future upgrades. Several factors must be in place for such a cooperation to succeed. This includes having a common set of requirements and synchronised timelines for acquisition. The cooperating nations will also have to seek common solutions in the areas of logistics and in-service support.

Norway's six ULA-class submarines were commissioned between 1989-1992. The submarines were designed to last for 30 years, and will reach the end of their life in the mid-2020s.

The current plans are to operate the ULA-class until the mid-2020s. A procurement program for new submarines is expected to take more than ten years with first delivery approximately seven years after signing a contract, with subsequent delivery of one submarine per year.

Norwegian industry is world leading in key technology areas for submarines, and the Norwegian Government will seek to utilize the planned submarine procurement to help strengthen their market access. Export and international cooperation is necessary to maintain a viable national defence industry, and an investment in submarines will be used actively in talks with international partners to help ensure the continued development of a competent and competitive Norwegian defence industry. The Norwegian Parliament expects that a potential future procurement will ensure contracts for Norwegian defence industry equal to the procurement cost, and that these contracts will provide access to the home market of the chosen supplier.

**ESD:** What are the most important defence programmes currently executed by the NDMA? What – on average – is the annual budget available for defence materiel investments in Norway?

**Stølan:** On average, the annual budget for defence materiel investments is approximately NOK13Bn (€1.4Bn), not including the F-35 programme. The F-35 programme is a separate programme under the aegis and budget control of the Ministry of Defence.

The priority of defence programmes (the most important) is decided by the Ministry of Defence, in collaboration with the armed forces and the NDMA.

**ESD:** Now that you have announced a downselection to only two remaining contenders, what is the current status and projected further schedule of the new submarine programme?

**Stølan:** We are referring this question to the Ministry of Defence. Contact: [milinfo@fd.dep.no](mailto:milinfo@fd.dep.no)

Also, see this link for a press release on the topic:

<https://www.regjeringen.no/en/aktuelt/strategic-partners-for-norways-future-submarines/id2482241/>

**ESD:** Which of your current programmes are carried out in international partnerships with other national or multinational procurement organisations?

**Stølan:** Within the framework of the Nordic Defence Cooperation, Norway, Denmark, Sweden and Finland intend to make a joint procurement of combat uniforms. This project is known as the Nordic Combat Uniform System (NCU). In May 2016, the four countries signed a Technical Arrangement covering the further procurement cooperation. Norway has accepted to be lead nation for the NCU project. Other examples of international partnerships include:

### F-16 Combat Aircraft

In order to sustain and develop new capabilities for the Norwegian F-16, the Norwegian Armed Forces has for a long time been a member in the F-16 MNFP community (Multi National Fighter Program). The following countries are members of the F-16 MNFP:

- USA
- Denmark
- Belgium
- Netherlands
- Portugal
- Norway

This cooperation has been very successful for all members in order to sustain and in-





Photo: Darin Russell, Lockheed Martin

follow up programmes are in the planning stage.

#### NH90 Helicopter

The purchase of NH90 helicopters for the Norwegian Armed Forces is based upon a national contract with NHI (Nato Helicopter Industries). Norway cooperates and shares costs with other nations coordinated by NAHEMA (NATO Helicopter Management Agency) in several areas (qualification, quality assurance, training, logistics, airworthiness and configuration management). The following countries are members in the NH90 community:

- France
- Germany
- Italy
- Netherlands
- Belgium
- Sweden
- Finland
- Australia
- New Zealand
- Spain

**As one of nine countries Norway has signed the JSF MoU for production, sustainment and follow-on development (JSF PSFD MoU).**

roduce new capabilities for the F-16 fleet in all the participating countries. The costs have been much lower than if each country should have established programmes themselves (M-programmes)

#### C-130J Transport Aircraft

After the purchase of four C130J, Norway joined the JUG community (Joint User Group). The following countries are members in JUG:

- USA
- UK
- Australia
- Italy
- Canada
- Norway

Norway became a member of this community in 2011. The members cooperate and share costs in order to develop upgrades for the C-130J. Two programmes, Block 7.0 and 8.1, are now under development and

#### JSF Joint Strike Fighter (F-35)

An MoU for production, sustainment and follow-on development (JSF PSFD MoU) was established in 2007 by the following countries:

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Photo: Simen Rudi, NDMA

**The Norwegian Army is one of seven European operators of the CV90 MICV.**

Photo: Petter Brenni Gulbrandsen, Royal Norwegian Navy

**The four ULA Class submarines of the Royal Norwegian Navy are to be replaced by new units by the mid-2020s.**

- USA
- Canada
- Italy
- UK
- Netherlands
- Australia
- Turkey
- Norway
- Denmark

**ESD:** Are there defence procurement efforts executed in the scope of public-private partnerships?

**Stølan:** Yes. The Armed Forces have leased coast guard vessels under a PPP arrangement for a number of years. In addition, there are a number of cases that have been subject to outsourcing. We do not regard this as PPP, but some organisations might do that. The closest example is the formation of Aerospace Industrial

Maintenance (AIM Norway) as a state-owned enterprise in December 2011 as an example of PPP as they have long term

maintenance contracts with the Armed Forces, which used to be in-house maintenance.

**ESD:** What advice can you give to a foreign defence contractor who wants to enter into a business relationship with the NDMA and the Norwegian Armed Forces?

**Stølan:** NDMA uses competitive bidding as our primary procurement procedure. All competitive tenders are published on DOFFIN, or Tender Electronic Daily (TED) when above EU thresholds, used by all Norwegian public entities. Due to security classification some tenders are not published. In these cases the NDMA approaches appropriate suppliers directly. NDMA performs general or specific market surveys on a regular basis and companies might contact us to present relevant information. Use our home page to find relevant points of contact. A good idea might be to cooperate with Norwegian companies to access the Norwegian defence market. The point of contact for such initiatives can be the Norwegian Defence Industry Association.

**ESD:** Are there any materiel requirements from the Norwegian Armed Forces that constitute long term future challenges for the NDMA?

**Stølan:** One of the most important tasks in the long term future is to contribute and make sure the new combat aircraft F-35 gets smoothly into operations. In addition, the procurement of Norway's future submarines will require a big effort.

Link: Future Acquisitions for the Norwegian Armed Forces – 2015-2023.

<https://www.regjeringen.no/en/dokumenter/framtidige-anskaffelser-til-forsvaret-faf-20152023/id2398671/>

**The interview was conducted by Jürgen Hensel.**

Photo: Simen Rudi, NDMA

**Satellite communication test in the Arctic region.**





# Capabilities Made in Norway

## Norwegian Defence Industry Supplies World-Class Defence Equipment to Armed Forces Around the World



Photo: FSI

**Torbjørn Svensgård**

Norway has an advanced and innovative defence industry with state-of-the-art technology and products shaped by the operational requirements of the Norwegian armed forces. Norwegian defence companies are world-leaders in several technology and product areas with over 70% of the turnover generated from customers outside Norway.

The Norwegian defence industry has a proud history and can track a continuous line of development more than 200 years back to when Norway got its constitution in 1814. Today, the industry is an integral part of Norway's overall defence capability and provides a significant contribution to safeguard the nation's essential security interests. Specific local and regional conditions related to the Arctic climate, challenging topography, resource constraints, extreme

international market. However, for reasons related to the issues listed above, this is not always possible. In such cases, the armed forces call upon the Norwegian defence industry to develop bespoke solutions that meet the dedicated requirements of the Norwegian armed forces.

### Defence Materiel and Export

While meeting the operational requirements in the most resource effective way is always top priority, export potential is a mandatory requirement likewise when de-

to sustain a viable defence industry. Unit cost and the cost to sustain and maintain equipment solely operated by the Norwegian armed forces by far exceeds what a small country like Norway can afford. Furthermore, the industry has to sustain and develop technology and knowledge in-between major acquisitions and major upgrades by the Norwegian armed forces. Export of defence equipment in itself is therefore an important part of Norway's essential security interests, as a national defence industrial base could not exist without exports.

### Norwegian Defence Industry – Key Facts

- Revenues €1,4 -1,6 billion/year
- >70% sales outside of Norway
- R&D share > 10%
- 5000 man years
- ~140 companies
- SMEs >85 %
- International presence (Production/R&D)  
USA, Canada, Sweden, Finland, Poland, Germany, Switzerland, Spain

littoral conditions and the vast ocean areas under Norwegian jurisdiction in the high north have shaped the Norwegian defence industry's capabilities and honed the skills of the companies and their employees. The Norwegian armed forces prefer to acquire defence equipment off-the-shelf on the

Photo: Kongsberg



**Kongsberg's PROTECTOR weapon station – shown here is the naval MK50 variant operated by the the US Navy – is among Norway's best sellers in export.**

veloping new equipment and systems. The reason for this is that the volumes procured by the Norwegian armed forces of a particular type of equipment are far too small

In the scope of carefully selected technologies and product areas the Norwegian defence industry today is in control of some of the most advanced technology segments

### Author

**Torbjørn Svensgård** is the President and CEO of the Norwegian Defence and Security Industries Association (FSI)



Photo: reddit.com

***With a top speed in excess of 60 knots the Royal Norwegian Navy's SKJOLD Class coastal corvettes are the world's fastest operational naval ships.***

and capabilities in the industry and manufactures several products and systems that are considered leading on the international market. More than 70% of its revenues are generated with customers outside Norway and the industry has one of the largest export shares of its kind in the world.

## Research and Development

In order to decide where the armed forces should invest in defence research and development and seek cooperation with Norwegian industry, the Ministry of Defence has identified a set of prioritised technologies, endorsed by the Norwegian Parliament.

The key technologies are:

- Command, control, information, decision support and combat systems;
- Systems integration ;
- Autonomous systems;
- Missile technology;
- Underwater technology;
- Ammunition, aiming devices, remote weapon stations and energetic material for military purposes;
- Advanced materials developed or adapted for military purposes;
- Life-cycle support for land, naval and air systems

In order to translate these technologies into products and systems, a model for cooperation between the military user community, the defence research community and the defence industry has been developed and refined for decades. This "triad" facili-

tates close integration and interaction between the key stakeholders from the very early phases of a development programme until successful implementation and transition to operational use.

By utilising this collaborative framework the Norwegian defence industry is able to develop, deliver and export state-of-the art world-class products and systems in the following areas:

- Missiles (NSM/JSM)
- Ground-based air-defence
- Rocket motors
- Remote weapon stations
- Advanced ammunition and shoulder-launched weapons
- Personal reconnaissance systems (Nano-UAV)
- Underwater systems
- Command, control and communication systems
- Secure information systems (crypto)
- Soldier systems.

## International Cooperation

In addition to the collaborative framework, that brings the key national stakeholders together, international cooperation and active participation in bi- and multilateral programmes have been paramount to the Norwegian defence industry's success on the international market. Exports have grown by a factor of more than 3.5 over the last 15 years. Partnerships have actively been used as a vehicle to secure market

access and technology cooperation. These partnerships are paramount to sustain the industry's position on the international market today and in the future. All Norwegian defence programmes of any significance involve international industry-to-industry cooperation.

One of the most important reasons why cooperation has been successful is that the industry has strived for products and systems that are platform independent. With the exception of advanced naval vessels, Norway does not manufacture major platforms such as armoured vehicles, aircraft or submarines. Rather than having to invest to keep legacy platforms and systems alive, the Norwegian industry can continue to invest in those focus areas where we have technology and products that also have a future in a challenging economic environment.

Norwegian defence companies are small when compared to the major international defence contractors; hence, head-on competition is not a viable approach. Taking a flexible approach to cooperation, and being prepared to respond quickly to changes and emerging opportunities have proven to be a successful strategic approach.

In cooperation with international partners, Norwegian defence industry today manufactures, markets and delivers "high-end" defence products such as anti-ship and land attack missiles, advanced ammunition, rocket motors, air defence systems, remotely controlled weapon stations, communication equipment, combat management systems, personal reconnaissance system, soldier systems and many more to customers around the globe. The biggest and most important export market by far is the United States. The Nordic nations are also important. NATO and EU count for approximately 90% of defence exports from Norway. However, markets further away, such as Australia, South-East Asia and The Middle East, are becoming increasingly important.

Norway's commitment to, and active participation in, international collaborative development and production programmes is yet another important contributor to the growth of the Norwegian defence industry.

## F-35 Joint Strike Fighter

Norway is a partner in the US-led F-35 Joint Strike Fighter programme. This has opened up opportunities for a substantial number of Norwegian companies to participate in the programme as key suppliers. The Norwegian industry's contribution to the F-35 includes advanced composite parts and subassemblies, electronic subassemblies,





mechanical components and support services. A new 5th generation long-range joint strike missile (JSM) to provide for the F-35 the operational capability required by the Norwegian Air Force, is under development by the Norwegian industry, lately also in cooperation with Australian industry. New armour piercing ammunition (APEX) for the F-35, also developed by Norwegian industry, is currently undergoing qualification. APEX will increase the aircraft's combat effectiveness against land targets and for close air support operations. Both JSM and APEX are excellent examples of how the Norwegian Government and Norwegian industry invest to enhance the operational capability of the F-35 to meet national requirements that cannot be responded to with off-the-shelf solutions.

### The Norwegian Defence and Security Industries Association (FSi)

The Norwegian Defence and Security Industries Association (FSi) is the only trade association in Norway dedicated to advocating the interests of the Norwegian defence and security industries. The association is the primary interlocutor and partner for the Norwegian Government in matters of importance to the industry.

FSi's mission is to foster framework conditions for member companies to succeed on the domestic and global defence and security markets, thereby contributing to Norway's national defence and security goals.

FSi is also a focal point for foreign contractors seeking cooperation with Norwegian companies in relation to Norwegian defence procurements abroad and international collaborative programmes.

The association has approximately 125 member companies – a diversified group ranging from the major national defence contractors to one-man businesses, all with unique capabilities built on innovation and advanced technology, serving both the military and the civil security markets. About 85 per cent of the companies are SMEs. FSi is an independent private association owned, governed and funded exclusively by the members. The association is affiliated and collocated with the primary business association in Norway, the Confederation of Norwegian Enterprise (NHO).

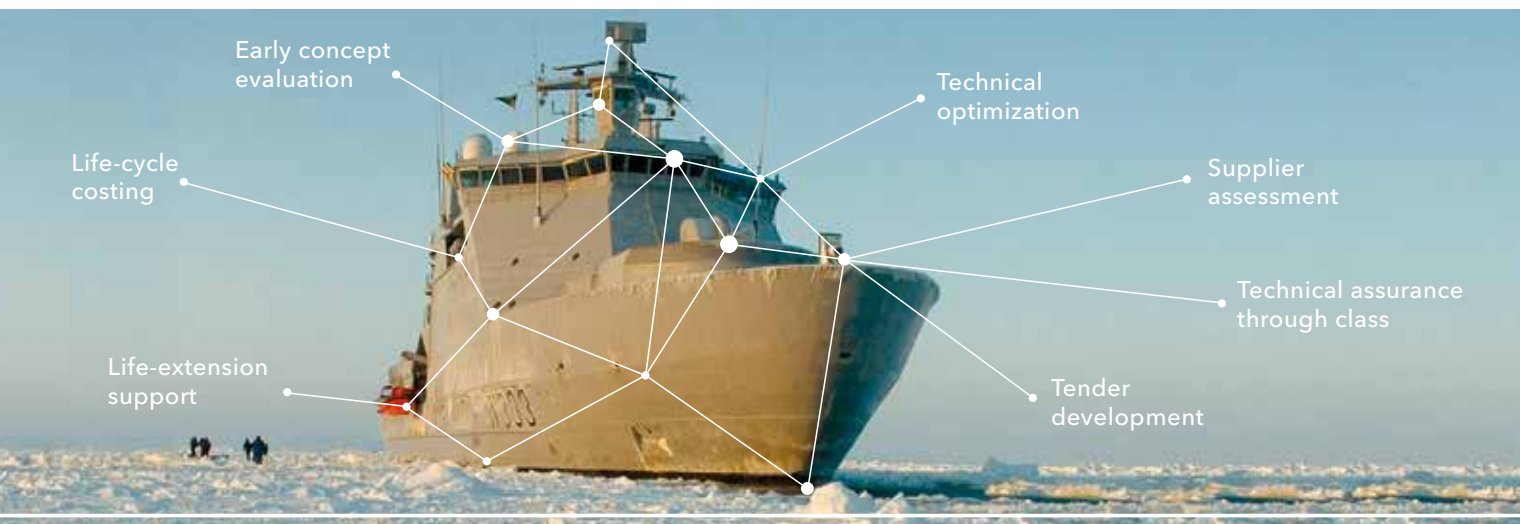
### Naval Technology

On the naval side, Norwegian industry has developed the shipborne long-range stealthy Naval Strike Missile with anti-ship and land attack capability. The missile is currently in operation with the Norwegian and Polish navies and has been selected by the Malaysian Navy. The complex oceanographic conditions along the long Norwe-

gian coastline require bespoke solutions for underwater acoustic applications. Norwegian sonar technology, and in particular the capability to process underwater acoustic data, are state-of-the art. The technology provides the operational user with the capability to navigate and maintain situational awareness under water with extreme precision. Likewise, anti-submarine warfare and

mine countermeasures are also core capabilities of the naval industry. The Norwegian industry offers some of the most advanced autonomous underwater vehicles currently available as well as intelligent disposable mine neutralisation systems.

The Norwegian Navy's SKJOLD Class coastal corvettes are the world's fastest operational naval ships with a top speed exceeding 60



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Photo: UK MoD



**The British Army deployed the BLACK HORNET UAV from Prox Dynamics during the ISAF mission in Afghanistan**

knots. The ships were designed, developed and built in Norway. The "air cushion" catamaran hull is made of advanced composite materials. High speed, combined with a stealthy design and the strike capability offered by the Norwegian Naval Strike Missile (NSM), make the SKJOLD Class an efficient and lethal weapon system against both surface and land targets.

### Technology Contributions

The NATO EVOLVED SEA SPARROW programme and the European IRIS-T programme get their propulsion from a Norwegian company. The motor for the AMRAAM-missile, which is the primary weapon for the US Air Force, has been developed and manufactured in Norway; the same applies to the SIDEWINDER missile. The Norwegian industry has delivered motors for the European EXOCET Block 3 and recently the LMM missile. NATO AWACS, NATO AGS and NATO ACCS are other examples of international programmes where Norwegian companies deliver critical software and support.

Remotely operated weapons stations for armoured vehicles and naval applications are another success story. The Norwegian industry is the market leader in this area with a market share close to 90%. About 20,000 weapon stations have been delivered to almost 20 nations in cooperation with armoured vehicle manufacturers in both the US and Europe.

The Norwegian NASAMS ground based air defence system has become the benchmark for this type of systems in NATO. Seven nations, including the US, currently

operate the system, which has provided air defence coverage to the US Capital, Washington DC, 24 hours/365 days a year for more than 10 years.

The world's smallest operational UAV has been developed and manufactured in Norway. Weighing less than 20 grammes, but equipped with three cameras and capable of providing real time HD video over a dedicated data link with an effective range of more than 1,5 km in severe weather conditions, the BLACK HORNET is the most advanced and capable UAV of its kind. It provides the warfighter with a personal reconnaissance system that increases situational awareness, enhances combat effectiveness and significantly improves safety.

Secure information systems and advanced communication equipment for mission critical applications are other areas where the industry excels. For more than 15 years, Norwegian industry has been the sole sup-

plier of crypto solutions for "high grade" IP networks in NATO.

In addition to the major companies delivering the systems and products described above, the industry also comprises a significant number of high-tech SMEs, with highly specialised products. Advanced high quality electronic assemblies, complex mechanical components and sub-assemblies, electro optic equipment, different kinds of sensors and deployable camp and command and control facilities, are examples of what the industry has to offer.

### Perspectives

The Norwegian defence industry is developing rapidly and is taking an active role in restructuring the Nordic defence industry. Kongsberg's recent acquisition of 49% of the shares in the Finnish national champion Patria is an important step towards establishing an agile and internationally competitive defence industrial group, also involving NAMMO, the Nordic powerhouse for ammunition, shoulder-launched weapons and rocket propulsion; Patria has a 50% share in Nammo.

The Norwegian defence industry plans for further growth and is ready to explore new opportunities and new markets. An updated national defence industrial strategy, endorsed by the Norwegian parliament in June this year, reaffirms the Norwegian Government's and armed forces' commitment to continue to invest in the prioritised technology areas and support the industry's efforts to compete and win new business on the international market. A mature modern product portfolio, funded development programmes, wide international market presence and a web of strategic alliances with international partners makes the industry an attractive and reliable supplier and partner for customers world-wide. ■

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HNoMS Fridtjof Nansen  
during RimPac 2014

# “In the future, we have to manage and understand a sea of data.”

Photos: author



**Patrick Auroy took up the post of NATO Assistant Secretary General for Defence Investment in October 2010 after a professional career in the DGA (Délégation Générale de l'Armement, today: Direction Générale de l'Armement), the armaments branch of the French MoD.**

**ESD:** What problem areas do you see as the greatest challenge to NATO today?

**Auroy:** Geo-strategically NATO is facing challenges from all over the world; in its own neighbourhood and beyond. Today's world is unpredictable, unstable, and volatile, in ways we have not seen for some time, if ever. From an investment standpoint, following the Wales Summit in 2014, Allies have effectively begun to reverse the decline of defence budgets and at the Warsaw Summit in July 2016 we acknowledged this trend. However, we still have a long way to go for all Allies to reach 2% of gross domestic product (GDP) for defence and more effort is needed to maintain our capability edge.

We have to prepare for the future. By working with Allied Command Transformation and the Science and Technology Organisation, for example, we must better understand how cyber, artificial intelligence, additive manufacturing, high-energy, and quantum computing can impact the future of NATO operations. We need to innovate and adopt non-traditional methods for capability development.

**ESD:** As Chairman of the Conference of National Armaments Directors (CNAD) you have changed the CNAD meetings from just being Powerpoint presentations to a fo-

**The work of NATO's Defence Investment Division focuses on the delivery of military capabilities ensuring that forces assigned to the Alliance are properly equipped and interoperable to undertake the full range of military missions. ESD spoke with NATO's Assistant Secretary General for Defence Investment, Mr Patrick Auroy\*.**



**Plenary meeting of the Conference of National Armament Directors (CNAD)**

rum for decision-making. Are you satisfied this has worked out in the right direction?

**Auroy:** This year the CNAD celebrates its 50th anniversary, but I would not say that the CNAD was ever a "Powerpoint" committee. We only need to look at the record of major acquisition programmes that draw their origin from CNAD decisions – Airborne Warning And Control System (AWACS) and its follow-on capability Allied Future Surveillance and Control (AFSC), Ballistic Missile Defence (BMD), Alliance Ground Surveillance (AGS), the NATO SEASPARROW Missile, NH-90 helicopter and more.

The power of the conference comes from bringing together the heads of armament from 28 allies to develop a constructive environment to initiate, develop and procure capabilities together. CNAD functions as NATO's 'capability delivery engine', and I am optimistic that allies are seeing its value just as defence budgets begin to increase. It will always be a nice challenge to find ways

to attract all nations, including partners, to contribute to the dialogue.

CNAD is also working to create mechanisms, and change attitudes, to involve the defence and security industry earlier in capability development. The NATO Industrial Advisory Group (NIAG) is instrumental in that sense and they participate in a NATO-wide effort to implement the "Framework for NATO Industry Engagement", our tool for improving the relationship. Furthermore, together with SACT, we co-organise the annual strategic NATO-Industry Forum (NIF) where NATO, industry, and nations, including EU participants, are exploring new relationships for improving the delivery of capabilities.

This year's NIF is on 9 November in Brussels, and I am excited by the confirmed attendance of leaders from some of the largest defence companies in the world.

\*From 4 October 2016 the ASG/DI will be Mr. Camille Grand from France.



**ESD:** From your point of view, what was the most important outcome of the 2016 Warsaw Summit?

**Auroy:** For me the most important outcome was the demonstration of solidarity and commitment to fundamental NATO values, demonstrating the power and the determination of all allies.

The declaration of NATO BMD Initial Operational Capability (IOC), the acknowledgement of Joint Intelligence Surveillance Reconnaissance (JISR) IOC and the intent to promote intelligence sharing, the deci-

**ESD:** The Summit endorsed work on a concept for a successor to the AWACS fleet around 2035. Which role do you envisage NATO SLCM (System Life Cycle Management) activities and the SLCM products can or should play in planning the follow-on system in its early stages?

**Auroy:** The procurement cost of a defence capability represents in the region of 40% of its entire life-cycle cost, the rest being operation and maintenance, modernisations and upgrades, and even retirement. Our SLCM policy provides

the process of defining options for future NATO surveillance and control capabilities”.

**ESD:** What have been the benefits from the Agency Reform and any lessons learned?

**Auroy:** NATO's agencies are vital mechanisms for procuring and sustaining capabilities for allies and partners. We started the reform with 14 agencies, and allies agreed to streamline them into two major programmatic themes: Procurement & Support, and Communications & Information. The aim was to optimise the supporting functions and create more effective bodies to support projects and programmes, without disrupting service and capability provision to military operations and the Alliance. To some extent, it has been a case of working on the engine while the plane is in flight.

In terms of lessons learned, we have seen that the very ambitious goals set at the beginning of this process, coupled with the transition to leaner organisations, has posed significant challenges to agencies' delivery of expected benefits and savings. Nevertheless, we are confident that this structure will improve results for all concerned in the years to come.

**ESD:** How will you transfer AGS (Alliance Ground Surveillance) from NAGSMA (NATO AGS Management Agency) to NSPA (NATO Support and Procurement Agency) and what is the timeframe?

**Auroy:** AGS is procured by 15 allies through NAGSMA, and will provide a world-class capability owned and operated by NATO. This is a great example of what allies can achieve together, and a model for multinational cooperation. The AGS programme will transfer from NAGSMA to NSPA, which will be re-



**A Boeing type 707 AWACS aircraft during the 25th anniversary celebrations of the AWACS fleet.**

sion to start defining options for the future NATO surveillance and control capability, are all critical outcomes for my division. Recognising cyber space as an operational domain and the signature of 'Cyber Defence Pledge' were also important since it reaffirmed NATO's commitment to assure protection and success of our missions and operations in a domain that becomes more important by the day.

an integrated approach to the delivery of cost effective defence capabilities. For AFSC we use the NATO Programme Management Framework to both describe the programme and to aid decision-making at all management levels, to ensure optimisation over the programme's entire life.

This approach helped to inform the Warsaw Summit decision “to collectively start

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**The GLOBAL HAWK constitutes the unmanned aerial element of the Alliance Ground Surveillance (AGS) system.**

sponsible for the life cycle management of the capability. This transfer is based on a detailed plan developed by the two agencies together with the military; it defines the major principles of the system's transition, including expertise and human resources. This takes into account the delivery schedule of the AGS core system, the operational requirements of the NATO AGS Force, contractual

obligations and engineering functions. The actual transition begins next year and will close with the declaration of the AGS full operational capability.

**ESD:** How does NATO see AWACS, AGS and JISR evolving in the future?

**Auroy:** At Warsaw we agreed to pursue future modernisation of AWACS and extend its service life until 2035, to continue providing NATO with airborne early warning, command and control, and battle management. In parallel, the successor capability, AFSC, advances into the concept development stage in the new year. AGS comes online next year, and will be integrated, alongside national ISR contributions, into our intelligence capabilities, processes and networks. NATO's JISR initiative binds these capabilities together to ensure the right information to the right people at the right time. I see the focus shifting toward facilitating better tasking and information exchange NATO-wide through collaborative networks and

using all available intelligence efficiently. In the future, it could be that all sensors are distributed or even that everything becomes a sensor, and all we have to do is to manage and understand the 'sea of data'.

**ESD:** When you take the experiences from AGS, BMD and AWACS into consideration, what would you recommend NATO do differently in future common procurement of defence systems?

**Auroy:** AGS, BMD and AWACS reflect the value the Alliance adds in procurement. Whether providing actual airframes and functions with AGS and AWACS, or a command and control backbone to link Allies' individual systems as with BMD, NATO adds value through commonality and harmonisation of requirements, joint development and procurement efforts, and standardisation.

Naturally, the lessons learned are continuously fed back into our processes, and together with the lessons from Smart Defence, are used in what we now call Multi-national Approaches.

NATO has already started changing its procurement process and the fact that we transfer AGS from NAGSMA to NSPA for through-life support, and that we explore options for AFSC long ahead of AWACS' retirement, are indicators of this new approach.

Going forward, I would like to see NATO embrace a long term vision in defence capability planning, with projections beyond 15-20 years; this would enable the allies to build momentum together for the procurement of collective capabilities that matter for the Alliance as a whole.

**The interview was conducted by Peter Bossdorf.**

#### Legend

ACT	Allied Command Transformation
AWACS	Airborne Warning And Control System
BMD	Ballistic Missile Defence
CNAD	Conference of National Armaments Directors
JISR	Joint Intelligence, Surveillance and Reconnaissance
LCMG	Life Cycle Management Group
NAGSMA	NATO AGS Management Agency
NATO	North Atlantic Treaty Organisation
NIAG	NATO Industrial Advisory Group
NSPA	NATO Support and Procurement Agency
SACT	Supreme Allied Commander Transformation
SLCM	Systems Life Cycle Management
STO	Science and Technology Organisation

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# “The acquisition of new combat vessels plays a critical part in maintaining the Navy’s capability.”

Pictures: Finnish Navy



**Commodore Timo Hirvonen has been the Chief of Staff of the Finnish Navy since May 2016.**

## Interview with Commodore Timo Hirvonen, Chief of Staff, Finnish Navy.

The cooperation between Finland and Sweden has deepened with the aim of increasing the operational readiness of the Swedish-Finnish Naval Task Group (SFNTG). The cooperation supports the countries’ capability of acting jointly, under common command within the SFNTG, in international crisis management operations.

The capability of the Finnish Navy will decrease after 2025 as the RAUMA Class fast attack missile craft reach the end of their life-cycle. The HÄMEENMAA class minelayers will reach the end of their life-cycle at the same time, which will have a severe impact on the Navy’s minelaying capacity. The life-cycle of the vessels to be decommissioned cannot be extended in a cost-efficient way. The combatants cannot be replaced by any other solutions than new surface combatants.

**ESD:** The new and emerging security environment is characterised by asymmetric threats including terrorism, (illegal) migration and trafficking, cyber attacks, but also crises at political levels. How is your navy positioned in response to these challenges in terms of self, national and Alliance defence? Are there capability shortcomings?

**CDRE Hirvonen:** The main tasks of the Finnish Navy are Finland’s national defence and supporting other authorities and international military crisis management. For the Navy, the national defence of Finland means responsibility for maritime surveillance, maritime defence and the safeguarding of the sea lines of communication. The Navy supports other authorities, for example in oil recovery in maritime areas or by providing other means and capabilities on request. The Navy participates in international crisis management operations and constantly rehearses its readiness to operate as part of a multinational force. Existing and future capabilities are built on the demand to fulfil all main tasks with the same resources.

The key capabilities of the Finnish Navy are surface warfare, minelaying, anti-submarine warfare and coastal troops manoeuvre and striking capabilities.

**ESD:** What are currently your most important armament projects? Are any of these carried out in international partnerships? What are the respective capability objectives?

**CDRE Hirvonen:** The acquisition of new combat vessels plays a critical part in maintaining the Navy’s, and thereby also the Finnish Defence Forces’ (FDF), capability. The FDF has launched a project (Squadron 2020) to buy surface combatants to replace the Navy’s capabilities which will become outdated in the 2020s. The new vessels are expected to be capable of territorial integrity surveillance, securing vital sea lines of communication and deterring attacks from the sea.

To be able to carry out these tasks, the vessels have to be able to monitor maritime areas above and sub-surface and in the air space and to use weapons to counter potential threats from enemy forces. The exact configuration of the weapon system will be decided in the course of planning, but at least sea mines, torpedoes, surface-to-surface and surface-to-air missiles are likely to be included.

The vessels are designed primarily for national defence needs and it is vital that they can also operate in winter conditions;

they are expected to navigate through ice-covered waters. In addition, they could be used for international crisis management. At this point the plan is to construct four vessels. The planning phase of the project is 2015-2018 and construction is scheduled to start in 2019. The national emergency supply of the vessels has to be taken into account within the whole operational time.

**ESD:** What are your priorities for the continued development of your navy – in terms of structures, human resources, training, materiel and international cooperation?

**CDRE Hirvonen:** Development programmes like Squadron 2020 always have a direct influence on the organisation, including factors related to personnel, materiel, training, facilities and international interoperability as a whole. The Finnish Navy sustains and develops capabilities in areas such as surveillance, anti-submarine warfare, and anti-surface warfare that can be applied in archipelago and open sea conditions as well as in crisis management operations. The Navy enhances its capabilities by obtaining three new mine hunters, by improving the C4I systems, by performing a midlife update of the Squadron 2000, by procuring mine warfare capabilities, and developing the mobile coastal troop’s capabilities.

**ESD:** Last but not least, as the publication of this interview coincides with Euronaval, Europe’s largest naval exhibition – will there be a delegation from your navy at Euronaval, and if so, who will be part of it and what are they interested in?

**CDRE Hirvonen:** The Finnish Navy will participate in Euronaval with staff officers from the Navy Command, personnel from the FDF Logistic Command and the National Defence University. These three separate delegations are generally interested in the latest naval development projects, new concepts and capability building especially with integrated weapon systems.

**The questions were asked by Peter Bossdorf.**

# PXR BALTOPS 2016 – Expanding in Numbers and Reach

**Georg Mader**

During a 2016 briefing to the OSCE High-Level Military Doctrine Seminar in Vienna, Vice Admiral James Foggo, Commander US Navy 6th Fleet, commented to ESD “The rapid changes in the threats we face: few would have predicted that terrorists and their sympathisers threaten societies by using all means, including social media. The conflict with ‘Daesh’ in Iraq, Syria and Libya creates and contributes to a mass migration crisis that not only is a humanitarian challenge but also creates real security concerns for Europe –also from a naval aspect.”

In the latter respect Foggo pointed to the recently-initiated NATO and FRONTEX mission against human-traffickers organis-

Photo: Mader



**Vice Admiral James Foggo, Commander US Navy 6th Fleet; Commander Naval Striking And Support Forces NATO; Deputy Commander US Naval Forces Europe and Joint Force Maritime Component Commander Europe**

ing the flow of migrants in the Aegean and explained that “while the EU has so far not asked for 6th fleet ships for that FRONTEX operation, we provide intelligence/support,

## Author

**Georg Mader** is a defence correspondent and freelance aerospace journalist based in Vienna, Austria, and a regular contributor to ESD.

as we bilaterally do for their operations off North Africa. But EUNAVFOR-Med is a different command, led by Admiral Enrico Credendino as Operation ‘Sophia’.”

## Russia and the BALTOPS Exercises

In a wider security context, the Admiral remarked that “As a regional commander I also have to add that Russia – originally a key stakeholder in European Security – disregards international principles of sovereignty and is using force to accomplish its goals, thus planting the seeds of renewed tension and militarisation in the region. This was unexpected and unfortunate, but such emerging challenges we will face can come – conventional or nuclear – from any direction, at any time in the foreseeable future. And these will require military force to deter and if necessary, to defend.”

In underlining the presence of naval forces at sea regarding deterrence and defence, Foggo used the last BALTOPS [Baltic Operations] exercise to illustrate: “I had the pleasure to serve as the NATO Commander of that flotilla, in a front row seat to this ultimately highly rewarding effort. It was a privilege leading BALTOPS for the second year in a row. Not many commanders have been able to do that in the past. Seventeen like-minded nations sailing together to openly assure security and cooperation in those shared spaces that connect us, particularly in the Baltic. First 49 ships, 62 aircraft, 5,600 sailors, airmen and Marines came together. Seven hundred Marines hit

the beach in Ramlösa in Sweden and in Ustka, Poland. Now we had 15 of 28 NATO allies participating, with our two partner nations from Finland and Sweden. This is the 44th year of BALTOPS, but it is only the second year that BALTOPS has been commanded by a NATO commander.”

The Admiral reported that “according to the comments from our US Marines, this was an extraordinary experience and a wonderful place to operate, and something different for them.

In an archipelago with 100,000 islands and in an area with forest and trees and dirt and mud, quite different from the sand that they’ve been operating in for most of previous times.”

“And while there we had no official observers from Russia, there was – of course –

a Russian Air Force ‘welcoming committee’ from Kaliningrad: two sorties of Su-24 aircraft four times, at high speed and low altitude. I encouraged every sailor who recorded their flypasts on iPhone to put them on the web with the caption “Sailors and Marines of BALTOPS 2016 enjoy an air show, compliments of the Russian Air Force.” I wanted them to know we are here, with a strong message of solidarity, alliance, unity of command, unity of effort and reassurance to our Baltic partners.”

## Mediterranean Remarks

To ESD, the Admiral, who is headquartered in Naples, mentioned participation of 6th fleet activities connected to the Syrian civil war. “Around the time of the Paris ‘Daesh’ terrorist attacks, I flew to the French aircraft carrier CHARLES DE GAULLE, where USN



Image: NATO





Photo: AFP PHOTO / US NAVY 6th FLEET

**A Russian Sukhoi Su-24 attack aircraft makes a very-low altitude pass by the USS Donald Cook (DDG 75), an ARLEIGH BURKE Class guided-missile destroyer, operating in the Baltic Sea on 12 April 2016.**

exchange personnel were conducting flight ops within their RAFALE air wing. I was very impressed with the total integration in their strike operations over Syria, before they joined them in the Arabian Gulf. And joined we continue to operate where not everybody operates, and we continue to be 'present' to see with our own eyes and sensors what is going on. To whatever subsequent purpose ..."

Regarding any possible "deconfliction" between

US and Russian warships in the Mediterranean such as that agreed in Syrian airspace, the Admiral responded that "It is not necessarily the same as in the air. In abiding by standard naval rules of behaviour, when we pass each other with 8,000 ton warships in the night, we exchange signals and ask for identification. We expect the same – and for the most part the Russian sailors react professionally. No problems. And why not? – we are not at war with them..."

## A2/AD and "Freedom-of-Navigation"

Concerning the US-upheld dogma of global freedom-of-navigation, the Admiral explained that "In some areas of the world, including here in the Baltics and in the Black Sea, and now also in the Eastern Mediterranean, we are observing a kind of an Anti-Access/Area Denial (A2/AD) strategy, which is one that we need to keep an

eye on, because it can restrict the ability of commerce and freedom of navigation and sea lines of communication that are in international waters. Those

waters are called international waters for a reason: they belong to no one and they are there for all nations to be able to navigate with commercial vessels that contribute to prosperity – and as well with naval vessels that contribute to security."

Questioned on a "trend" normally mostly men-

tioned in connection with China and the South China Sea, Foggo said "There are a lot of A2/AD regions, and names that are coming around and different areas in the world where others may look to actually restrict our freedom of movement, freedom of navigation, and freedom of action. Yes, there are challenges under this new A2/AD environment, as it seems to be springing up around the world. But we will take every opportunity to improve our ability to counter those challenges as they arise. Therefore we need to continue to come out there and challenge ourselves such that we can answer those challenges should they arise in the future, and we'll take the opportunity to do so."

One part of the A2/AD challenge is the threat from mines. Foggo responded "When we define A2/AD, certainly offensive mine warfare is a part of it, and so in this scenario – as we did last year – we have seeded minefields, inert, practice mine-

fields. The mine-countermeasure ships and divers and experts don't know where those mines are actually located. They know that there's a choke point. They know a general geographic location and we tell them, go and find the mines and clear them."

## "Submerged" Talks

VAdm Foggo was originally a submariner and therefore ESD asked him how the undersea domain contributes to the daily operations of 6th fleet, other than escorting transiting carrier groups. He warmly smiled and commented that "US subs these days are busier than ever. I won't tell you numbers, but we deploy subs to the Mediterranean every year. They are indispensable for in-theatre security collaboration, in collecting valuable ISR for decision-makers, and also in countering the one constant competitor that we have seen 'dented' but not degraded since the 'non-kinetic third battle of the Atlantic'. Those are the Russian submarines. They have meanwhile resolved to build a capable, high-end submarine force. You know, when a modern diesel-electric submarine is submerged on batteries, it is very hard to detect – and lethal. The Russians just sailed their second-built KILOCASS class from the Northern fleet down into the Eastern Mediterranean and then fired KALIBR land-attack missiles into Syria. Then it went to the Black Sea, where there are now two KILOS and – by our assessment – that will become six. We, as an alliance, remain concerned and vigilant about that, and it is important that we hone and modernise our ASW-skills above and under the seas."



Photo: NATO

**Dutch Helicopter operating during NATO's DYNAMIC MONGOOSE anti-submarine exercise in the North Sea, off the coast of Norway, on 4 May 2015**

Questioned on particular ASW platforms in his area of command, Foggo points to the P-3 ORION MPA/ASW aircraft of the "Pelicans" at Sigonella, Sicily, that are earmarked to be replaced by P-8 POSEIDONS. "These are great aircraft and force-multipliers, as you can see in the recent British SDSR-decision covering nine of them." ESD commented on NATO's naval anti-submarine exercise DYNAMIC MONGOOSE, which took place in Norway during June 2016, and the fact that BALTOPS also included shallow-water submarine operations. The question arose as to why these were not combined. Vice Admiral Foggo answered "Two very different geographic

areas. Baltic nations who are unable to participate in DYNAMIC MONGOOSE can conduct ASW operations here in the Baltic Sea. The environment, salinity and the environmental conditions and commercial traffic and noise in the underwater domain are different, and so it is testing for the Swedes, for the Finns, for other nations of the region. The German submariners too, say that there is a particular set of environmental conditions that are very characteristic to this region, different in and off the coast of Norway."

Asked on participating submarine forces, Foggo responded that "Submarine on submarine is something new for BALTOPS. In

2015 we had one submarine. This year we had three. So we have the luxury of pitting one very quiet, diesel-electric submarine against another and that is probably the most difficult challenge for those boats. We were very fortunate that this year we had a return deployment of the Polish submarine KOBLEN, joined by the Portuguese submarine TRIDENTE and the Swedish submarine HALLAND. I had the pleasure of actually embarking HALLAND and diving in the Baltic Sea, conducting portions of the exercise and then surfacing and coming back here to the command ship. I was very impressed with the professionalism of that team. What those submarines bring to the table here is an opportunity for the surface ships to exercise their skills in ASW against a very quiet, high-end diesel-electric submarine that – as I previously remarked – is very difficult to track when it is on battery. So I think there were benefits for both exercises, BALTOPS 2016 and DYNAMIC MONGOOSE."

In closing, Vice-Admiral Foggo pointed out that "Anti-submarine warfare skills are a continuum. They've got to be exercised all the time. We can't let them atrophy. We've got to maintain that edge and so it's nice to be able to spread that around amongst the allies and partners, at different times throughout the year."

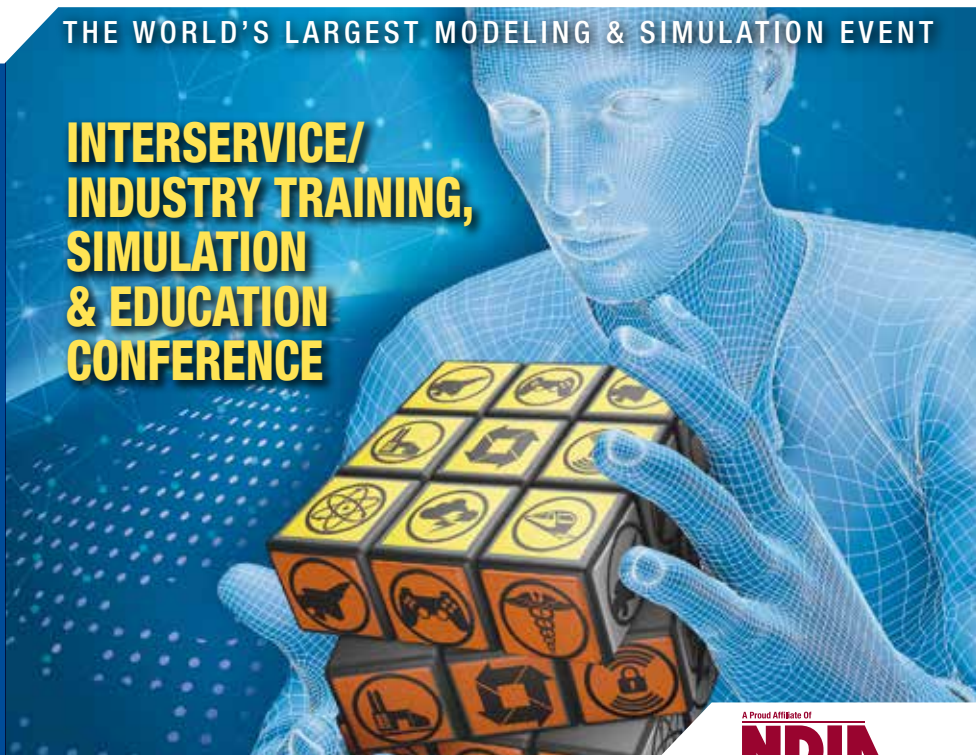


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# “The modernisation of the Navy is achieved with the involvement of the domestic industry and partner nations.”



Photo: MoD Croatia

**Rear Admiral Predrag Stipanović has been the Chief of the Croatian Navy since February 2015.**

**ESD:** The new and emerging security environment is characterised by asymmetric threats including terrorism, (illegal) migration and trafficking, cyber attacks, but also crises at political levels. How is your navy positioned in response to these challenges in terms of self, national and Alliance defence? Are there capability shortcomings?

**RADM Stipanović:** The dynamics of the contemporary security environment are challenging naval forces to develop dual-use capabilities required to support law enforcement and other civil organisations with non-traditional tasks, at the same time sustaining the readiness to engage as naval power when required. As the structure of the Croatian Navy includes the Coast Guard (CG), we have balanced our sets of capabilities in order to enable transition of supported-supporting roles between the flotilla's naval assets and the CG. At the national level, this model is effective due to inter-sectorial coordination and collaboration of the CG and the fact that CG personnel is Navy personnel assigned to the CG. We may say that effective collaboration with non-military organisations at sea is achieved through our CG, while mil-to-mil collaboration is sustained through the Navy HQ and operational units, including cooperation with NATO, EU and regional powers.

Operational shortcomings are resolved with compressive national collaboration at the strategic, operational and tactical levels. The capability development process has been coordinated in order to avoid overlapping and, at the same time, shortcomings. Depending on the nature of the threat, sup-

## Interview with Rear Admiral Predrag Stipanović, Chief of the Croatian Navy.

port to the NATO collective defence and EU collaborative engagement is achieved through situational awareness and common procedures.

**ESD:** What are currently your most important armament projects? Are any of these carried out in international partnerships? What are the respective capability objectives?

**RADM Stipanović:** Our armament projects are focused on the development of capabilities that are in support of our national objectives and attainment of NATO's naval capability targets. In accordance with the Long-Term Development Plan, we are currently building five coastal patrol boats for the CG with the objective to enhance capabilities and capacities to protect national interest, and to conduct preventive measures to protect international law and order in our Ecological and Fisheries Protection Zone in the Adriatic Sea. Modernisation projects are focused on the improvement of the MSA<sup>1</sup> and the development of MCM<sup>2</sup> capabilities. MSA projects include the modernisation of the radar surveillance systems and the integration of all national maritime surveillance systems into a single RMP<sup>3</sup>. MCM capabilities development is focused on MCM in shallow waters and sustainment of the Q-routes. We have acquired autonomous underwater vehicles and are planning for the acquisition of two second-hand mine hunters.

**ESD:** What are your priorities for the continued development of your navy – in terms of structures, human resources, training, materiel and international cooperation?

**RADM Stipanović:** The Navy will continue to develop capabilities in order to protect national interests at sea, contribute collective defence and to promote a cooperative regional approach to the security challenges. Challenged with a wide spectrum of contemporary operational requirements, we are continuously assessing our capabilities and adjusting our training. Our structure is periodically revised and adopted to provide a sufficient level of flexibility to sustain our mission in the AOR<sup>4</sup>. While balancing

priorities between personnel and materiel resources we are focusing our efforts on personnel development. Beside national education and training, most of the Navy's personnel is taking advantage of education and training abroad, provided by partner nations and NATO COE's<sup>5</sup>. Also, the Croatian Navy is offering training programmes to our partners, and our intent is to increase partners' involvement in training events.

With a limited budget we have focused our acquisition projects on the development of key capabilities. Our platforms and equipment are periodically upgraded and modernised in order to increase operational effectiveness and to sustain interoperability with NATO and EU naval assets. It is essential for us to continue the modernisation of the Navy and that is achieved with the involvement of the domestic industry and partner nations.

International cooperation is of absolute importance to us. Without support from our partners, our Navy would have had greater challenges in capabilities development. International cooperation has enabled opportunities that help us to develop the Navy that is today actively involved in naval operations abroad and supporting NATO and EU partner nations.

**ESD:** Last but not least, as the publication of this interview coincides with Euronaval, Europe's largest naval exhibition – will there be a delegation from your navy at Euronaval, and if so, who will be part of it and what are they interested in?

**RADM Stipanović:** Croatia will be represented by engineers from the MoD's Armament Directorate and from the Navy. Our current scope of interest includes autonomous and remotely operated MCM systems and solutions, as well as different combat sensors and management systems.

**The questions were asked by Peter Bossdorf.**

### (Endnotes)

- 1 Maritime Situational Awareness
- 2 Mine Countermeasures
- 3 Recognised Maritime Picture
- 4 Area of Responsibility
- 5 Centre of Excellency

# British Naval Construction

## Current Programmes and Future Prospects

**Conrad Waters**

In spite of considerable contraction in recent years, the United Kingdom's naval construction sector remains one of Europe's largest. Important decisions are now being taken that could shape the industry's future for the next decade and more. In July 2016, the British Parliament voted in favour of replacing the four Trident missile-armed strategic submarines that form the UK's nuclear deterrent on a like-for-like basis.



Photo: BAE Systems

*The lead QUEEN ELIZABETH Class carrier being floated out of her building dock at Rosyth in 2014. Orders for the class triggered a major consolidation in British naval construction.*

This paves the way for further investment in Britain's largest naval programme. Meanwhile, work on a new National Shipbuilding Strategy will set a way forward for surface warship construction when its results are announced towards the end of the year.

### Background: Infrastructure & Expenditure

The British Royal Navy has shrunk on an almost continuous basis over the seventy

years since the end of the Second World War. This has inevitably resulted in a similar reduction in the size of the naval construction and equipment sector needed to support the fleet. In spite of this, the Royal Navy remains one of Europe's most potent naval forces and – with the imminent arrival of the new QUEEN ELIZABETH class aircraft carriers – one of a few globally able to deploy a full spectrum of maritime capabilities. Moreover, UK governments of all political colours have consistently endorsed the maintenance of sufficient indigenous industrial capacity to ensure the domestic construction and maintenance of both submarines and 'complex' surface warships.<sup>1</sup>

Industry's current shape owes much to decisions taken over ten years ago by the then Labour government under its 2005 Defence Industrial Strategy. In essence,

it determined that consolidation in the sector was inevitable to balance likely long-term demand with capacity. Government therefore used its leverage on the main shipbuilders, particularly from the temporary boost to workload and revenues created by the one-off QUEEN ELIZABETH class programme, to encourage this process. This ultimately ensured that the vast bulk of the UK's surface warship construction capacity fell under the control of BAE Systems. BAE subsequently rationalised these operations to focus assembly at its two yards at Govan and Scotstoun on the River Clyde in Glasgow. Submarine construction had already been concentrated on BAE's facility in Barrow-in-Furness on England's north-west coast.

In spite of BAE Systems' dominance of naval construction, there are other im-

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Photo: BAE Systems

**Current British submarine construction is focused on completing the existing ASTUTE class. This image shows the third boat, ARTFUL, departing on initial sea trials in 2015.**

portant players in the British maritime sector. Notably, Babcock International's Marine and Technology division operates major dockyard facilities at Rosyth near Edinburgh and Devonport in Plymouth. Rosyth is where the two QUEEN ELIZABETH class aircraft carriers have been assembled. Along with BAE's Portsmouth operation, these yards have an effective monopoly on the Royal Navy's refit and upgrade requirements. In addition, Babcock has a small shipbuilding facility at Appledore in Devon, which has exported several patrol vessels to the Irish Naval Service. Along with the Cammell Laird shipyard on Merseyside and A&P's yard on the River Tyne near Newcastle, Appledore has also constructed sub-assemblies for the QUEEN ELIZABETH class programme. Both Cammell Laird and A&P play an important further role maintaining the ships of the Royal Fleet Auxiliary that support the Royal Navy's front-line fleet.

It is also important to stress that the UK naval sector comprises a much broader range of suppliers of equipment and services. As well as serving Royal Navy requirements, many of these groups have enjoyed considerable success in the export sector. Notable examples include the propulsion and equipment activities of Rolls-Royce's Marine division, Thales UK's maritime systems business and the naval missile activities of MBDA. In the field of intellectual expertise, BMT Defence Services has carved out a leading niche in the area of conceptual and preliminary warship design. Similarly, QinetiQ has a broad maritime business

ranging from mission systems to survivability assessment.

After decades of contraction, future British defence projections suggest a reasonably positive outlook for the naval shipbuilding sector. The latest Defence Equipment Plan 2015 – published before the 2015 Strategic Defence and Security Review (SDSR)



Image: BAE Systems

**The SUCCESSOR Class strategic submarine will dominate British naval procurement for the next two decades.**

was released – allocates £19bn to procuring and supporting surface ships over the decade to 2024/25. Moreover, this figure will be dwarfed by a further £43bn earmarked for submarine construction and sustainment over the same period. This

sum, which is by far the largest element of the total c. £166bn procurement plan, reflects the huge costs associated with the future strategic submarine fleet. SDSR 2015 subsequently lifted planned expenditure to £178bn over the same period. It seems that much of this increase has been allocated to growth in estimated strategic submarine construction costs.

## Submarines

The SUCCESSOR programme to replace the current TRIDENT missile-armed submarines of the VANGUARD class will increase in importance as the decade progresses. However, current construction is dominated by assembly of the ASTUTE Class of nuclear powered attack submarines under a project that traces its origins to the 1990s. Orders for the first three boats in this class were placed with BAE Systems in March 1997. At this time deliveries were expected from 2005 onwards at a total cost of c. £2.2bn. Both of these expectations proved overly optimistic, largely due to an erosion in submarine design and construction skills that arose from the lack of work after the Cold War's end. The submarines started commissioning some five years behind schedule in 2010. Total costs of £3.5bn were around half again as much as the initial estimate. The extent of these problems had a signifi-

cant impact on the approach adopted for the remainder of the ASTUTE Class programme, which now extends to a total of seven submarines. In particular, procurement for the later boats has been carried out on an incremental basis to allow tighter



Photo: Crown Copyright 2010

**Replacement of the existing Type 23 frigate class is driving current Royal Navy surface construction. This is KENT in 2010.**



Image: BAE Systems

**The planned number of Type 26 frigates was reduced from thirteen to eight in the 2015 SDSR, in favour of the new General Purpose Frigate.**

cost control. Approval for completion of the full programme was only received in 2012. At the moment, the fourth boat – AUDACIOUS – is expected to be launched by the end of 2016 prior to entering service in 2018. The other three will follow through to 2024. Costs average c. £1.5bn per unit for these last three submarines. Both budget and delivery timescales for these boats appear to have been well-controlled to date.

The class suffered from some well-publicised teething troubles when first entering service, but many of these have now been resolved. Technically, the c. 7,500-ton (submerged) ASTUTE can be seen as being broadly equivalent to the US Navy's VIRGINIA Class. The most recent 'Core H' incorporated in the PWR-2 reactor provides a

similar 'whole boat life' endurance as the US Navy boats. Equally, the performance of its Thales Sonar 2076 suite is reported to have performed well in trial exercises against the US boats. Whilst ASTUTE lacks the US Navy's vertical launch systems, launching both torpedoes and cruise missiles from six traditional 533 mm tubes, a total capacity of thirty-eight weapons is similar to that of its American contemporaries.

The ASTUTE Class will be followed into construction by the SUCCESSOR strategic submarines as part of a planned 'drum beat' of orders intended to prevent the loss of key skills that was such a problem in the past. The project is expected to cost c. £31bn (plus a £10bn contingency) in total. Nearly £5bn of this has already been spent on design development, long-lead items

and industrial infrastructure. Re-affirmation of the UK Parliament's commitment to the programme on 18 July 2016 should pave the way for actual construction to commence. However, in a break with usual British practice, SDSR 2015 confirmed that investment would be phased over several stages rather than be subject to a single 'Main Gate' investment decision. The four new submarines will become operational from the early 2030s onwards to allow a seamless transition from the existing VANGUARD class. Much work – including a common missile compartment – is being carried out in collaboration with the US Navy's programme for SSBN(X) OHIO Replacement Submarines. Few firm details of the new submarines have been released but it is intended they will each carry eight operational missiles in a twelve-tube compartment. Other components will include a new PWR3 reactor based on American design practice and an X-shaped rudder.

## Surface Vessels

Turning to programmes for surface vessels, recent activity has been driven by construction of the two 65,000-ton QUEEN ELIZABETH class aircraft carriers. Able to operate an air group of around forty fast jets and helicopters, they will constitute the largest warships ever commissioned by the Royal Navy. Formal orders for the two vessels were placed in 2008, with building work being overseen by an Aircraft Carrier Alliance comprising Babcock International, BAE Systems, Thales UK and the UK Ministry of Defence. The lead ship will be delivered early in 2017. Physical assembly of the other, PRINCE OF WALES, is also now complete. She will be launched within the next twelve months. A notable feature of the build-strategy was the fabrication of the ships' constituent blocks at shipyards around the UK prior to final assembly and integration at Babcock's yard at Rosyth. One positive result of this approach has been a general improvement in skill levels across the UK shipbuilding industry. The development of this broad base of expertise could have relevance to the National Shipbuilding Strategy currently under development.

With work on the aircraft carriers now starting to wind down, procurement of a new class of Type 26 frigate – also known as the Global Combat Ship – is likely to dominate surface ship construction over the next decade. Like many British warship programmes, this has experienced a prolonged and complex gestation period. Planning for the vessels – intended to replace existing frigate classes – began as part of the Future Surface Combatant



project in the late 1990s. In early 2010, BAE Systems was finally awarded a four-year, £127m contract to design the ships. The publication of SDSR 2010 in October affirmed the new coalition government's commitment to the programme in spite of reductions to the Royal Navy's surface fleet, but led to efforts to produce a simpler and cheaper design. These were ultimately to prove unsuccessful, with major consequences for the scope and scheduling of the project.

A major factor behind the struggle to control the Type 26's overall cost has been the Royal Navy's requirement for a high-end anti-submarine platform capable of defending the strategic submarine force and carrier task groups from the most severe underwater threats. This has resulted in a large, sophisticated ship that – with a displacement of nearly 7,000 tons and a

for a construction contract were still underway as of mid-2016. This has caused a potential gap in workload at BAE Systems' Clyde yards. To alleviate this, it was agreed in November 2013 that BAE would build three new offshore patrol vessels based on the AMAZONAS class sold to Brazil. SDSR 2015 stated that this programme would be increased to five vessels, essentially due to further delays in Type 26 assembly. The new ships incorporate a number of detailed changes from the original variant to meet Royal Navy requirements, including a strengthened flight deck, upgraded electrical system and enhanced refuelling capabilities.

The formal contract for the initial three of what are known as the Batch 2 RIVER Class was signed in August 2014. Construction is now well underway. Speaking to European Security and Defence, Programme Director

isation programme across both the Govan and Scotstoun sites to drive further efficiencies. Under this, Govan will be the site for initial fabrication and assembly up to the load-out stage. Work will then transfer to the downstream Scotstoun yard, which will be the centre for work on completion, systems commissioning and final acceptance.

### National Shipbuilding Strategy & General Purpose Frigate

The consolidation of the British naval sector that arose from the 2005 Defence Industrial Strategy was accompanied by arrangements known as Terms of Business Agreement (TOBA). These essentially required industry to maintain a given level of capacity and achieve ongoing efficiencies in return for a committed workload. For surface

#### Current & Planned British Royal Navy Construction Programmes

##### Submarines

Class	Type	Displacement	First Ordered	Total	Completed	Ordered	Planned
ASTUTE [1]	Nuclear-powered attack submarine (SSN)	c. 7,500 tons	1997	7	3	2	2
SUCCESSOR	Nuclear-powered strategic submarine (SSBN)	Not Known	Planned	4	0	0	4

##### Surface Vessels

Class	Type	Displacement	First Ordered	Total	Completed	Ordered	Planned
QUEEN ELIZABETH	Aircraft Carrier (CV)	65,000 tons	2008	2	0	2	0
Batch 2 RIVER	Offshore Patrol Vessel (OPV)	c. 2,000 tons	2014	5	0	3	2
Type 26	Frigate (FFG)	c. 7,000 tons	Planned	8	0	0	8
General Purpose Frigate	Frigate (FF)	c. 4,000 tons	Planned	5+	0	0	5+

##### Auxiliaries [2]

Class	Type	Displacement	First Ordered	Total	Completed	Ordered	Planned
TIDE	Replenishment Tanker (AOR)	c. 38,000 tons	2012	4	0	4	0
Solid Support Ship	Replenishment Ship (AFS)	Not Known	Planned	3	0	0	3

##### Notes:

1. Contracts for the ASTUTE Class are being awarded on an incremental basis. Although all remaining boats are in the course of fabrication, contracts to complete the final two submarines have yet to be signed.

2. Auxiliary ships are not considered as 'complex' and are therefore eligible for construction overseas. The four TIDE class tankers are being built in South Korea to a British BMT Defence Services design.

length of 150m – is almost as large as the preceding Type 45 air defence destroyers of the DARING class. In July 2016, the head of the UK's defence procurement agency indicated that the cost of the eight-ship programme – reduced from a previous plan of thirteen by SDSR 2015 – will amount to c. £8bn or £1bn per ship. This compares with £6.2bn currently allocated to building the QUEEN ELIZABETH class.

To date, it has proved difficult to conclude a firm contract for Type 26 build. Although commitments with respect to design work and long lead items for the first three ships already amount to c. £1.8bn, negotiations

Iain Stevenson of BAE Systems confirmed that build of the first three ships is running to schedule, with load-out of the first ship – FORTH – scheduled for August 2016. The switch from a traditional dynamic launch – the first time this has been undertaken for a complete ship on the Clyde – will allow the ships to enter final outfitting at a higher level of completion and will speed overall build times. The programme is allowing the development of the team that will eventually take forward the Type 26 build and is helping to refine the approach that will be used for the new programme. Meanwhile, work has started on a modern-

ships, the relevant document was the 2009 TOBA between the UK government and what is now BAE Systems Maritime – Naval Ships. The fifteen year contract reinforced BAE's de facto monopolistic position as the supplier of the Royal Navy's complex warships. The change in UK government in 2010 resulted in more ambivalence about the value of the Surface Ships TOBA and its terms were suspended in 2013 as part of the deal that saw the new offshore patrol vessels ordered. A more fundamental change was heralded in January 2015. The then Chancellor of the Exchequer, George Osborne, announced a new National Ship-

Photo: Conrad Waters



**BAE Systems are currently making good progress building the first three of five Batch II RIVER Class offshore patrol vessels. The ships are similar to Brazil's three AMAZONAS class vessels; ARAGUARI is pictured here.**

Image: BMT Defence Services



**BMT's VENATOR 110 concept is a leading contender for the new General Purpose Frigate design.**

building Strategy (NSS) to revisit the optimum infrastructure required to meet Royal Navy warship requirements. The development of the NSS initially proceeded at a slow pace and details of its terms of reference have remained sketchy. It appears to be limited in focus to complex surface warships but to encompass all aspects of construction and integration, including the role of suppliers. There is a strong emphasis on developing UK prosperity and exports across the naval sector, an emphasis that can only have been reinforced by the recent Brexit vote. SDSR 2015 confirmed that the strategy would be published before the end of 2016. Respected industrialist and sector expert Sir John Parker was appointed to lead the NSS in March 2016. SDSR 2015 also announced that at least five new light frigates would be acquired to compensate for the fall in planned Type 26 numbers. The new General Purpose Frigate

(GPFF) – also sometimes referred to as the Type 31 – is expected to play a key part in the NSS. Intended to be a cheaper, more exportable supplement to the Type 26, the GPFF is likely to be a development of an existing design optimised for rapid production. Although initial thinking was that the GPFF would follow on from Type 26 production, it appears that consideration is now being given to a different sequence of construction under the NSS. One design that has direct relevance to the planned GPFF programme is BMT's VENATOR 110 concept. It is part of a wider family of VENATOR designs that share a common hull-form and emphasise both modularity and open architecture. The 4,000-ton VENATOR 110 was developed to meet a perceived need from a number of navies for a globally-deployable frigate that could balance capability, survivability and cost. VENATOR 110's preliminary design is

already relatively mature; for example, hydrodynamic tank testing of the hull-form has already been completed. BMT Defence Services Business Development Director Roy Quilliam also confirmed to European Security and Defence that discussions with a number of key equipment suppliers have allowed development of a number of options around mature equipment, reducing project risk and giving a degree of reassurance about likely expense. It is estimated the VENATOR 110 could be built at a unit production cost of c. £350m or about a third of that of a Type 26 frigate. BAE Systems are also developing concepts to meet the GPFF requirement, based on stretched derivatives of the RIVER Cass and the larger AL SHAMIKH corvettes built for Oman.

NSS is likely to make a number of important recommendations with respect to GPFF. These will include the best way to engage the overall UK industrial base in the programme and how to maximise export potential. Whilst Type 26 frigate construction will be focused on the Clyde, it is conceivable that parts of the GPFF programme will be assigned to other yards to retain skills boosted under the QUEEN ELIZABETH programme. The focus on exports is also likely to extend beyond the sale of ships to the potential inherent in the wider naval industrial 'enterprise'.

## Conclusion

British naval shipbuilding is at something of a crossroads. In the absence of major political change, recent re-affirmation of commitment to the SUCCESSOR programme ensures the sustainment of a significant submarine construction and equipment industry for twenty years and more. Work on the NSS evidences a similar desire to maintain a substantial indigenous industrial base for surface warships. There are real prospects of leveraging the investment made across the industry by the QUEEN ELIZABETH programme to expand on the existing export achievements of providers of equipment and know-how. This could produce a more balanced industry that is less reliant on Royal Navy orders for its future success. The proposed General Purpose Frigate could well provide a catalyst for this change. However, much will depend on the outcome of the NSS, as well as government's willingness to provide both the funding and practical support needed to implement its conclusions. ■

### (Endnotes)

<sup>1</sup> By contrast, there is a willingness to allow non-complex ships, such as auxiliaries, to be built overseas. Four TIDE Class tankers are currently being built in Korea to a BMT AEGIR design. It also seems three planned solid support ships could be built overseas.



# Multi-Role Combat Ship Class 180

## First Experiences with the Competitive Contract Award Procedure

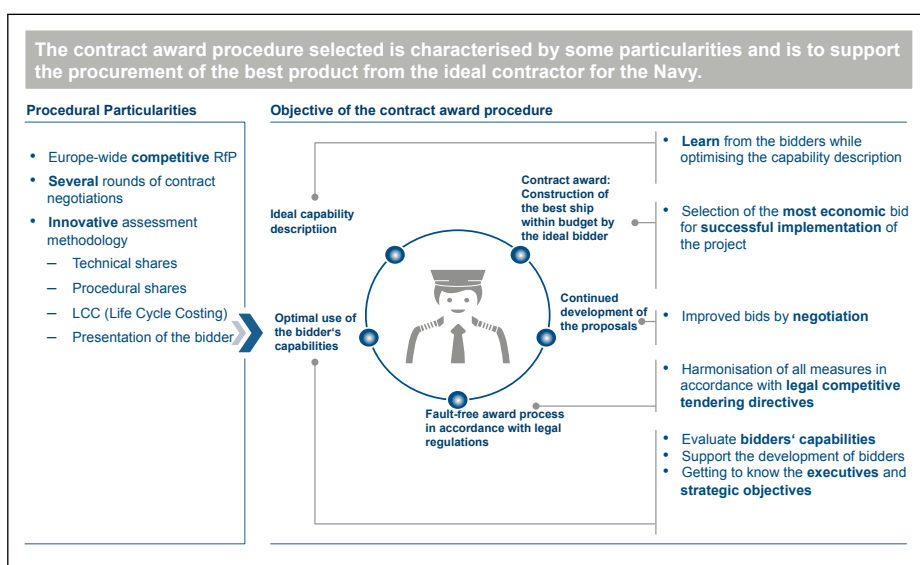
Rudolf Braun

The Multi-Role Combat Ship Class 180 (Mehrzweckkampfschiff 180 – MKS) is to ensure the German Navy's three-dimensional warfare capability in high-intensity sea battles and enable the Bundeswehr to perpetuate substantial and sustainable contributions to combined operations with its partners and allies in NATO and the EU.

The Multi-Role Combat Ship 180 has been the first large-scale naval armament project for which an invitation for tenders was issued in the form of a Europe-wide competition. The MKS 180 project has just entered into a new phase. On 23 May 2016 a number of bidders accepted the invitation and submitted first tenders, opening the competitive race for the most economic tender. The tender documentations – several thousands of pages each – are now being sifted, examined, and assessed. The outcome of this process will be incorporated into the next iteration step of the awarding procedure, in which the bidders are invited to submit a second tender.

### Objective of the Contract Award Procedure

As outlined in the contract award documents disclosed on 1 December 2015, the objective of the MKS 180 contract award procedure is aimed at completing a procurement project at the closure of which the complete system with the operational MKS 180 weapon platform will have emerged. The (public) customer intends to acquire a complete, powerful and economic system within the monetary bounds of the project while keeping under control the typical risks inherent in armament projects. Accordingly, the contract award documents constantly indicated the great importance attached to the processes to be introduced for the bidder and its subcontractors. Processes are primarily understood to be effective project management tools that focus on a joint risk management performed by bidder and customer alike. Another important process is the permanent observation



### Objective of the competitive tendering procedure

of life cycle cost aspects in selecting the different components to minimise a priori any in-service costs.

### Ideal Specifications for Tender

The customer wishes to learn in substance from the bidders, hereby optimising his specifications for tender. This optimisation is based on defined requirements which will be particularised in the course of the procedure and give customer and bidders the opportunity to identify cost-pushing elements and to fine-tune the requirements in line with the technical solution. This tailoring and specification process should help to identify and eliminate possible inconsistencies both in the technical requirements and in the elaboration of the technical solution. Both quality and level of detail of the requirements are therefore increased during the awarding procedure, without altering the main features of the procurement object. The requirements are updated, specified and interlinked within a customer requirement model, in which the structuring and traceability of compliance with the

requirements constitute decisive factors. To this end, the customer predefines the system structure as the logical structure of the weapon platform. The requirements are then allocated to the respective system elements to make apparent which system element fulfils which requirement.

### Optimum Exploitation of Bidder Capabilities

In the negotiation rounds between a number of tendering phases, the bidders are expected to add their own view of the market to the negotiations and the project: which priorities and possible extensions are visible on the horizon and should possibly be considered as early as in the solution concepts, e.g. by technical provisions concerning the ship's design? Which technological developments and standards have been recognised on the market and how should they be reflected (e.g. to reduce/delay obsolescence)? Which cost determinants are contained in the requirements and how can they be implemented with respect to an optimum cost-benefit ratio? The answers to these

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questions should influence the building specification.

## Continued Development of the Tenders

Accordingly, another objective of the awarding procedure is the development of a high-quality building specification as the basis for design, construction and delivery of the weapon platform. To this end, at least two tendering and negotiation phases will be scheduled before a tender eligible for award may be submitted.

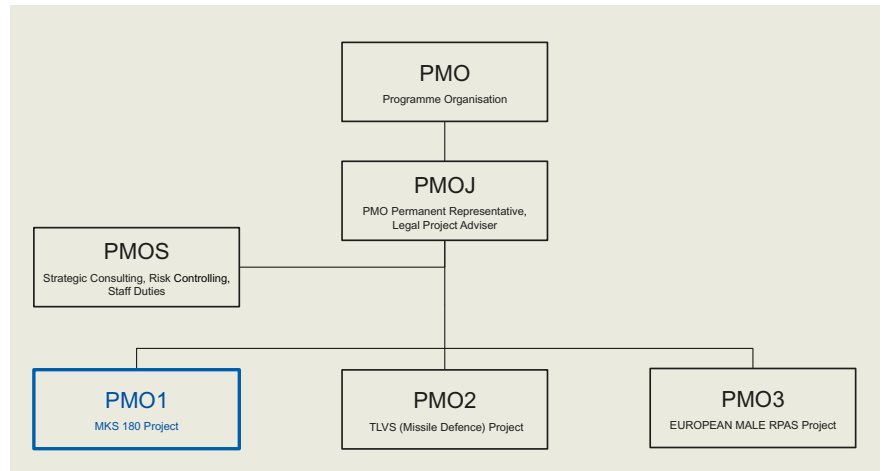
## Procedural Compliance with the Procurement Regulation

The MKS 180 contract award procedure is carried out in the scope of a Europe-wide competitive tender in several negotiation rounds pursuant to sect. 11, subsect. 1, Public Procurement Regulation for the Areas of Defence and Security.

The customer needs to harmonise all measures of the award procedure with the procurement regulation framework in order to provide legal certainty for the actions of bidders and customer.

## The Ideal Bidder Designs the Best Ship within the Given Budget

The MKS 180 armament project is capped by a price ceiling, i.e. a fixed budget has been appropriated to the procurement phase to acquire a powerful and life cycle economic weapon platform. The customer therefore seeks bidders who may support him in achieving these two targets: first, not to exceed the budget during



*Programme organisation*

the implementation phase, and second, to optimise the tenders with respect to economic efficiency during the life cycle. In order to satisfy the procurement ceiling during the implementation phase, the customer especially expects the bidders to suggest how requests for follow-up requirements/modifications are to be avoided. To minimise life cycle costs, the customer intends to cooperate with the future contractor.

Is the future contractor able to suggest keys to a cost-efficient in-service use, to reduce any uncertainty in the cost estimate existing at the time the contract is concluded, and to fine-tune the in-service use of his product in the Bundeswehr?

High commonality with existing Navy systems greatly impacts the development of a technical solution for the weapon platform's in-service use. The customer therefore considers life cycle aspects in his assessment and addresses them frankly in the negotiations with the bidders.

## Special Procedural Features

Apart from the already mentioned Europe-wide invitation for competitive tenders and the conduct of several negotiation rounds, the special procedural features also include an innovative assessment methodology. To this end, also best practices from different areas of responsibility (e.g. the Federal Ministry of Education and Research) were assessed and have been adapted to the project. Which methodology is used in other areas to assess large-scale projects? What are the key factors for successful project implementation? Such questions were assessed e.g. with a view to analyses.

On 1 December 2015, the contract award documentation was sent to the bidders including the assessment matrix, the tender terms outlining the awarding procedure and the tender content requirements, a first specification for tender and a draft contract. Apart from the technical and process-describing parts and the life cycle cost



*MKS 180 design study*



calculation also presentations conducted by the bidders are assessed which are a novelty in the procurement process of a major Bundeswehr naval project.

Another characteristic of the project is its organisational allocation: as of 1 April 2016, the MKS 180 project was transferred as one of three projects within the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (Bundesausrüstungsamt für Ausrüstung, Informationstechnik und Nutzung der Bundeswehr – BAAINBw) to a programme organisation (Programmmorganisation – PMO) for the purpose of establishing the viable management organisation built up in the BAAINBw Sea Directorate under the special focus of BAAINBw control. Concurrently with establishing the PMO, the technical supervision over the MKS 180 project was transferred on 20 June 2016 to the area of responsibility of the Commissioner for the Strategic Management of National and International Armament Activities of the Bundeswehr in the Federal Ministry of Defence.

### First Experiences

The described innovative assessment methodology is applied to the presently received tenders. The assessment process will take most of the next few months. First experiences have already been collected from first presentations conducted by the bidders. In their presentations, the bidders had the opportunity to illustrate their understanding of the task, the conceptual basics and the intended way ahead developed in their tenders. In this way, the customer was enabled to deepen his understanding of the tenders and the players on both sides had the chance to get to know each other. In the second part of their presentations, the bidders had to answer questions that were of general or project-related nature, referred to their understanding of the project, or touched in depth the most important relationships and issues decisive for the success of the project. The bidders answered the for the most part open questions in detail and conceptual depth so that the customer was able to visualise precisely their respective capabilities. In the last part of the presentation, the bidders had to solve a practical problem in which critical incidents occurring in a fictitious complex project

situation (scenario) were described. The bidders produced technical and process-related solutions targeted at a successful project implementation. The solutions were built on the actual contents of their tenders (e.g. real technical solutions and project planning).

To summarise from the customer's point of view: this novel part of the assessment methodology is expedient and promising for customer and bidders alike. It does not only permit the acting parties to get to know each other and their strategic objectives, but also enables a (self-)assessment

of the bidders' capabilities and approaches to realise the abovementioned objective of the awarding procedure in their tenders. A further application of this methodology to follow-on tenders will intensify this effect all the more.

The way ahead pursued with the Europe-wide MKS 180 competitive procurement project is a path of trial and tribulation – yet it is appropriate, because one objective remains predominant: the Bundeswehr shall receive the best possible product obtainable in Europe within the given budget. ■


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# The Italian Navy's New PPA and LSS

## First Design Details Emerge

Luca Peruzzi

**The Italian Navy's fleet renewal programme has entered the shipbuilding phase, thus representing a major milestone for the Italian MoD and the Navy to safeguard national maritime interests.**

**T**he contracts for the development, production and ten-year in-service support programmes for the multirole patrol vessel or Pattugliatore Polivalente d'Altura (PPA) and the Logistics Support Ship (LSS) were awarded by the OCCAR international procurement organisation (on behalf of the Italian MoD) to an industrial consortium led by the Fincantieri shipbuilding group in May and November 2015, covering one LSS and seven PPAs (with options for additional three units). With Fincantieri as the prime contractor, subcontractors include the Leonardo Group as combat system integrator and main supplier. The €5.4Bn fleet renewal programme also includes a Landing Helicopter Dock (LHD) and two high-speed special support vessels already contracted with the same Fincantieri-led consortium and the Intermarine group.

While OCCAR is in charge of the LSS and PPA programme management, which offers wider contractual flexibility and considers the participation of third parties as an option, the time constraints with regard to the design development and construction of these vessels have led to the establishment of side-by-side work between the Navy Staff and NAVARM, OCCAR and the industrial consortium for the generation of innovative modelling and simulation tools in order to anticipate possible risks and shortcomings.

### PPA (Pattugliatore Polivalente d'Altura)

With the objective to replace different classes of ships and to accomplish a wide range of missions ranging from maritime security to high-seas patrol and control, from amphibious support operations to

dual-use operations including humanitarian assistance and disaster relief (HADR), and civil protection support, the new PPAs will be delivered in three different configura-

tions based on a highly profiled bow section. Known as a wave piercing bow and already applied by Fincantieri to high-speed ferries, this design offers higher speeds, however excludes the fit of a hull-mounted sonar. The stabiliser fins positioned amidships optimise stability and seakeeping performance, while a bow thruster facilitates manoeuvrability in restricted waters. The requirement for a modular area for vehi-



Picture: Italian Navy

***In the scope of the Italian Navy's fleet renewal programme, a Fincantieri-led consortium including other business areas of the Leonardo Group is developing, building and equipping seven multirole patrol vessels or PPAs (Pattugliatori Polivalenti d'Altura – shown here), one Logistics Support Ship (LSS) and one Landing Helicopter Dock (LHD). The Intermarine group is providing two high-speed Special Forces support vessels.***

tions based on a common platform: two Light, 3 Light Plus and two Full combat capable vessels with different weapons, sensors and systems.

Managed by a programme division in Rome, the first-of-class PPA (in the Light configuration) is planned to be handed over in May 2021, after first steel-cut by the end of 2016 and launch in the second quarter of 2019. The remaining PPAs (including the first Light Plus variant to be handed over in 2023), will be delivered one each every year (until 2026) except for the year 2024, during which the delivery of two units including the first PPA Full is scheduled.

With a length of 133 metres, a beam of 16.5 metres and an unspecified displacement in excess of 4,500t, the PPAs are characterised by a unique hull design to reach

clues and equipment under the flight deck pushed the designers to introduce a docking area at the stern.

The PPA features a steel hull and superstructures in aluminium alloys to enhance the stability of the plethora of sensors and systems installed above, together with a composite topside for the communication antennas above the integrated bridge. The superstructure is divided in two main blocks, the fore one including the integrated bridge and combat operation centre, the dual-band AESA radar and other main sensors and systems, while the aft block is centred on the stern funnel and hangar, all designed to reduce radar and infrared signature.

In support of better performance and flexibility, as well as reduced emission and fuel

### Author

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consumption, in accordance with the Italian Navy's 'Green Fleet' strategy, the CODAG (Combined Diesel and Gas) propulsion system with two shafts with controllable-pitch propellers and conventional rudders features SCR (Selective Catalytic Reduction) and Green Diesel adoption.

The propulsion system is centred around one Avio Aero/GE Marine Solutions 32 MW LM2500+G4 gas turbine and two MTU 20V8000 M91L 10MW-each diesel engines linked to the two shafts with a Renk-developed cross-connected gearbox, while two 1.35 MW electric motors are connected with the two shafts through a small dedicated gear and managed by GE Marine Solutions MV3000 drives. The two electric motors can also act as an emergency propulsion system. Electrical power for propulsion, on-board systems and ashore requirements will be supplied mainly by four new design diesel-generators. The electric motors can provide up to 10 knots speed for patrol and silent ASW operations, while the propulsion package can provide

introduces on the PPA design a 690V/60Hz electrical system, with the capability to provide 2.5 MW ashore with dedicated equipment for HADR and civil protection needs. To satisfy these and military requirements there are two modular areas, positioned amidships and under flight deck respectively. The latter comprises an aft compartment with a central 9.5-metre RHIB launch and recovery ramp and lateral areas for underwater warfare equipment. In the full combat configured PPAs these will accommodate a twin-heavyweight torpedo launcher and a Variable Depth Sonar (VDS). The other compartment with shipside lateral doors can accommodate a range of equipment, from five-20ft ISO standard containers to two additional 9.5-metre RHIBs or alternatively a 30-beds hospital compound, special forces craft or unmanned surface/underwater vehicles. The amidships deck area is equipped with two cranes for two RHIBs with a length of up to 11 metres, while alternatively a third 20t crane can manage up to 8 standard containers or a single LCVF.

**To satisfy a wide range of military and HADR/civil protection missions, the PPAs will have two modular areas, positioned amidships and under the flight deck respectively. Both can embark, launch and recover a large portfolio of manned and unmanned craft, as well as transport or utility containers for different purposes, while the stern area will be able to accommodate ASW sensors and weapons.**

up to 25 knots on diesel only, and 32+ knots maximum speed in gas turbine mode. Endurance is +5,000 nm at 15 knots.

For the first time the Italian Navy in-

With its complement of 90, in addition to a flight detachment and security or special forces, the PPA can accommodate up to 180 beds with cabins of various capacities and common external services for two or multiple cabins. The stern flight deck can handle EH-101 type helicopters up to Sea State 5, while the single hangar can accommodate up to two NH-90s; unmanned air vehicles are planned for the future.

### The Combat System

The requirements for dual-use, high modularity, redundancy, survivability and operational flexibility at reduced costs for procurement and in-service support are also addressed by a new generation combat management system as well as innovative solutions for crew, maintenance and training, which are common to the three ships' designs.

The most innovative solution adopted by the PPA to reduce crew numbers and enhance operational flexibility is the Combat Operational Bridge (PLOC, PLancia Operativa di Combattimento), inspired by aeronautics concepts and developed by the Italian Navy in cooperation with Leonardo and Fincantieri. Instead of an integrated 'conventional' bridge, the PLOC will be centred on a side-by-side stations 'cockpit' positioned in a prominent bridge structure, where pilot and co-pilot officers will be able to conduct and operate the platform autonomously, including weapon systems for self-protection and supported by four operators with multifunction consoles, which are all supervised from the commander's seat/console behind the cockpit. The workstations for the two pilots are equipped with three large multifunction touch-screen colour displays, head up displays (HUD) which project data on the windows of the bridge as so-called augmented reality and EO/IR systems' images. An innovative combat operations centre (COC), with multifunction consoles, a large mission wall screen and new generation touchscreen tactical table, is positioned behind the PLOC on the same deck.

To maximise commonality and to reduce costs, a common new generation CMS (hardware and software) is being devel-



**The seven PPAs (with an option for three additional vessels) will be built in three different configurations, based on a common platform but with scaled combat systems: two PPA Light (shown here) with only gun-based armament and X-band radar, three PPA Light Plus with gun/missile armament plus C-band radar, and two PPA Full with a complete combat system, including dual-band radar.**

oped for the PPAs, LSS and LHD. Reportedly designated SADOc Mk 4, the new CMS will have a federated, open, modular and scalable architecture, also using COTS hardware and software.

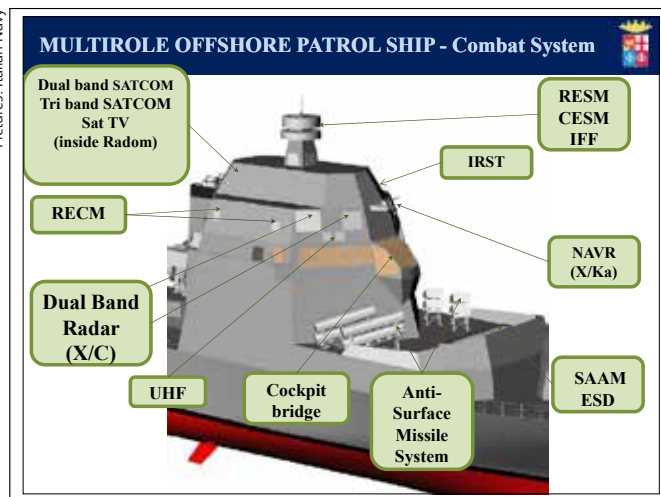
The IP-based communications suite being developed by Leonardo's Land and Naval Defence Electronics, will have secure V/UHF and HF communication systems based on Software Defined Radio (SDR) architecture and multi-band SATCOM systems.

be delivered from 2024. The radar is being developed and produced by Leonardo and tested by industry on a test bed developed and established at Leonardo's site near Naples and representing the ship superstructures with sensor installation.

The new AESA radars will be complemented by a new generation IFF with a circular phased array antenna and interfaced with a new integrated EW (IEWs) suite developed and provided by Elettronica with fixed

to equip all PPA, LSS and LHD platforms. Leonardo's Defence Systems Division will provide the PPA Full ASW suite including the new generation ATAS, a low-frequency active towed array sonar with towed-body with compact dimensions, low footprint and weight to counter both submarines and torpedoes. The company will also provide the two-heavyweight torpedo launchers for BLACK SHARK Advanced torpedoes, and an ASW reaction manage-

Pictures: Italian Navy



**The Italian Navy has designed the PPA to accommodate a scaled combat system including a dual or single band AESA radar with planar phased array antennas interfaced with EW and IFF suites, as well as a comprehensive communication suite based on Software Defined Radio (SDR) architecture and a multiband SATCOM and EO/IR distributed surveillance system.**



**The PPA has been designed with innovative solutions to reduce crew numbers and enhance mission flexibility. The Combat Operational Bridge or PLOC (Plancia Operativa di Combattimento) will feature a side-by-side two stations cockpit with a pilot and co-pilot who will conduct the ship and manage sensors and weapon systems for self-defence.**

Based on Leonardo's SWave family product portfolio and the Italian MoD's SDR programme, the shipborne SDR is under development to be applied to all new ships starting with the LSS and making the Italian Navy a European frontrunner in SDR in the naval domain. The communication suite also includes GMDSS, Link 11, 16 and 22 datalink managed by the Multiple Data Link Processor (MDLP). The navigation suite is common to all ship types and includes inertial platforms, GPS, WECDIS, AIS and two navigation radars.

Based on Leonardo's naval 'C' band and aeronautics 'X' band research and development and the Italian Navy's experience with the EMPAR family, the PPA Full will be equipped with a dual-band (X & C band) active electronically scanned array (AESA) radar with eight active phased array antennas, with four in X-band and four in C-band. The PPA Light (and LHD) will receive only the four-array AESA X-band radar while the PPA Light Plus (third-of-class to be delivered in 2023) will have only the four-array AESA C-band radar. The full dual-band radar will equip the PPA Full to

phased array antennas. The new IEWS will include RESM, CESM and RECM with electronic intelligence capabilities in three different configurations depending on the PPA variant (and LHD) and integrated with Leonardo Defence Systems' new ODLS-20 decoy launchers capable of using RF, IR and anti-torpedo decoys.

Enhanced situational awareness will be provided by Leonardo's DSS-IRST or Distributed Static Staring IRST suite including fixed EO/IR groups in addition to rotating detection heads with different bands, TV cameras and an IR system providing 360° coverage against both surface and air threats. The DSS-IRST will equip the PPA Full while the Light Plus and Light variants will have a scaled-down version of the system. The gun fire control will be assured by the new NA-30S Mk2 director with X/Ka bands radar, EO/IR and laser rangefinder. Additional surveillance and non-lethal self-protection will be provided by a long-range acoustic device (LRAD) provided by Sitep Italia and already installed on the AAW destroyer CAIO DUILIO, with acoustic and optical non-lethal dissuading systems

ment system (RMS) for a new anti-torpedo decoy deployed by two multirole ODLS-20 launchers. All PPA, LSS and LHD units will also receive a diver detection system, while Leonardo will provide the obstacle avoidance system for LSS and LHD. The latter platform will also have a torpedo detection and countering system based on Leonardo's BLACK SNAKE passive towed array, RMS and ODLS-20 with the new decoy.

## Armament

Leveraging on the latest naval weapon and guided munition developments, the Italian Navy will equip the PPA with a common gun and missile package, selected components of which will also equip LSS and LHD. All PPA will have Leonardo Defence Systems' 127/64 mm LightWeight (LW) main gun mount with automatic magazine loader, naval fire computer system and the VULCANO family of guided munitions, the stealth over-deck or 'SOVRAPONTE' new version of the 76/62 mm SUPER RAPID gun in STALES configuration currently under development with guided ammunition. The





## MARITIME INSIGHTS



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gun mount does not require deck penetration and, compared to the current SUPER RAPID mount, has reduced weight and footprint, and two 25 mm remotely controlled KBA guns. Both the PPA Light Plus and PPA Full configurations will also have the SAAM Extended Self-Defense (ESD) PPA surface-to-air missile defence system currently under development by MBDA

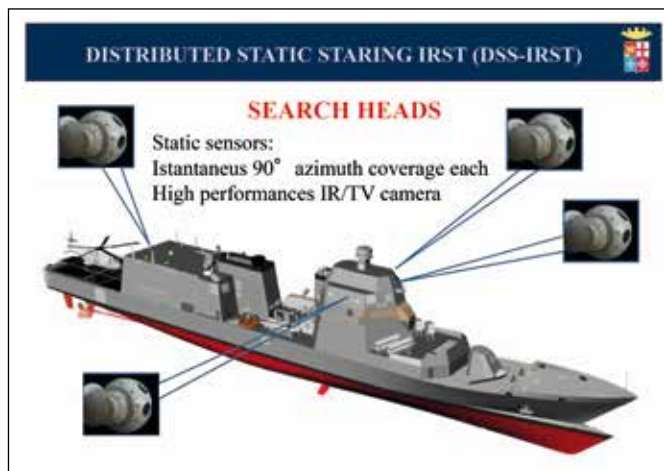
cutting ceremonies held in February 2016, the aft-section keel laying followed in July 2016 with fore-section planned for the end of 2016. Once completed, the two sections will be transferred and assembled together at Muggiano's shipyard, where the ship will be completed and launched at the beginning of the last-quarter of 2017. After outfitting, the first platform's sea going is due

humanitarian and disaster relief (HADR) and civil protection missions, the double-hull, 181-metre long and 24-metre large LSS features a stern with a one spot flight deck and a large hangar to host and maintain up to two EH-101 helicopters, a NATO Role 2 LM hospital and maintenance and repair facilities, in addition to accommodating up to 200 persons, including a 167-member crew. The LSS

Pictures: Italian Navy



**The PPA units will have a large stern flight deck capable of handling 15-ton AW-101 helicopters and a single hangar capable of accommodating and maintaining two NH90 helicopters, with unmanned air vehicles planned for the future. The PPA Full will have an ASW suite with Active Towed Array Sonar (ATAS), heavyweight torpedo launcher and ASW reaction management system for ODLS 20 multi-task decoy launchers.**



**The PPA Full configuration will comprise a new generation Distributed Static IRST suite including four fixed EO/IR turret groups in addition to three rotating groups with different bands TV cameras, IR and laser rangefinder. The PPA Light and Light Plus will have only an IRST based on two Leonardo JANUS N turrets.**

Italy. Derived from the FREMM package, it is centred around Leonardo's new AESA radar and two-8 cell SYLVER A50 launchers from DCNS for ASTER 15/30 air-defence missiles. In the PPA Full dual-band (X & C) radar version equipped with the future ASTER Block 1 NT version, in the development programme for which the Italian MoD participates, the SAAM ESD PPA air-defence system will be able to deal with tactical ballistic missile threats. The Italian Navy has a requirement to equip the PPA Full with eight new MBDA OTOMAT TESEO anti-ship missile systems, the development of which is still an option in the current contract.

## Logistic Support Ship (LSS)

Contracted by OCCAR and managed by a programme division in La Spezia, the new 23,500t full load displacement Logistic Support Ship's (LSS) hull and superstructures are under construction in two sections, with the 94-metre long and 4,000t fore-section being built by Fincantieri at Castellammare di Stabia (Naples), while the 86-metre and 7,000t aft-section is being built at Riva Trigoso shipyard. With steel



**The IP-based communication suite will have advanced equipment based on Software Defined Radio (SDR) architecture and multi-band SATCOM terminals. The whole package will equip the PPA, LSS and LHD units with a scaled number of radios and SATCOM terminals.**

in the second quarter of 2018 with the first ship's combat system sea acceptance trial in the third quarter of 2018 and delivery in February 2019. Designed to operate in multiple scenarios with a high level of flexibility, and being capable supporting naval and joint task forces,

will be built according to RINAMIL standards and pollution prevention international conventions like the MARPOL, as well as those not yet mandatory, such as the Hong Kong Convention about ship recycling. The CODLAD (Combined Diesel Electric And Diesel)-configured propulsion system

Picture: Leonardo





Photo: author

***With delivery scheduled for 2019 the Logistic Support Ship (LSS) will be able to support a naval formation in out-of area operations. The 23,500 full load ship will have extensive maintenance and hospital areas and equipment in addition to a flight deck capable to accommodate CH-53 type helicopters and a hangar capable to host and maintain two EH-101 helicopters.***



Photo: author

***The LSS will have a command, control, navigation, communication and combat system based on software and hardware of the new, scalable, modular and open-architecture common Command Management System (CMS) being develop by the Leonardo group for the PPA, LHD and LSS programmes and to be retrofitted to in-service ships during mid-life update efforts.***

will be centred around two MAN Diesel & Turbo 20V32/44CR 12,000 kW-each diesel engines and two 1.5 MW electric motors, sided by four MAN Diesel & Turbo 6L27/38 2,000 kW-each gensets (plus one 1 MW emergency genset) to provide propulsive, on-board and ashore electrical power. While the electric motors will assure up to 10 knots speed, the ship will reach 20+

knots under diesel-electric power, with 7,000 nm/16 kt endurance. The LSS will also be equipped with two thrusters (one bow and one aft) to enhance manoeuvrability in confined waters.

Capable of supporting a 4-5 ships task force in out-of-area operations, the LSS will be equipped with a replenishment at sea (RAS) package including 4 abeam

## LHD

The contract for the LHD was awarded in June 2015 to a consortium led by Fincantieri, and the programme management is executed directly by the Italian MoD's NAVARM directorate. The LHD is designed to carry out disaster relief and humanitarian support operations, in addition to amphibious and other traditional military tasks. First steel cut is planned for the summer of 2017 with a launch in spring 2019, first sea-going in the second quarter of 2020, and delivery in March 2022. To replace the rapidly ageing in-service LPDs, the new reportedly TRIESTE-named class of LHDs will be significantly larger and more capable with an unspecified displacement in excess of 22,000t, a 230 x 36 metre full flight deck with a two-block island and six helicopter spots in addition to a SAR spot and two 40t elevators. Built according to RINAMIL standard, the new LHD will have a 2,200-square metre hangar connected to a lower garage with well deck though a 4-metre large ramp and a 40t elevator, with the hangar also capable of accommodating light vehicles. The 50 x 15 m well deck can provide accommodation for both national and NATO craft, including a US LCAC or 4 type LCM-1E landing craft with a 60t carrying capability and a 1,000-square metre garage for heavy equipment including tanks and support vehicles. The LHD will also have two 16-metre transport boats and four RHIBs. The new amphibious ship will have extensive hospital capability, capable of accommodating a NATO Role 2E (Enhanced) hospital on a 770-square metre area with 20 beds, 2 surgery and six intensive care units, as well as extensive command, control, computer, communications and information facilities, in addition to accommodation for a crew of around 460 and 600 amphibious and support personnel. The propulsion package based on CO-DOG (Combined Diesel Or Gas turbine) configuration with electric motors for low-speeds is centred on two 37-MW rated Rolls-Royce MT-30 gas turbines, two MAN Diesel & Turbo 20V32/44CR 11,000 kW-each diesel engines and two 1.25 MW electric motors, sided by four MAN Diesel & Turbo 9L32/44CR 5,040 kW-each gensets to provide propulsive, on-board and ashore electrical power. While the two electric motors will provide up to 10 knots of speed, the ship will reach 18 knots with diesel power, and 25 knots using its gas turbines. Endurance is 7,000 nm/16 kt. The LHD will also be equipped with three thrusters (two bow and one aft) to enhance manoeuvrability in confined waters.

The command & control, communications, identification and navigation hardware and software is common to the PPA in the Full configuration, but the command management system will be based on 35 multifunction consoles and an over 50-channel communications suite. The sensor suite will include the X-band AESA multifunction phased arrays radar sided by a new air-surveillance long-range L-band AESA radar with a rotating antenna together with the EW suite and DSS-IRST or Distributed Static Staring IRST and anti-torpedo self-protection system. The armament will include three Leonardo STRALES multi-feeding 76/62 mm gun mounts with guided ammunition and three 25 mm remotely controlled guns.



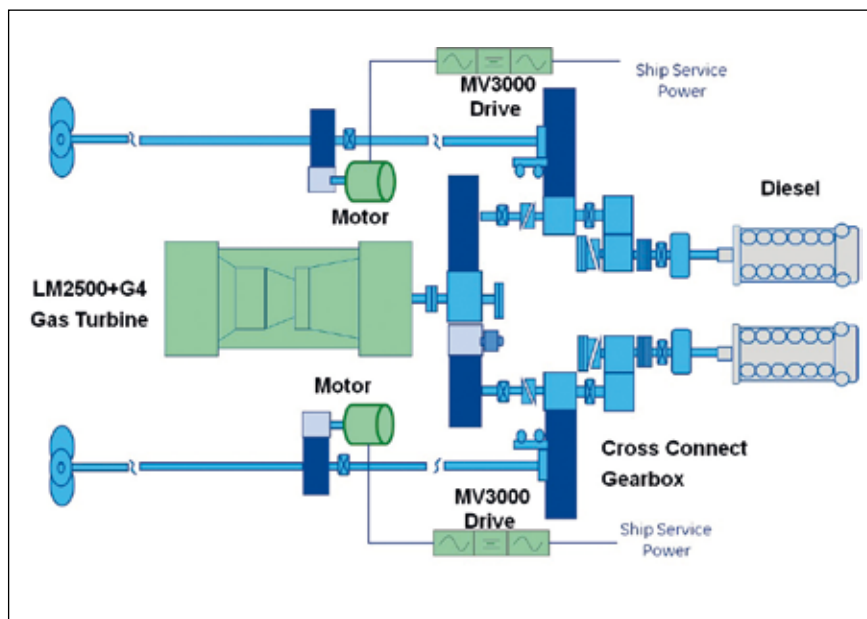


The PPA will have a gun package with the 127 mm LW mount with VULCANO as a central element, long-range guided ammunitions and a 76/62 mm Super Rapid in a new stealth, non-penetrating, reduced weight gun mount version with guided ammunitions (shown here). The SAAM ESD PPA air defence missile system will be provided by MBDA Italy. Together with a dual band AESA radar and enhanced ASTER 30 versions it will be able to deal with ballistic threats.

Photos: author



The LSS will have extensive Replenishment-At-Sea (RAS) facilities provided by Hepburn Engineering with two stations per side for liquid (marine fuel, JP5 and water), one station each side for heavy material and another on each side for light materiel transfer in addition to a stern marine fuel transfer station.



The propulsion machinery arrangement of the Italian Navy's new PPAs is based on an Avio Aero/GE Marine Solutions 32MW-rated LM2500+G4 gas turbine, two MTU 20V8000 M91L 10MW-each diesel engines linked to the two shafts with a Renk-developed cross-connected gearbox, while two 1.35 MW electric motors are connected with the two shafts through a small dedicated gear and managed by GE Marine Solutions MV3000 drives.

(two per side) refuelling points for marine fuel, JP5 and water, two stations (one for each side) for heavy material transfers, two stations (one each side) for light material transfers and one aft refuelling station for marine fuel. Hepburn Engineering will provide the RAS package. The LSS will be capable of transporting 6,700 and 3,700 m<sup>3</sup> of marine and JP5 fuel respectively, 800 m<sup>3</sup> of fresh water, 220t and 15t of ammunition and lube oil respectively, 30,000 food rations, 20t spare parts, and 8 20ft ISO standard containers managed by two 30t offshore-stabilised cranes. In addition to workshops and laboratories for maintenance and repair activities at sea, the LSS will also feature extensive hospital and healthcare facilities with two

operating theatres and 12 hospital accommodations for seriously injured patients. With a 360° view main bridge, the LSS will have a new generation integrated bridge and command, control, communication & mini-combat system with nine workstations derived from the PPA and LHD designs. The latter will include two X/Ka-bands Elettronica GEMINI LPI navigation radars, a GFE-provided RAN-21S air and surface surveillance radar, Leonardo's full communication and identification suite, a two-turreted JANUS-N EO/IR system, in addition to two 25 mm remotely controlled guns for self-protection, obstacle warning and anti-swimmer sonars, and a Sitep provided non-lethal acoustic and optical system. ■

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# AEGIR Type Support Vessels

## A Cost-Effective Response to Modern Naval Logistics Support Requirements

Conrad Waters

**Increasing obsolescence of existing ships and more stringent environmental requirements are driving significant global demand for modern logistics support vessels. One potential solution to this need is British BMT Defence Services' AEGIR® family of fleet support ship designs.**

**A**EGIR is intended to be a flexible and affordable concept that can be readily adapted to bespoke user requirements. Vessels based on the design family will shortly enter service with Britain's Royal Fleet Auxiliary and the Royal Norwegian Navy.

### Logistics Support Vessel Demand

In spite of the increased emphasis on expeditionary deployments that accompanied the end of the Cold War, acquisitions of logistics support vessels during this period have been relatively limited. This reflects both the shrinkage of many of the larger fleets that had previously invested heavily in such ships and a prioritisation of limited resources towards front-line warships. There have been exceptions to this trend; Germany's type 702 BERLIN Class combat support ships and the Spanish replenishment oiler CANTABRIA are notable European examples. However, in general terms an extended period of under-investment has produced a legacy of elderly and increasingly obsolescent ships.

Another development during this time has been the emergence of increasingly stringent environmental requirements. Amongst these, the phasing-out of single-hulled commercial tankers under the International Maritime Organisation's MARPOL regime has probably been the most significant. Although these regulations do not apply to naval tankers, the pressure to

withdraw such vessels has inevitably been increasing. As well as the bad publicity that might arise from a major oil spill, the possibility of being refused entry to foreign ports has also to be taken into account.



Pictures: Author

**The TIDE Class is to replace the remaining ROVER and LEAF Class tankers operated by the British Royal Fleet Auxiliary (RFA). Shown here is RFA GOLD ROVER. She will be decommissioned in 2017.**

The combination of all these factors is driving a major upturn in orders for support vessels that is already underway. It has been estimated that around seventy new naval replenishment ships will be needed over the next decade. They will form a significant part of an overall market for logistics support vessels that analysts at IHS Jane's anticipate will average c. US\$2Bn p.a. for the next ten years.

### The AEGIR Design Concept

One group that was quick to recognise the likely impact of these changes was British design house BMT Defence Services. It had started to analyse the likely market for a

new design of replenishment vessel as early as 2004. In addition to the impact of double-hull regulations, there was a recognition that comparatively limited numbers of orders had resulted in naval auxiliary design falling behind the most up-to-date commercial practices. This resulted in a decision to develop blueprints for a new generation of auxiliary tankers. This new concept would be focused on naval requirements for replenishment-at-sea, speed and survivability whilst incorporating modern tanker design innovations. In 2005, an agreement

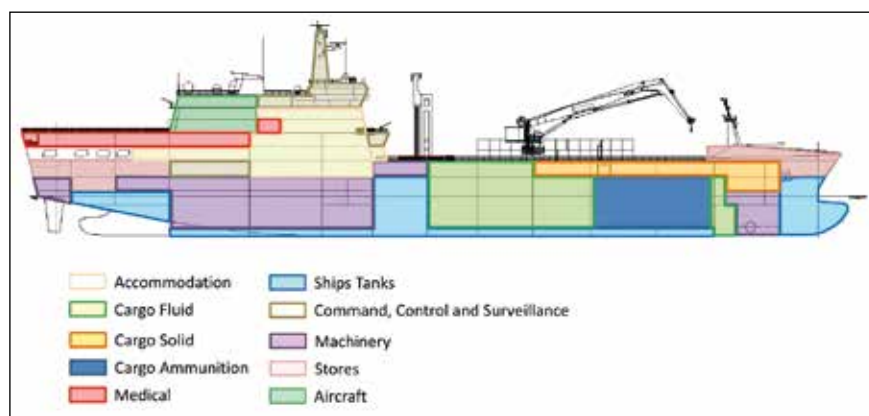
was reached with Norway's Skipskonsulent to use features contained in their state-of-the-art Baltic type product tankers as a basis for the AEGIR family.<sup>[1]</sup> The market launch of the concept took place in the same year.

Four designs were initially produced to represent the AEGIR concept. Three of these were scalable versions of a fleet tanker design covering the 10,000 (AEGIR 10), 18,000 (AEGIR 18) and 26,000 ton (AEGIR 26) deadweight size ranges. The fourth was a multi-commodity replenishment oiler, the AEGIR 18R. This was based on the AEGIR18 hull but the aft-most fuel tanks were replaced with a cargo hold. In practice, however, specific variants of

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**Schematic drawing of the RNoN's MAUD logistics support vessel.**



**Artist's impression of the TIDE Class during a RAS operation with a T45 Class destroyer**

the AEGIR family have been developed in response to particular user needs. These have even extended to an option with a Ro-Ro sealift capability. The overall aim is to meet these specific customer requirements whilst maintaining affordability. In addition to overall size/capacity, major cost-drivers include power and propulsion arrangements, the level of survivability incorporated in the hull and the sophistication of command and control and system automation desired.

All of the AEGIR family design incorporate a modern double hull and efficient twin skeg hull-form. Such twin screw designs have become increasingly popular in commercial tanker construction in recent years. They improve propulsive efficiency through dividing installed power between two plants and provide full redundancy in the event of one of the propulsion lines becoming disabled. From a naval perspective, the arrangement improves overall survivability whilst increasing the margin of safety during potentially hazardous replenishment-at-sea (RAS) evolutions. The twin skeg form

has the advantage of being both highly manoeuvrable and directionally stable, characteristics that have been demonstrated in sea trials of the first ship built to an AEGIR

#### Original AEGIR Family Replenishment Tanker Concepts

Type	AEGIR 10	AEGIR 18	AEGIR 26
Deadweight	10,000 tonnes	18,000 tonnes	26,000 tonnes
Length – Overall	145.6m	175.0m	196.6m
Moulded Breath	20.8m	25.0m	28.3m
Moulded Draught	7.7m	9.2m	10.5m
Cargo Capacity – Cubic m	8,000	16,000	24,000
RAS Stations	2 abeam plus 1 stern	Up to 4 abeam plus 1 stern	Up to 4 abeam plus 1 stern
Aviation Facilities	Flight deck	Flight deck and hangar	Flight deck and hangar

design. Although the hull-form is similar for all AEGIR variants, hull lines are refined to suit the speed profile and draught required for specific ship usage.

To date, all AEGIR type ships ordered have incorporated a hybrid combined diesel-

electric or diesel (CODLOD) propulsion arrangement. Whilst there are differences in system specification to suit customer requirements, the arrangement essentially involves the supply of propulsive power to each of the two shaft-lines by means of either a main diesel engine or a hybrid machine coupled to a reduction gearbox. In addition to providing propulsion during low speed operation, the latter can alternatively be used as generators to supplement or replace the electrical power supplied by the main diesel generating system. For example, the hybrid machines could help satisfy the heavy requirement for electrical power during a RAS evolution when acting as generators.

Provision of a safe and effective RAS capability is clearly an essential requirement for the overall AEGIR family. The original concepts provided between two and four fluid replenishment stations dependent on variant size as well as an additional stern refuelling rig. There was also provision of a helicopter flight deck to assist vertical replenishment (VERTREP) operations. The larger AEGIR 18 and AEGIR 26 concepts were equipped with a hangar. The cost-effective provision of helicopter facilities has always been a difficulty in the conversion of commercial tankers to naval roles due to lack of suitable space aft of the superstructure. This has been one argument BMT has deployed in support of the benefits of new construction to meet logistics support vessel requirements.

The AEGIR design was developed both to Lloyds Register naval ship rules (supplemented by commercial tanker rules) and DNV classification rules for naval support vessels. However, the rules of any society belonging to the International Association

of Classification Societies (ICAS) could be adopted. BMT's market niche as a leading naval design house also means that it is able to work with a wide range of shipyards. A strong partnership with South Korea's Daewoo Shipbuilding & Marine Engineering

(DSME) has brought the most tangible success to date. However, opportunities have also been explored with other builders. In the words of BMT's Chief Naval Architect, Andy Kimber, 'BMT works collaboratively with its partners and customers to deliver fit-for-purpose replenishment ship designs that can be built in a very cost-effective manner by many international shipyards'.

## Royal Fleet Auxiliary TIDE Class

The first tangible success for the AEGIR design came in February 2012. The United Kingdom's Ministry of Defence announced that DSME had been selected as preferred bidder for a £452M (c. €555M) contract for four new tankers built to a BMT design under the Military Afloat Reach and Sustainability (MARS) programme. The resulting TIDE Class was derived from the AEGIR 26 concept but was subject to significant revision to meet UK requirements.

The TIDE Class replaces the remaining ROVER and LEAF Class tankers operated by the British Royal Fleet Auxiliary (RFA). It is focused on liquid replenishment at sea for UK naval forces, particularly the new QUEEN ELIZABETH Class aircraft carriers. Each ship is able to carry 19,000 cubic metres of marine or aviation fuel, as well as 1,300 cubic metres of potable water. The importance of the primary mission is reflected in a very limited ability to ship solid cargo, which is restricted to eight TEU containers. Overall length of 200m and beam of 28.6m is very similar to that set out in the original AEGIR 26 concept but the ships are significantly more capable in several areas. For example, expanded aviation facilities are intended to allow the safe operation and support of a helicopter up to AW101 Merlin size. Another area of enhancement relates to accommodation, which needed to meet merchant navy standards for RFA civilian crew.

An interesting insight into British naval requirements is provided by the high levels of survivability incorporated into the new ships. Significant attention has been paid to ensuring a stealthy design, including reduction of reflective surfaces and measures to reduce infra-red and acoustic emissions. The level



*Artist's impression of MAUD during RAS with a FRIDTJOF NANSEN Class frigate of the Royal Norwegian Navy*

of redundancy inherent in the independent propulsion provided to each of the twin shafts is reinforced by physical separation of the machinery into watertight forward

and aft engine rooms. In addition the bow thruster can be lowered to provide a 360 degree azimuth capability for secondary propulsion should both shaft-lines be dis-

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bled. RAS capabilities are optimised for the QUEEN ELIZABETH class and include three abeam replenishment stations as well as a stern position.

Steel for the first TIDE Class vessel, named TIDESPRIING, was cut on 24 June 2014. She was floated out in April of the following year prior to an official naming ceremony on 7 October 2015. Whilst her delivery is reportedly running several months behind schedule, personnel involved in sea trials suggest that these have progressed well. There is particular satisfaction with overall build-quality and handling performance. Once TIDESPRIING has been handed over,



**MAUD supporting a ULA Class submarine of the RNoN**

than the TIDE Class vessels but incorporates much greater multi-role capabilities than the more focused British ships. Whilst re-

construction programme. Initial plans envisaged delivery by the end of 2016 prior to final acceptance trials and an extensive



**FoC TIDESPRIING during outfitting**

she will sail for A&P group's Falmouth yard in South West England for installation of military and other sensitive equipment prior to official entry into service. Work is now well underway on all three of her sister ships. The UK's Defence Equipment & Support procurement agency has indicated that it remains confident that the project will be completed within its approved budget and that all four ships will be in service by 2018, as planned.

### Royal Norwegian Navy MAUD

A further success for the AEGIR concept was achieved in July 2013, when the Norwegian Defence Logistics Organisation announced a c. 1.3Bn kr (c. €140M) contract for a logistics support vessel. The new ship – named MAUD – was a significant evolution of the AEGIR 18/18R types and also benefitted from design work done on the TIDE class. As for the British ships, construction was entrusted to DSME. MAUD is a good example of the AEGIR family's design flexibility. With an overall length of 180.7 m and beam of 25.9 m, she is smaller

taining the capability to transport considerable quantities of liquid stores, she has a much higher capacity for solid cargo; for example 40 TEU containers, 200 tons of ammunition or a mixture of vehicles and boats. Replenishment can be carried out by means of two abeam RAS positions and by a stern reel. There is also a 25-tonne crane to assist with the handling of solid stores. Most significantly, MAUD can also undertake a broader range of responsibilities. These extend to acting as a support vessel for smaller warships, as a hospital ship or even as a force command platform. Fitting all these capabilities in a single ship and ensuring all work effectively has been a significant design challenge. For example, crew recreational spaces under the flight deck can be converted into wards for up to 48 patients when acting as a hospital ship. Mooring positions and a side ramp, supplemented by the crane, assist the maintenance and support of other vessels when acting in a mothership role.

The first steel for MAUD was cut in May 2015. Sea trials were initially scheduled for mid-2016 but, as for the TIDE Class, there appears to have been some slippage in the

work up period. This should culminate with acceptance into operational service at the start of 2018.

### Conclusion

BMT's early identification of a need for a new generation of modern logistics support vessels has certainly paid dividends in the selection of AEGIR-derived designs for British and Norwegian requirements. AEGIR type vessels have subsequently lost out in competitions for Royal Australian Navy and Royal New Zealand Navy replenishment vessels. However, BMT continues to explore a variety of future opportunities in partnership with DSME and with other yards. More broadly, the AEGIR concept's successful adoption of modern commercial design practices and its ready adaptation to perform a wide range of support roles are significant indications of broader market trends. The new TIDESPRIING and MAUD will therefore represent an important evolution in naval auxiliary design when they enter service over the coming months. ■

Note:  
1. Aegir is the Norse god of the sea.

# Technology Application Plus Common Sense

## Combat Multiplication Possibilities for the Infantry

**David Saw**

**Wanting more combat power for your soldiers is a desire probably as old as war itself, yet time after time the application of new techniques and the utilisation of new technology offers the method and the means to deliver this increased combat power.**

**T**he reality of the situation is that there are many facets to combat multiplication and in this article it is our intention to look at some of the key issues involved. Many of these will be quite obvious, others somewhat unusual and some are still on the verge of becoming a usable reality rather than remaining a technology demonstration item.

Before we get to the present day it is worth providing some instructive historical examples of adding combat power to infantry units. For the British Army, the primary tactical unit was the battalion and in 1914 this had a personnel strength of 1,007 men, including 30 officers. It was organised into a battalion headquarters (HQ) and four companies of 227 men each. The company was divided into four platoons of 48 men each, with the platoon sub-divided into four sections, with the standard weapon being a bolt-action rifle. Each infantry battalion was also provisioned with a machine gun section of one officer and 17 men, operating two Vickers Medium Machine Guns (MMGs).

Combat experience inevitably drove change, as did increased weapon production and availability. In February 1915, the battalion machine gun section received two more Vickers MMGs. The next development in early 1916 was that the four MMGs at the battalion-level were combined into a brigade-level asset before being transferred to the newly formed Machine Gun Corps in February 1916. In exchange for the lost Vickers MMGs each battalion was then issued with four Lewis Light Machine Guns (LMGs).

### Author

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Photo: US Army



***An M249 gunner searches out targets in Helmand Province, Afghanistan. The US Army discovered that the average M249 gunner in Afghanistan had an average fighting load of 35.87 kg, equivalent to 44.74% of body weight, an approach march load of 50.23 kg, equivalent to 62.71% of body weight.***

The Lewis Gun was developed by Captain Isaac Newton Lewis of the US Army in 1911, the US was uninterested though and this led to Lewis moving to Liege in Belgium to establish a company and to start producing the weapon. A few guns were sold to Belgium, but it was the British who would become the major customer, with Lewis moving to Britain in 1914. The Lewis Gun was a 7.5x56mmR LMG that was pan-fed from a 47 round magazine, it was more expensive to produce than the Vickers MMG but it was half the weight. The weapon was officially adopted in October 1915, entering service in combat units in early 1916. As noted, the initial issue scale was four guns per battalion, but by July 1916 that had risen to 16 per battalion, one for every platoon. For the first time the British had a deployable automatic weapon at the platoon level.

Operational conditions would drive further change in British organisation at the platoon level. For example, by 1917, some platoons were organised on the basis of an HQ with an officer and two NCOs, an eight-man "bombing section" using hand grenades, a section of 13 riflemen, 11 rifle grenade men and two Lewis LMG sections of seven men each. At this point the platoon would normally have only one Lewis LMG. It appears that British units would often scour the battlefield for lost or abandoned Lewis Guns to take them on charge to increase firepower. By 1918 the battalion would be provided with 36 Lewis LMG, allowing two per platoon, but even then units would still look to find more LMGs if they could. All of this is an obvious example of increasing combat power. In comparison with the rifle-equipped





Photo: Crown Copyright



***The British L85 rifle has had its problems over the years, although these now appear to have been resolved in the current L85A2 version. New additions to the weapon, such as improved sights and polymer (instead of metal) magazines, have increased reliability and reduced the weight of the weapon.***

Photo: US Army

***US Army and Afghan National Army (ANA) on patrol in Afghanistan. The increasing loads being carried by US infantry led the US Army to conduct a Dismounted Combat Operations in Afghanistan Battlefield Loads Study. Loads were found to be far in excess of the 30% of body weight previously identified as a suitable benchmark.***

platoon of 1914, the 1917 variant had an LMG or two, hand grenades and rifle grenades, none of which were available in 1914.

Another issue that is still relevant to today is weight: you add more tools for the infantry and you add more weight. During the Battle of the Somme, the initial waves of British infantry were carrying a combat load of some 30 kilos, troops in the carrying platoons in subsequent waves carried even more weight. This extra weight was necessary as it included tools and other equipment necessary to repair enemy trenches once they had been seized in order that they could be held against counter-attacks. According to the US Army FM 21-18 manual on "foot marches", the fighting load for an infantryman should be less than 21.77 kg. A US study entitled "Comparison of Some Anthropometric Characteristics of Male Soldiers" revealed that an average soldier in 1919 had a height of 1.72 metres and

a weight of 65.72 kg, whereas a soldier in 1984 would have a height of 1.92 metres and weigh 75.66 kg. It should also be noted that the average British soldier of 1916 would be less tall and lighter than his US equivalent of 1919, and certainly not as well fed. It would therefore be plausible to assume that British soldiers were going into combat on the Somme with a combat load equivalent to over 50% of their body weight! As we shall see, combat loads are still a critically important issue for the infantry.

## Getting Heavy

If you assume that your infantry is always going to be working from vehicles you can, to a certain extent, ignore the issue of weight control in terms of individual soldier



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equipment and weapons. However, the infantry will eventually have to leave the vehicles to enter the world of what the British Army describes as Dismounted Close Combat and here is where your problems begin. Inevitably, modern western ground forces look to have firepower dominance over an opponent, whatever weapons they have will also need an adequate supply of ammunition, there will also be a myriad of sights and sensors, communications equipment and then of course there is body armour to consider. All of this can be described as absolutely essential and it does provide the infantry with increased combat power. However, if you are in a Dismounted Close Combat environment you will also be extremely conscious of the weight burden of all of these tools. More weapons and ammunition equals more weight, sights, sensors and communications equipment equal more weight as do their batteries.

Two trends would define how the British Army would seek to achieve a combat multiplication factor in terms of Dismounted Close Combat. The first trend line was driven by operational experience in Afghanistan and Iraq, this would see dramatic changes to infantry equipment. New systems were acquired as Urgent Operational Requirements (UOR) and fielded rapidly, this was positive at the time but post-conflict there is a lot of equipment in the inventory that does not necessarily fit the future vision of what the infantry should have.

If the first trend line was reality driven, the second trend line was driven by technology. The British, like everybody else were, swept away with the potential of battlefield digitisation and this gave birth to an infantry programme known as Future Integrated Soldier Technology (FIST). FIST was a transformation programme that was aimed at adding new capabilities to the soldier in

Photo: Crown Copyright



***British infantry engage hostile forces in Afghanistan with their 7.62x51mm GPMG. This weapon once again proved how important it is to the infantry. Nonetheless, the goal for the future is to find a weapon with the same level of battlefield performance that has a significantly reduced weight burden.***

such areas as command and control, lethality, mobility, survivability and sustainability. FIST, like all future soldier programmes, promised much, but fielding a full-spectrum capability in this area is still a challenge for the future. There are significant issues to consider in these future soldier programmes, new capabilities are being added and there will obviously be a weight burden. Adding electronics means batteries and batteries mean weight, plus the additional problem of being able to consistently recharge said batteries.

From the perspective of FIST, there has been understanding of the need to reduce the weight burden, the British have also been looking at reducing the number, weight and types of different batteries in use. They are also working on reducing the weight of weapons, for example a

reduced-weight General Purpose Machine Gun (GPMG) was being studied. What the British wanted with their FIST programme will take time to fully achieve, with matters not being helped by the loss of impetus behind the FIST programme and the arrival of the Future Soldier Vision (FSV) effort as the path to the future. In the meantime, there are realistic steps that can be and have been taken to provide more combat power in the Dismounted Close Combat environment.

### First Steps

One of the most straightforward steps to increasing combat power for the infantry is to improve small arms performance and one of the easiest means to achieve this is to enhance ammunition. The US Army

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***How much weight do you expect the infantry to carry? Here, a Javelin missile is being carried by a British soldier about to go on patrol in Afghanistan. Experience in Afghanistan showed that 20 kg was the optimum combat load for the infantry, but most of the time they ended up carrying far more.***



***The Lockheed Martin HULC (Human Universal Load Carrier) is an example of one of the exoskeleton programmes developed to meet evolving US military needs. Currently, US Special Operations Command is working towards fielding their Tactical Assault Light Operator Suit (TALOS) exoskeleton in August 2018.***

has fielded the M855A1 5.56x45mm and M80A1 7.62x51mm Enhanced Performance Rounds, while the US Marine Corps looked for its own solution and developed the Mk318 5.56x45mm round. Australia has also improved its ammunition by fielding the F1A1 5.56x45mm round. At Eurosatory, BAE Systems discussed British enhanced performance ammunition in the shape of the 5.56x45mm L31A1 Enhanced Performance Ball and the 7.62x51mm L59A1 High Performance Ball rounds. Both of these rounds exhibit significantly improved performance against hard targets than the previous generation of ball rounds.

Combat experience saw the British make significant small arms changes, this saw a four-man fire team eventually end up having an L85A2 5.56x45mm rifle, an L85A2 with an L123A3 40x46mm Low Velocity under-barrel grenade launcher (Heckler & Koch AG36), a Lewis Machine Tool (LMT) L129A1 7.62x51mm Designated Marksman Rifle (DMR) and an FN Herstal L110A2 Minimi Para 5.56x51mm Machine Gun. The L85A2

rifle resolves reliability issues, plus the acquisition of a Magpul polymer magazine and new sights sees a significant weight reduction. The Minimi adds firepower, but there were concerns over range and this saw the acquisition of the 7.62x51mm variant of the Minimi as a UOR in limited numbers to act as a corrective measure.

The British are considering whether to retain the L110A2 Minimi at the fire team level, while at the same time reconsidering indirect fire options at the platoon level. The Hirttenberger M6-640 60mm Commando Mortar is deployed at the platoon-level, with the M6-895 variant being deployed at the battalion level. It is the retention of the mortar at the platoon-level that appears to be being questioned at present. So much equipment was acquired under the UOR system for Afghanistan that the British find themselves having to determine what is worth keeping and what does not fit in with their perceived future needs. Added to which, whatever they do decide to keep has to be integrated into the context of the

future evolution of the FSV effort. As we can see, the British Army still has plenty of questions to answer as regards the infantry, the weapons it needs and how all of this will fit into the FSV architecture. Moreover it will have to do all of this while confronting an ongoing personnel shortage.

## Studies & Solutions

Back in 1998 the US Army Joint Readiness Training Center (JRTC) conducted the "Soldier Load Study" and this recommended that approach march loads should be less than 30% of soldier body weight. By the time the US Army became embroiled in Afghanistan, it started to become concerned about soldier loads in real combat conditions and found it had very little information on the subject, in fact the US Army had never done any research in this area. They found that the only US battlefield load study had been conducted by the US Marine Corps after Makin Island Raid of 17 August 1942!

This led to the Center for Army Lessons Learned (CALL) being tasked with a study of battlefield loads in Dismounted Combat Operations in Afghanistan, with research being conducted in the field in April/May 2003. The study demonstrated that a rifleman had an average fighting load of 28.57 kg, equivalent to 35.9% of body weight, an approach march load (fighting load and assault rucksack) of 43.39 kg, equivalent to 54.72% of body weight, and an emergency approach march load (approach march load plus main rucksack) of 57.76 kg, equivalent to 71.41% of body weight.

Others carried more weight, for example the M249 Squad Automatic Weapon (SAW) gunner had an average fighting load of 35.87 kg, equivalent to 44.74% of body weight, an approach march load of 50.23 kg, equivalent to 62.71% of body weight, and an emergency approach march load of 63.66 kg, equivalent to 79.56% of body weight. The gunner on the M240B machine gun had an average fighting load of 36.91 kg, equivalent to 44.46% of body weight, an approach march load of 51.41 kg, equivalent to 62.21% of body weight, and an emergency approach march load of 60.3 kg, equivalent to 68.92% of body weight. The M240B assistant gunner and ammunition bearer carried an even greater weight burden.

Finally the 60mm mortar gunner had an average fighting load of 28.93 kg, equivalent to 38.06% of body weight, an approach march load of 49.33 kg, equivalent to 64.22% of body weight, and an emergency approach march load of 64.95 kg, equivalent to 88.14% of body weight.

Again others carried more; the mortar squad leader carried an emergency approach march load equivalent to 96.8% of body weight, while the fire support NCO carried an emergency approach march load equivalent to 98.83% of body weight. Forcing the infantry to carry excessive loads in combat reduces operational effectiveness, increases fatigue and increases the risk of injury. Whilst the Americans and the British came to the conclusion that a fighting load of 20 kg was optimum, being able to make that a reality was proving difficult. Then, once you add in the weight burden of an approach march load, the ongoing problems are readily apparent.

In an ideal world, you would negate the weight burden that the soldier has to carry, and you would also look to enhance personal protection for the soldier and then add increased mobility into the mix of desirable characteristics. Achieving all of that was once considered to be in the realms of science fiction. Increasingly, it appears that these positive characteristics can be achieved and that it is science fact. The medium that makes this possible is the Exoskeleton. A dictionary definition of an exoskeleton is that it is a hard outer layer that covers, supports, and protects the body of an invertebrate animal such as an insect or crustacean. In the context we are discussing, an exoskeleton is a wearable machine/technology, either powered or unpowered, that is designed to increase or enhance human performance. In medical applications, an exoskeleton can be used to restore human performance.

The theory of the exoskeleton as a means of augmenting human performance has been around for a very long time. In the 1960s the US military and General Electric worked on a number of different concepts, but it is the technological advances of recent years that have made exoskeletons an approachable reality. Two military exoskeleton programmes that demonstrated some of the capabilities necessary were the Ekso Bionics and Lockheed Martin HULC (Human Universal Load Carrier) and the XOS and XOS2 by Sarcos/Raytheon. HULC claimed a range of 20 km on level terrain at a speed of 4 km/h. It could carry loads of 90.71 kg, and was capable of a burst speed of 16.09 km/h. A 72-hour long range extended mission ver-

sion of the system was also available. Currently, the lead US military exoskeleton programme is the Tactical Assault Light Operator Suit (TALOS). The programme comes under the auspices of US Special Operations Command and they are working towards fielding the system in August 2018. Their emphasis is on protection and then mobility. The point, though, is that if TALOS can be fielded by August 2018 it will show that the military exoskeleton is a reality and is a believable technology that can be fielded near-term. There are many

military exoskeleton research programmes currently underway around the world, what will make the difference is seeing a programme in service.

Assuming that an affordable and functional exoskeleton is deliverable, it will be a true revolution in military affairs. It will give the infantry more protection, more firepower, more load carrying capability and more mobility. Getting the infantry where it needs to be, ready to fight and not exhausted from excessive load carrying – this will be true combat capability multiplication. ■

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# Joint Light Tactical Vehicle – Deliveries Begin

**Sidney E. Dean**

**Oshkosh Defense is scheduled to begin deliveries of the first Joint Light Tactical Vehicles (JLTV) to the US Army in October. These deliveries will begin fulfilment of the first Low Rate Initial Production (LRIP) order placed with Oshkosh in August 2015.**

**T**hat first order is for 201 vehicles. A second LRIP order for 657 vehicles was placed in March of this year. Fulfilment of that order is expected to begin in January 2017. The decision to enter Full Rate Production (FRP) should be made during the first quarter of Fiscal Year 2019, i.e. during the final quarter of calendar year 2018. Initial Operational Capability (IOC) of the JLTV is expected in late 2019, a delay of approximately one year over previous planning. Following a fourteen month evaluation of prototypes supplied by Oshkosh and two competing firms – Lockheed Martin and AM General – the Pentagon in August 2015 awarded Oshkosh the exclusive contract to produce the JLTV. This initial contract specifies total deliveries of 16,900 vehicles, of which 5,500 will go to the US Marine Corps; the remainder are destined for the US Army, where they will primarily be assigned to frontline units. The initial contract is valued at \$6.7Bn and will be fulfilled in eight blocks, with deliveries expected to continue through the end of 2024. If performance meets the Pentagon's expectations, follow-on procurement – exclusively for the Army – is expected. This would increase the total buy by the US armed forces to nearly 55,000 vehicles, and extend deliveries to circa 2035.

## Contract Dispute

On 8 September 2015 Lockheed Martin filed a lawsuit in the US Court of Federal Claims, challenging the contract award to Oshkosh. The firm cited information newly released by the Army concerning the eval-

uation and award process as evidence of procedural flaws. While not legally required to do so, Oshkosh halted JLTV production after the protest was filed, but resumed work in mid-December after 98 days. Lockheed finally dropped its protest in February of this year.

vehicles is essential to determine and re-evaluate necessary engineering changes prior to FRP.

"A 90-day delay grew into about six or eight months delay just because of the difficulty of rescheduling a test phase that we were going to do, which then impacts the decision date for the full-rate production decision; which, in turn, puts our funding out of phase for the JLTV programme ... which then allowed us to take a look at the time difference between the completion of testing and that whole rate production decision, and it ended up stretching out IOC about a year," explained Thomas Dee,



Photos: Oshkosh Defense

*JLTV pre-series production*

According to DoD sources the production delays in connection with Lockheed's protest are to blame for the delay in IOC. The USMC had expected to field its vehicles first, in late 2018, but has revised that estimate to the fourth quarter of calendar year 2019. The Army delay is more moderate, shifting from mid-2019 to late 2019. The duration of the shift is based not only on the actual interruption of production, but also on the requirement to re-schedule testing. Operational testing of the LRP

the deputy assistant secretary of Naval Expeditionary Programs and Logistics Management (who is also responsible for US Marine Corps programmes).

Army spokesman Michael Clow added: "The programme's schedule is carefully sequenced to accomplish necessary testing and logistics development activities prior to conducting Multi-Service Operational Testing and Evaluation (MOT&E)". The MOT&E for the joint acquisitions programme, originally sched-

## Author

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uled for July 2017, has been pushed up to February 2018.

Overall, the JLTV acquisition process has been praised as efficient, with no serious delays due to technical issues. In March Scott Davis, Army programme executive officer for combat systems and combat support systems, announced expectations that the overall JLTV programme would end up costing ten to fifteen percent less than originally estimated. The Pentagon Select Acquisitions Board has even forecast a nineteen percent cost reduction, from \$30.4Bn for 55,000 vehicles, down to \$24.7Bn.

Rather than pocket the savings, the Army has decided to reinvest the money into an accelerated JLTV procurement. This would shave approximately five years from the original timeline, which had anticipated vehicle deliveries through the year 2040.

### Up-Gunned for New Mission?

The JLTV is designated as the successor and replacement of the up-armoured version of the High Mobility Multipurpose Wheeled Vehicle HMWV, generally known as the Humvee. The new vehicle displays significant performance enhancement for almost every parameter, including payload, speed, mobility, and occupant protection. One feature enhancing off-road mobility is the Oshkosh Defense TAK-4i independent suspension system which can be raised or lowered to accommodate terrain and provides 508mm of wheel travel. Comparison testing of the Oshkosh JLTV with the prototypes originally offered by the competing firms found the Oshkosh vehicle to be more reliable, with 7,000 miles between Operational Mission Failure (OMF). Oshkosh's vehicle also proved more reliable than the current up-armoured Humvee, which performed 3,000 miles between OMF. The 6.4 ton vehicle can be airlifted internally by C-130 and C-17 class aircraft, or externally by heavy-lift rotary aircraft (CH-47, CH-53). The JLTV comes in two variants: the two-seat Combat Support Vehicle (CSV), configured as a utility transport with 5,100-pounds payload capacity; and the four seat Combat Tactical Vehicle (CTV) with a 3,500-pound payload capacity. The CTV can be configured through mission modules to function as a general purpose vehicle, a heavy-gun carrier or a close-combat weapon carrier. Armament can include all classes of machine gun as well as grenade launchers and anti-tank guided missiles.

The Army is now also considering the JLTV to fulfil the armed reconnaissance function. In April the Army cancelled the programme to develop a new, specialised vehicle (Light



*The next-generation Oshkosh JLTV is a "network on wheels", able to serve as a mobile command centre in future missions.*

Reconnaissance Vehicle) for infantry scout platoons. JLTV is emerging as the prime candidate for equipping these 36-person units. However, the Army Capabilities Integration Center (ARCIC) and the Maneuver Center of Excellence (MCOE) advocate a redesign for JLTV assigned to the scout role. "It would have to carry six soldiers and a 30mm cannon," said Lt. Gen. H.R. McMaster, director of ARCIC and deputy commanding general of Futures at the Army Training and Doctrine Command. As reconnaissance units act independently beyond range of their parent unit they require sufficient firepower for self-defence. The .50 calibre machine gun is considered inadequate for that role.

Colonel William T. Nuckols Jr., director of Mounted Requirements at the MCOE stressed the need for a six-person variant of JLTV. It would simplify logistics by requiring only six instead of nine vehicles per platoon. More importantly, it would increase operational effectiveness, said Col. Nuckols. Army leadership and Congress would need to approve any changes in the JLTV design – changes which, according to Colonel Nuckols, could take seven to ten years to implement.

### Export Market

While the JLTV is not currently available for export, Oshkosh is optimistic regarding future foreign orders. Oshkosh Defense already supplies tactical vehicles to numerous nations around the world. The firm maintains a global marketing office in Washington DC and a Middle Eastern regional office in Abu Dhabi.

The United Kingdom is assessing the JLTV's suitability for the British Multi-Role Vehicle – Protected (MRV-P) programme. "We can confirm that we are talking to the US DOD regarding package 1 [of MRV-P], to inform our understanding of an FMS [Foreign Military Sale] option for the Joint Light Tactical Vehicle," said an MoD spokesman in June. Oshkosh Defense CEO John Bryant confirmed in June that talks with Britain were underway "at a very early stage". If the assessment is positive then London would likely become the first foreign buyer of JLTV.

In principle, any nation currently employing the Humvee would seem a natural market for the JLTV, which is billed as the Humvee's new, improved successor. More than seventy nations use the HMWV. In May, the firm prominently featured the new light tactical vehicle at the SOFEX Special Operations Exhibition in Amman, Jordan; in June, it presented the JLTV to European audiences in Paris during EUROSATORY 2016. Oshkosh representatives left no doubt about their expectations for widespread global marketing. As an extra service Oshkosh would prepare the vehicles for mounting weapons, albeit only for western systems. "We can't prepare a vehicle for integration with Russian [weapon] systems, for example," said Oshkosh senior manager for global marketing Laura Cresswell during SOFEX 2016. But she said the firm would still sell JLTVs to a buyer even if it knew they were going to install Russian weapons. Several US allies and partners, including NATO members Bulgaria and Greece, currently employ Russian-designed weapons on their Humvees ■



# Weapons and Sensor Concepts for Surface Combatants

## Responding to an Uncertain Future

Bob Nugent

Naval multipurpose surface combatants – frigates, destroyers – are the centrepiece of most modern ocean-going navies and enduring symbols of a nation's seapower. AMI's naval market database shows 600 frigates and destroyers in service today. They make up only about 5% of all naval ships, but are leading indicators of the prevailing operational and engineering wisdom regarding ship and combat systems design within their respective navies.

Further, AMI forecasts that the world's navies plan to invest US\$300Bn to acquire some 430 new frigates and destroyers through 2035. This represents almost a third of all planned spending on new naval ships worldwide. These numbers affirm how surface combatant ships and systems will continue to influence the naval combat systems art in the decades to come.

This article draws on AMI naval market research information to compare weapons and sensor concepts on several classes of modern surface combatants serving now or set to join US and NATO navies over the next 5-10 years. Specifically, the article will look at mission capabilities and combat systems fits on five ship classes: the US Littoral Combat Ship (both designs), the French Batch I FREMM (ASW), the Italian BERGAMINI class FREMM frigate, the German F125 class frigate, and the UK Type 26 Global Combat Ship.

Taken together, these ships provide a broad sample of naval surface combatant designs and combat systems approaches today. Comparing these ships' weapons and sensor fits provides some insight into how these nations see and are responding to today's shifting operational requirements and preparing for an even murkier naval future.

### Designing for Uncertainty

All of the ship classes looked at below reflect a core challenge in contemporary naval sensor and weapon concepts for surface combatants, which systems should

Photo: ESD archives



**FREEDOM Class LCS**

take priority within a ship's limited space to best meet an uncertain future?

The Cold War naval planning framework of known threats and operating areas supported sensor and weapons – and ultimately ship design – concepts optimised for single missions such as ASW or Anti-Air Warfare. In contrast, the current operational and fiscal environment calls for cost effective and operationally effective ships, sensors and weapons. Political leaders expect the current generation of surface combatants to deal with a broad set of peacetime missions – often while operating as independent units. Those same ships are also tasked to prepare for an array of increasingly menacing threats across the scope of conventional warfare – over, on and under the sea, and extending ashore. Navies have responded to this challenge with a variety of weapons and sensor con-

cepts. Based on the data below, the preferred approach has been to build larger ships (5,000 tons and up). These designs provide enough space to permanently mount a wide range of weapons and sensors for a wide set of missions. Communication, radars, weapons, and supporting platforms (most notably the helicopter) are always available and designed with the flexibility to meet different missions as they arise. Further, the larger ship design purposely includes excess margins in weight and space that can accommodate future weapons and sensor upgrades – here the observation that “steel and space are cheaper than whole new ships” applies. Proponents of this approach tend to note that surface combatants must “come as they are” ready for any and all missions that might arise, and with the tools ready to do the job. This flexibility is one of the key dis-

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tinguishing characteristics of naval power and often is cited as one of the unique contributions naval platforms make to national security. Some examples of this approach are seen in the Italian and French FREMMs and the German F125.

At the other end of the spectrum is a design approach confronting the continual cost increases of complex naval ships and systems. This means fewer and fewer navies can afford fleet structures where all surface combatants are large, "high end", and equipped for any mission any time.

This concept of ship sensor and weapons centres on a modular ship design. This modularity brings the ability to shift weapons and sensors off and on the ship as needed to reconfigure the ship's weapons and sensors for specific missions or areas. A core assumption of this approach is that a sea service would have sufficient infrastructure and operational flexibility – in short, sea control – to permit reconfiguring as and when needed.



**INDEPENDENCE Class of the US Navy's Littoral Combat Ship**

complement the larger Type 45 Air Defence destroyer. The AAW variant of the French FREMM, if built, will add a much more robust air and missile defence capability.

On the sensor side, all five of the ship classes here mount multi-function radars, enabling them to contribute to building an

considerably to the security of larger naval formations operating at sea.

**Anti-Surface Warfare:** All of the European ship classes bring effective ASuW missile armaments. Even the F125's venerable Harpoon missile has been modernised to pose a robust ASuW threat in most operational scenarios. The UK Type 26, with planned upgrades to the next generation long range Anti-Surface Missile (LR ASM), will be at the leading edge of surface warfare.

The notable exception to the pattern above is the US LCS. Here the ship's specific design features shift the main ASuW capability from the sea frame to embarked helicopters. And the Surface Warfare mission package to equip both LCS designs will add Hellfire missiles. These will enhance the helicopter platform in dealing with "swarms" of high speed small and manoeuvrable surface targets.

	LCS (US)	FREMM I (Fr)	FREMM (It)	F125 (Ge)	Type 26 (UK)
Concept Start	2002	2002	2002	1997	2009
Build Start	2005	2007	2008	2011	2016
Hulls Built/Planned	52	8	10	4	13
Crew+Embarked	50+25-50	100+	100+	120+	120+50
FL Displacement	2,800-3,100	5,800	5,900	7,200	6,000
Endurance (NM/kts)	4,300@18-20	6,000@15	6,000@15	4,000@20	7,000@15

Clearly the US LCS designs are the clearest example of this approach to weapons and sensor fits – and have stimulated much argument and controversy over the course of the programme. But it should be noted that other navies have also adapted a modular approach in some aspects of their current ship weapons and sensor fits. One example is the UK Type 26's flexible "mission area" that can embark and operate sensors and equipment depending on the mission. Another is the German F125's ability to operate unmanned maritime platforms for mine warfare – a mission not usually included in surface combatant weapons and sensor capabilities.

## Comparing the Classes:

**Anti-Air Warfare:** Most of the ship classes profiled here have limited anti-air capabilities – missiles and guns that provide self/point defence or short range fleet defence at ranges out to about 30 km (16.1 NM). The Italian FREMM and UK Type 26 add medium range air defence capabilities with their ASTER 30 and extended range CAMMS respectively. The latter would

operational picture in medium and long-range air defence missions. In addition to ample early warning of incoming threats to the ships themselves, these radars add



**French ASW FREMM variant**



Weapon Systems					
	LCS (US)	FREMM I (Fr)	FREMM (It)	F125 (Ge)	Type 26 (UK)
<b>Missiles-ASuW/ASW</b>	Longbow Hellfire surface-to-surface missile systems	- ASuW: 8x Matra BAE Dynamics Alenia (MBDA) MM 40 Block 3 Exocet SSMs launched from two quad launchers	- ASuW: 8x MBDA Teseo (Otomat) Mk2 Block IV SSMs	- ASuW: 2x quad launchers for Boeing Harpoon	- ASuW: 3x 8-cell Lockheed Martin VLS for eight Lockheed Martin LRASM and 16 Raytheon TACCOM. -ASW: 8x TACTOM cells for VL-ASROC
<b>Missiles-AAW</b>	Raytheon Mk-31 RAM Block 1	1x 16-cell Multi-mission A43 VLS for MBDA ASTER 15 SAM	A mix of ASTER 15 and ASTER 30 SAMs in two 8-cell SYLVER A50 Vertical Launch System (VLS) launchers	Raytheon Mk31 Rolling Airframe Missile (RAM) system with two Mk 144 launchers with 21 cells each for RIM-116B RF/IR homing SAMs	MBDA Common Anti-Air Modular Missile (CAMM) Sea Ceptor SAMs launched from eight 6-cell CAMM VLS (48 missiles)
<b>Guns</b>	1x BAE Systems Bofors 57mm Mk 110 Naval Gun System 2x 30mm guns; 4x 12.7mm machine guns	-1x OTO Melara 76/62 Super Rapid naval gun -2x Nexter Narwhal 20B 20mm remote weapon stations (RWS)	-1x OTO Melara 127mm/54 Lightweight (LW) main gun -1-2x OTO Melara 76mm/62 Super Rapid gun mount. -2x OTO Melara KBA 25mm guns	-1x OTO Melara 127mm naval gun with guided VULCANO ammunition -2x Rheinmetall MLG-27 remote controlled 27mm autocannons -5x 12.7mm Hitrole-NT remote-controlled machine gun turrets -2x 12.7mm machine guns	-1x 127mm/64 light-weight main gun -2x MSI 30MM DS30B guns. -Close-in-Weapon System (CIWS): Two Raytheon Phalanx Mk 15 Blk IB 20-mm guns
<b>Torpedoes</b>	None (embarked helicopter can carry)	-2x Eurotorp TLS fixed torpedo launchers for MU-90 Impact lightweight ASW torpedoes	4x 324mm fixed torpedo tubes (two twin launchers) with Eurotorp MU-90 Impact lightweight ASW torpedoes. ASW Variant will have eight MBDA Milas missiles	BAE Mk 32 324mm (triple tube) torpedo launchers for Eurotorp MU90 lightweight ASW torpedoes	4x J & S Marine 324mm fixed torpedo tubes for the BAE Systems Stingray lightweight torpedoes

The main gun batteries of the European ships above continue to demonstrate that naval guns are key to the naval weapons mix. The Italian, German and UK ships are all equipped with the 127mm (5") gun. In the

case of the Italian FREMM, the VULCANO extended range precision munition adds additional land target engagement options. The French FREMM opts for the 76mm gun, while the US LCS (both designs) con-

tinues to mount the 57mm weapon also in service with the US Coast Guard. These smaller calibre weapons, together with the wide range of small calibre close in weapons systems (20-30mm) provide additional defence against high speed surface and air threats.



(Photo: wikipedia)

**Italian BERGAMINI Class FREMM frigate**

**Anti-Submarine Warfare:** The proliferation of submarines worldwide and the growth in capabilities of conventionally-powered submarines have clearly influenced sensor and weapons fits for all five classes of ships. The French FREMM is designed with the ASW mission as a priority and so is equipped with the most capable array of sonars. That said, all of the ships looked at in this article include sonar (hull mounted and towed), torpedoes (ship and helicopter-mounted), and fittings to operate the newest generation of ASW helicopters (NH-90, MH-60 and others). The LCS again, with its smaller size and modular design, does not have the range of ASW weapons and sensors of its larger European counterparts. Still, with the ASW mission package, and modifications to the design ongoing (such as adding a variable depth sonar), the ship adds ASW capability to the surface fleet.



Photo: TKMS

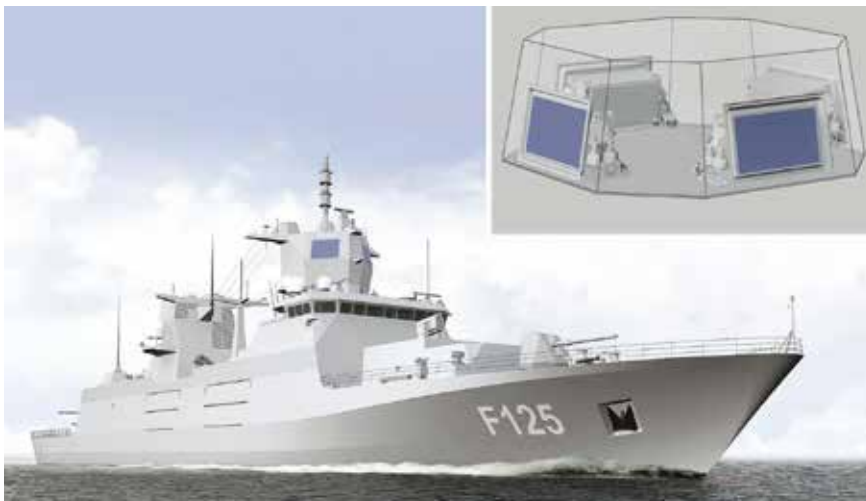
**German F125 during sea trials on the Elbe River near the City of Hamburg****Sensor Systems**

	<b>LCS (US)</b>	<b>FREMM I (ASW) (Fr)</b>	<b>FREMM (It)</b>	<b>F125 (Ge)</b>	<b>Type 26 (UK)</b>
<b>Radar-Search</b>	EADS/Airbus TRS-3D. TRS-4D starting with LCS 17	Thales HERAKLES Multifunction Radar	- SELEX MM/SPY-790. EMPAR (G band), also performing surface search, fire control, and navigation functions. - SELEX RASS (E/F band)	- Airbus TRS-4D/NR Multi Function - Surface Search Radar: Two Airbus X-band	- BAE Systems Insyte Type 997 ARTISAN MFR (Est)
<b>Radar/Sensor-Fire Control</b>	Navantia DORNA EO/IR System	Selex NA-25	SELEX MM/RTN-25	Rheinmetall Defence Electronics MSP-600 electro-optical sensors	2x Chess Dynamics Sea Eagle FCEO for MSI 30mm guns
<b>Sonar</b>	- Variable Depth Sonar (VDS): Possibly Thales CAPTAS 4 - Towed Array: Possibly TB37 MFTA	- Thales Underwater Systems 4110CL hull-mounted active search and attack sonar (medium frequency) - 4200 Combined Active/Passive Towed Array Sonar (CAPTAS-Mk II V1) Integration may take place using the MultiRole Sonar System (MUROSS)	-Thales Underwater Systems UMS 4410CL hull-mounted active search and attack sonar (medium frequency) -Thales CAPTAS 4249 towed array	Atlas Elektronik sonar suite consisting of bow-mounted and towed array sonars; plus CERBERUS portable diver detection sonar	- Bow Mounted: Thales UK 2050 sonar (all 13 units). - Towed array: Thales Sonar 2087 towed array (8 ASW units)
<b>Helicopter</b>	Flight and hanger for two MH-60R/S helicopters and/or three Fire Scout VTUAVs	Flight deck and hanger for one mid-sized helicopter (either an AS 565 Panther or an NH 90)	Flight deck and hanger - 2x NH-90 or - 1x AW-101	Flight deck and hanger for two NH-90 helicopters	Flight deck for the operation of one large helicopter and hanger for the storage of one medium sized helicopter
<b>Unmanned-Air</b>	Fire Scout VTUAV	Possible (small fixed wing or VTUAV)	Possible (small fixed wing or VTUAV)	Possible (small fixed wing or VTUAV)	Small VTUAV
<b>Unmanned-Surface/sub</b>	UUV: RMS USV: CUSV, KNIFEFISH to support mine warfare, ASW missions	UUV and USV to support ASW	None indicated	Atlas Elektronik ROV, AUVs and USVs to support mine warfare missions	Flexible Mission space for combination of UMS and rigid hull inflatable boats (RHIBs)





**Launch of an EXOCET MM 40 Block 5 anti-ship missile from a French FREMM frigate**



**Airbus Defence & Space's TRS-4D surveillance radar implements state-of-the-art gallium nitride AESA sensor technology and has been selected to equip both the German F125 and the US LCS (from LCS 17).**



**Artist's impression of the UK Royal Navy's Global Combat Ship (Type 26)**

**Mine Warfare:** Historically, mine warfare has not been the province of multi-mission surface combatants. Specialised mine warfare ships and aircraft, and their sensors and weapons, have fulfilled most mine warfare requirements. However, with the decline in purpose-built mine warfare ship construction, and retirement of rotary wing mine warfare platforms like the MH-53, mine warfare is being added to more conventional AAW, ASuW and ASW sensors and weapons.



**The 57 mm Mk 110 Mod 0 naval gun system from BAE Systems/ Bofors – shown here aboard USS FREEDOM – has been selected as the medium-calibre gun for the US Navy's LCS fleet.**

This is most clearly seen in the US LCS. The LCS Mine Warfare mission package, with heavy reliance on unmanned systems, will see this surface combatant take a leading role in mine warfare.

The LCS stands out but is not the only platform where mine warfare is added to the ship's core weapons and sensor sets. As noted, the German F125 also includes mine warfare with unmanned maritime systems as a new capability.

## Conclusion

Combatant ship design is by nature a conservative art. Naval architects and officers alike work to ensure new weapon and sensor concepts reflect hard-learned practical experience at sea. After all, many of these ship projects will cost several billion US\$ to build, and will serve 30 years or longer. So mistakes made in initial combat systems can be hard to overcome, even with mid-life upgrades and modernisation incorporated into the original design.

At the same time, the pace of technological and strategic change affecting naval ships appears to be accelerating. Original concepts and designs for many of the ships detailed above started some 10-15 years ago, when the Post-Cold War maritime security environment appeared very different than today's world. Naval technologies have seen similar significant changes – especially in the areas of unmanned systems, electronic and cyber warfare, and energy (affecting weapons and propulsion designs).

As seen above, navies in the US and Europe are following weapon and sensor concepts for their surface combatant ships that balance traditional ship and system layouts with strategic and technological change. This need for balance will continue to influence how different navies define the "state of the art" in their naval surface ship weapons and sensor systems. ■

**To complement the F125's sensor fit the portable CERBERUS detection sonar supports the operations of combat divers.**

# Supporting French Defence Exports

## Tasks and Measures of the Direction Générale de l'Armement (DGA)

David Saw

**The Direction Générale de l'Armement (DGA) can be described as the defence procurement agency of the French government, although that would do it a disservice.**

In fact the DGA is far more than a defence procurement agency, it supports research and development and innovation, it plays a central role in French defence exports and

that the possession of a capable defence industry offers significant political, strategic, economic and technological benefits. Consequently France has looked to have

(SSBN) of the French Navy, each carrying 16 M51.2 missiles, with a range in excess of 6,000 km and a French-designed warhead system capable of penetrating current and envisaged threat defences. In addition, the French Air Force has a nuclear capability in the shape of the ASMPA (air-sol moyenne portée améliorée) that entered service with the Dassault MIRAGE 2000N K3 in 2009 and with the Dassault RAFALE in 2010. The weapon is produced by MBDA and is credited with a range of 500 km.

Work on sustaining the French nuclear deterrent for the long-haul is already underway, the contract for developing the next generation M51.3 missile was awarded to Airbus Defence & Space in 2014. Now M51.3 development will be incorporated into the newly formed Airbus/Safran joint venture company Airbus Safran Launchers, with the missile due to enter service from 2025 onwards. The M51.3 will offer improved performance over the M51.2, in particular there is great emphasis on penetrating enhanced defences. Studies have also started on a successor to the TRIOMPHANT class SSBN. The DGA plays a pivotal role in French strategic nuclear programmes, managing the programmes and acting as contracting authority, while also supporting the R&D work necessary for future developments.

### Industrial Base

Returning to the subject of the French defence industry, it is important to note the political factors involved in sustaining industrial capability. In 1966 the French government decided to withdraw from NATO (this came into effect formally on 30 June 1966) and its military command structure, as well as closing foreign bases on French soil. Although there were accords between France and the NATO nations on French participation in the defence of Europe, it was not until 2009 that France officially returned to the NATO fold. Once it was outside of NATO, France had to develop its own strategic priorities, organise its forces to meet those priorities and then develop the equipment necessary to equip its forces.

To meet these objectives, France would have to maintain a defence industry that



Photo: DGA

**The DGA is at the centre of the French nuclear deterrent force. The M51.2 missile is now being introduced to the TRIOMPHANT Class SSBN, with work having started at Airbus Safran Launchers on the M51.3 successor missile system that is due to enter service from 2025 onwards. A new SSBN class is also being studied.**

in many European collaborative defence programmes. As such, the DGA is at the heart of French defence activity.

Unlike many European countries, France is actually credited with having a defined industrial strategy as regards defence. This has developed from the French belief

a defence industry capable of meeting the majority of French military equipment and equipment support needs.

Its industry also has a very special capability; France is one of the few countries that can develop, produce and deploy strategic nuclear weapons. Furthermore, France is totally in control of all aspects of its strategic nuclear capability, it is totally self-reliant. Previously it had supported a nuclear deterrent triad, with land, air and sea-based systems. Today, the French strategic nuclear deterrent rests with the four TRIOMPHANT Class nuclear submarines

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could meet the vast majority of its equipment objectives on land, sea and air. To sustain that industry the peaks and troughs of domestic demand would have to be offset by a constant emphasis on defence exports. This was a strategy that worked successfully for many years. However, the strategy would later have to be modified to cope with changing political and industrial landscapes in Europe from the end of the Cold War and onwards into the 1990s. In the past, French industry could expect to do well due to the fact that it could offer an alternative to becoming dependent on the Superpowersthat were the United States



Photo: French Air Force

**French Air Force RAFALE combat aircraft move out on a combat mission against Islamic State forces in Iraq and Syria. Now combat proven, RAFALE has also won export competitions in Egypt and Qatar, with India on the verge of signature. The DGA plays a major role in securing French exports.**

Photo: DCNS



**AQUITAINE (D650) was the first FREMM class frigate to enter service with the French Navy, being commissioned in November 2012. Sister ship NORMANDIE (D651) had been launched at Lorient on 18 October 2012, but prior to commissioning she was made available to Egypt as part of a major €5.2 billion export contract signed in February 2015.**

and the then Soviet Union. If you wanted a high performance fighter aircraft and the appropriate missiles to go with it, and did not want to go to Washington or Moscow, then Paris was the destination of choice. Dassault would be pleased to provide you with an appropriate fighter. Indeed the success of the MIRAGE III, MIRAGE V and MIRAGE 2000 is testimony to the success of the French defence industry model. France also did extremely well in other industrial sectors, for example in the naval industry, in

defence electronics, air defence, armoured vehicles and many other areas. Then the world changed, and in the post-Cold War era the existing defence industrial structures could no longer be sustained. This led to industrial consolidation at a national level and then at a European level. Out of this emerged major corporates that we see today, such as Airbus, Dassault, Thales, MBDA, Safran and DCNS. For French industry the consolidation process continues, the most recent example being

the merger of Nexter and Krauss-Maffei Wegmann (KMW) of Germany to create KMW + Nexter Defence Systems (KNDS). There is no doubt that industrial consolidation was essential, although this process was not the magical solution to sustaining defence and industrial capability in France and in Europe. First and foremost was European investment in defence programmes and the acquisition of defence equipment and ancillary services. In the context of France, that gave the DGA an ongoing critical role. While domestic and European demand was important, there was no escaping the fact that exports were vital. Domestic demand was no longer enough and so it was essential to have both domestic and export sales, for France this would mean that the DGA would come to play a key role in defence exports. France had assumed that the RAFALE would enjoy similar success to earlier French combat aircraft such as the MIRAGE, the problem was that there were a number of competitions where there were high hopes of success and the end result was failure. It came to the point where it was essential that RAFALE had export success to sustain the programme and the industrial base.

## Export Success

This requirement saw the French government form "Team France Export" led by Defence Minister Jean-Yves Le Drian, and involving the DGA, the military and industry. The objective of this was clear, they wanted to maximise French defence exports to sustain existing programmes and industrial capabilities, while also creating funding that could be invested into future programmes. At the end of 2014 Team France Export went into action to secure a major contract in Egypt and by February 2015 a €5.2 billion contract covering the supply of 24 Dassault RAFALE combat aircraft, a DCNS FREMM frigate, missiles, related equipment and training had been signed with Egypt. This was the first export contract for the RAFALE.

Team France Export had to react quickly to secure this Egyptian contract and to provide the financing necessary to make it a reality. The other complicating factor was that Egypt wanted rapid delivery, with mid-2015 as the target. This was where the DGA played a key role, the only way to meet the Egyptian timetable was to take equipment that was destined for the French military. The DGA was instrumental in this, diverting aircraft from French Air Force deliveries, with the first three twin-seat RAFALE aircraft being handed over to Egypt in July 2015, and three more aircraft handed over to the Egyptian Air Force in January 2016. In total Egypt will acquire 18 twin-seat and six single-seat RAFALE, with there being interest in a second batch of 12 aircraft.

As regards the FREMM frigate, it was decided that the second frigate for the French Navy NORMANDIE (D651) would be transferred to Egypt. NORMANDIE had been laid down at the DCNS Lorient Shipyard in October 2009 and launched on 18 October 2012. After the sale to Egypt, French Navy specific equipment was removed from the frigate and in March 2015 the Egyptian Navy crew went aboard the frigate to start training. Renamed the TAHYA MISR (FFG 1001), the ship became fully active in the Egyptian Navy in June 2015.

Team France Export gained a second major success in May 2015 when Sheikh Tamim bin Hamad al-Thani, the Emir of Qatar, signed a €6.3Bn contract with French President Francois Hollande. The contract covers the supply of 24 RAFALE, with options on 12 more, an air weapons package from MBDA, and a training package for 36 Qatari pilots and 100 technicians.

Qatar made its downpayment on the RAFALE contract at the end of 2015, allowing the value of the contract to be booked in the 2015 defence export figures. According to a DGA presentation in February 2016, in terms of defence exports 2015 had been a historic year. When the final figures were tabulated, defence exports in 2015 amounted to €16.Bn, up from €8.2Bn in 2014, €6.87Bn in 2013 and €4.82Bn in 2012. The DGA noted that the contracts with Qatar and Egypt were the principal contracts in the 2015 figures, but also noted that there were five major contracts in excess of €500M in value. According to the DGA in total 80% of 2015 defence sales were drawn from Africa and the Middle East.

In the context of the RAFALE programme the export contracts from Egypt and Qatar have been of critical importance in securing the future of the aircraft. They have also created a challenge for the DGA in balancing RAFALE fleet management and deliveries to the French Air Force and the French Navy, with the requirements of export customers. This challenge is on the verge of getting even bigger as India is on the brink of signing a €7.87Bn contract for 36 RAFALE aircraft, with French defence minister Jean-Yves Le Drian due to sign the Inter-Governmental Agreement (IGA) in Delhi.

Once India is signed that solidifies the RAFALE programme, with a high likelihood that Egypt and Qatar will both take up the options they have for an additional 12 aircraft each. Ideally Team France Export would be able to secure the long-awaited order for up to 60 RAFALE aircraft from the United Arab Emirates (UAE). This truly would put RAFALE in a positive situation and remove all doubts from the long-term future of the programme. The DGA is at the centre of French defence policy acting as the acquisition arm for the French military, plus it plays a critical role in managing France's defence industrial policy, both domestically and in terms of international collaborative programmes. It is also leading France's battlefield digitisation efforts and investing in French companies to generate a climate of innovation. As we have seen, it plays a key role in supporting French defence exports as well. ■

## Masthead

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## Working Together to Disrupt Digital Crime

(df) A new report, worked upon by BT and KPMG, warns of emerging threats from profit-orientated and highly-organised cyber-criminal enterprises. The report "Taking the Offensive – Working together to disrupt digital crime" finds that, while 94% of IT decision makers are aware that criminal entrepreneurs are blackmailing and bribing employees to gain access to organisations, roughly half (47%) admit that they don't have a strategy in place to prevent it. The report also states that 97% of respondents experienced a cyber-attack, with half of them reporting an increase in the last two years. At the same time, 91% of respondents believe they face obstacles in defending against digital attack, with many citing regulatory obstacles, and 44% being concerned about reliance on third parties for aspects of their response.

## Machines Fighting Hackers

(df) Mayhem won this year's Cyber Grand Challenge (CGC), which is organised by the US Defense Advanced Research Projects Agency (DARPA). The special point of this CGC is that, for the first time ever, computers were fighting the hackers, not humans. The teams had to develop machines that



Photo: DARPA

had to cope with the challenges. "The need for automated, scaleable, machine-speed vulnerability detection and patching is large and growing fast as more and more systems – from household appliances to major military platforms – get connected to and become dependent upon the internet," DARPA explained the background for this new focus. "Today, the process of finding and countering bugs, hacks, and other cyber infection vectors is still effectively artisanal. Professional bug hunters, security coders, and other security pros work tremendous hours, searching millions of lines of code to find and fix vulnerabilities that could be taken advantage of by users with ulterior motives." The first place was won by the machine Mayhem, which was developed by team ForAllSecure

of Pittsburgh. Second place was formally awarded to Xandra, a cyber reasoning system developed by TECHx of Ithaca, N.Y., and Charlottesville, Va. Following an extended verification process by the Cyber Grand Challenge Competition Framework Team and the DARPA Verification Team, third place was awarded on Sunday, August 7, to Mechanical Phish, developed by Shellphish of Santa Barbara, Calif. "DARPA was created nearly 60 years ago to prevent technological surprise, and I can think of no better way of doing that in today's networked world than by developing automated, scalable systems able to find and fix software vulnerabilities at machine speed," DARPA Director AratiPrabhakar said. "Our goal in cyber is to break past the reactive patch cycle we're living in today, and unleash the positive power and creative potential of the information revolution."

## EMSA Awards Contract for AIS

(df) The European Maritime Safety Agency (EMSA) has awarded a framework contract for a four-year satellite Automatic Identification System (AIS) data service to LuxSpaceSarl (an affiliate of OHB SE) and its partner ORBCOMM Inc. Headquartered in Lisbon, Portugal, EMSA is one of the largest consolidators of AIS data and is responsible for maritime safety, pollution-by-ship monitoring and ship security for the European Union and its Member States. LuxSpace will provide ORBCOMM's global real-time data feed of satellite-based AIS (SAT-AIS) data, which will be used by EMSA, other EU agencies and EU Member States for ship tracking and other maritime navigational, safety and security applications. "ORBCOMM's AIS service delivers comprehensive and reliable global coverage with high



refresh rates, which provides a complete situational picture of vessel activity worldwide", said Marc Eisenberg, ORBCOMM's Chief Executive Officer. Thomas Görlach, Managing Director of LuxSpace, added: "This achievement is an important step in our roadmap to establish further innovative services based on our next generation micro satellite product line, Triton-X."

## Jenoptik Power for Patriot

(gwh) Jenoptik's Defense & Civil Systems division will supply components for the PATRIOT missile defence system within the scope of several contracts. The overall order consists of several partial orders which the Jenoptik division received between June and August this year. Jenoptik will provide the power supply, the converter, the aluminium chassis as well as the spare part packages for the Patriot Advanced



Photo: Jenoptik

Capability-3 (PAC-3) systems. The power generators will supply the radar and the carrier system of the missile defence system with electrical power. The components will be produced at the Altenstadt location in Germany. Jenoptik is currently testing a hybrid power supply system which allows for reductions in previous fuel consumption of up to 50 percent.

## High Assurance Email Guard

(df) The first details of Nexor SENTINEL 4 were recently announced. The Nexor SENTINEL 4 is the latest version of Nexor's high assurance email guard and will have both



Photo: Nexor

new functionality and an enhanced user experience. "Nexor SENTINEL 4 is a key element in supporting our Information Exchange Gateway and Secure Information Exchange solutions by providing email validation," said Tony Roadknight, Lead Technologist at Nexor. "This latest version of our high assurance email guard will ensure that we meet the requirements of our customers." Nexor SENTINEL 4 meets the latest NATO confidentiality labelling (S4774) and binding (S4778) standards. Users of Nexor SENTINEL 4 can therefore be sure that they

have future proofed their email guards for when the standards are adopted. The other key advancement in Nexor SENTINEL 4 is an enhanced user experience for administrators, with new features for management, access controls and quarantine. Nexor SENTINEL 4 will enable role-based access, which allows greater granularity by assigning users the role that they actually require. In turn, this facilitates better security, as each user is only given access to what their role requires. It also enables changes to "ways of working" for example, by allowing the appropriate operational staff to manage access of their users rather than having to rely on technical staff.

### How to Defend the Nuclear Deterrent

(df) NATO held a two day conference on Cyber Defence, the NATO Cyber Security Alliance Symposium (NIAS16) in Mons, Belgium. It was an outstanding meeting of the Who's Who? in military cyber defence, with representatives coming from all Allied states. Richard Hale, Deputy Chief Information Officer for Cybersecurity of the US Department of Defense, highlighted the challenges his nation faces. And the changes of traditions they already went through in recent years. "After 9-11 our main objective was better sharing of information," Hale said. "Then came WikiLeaks and Snowden, leading to safer sharing again." Between

Photo: NCIA



these two extremes, sharing information openly to save the lives of soldiers and very few whistleblowers who want to make a name but have a negative impact on public opinion, the nations have to find their way. Hale pointed out, that these trends will continue and even gain more and more importance in the armed forces worldwide. "We have more IT people than we have Marines," Hale described the situation in the United States. But even though WikiLeaks and whistleblowers surely are nothing to ease work, the main problems still are the hidden, sophisticated and highly professional threats. To explain the real problem in few words Hale said: "How do you defend the nuclear deter-

### ADIPEC 2016

The Abu Dhabi International Petroleum Exhibition and Conference (ADIPEC) 2016 features a brand new exhibition zone and conference dedicated to security across the oil & gas industry. Security in Energy 2016 brings together cyber and physical security leaders in the oil and gas sector for the first time at ADIPEC 2016. The Middle East's security market is set to grow to US\$34Bn – three times the global growth average – according to a recent Frost & Sullivan report. The largest share, some 55% or US\$15Bn, is budgeted to go to securing government, energy, and critical infrastructure. Such huge investment underlines a robust approach to security, especially in the region's oil and gas sector, from ensuring physical asset protection to stopping hackers from accessing energy companies' IT systems. Supported by the Critical Infrastructure and Coastal Protection Authority (CICPA) and the UAE's Telecommunications Regulatory Authority (TRA), the exhibition promises to deliver cutting-edge products and services in the sector, while the dedicated conference will help address today's issues and shape the future security plans of the oil and gas sector. This inaugural four-day exhibition and three-day conference will bring together the world's leading industry security professionals, government officials, law makers, academics and protection agencies to share knowledge and ideas, helping to create a blueprint for discussion on how best to tackle current and future security concerns. Shape the regional and global security in energy sector by joining the conversation at Security in Energy 2016. For more information visit: [www.adipec.com/sie](http://www.adipec.com/sie)

rent?" Ian West, Chief of Cyber Security of the NATO Communications and Information Agency (NCIA), gave an overview of the challenges NATO, just like any other big organisation, is facing. And West outlined that the criminals or state actors will always get their chance. "We will never be one step ahead of the attackers, but we will try to keep close," said West. But new ways have to be taken and West puts special hope in the automation of cyber defence. "We seek the ability to automate as much as we can," West pointed out. "We are looking to take advantage of big data analysis." These challenges and technology trends facing NATO set the framework for the major upgrade of cyber defences that NATO is planning from 2017 to 2019, with the first contracts expected to be put out to tender in 2017. "We are about to embark on major refresh, worth about €70 million," said Rear Admiral Thomas Daum, Chief of Staff NCIA. "Today, cyber innova-

tion is driven by the private sector. Several nations have already stepped along the cyber domain path with industrial partners. This is why we want to have the conversation with you early, before we come to the actual acquisition stage," Daum said to the various industry representatives at NIAS16. Overall, NIAS16 was a complete success: the major industry, experts, officials and authorities all met during this two day event. With these annual conferences NATO closes a gap that existed between the experts and the military and offers a platform for a real dialogue between the actors in military cyber defence. Due to the closed-shop conference with participants only from military, politics or industry, discussion went into much more detail than at any other congress in the IT security area in Europe. NATO organized a very successful event with a possible impact that may enhance the Alliance's cyber defence capabilities within the next year.

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## Paramount Group and The Armored Group Announce Strategic Alliance at AAD 2016

During AAD 2016 (covered by European Security & Defence issue 4/2016) Paramount Group announced a strategic alliance with The Armored Group (TAG) to promote a complete portfolio of armoured vehicles for military, civilian, commercial and law enforcement purposes for selected



**Photo shows Ivor Ichikowitz, Founder and Executive Chairman of Paramount Group (left) and Robert Pazderka, President of The Armored Group, on the occasion of the signing of this agreement.**

markets around the world. TAG is a leading American builder of armoured personnel carriers (APC), SWAT tactical vehicles, personal protection vehicles and cash-in-transit vehicles, and also offers up-armouring

of Toyota Land Cruisers, Toyota Hilux's, and other commercial vehicles, a capability in high demand across the African continent for government and law enforcement. Paramount Group is Africa's largest privately-owned defence and aerospace company, producing highly advanced, mine-protected infantry combat vehicles (ICVs) for globally military users. Incorporating the engineering "lessons-learned" on vehicle and soldier survivability from asymmetrical conflicts in Africa and the Middle East, their line of vehicles is among the most advanced in the world. "This strategic alliance represents each company's ambition to provide our clients with the most complete armoured vehicle portfolio possible... TAG's highly respected products and capabilities are a natural enhancement to our offerings, and we can jointly promote a comprehensive, world-class portfolio to our clients," said Ivor Ichikowitz, Founder and Executive Chairman of Paramount Group. Robert Pazderka, President of The Armored Group, said, "Our customers trust us to provide the best armoured vehicle solutions and through this strategic alliance we offer the most comprehensive range of vehicles on the market... By collaborating with Paramount Group, we can promote an unrivalled offering." TAG's clients include the US Army and the US government, multinational companies and

foreign governments. TAG's American client and manufacturing base provides Paramount with further access to the US Armed Forces and law enforcement agencies. In turn, Paramount Group offers TAG access to its significant and well-established markets in Africa, the Middle East, and Central and Eastern Europe. This alliance will offer the respective companies' clients an end-to-end solution for civilian, law enforcement, and military armoured vehicles.

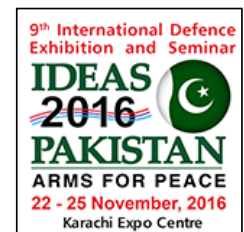
## Polaris Defense

(df) Polaris Industries Inc. announced the appointment of John M. Olson as Vice President and General Manager for Polaris Defense. Reporting directly to Bob Mack, President, Global Adjacent Markets, Olson will execute complete Polaris Defense P&L responsibility, lead and develop the long term strategy for the organisation, and build it into a top supplier of innovative customer solutions to the Department of Defense and other Government agencies. Olson has 28 years' experience in DoD/US-AF, NASA, and White House public service, including 12 years at the Pentagon, as well as 3 years' executive leadership in private industry. He is also a veteran with active service in multiple conflicts, including overseas and wartime support during conflicts in the Gulf, Bosnia/Kosovo, Somalia, Iraq, Afghanistan, and Libya.

# Preview

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# NAVAL DEFENCE AND MARITIME SECURITY EXHIBITION

# 2017

The leading naval defence and coastline security exhibition in the Middle East and North Africa region returns to Abu Dhabi in February 2017. NAVDEX 2017 will continue to attract influential VIP's, naval decision makers and investment companies from around the world to do business with international manufacturers and suppliers. Attracting more than 1,200 exhibitors and 101,000 local, regional and international trade visitors and officials from governments industry and armed forces.

For detailed plans about NAVDEX 2017, please visit [www.navdex.ae](http://www.navdex.ae)

To book an exhibition stand or a berth, please email [shahla.karim@adnec.ae](mailto:shahla.karim@adnec.ae)

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