

European Security & Defence

€8.90
D 14974 E



9/2022

International Security and Defence Journal



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FINLAND



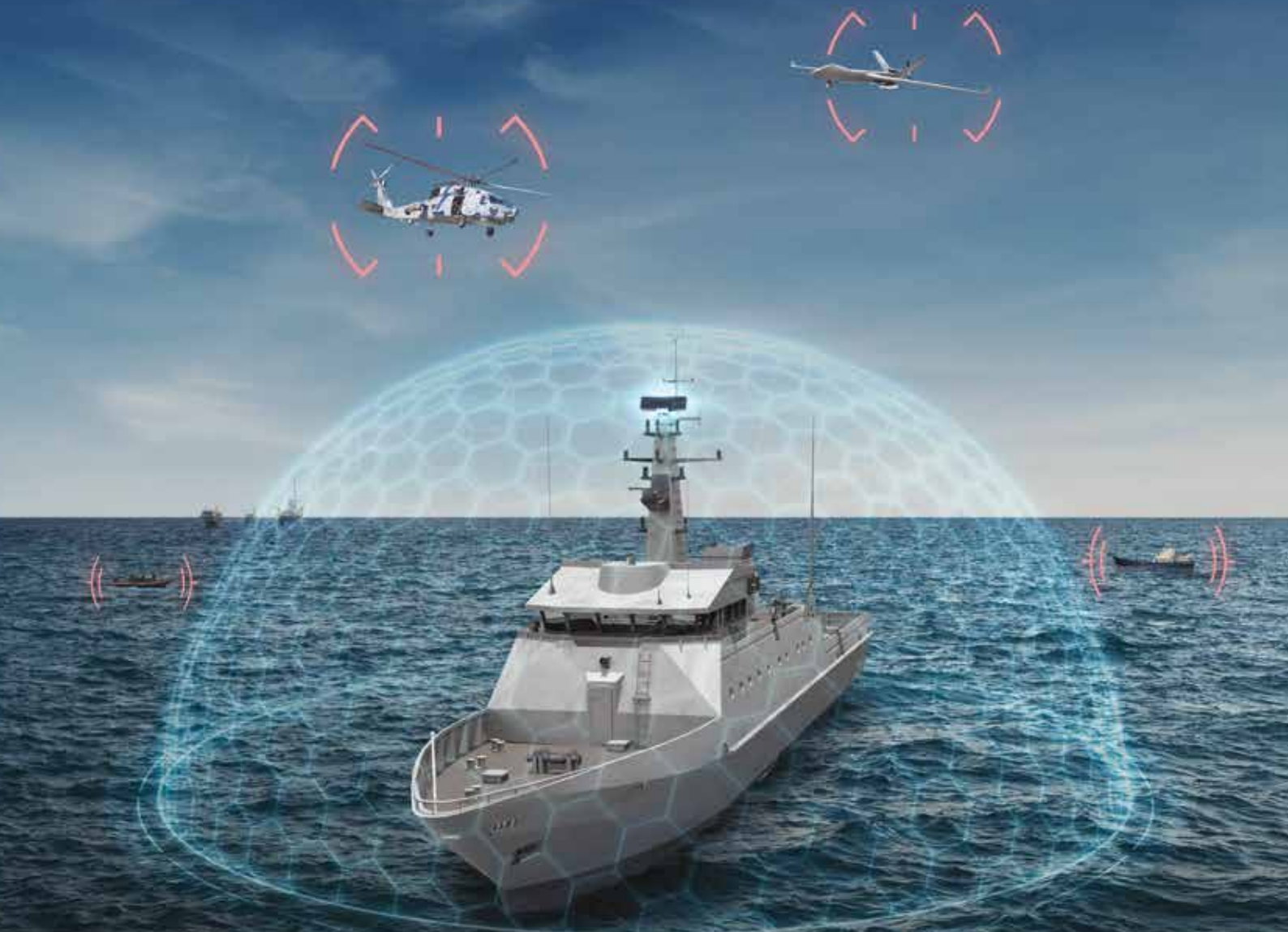
Defence Procurement in Poland

- UK Mobile Fires Platform
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The Outlook for a Ukraine Counter-Offensive

On the evening of Ukraine's 9 August 2022 attack on Saky airbase in Crimea, Volodymyr Zelensky addressed his fellow Ukrainians, stating: "The Russian war against Ukraine and against the entire free Europe began with Crimea and must end with Crimea – with its liberation." Two unnamed Ukrainian officials asked by POLITICO affirmed that the attack could be taken as the start of Ukraine's counteroffensive in the South.

The Ukrainian Armed Forces have shown that they are capable of recapturing territory lost to Russia during the opening phase, as they demonstrated to the North of Kharkiv. However, despite such success stories, their ability to transition from what has broadly been tactical-scale defence to much larger operational-level advances is much less of a known quantity and comes with significant risks.

Any Ukrainian attempt to recapture Crimea would either require moving South via the city of Kherson, or southwards over land from Zaporizhzhia. While either approach is possible, Ukraine's armed forces appear to have been telegraphing Kherson as their initial objective for some time, launching counteroffensives to retake land around Mykolaiv, and striking the Antonivskiy Bridge with guided munitions first around 27 July 2022, and then again on 8 August and 14 August 2022, following Russia's partial repair of the bridge. Keeping the bridge out of action is crucial to limiting Russia's capability quickly to move large quantities of equipment over the river, since without the bridge Russia is forced to rely on pontoon ferries.

However, there are causes for doubt that Kherson is likely to be the initial objective. During a War on the Rocks podcast aired on 20 August 2022, Michael Kofman, Research Program Director of the CNA Russia Studies Program, stated that colleagues or journalists who had visited Kherson region had noted that there did not appear to be much being prepared for an offensive.

This is understandable, as taking back Kherson would be a risky operation, requiring Ukrainian forces to mass and hence become more vulnerable to Russian indirect fires, as well as engage in urban warfare. If Kherson is taken back, it would shore up Ukraine's grip on the western bank of the Dnipro, but it is difficult to see how this can be converted into a meaningful bridgehead for an attack on Crimea. Firstly, it would be relatively simple for the Russian forces to hold the two bridges in the immediate area and to contest Ukrainian attempts to cross the river with ferries. Secondly, these crossings would always remain a weak link for Ukrainian logistics even if they succeeded in crossing the river in force.

This combination of factors would most likely translate to the Dnipro River becoming a barrier which would be difficult for either side to overcome, favouring a stalemate situation in the South. However, forcing this kind of stalemate in the South may not be a bad thing for Ukraine. This could potentially free up manpower for use on other fronts where progress toward Crimea would be a more realistic objective, such as the Zaporizhzhia front. As such, if there is a push on Kherson, the objective of such an operation would more likely be to eliminate Russia's foothold on the western bank of the Dnipro, rather than to set up the city as a serious staging point for a push on Crimea.

However, gaining back Kherson could come with a cost. Russia could similarly capitalise on a stalemate in the South; with lower manpower requirements to guard several crossings and the river, personnel would be freed up to push gains elsewhere. Russia's present commitment to holding Kherson is tying up a lot of manpower and resources in a position under continuous attack and where their prospects for advance look bleak. As such, temporarily prolonging this state of affairs may even be strategically desirable for Ukraine if they can use this window to make gains elsewhere.

Mark Czalet

Contents

■ SECURITY POLICY

- 11 **Protecting NATO's Eastern Flank**
Alex Horobets
- 16 **NATO 2030 Agenda: Readiness or Adaptability?**
Andreea Stoian Karadeli
- 20 **Turkey Imposes Obstacles to Nordic Countries' NATO Aspirations**
Eugene Kogan
- 22 **New Maritime Strategy for the United Kingdom**
Hans Uwe Mergener

■ COUNTRY FOCUS: FINLAND

- 24 **Finland – NATO and New Security Realities**
David Saw
- 30 **"Finland meets the NATO guideline of spending 2% of its GDP on defence."**
Interview with Kristiina Olsson, Director of Finance, Finnish Ministry of Defence
- 31 **Finland's Missile Defence Choice**
Debalina Goshal
- 32 **The Finnish Defence Industry and Changes in the Security Environment**
Tujia Karanko

■ ARMAMENT & TECHNOLOGY

- 34 **Poland Builds Deterrence Potential**
Grzegorz Sobczak
- 38 **CBRN in Europe: Prospects and Developments**
Dan Kaszeta
- 42 **The UK BOXER Programme Moves Ahead**
Christopher F Foss
- 46 **The British Army Artillery Renaissance – The Mobile Fires Platform**
David Saw
- 50 **The Challenge of HIMARS for Russia**
Mark Cazalet
- 54 **Medium Tactical Vehicles – The 6x6 Sector**
David Saw
- 59 **East European Armoured Vehicle Programmes**
Robert Czulda
- 68 **Coastal Defence Missile Systems**
Luca Peruzzi
- 76 **Urgency and Importance in Prepositioning Equipment and Supplies**
Tim Guest
- 82 **The Riot Act – Radio Monitoring**
Thomas Withington
- 86 **Rotary Wing Forces**
Ian Frain
- 90 **Loitering Munitions Update**
Tamir Eshel
- 94 **Challenging Times for the French Defence Industry**
David Saw
- 98 **Battlefield Potential of Laser Communications**
Tim Guest

■ INDUSTRY & MARKETS

- 64 **"Aluminium is the Best Combination of the Disadvantages of Materials."**
Interview with Dr Christian Kauth, Managing Director, General Dynamics European Land Systems-Bridge Systems GmbH (GDELS-Bridge Systems)

■ ARMED FORCES

- 104 **Defending NATO's Northern Approaches**
Alex Horobets
- 108 **Towards a European Army**
Alex Horobets

■ VIEWPOINT FROM ...

- 67 **Tel Aviv**
Tamir Eshel
- 85 **New Delhi**
Suman Sharma

■ THE BRUSSELS BACKDROP

- 19 **Results of a Summit**
Hans Uwe Mergener

■ COLUMNS

- 1 **Editorial**
- 3 **ESD Spotlight**
- 10 **Firms & Faces**
- 81 **Masthead**

Index of Advertisers

ADL	17
Aeronautics	15
Aimpoint	21
Autoflug	39
CANSEC	3 rd cover
Cristanini	75
DVD	105
Embraer	4 th cover
EVPU Defence	5, 55
Fischer Panda	7
Future Forces Forum	41
GSOE Symposium	32
Hanwha Defense	37, 49
IAI	2 nd cover, 29
IDEAS	23
Kallman	107
Koehler	57
LAAD	111
Marine Alutech	27
MAST MED	103
Mittler	109
NCT Europe	93
Patria	25
Photonis	19
Rafael	45
Rheinmetall	43
SAHA Expo	101
SOFEX	89
Vincorion	13
WB Group	53

■ US Army Selects AeroVironment JUMP 20 UAV for Future Tactical Unmanned Aircraft System (FTUAS) Increment 1.

On 19 August 2022, AeroVironment, Inc. announced it received an Other Transaction Agreement (OTA) award by the United States Army on 18 August 2022 for Increment 1 of the FUTURE TACTICAL UNMANNED AIRCRAFT SYSTEM (FTUAS) programme. The contract calls for the delivery of one JUMP 20 medium unmanned aircraft system (MUAS) to a selected Army Brigade Combat Team (BCT) as well as associated services and support. The FTUAS programme aims to replace the



Credit: US DoD

Specialist Christopher McCoy, assigned to 1st Engineer Battalion, 1st Infantry Division, conducts an engine start on the JUMP 20 prior to a launch during the FTUAS capabilities assessment at Fort Riley, Kansas.

RQ-7B Shadow reconnaissance UAV presently in service with various US Army BCTs with a more modern system. Increment 1 of the programme entails testing and fielding of the JUMP 20 before a larger-scale procurement decision is made.

The AeroVironment JUMP 20 is a fixed-wing UAV which is capable of vertical take-off and landing (VTOL) due to being fitted with four propellers for take-off and landing in a quad-copter-type configuration, as well as a tractor propeller at the front for level flight.

According to the manufacturer, the JUMP 20 has an endurance of 14+ hours, a standard operational range of 185 kilometres, and a useable payload capacity of up to 13.6 kg. AeroVironment have also stated that the system can be set up for operation in less than 60 minutes and features a common autopilot and ground control system architecture, allowing it to be configured to meet various operational or user requirements.

■ Rheinmetall and General Motors to Cooperate on US Army Logistics Trucks

(gwh) American Rheinmetall Vehicles and General Motors Defense have entered into a strategic collaboration to participate in the US Army's Common Tactical Truck (CTT)

project. According to a joint press release by the two companies, the US Army wants to find a replacement platform for the Family of Heavy Tactical Vehicles (FHTV). The heavy and medium wheeled tactical vehicle fleet platforms to be replaced include the PALLETISED LOAD SYSTEM (PLS), the HEAVY EXPANDED MOBILITY TACTICAL TRUCK (HEMTT) and the M915 LINE HAUL TRACTOR. The total requirement is estimated at 5,700 vehicles, with a value of approximately US\$5Bn (EUR5Bn).

The companies expect a prototyping contract to be awarded in December 2022 following the June RFP for the first phase, with prototypes to be delivered by the end of 2023 and tested by the US Army in 2024. The CTT production contract is expected to be awarded in 2025.

According to the companies, the CTT programme is a rapid prototyping project intended to enable the US Army to rapidly procure and test tactical truck prototypes to replace its current family of heavy tactical trucks. The US Army is looking for platforms with driver safety systems, good off-road capability, cyber security, machine learning, artificial intelligence, good survivability and fuel efficiency, as well as other technologies.

Rheinmetall is focusing on its recently-launched HX3 series, and the company added that the HX3 series incorporates key commercial technologies that reflect the joint venture between Rheinmetall and MAN Truck & Bus. This simplifies logistics, maintenance, and the modernisation of vehicles. GM Defense brings its experience of Other Transaction Authority (OTA) contracts, rapid prototyping, design and engineering, and delivery.

An Americanised HX3 will form the basis of the offer that the American Rheinmetall Vehicles and GM Defense team will make



Photo: Rheinmetall

to the US Army in the first phase of the CTT programme. Thanks to its open architecture, the basic HX3 vehicle will allow for continuous modernisation and capability growth as technology evolves. This will both reduce obsolescence issues and lower overall life cycle costs.

The companies' joint statement highlights the following features of the HX3 Common Tactical Truck (HX3-CTT) platform:

- interchangeable protected cab design,
- Advanced Driver Assistance Systems (ADAS)
- Drive-by-wire operation
- Open systems electrical architecture (allowing integration of leader-follower and autonomous capabilities)

The HX3 family is offered in multiple axle configurations from 4x4 to 10x10, and possesses a high level of commonality and modularity across variants, which can include cargo, load handling systems, tankers, and line haul tractors.

■ Type 23 Frigate Post-Life Extension Upkeep Started

(jh) Babcock International Group has started a post-life extension (LIFEX) on the Royal Navy's Type 23 frigate HMS ARGYLL at their Devonport facility. It is the first Type 23 to undergo a post-LIFEX upkeep, adopting a new approach to re-certification at the facility's Frigate Support Centre (FSC), the company writes in a press release.



Photo: Babcock

Babcock is to overhaul equipment and carry out design changes for new capabilities such as communications upgrades and mixed crewing. The DUKE Class frigate is also planned receive a full spray coat of paint the outer bottom and ship side.

The vessel is being prepared for a Lloyds structural survey to achieve an early full ship assessment in several weeks. Commissioned in 1991, HMS ARGYLL is the longest-serving Type 23 frigate and was the first to undergo upkeep within the LIFEX programme in 2015.

■ AI-Powered Navigation System for Project THESEUS 2.2

(jh) Rheinmetall has secured a contract with the UK MoD's Project THESEUS 2.2, an initiative to automate supply delivery to soldiers in hostile environments, the company writes in a press release. First systems have already been delivered. Rheinmetall Canada is working with



Polaris Government and Defense to augment the Polaris MRZR D4 tactical vehicle with the Rheinmetall PATH Autonomy Kit (A-kit), an Artificial Intelligence (AI)-powered navigation system. The project marks the first installation of the PATH A-kit on an MRZR D4. According to Rheinmetall, the contract was awarded in February 2022, following an invitation to tender. Rheinmetall is serving as the prime contractor, in collaboration with Polaris, and Rheinmetall Provectus, its Ottawa-based robotics branch. Polaris Defence United Kingdom is to provide in-country support. The contract scope includes installation, training, spare parts, and technical support for the PATH A-kit, as well as platform support on 11 Polaris MRZR D4 vehicles. Once equipped with the A-kit, the MRZR D4 is planned to be ready for crewed and teleoperated use cases, as well as autonomous execution of resupply missions, day and night. The Rheinmetall PATH A-kit has been designed to transform crewed vehicles into optionally crewed ground vehicles (OCGVs).

■ First EUROFIGHTER Handed Over to Qatar

(gwh) BAE Systems has delivered the first EUROFIGHTER TYPHOON to the Qatari Armed Forces during an official handover ceremony in Warton, UK. The fighter is due to be transferred to Qatar before the end of August,



and according to BAE Systems, one of its first missions will be to help protect the World Cup starting on 20 November. The event marks an important milestone in the programme, following the signing of a US\$6.7 billion contract in December 2017 between the Government of Qatar and BAE Systems for the procurement of 24 EUROFIGHTER TYPHOON and nine HAWK training aircraft, as well as a six-year availability support service. Social media teaser: "First Eurofighter Delivered to Qatar."

■ Northrop Grumman AN/TPS-80 Demonstrates Fire Control Capability against Cruise Missiles.

(mc) On 15 August 2022, Northrop Grumman announced that their AN/TPS-80 Ground/Air Task Oriented Radar (G/ATOR) successfully detected and tracked multiple simultaneous cruise missile threats during a recent live-fire test at the White Sands Missile Range, New Mexico. During the test, the AN/TPS-80 successfully tracked each target



after launch and passed the relevant information onto the Tamir missiles, resulting in the successful interception of several cruise missile representative targets.

The tests were part of the US Marine Corps' (USMC) GROUND-BASED AIR DEFENSE MEDIUM-RANGE INTERCEPT CAPABILITY (GBAD MRIC), a developmental programme aimed at developing a mobile very short-range air defence (VSHORAD) and counter-rocket, artillery and mortar (C-RAM) capability for the USMC to protect friendly assets from airborne threats including cruise missiles and aircraft.

The GBAD MRIC programme, led by the USMC, integrates the AN/TPS-80 G/ATOR radar with the Common Aviation Command and Control System (CAC2S) command and control (C2) system, and components of the Israeli Iron Dome System including a trailer-based variant of the launcher and the Tamir missile. The system is being developed in support of the Marine Corps Force Design 2030 strategy.

The AN/TPS-80 is a towed trailer-based radar which can be rapid emplaced and displaced, allowing it to be repositioned quickly after operation to avoid enemy targeting. Within the GBAD MRIC programme, the AN/TPS

serves as a multifunctional radar, undertaking both the search and fire control roles. Social media teaser: "Northrop Grumman AN/TPS-80 Demonstrates Fire Control against Cruise Missile Threats."

■ armasuisse Downselects Final Two Candidates for Wheeled Howitzer Requirement

(gwh) The Swiss procurement agency armasuisse has downselected to two final candidates for further testing and evaluation in the "Artillerie Wirkplattform und Wirkmittel 2026" (Artillery Effective Platform and Effective Means 2026) programme. The programme is aimed at replacing Switzerland's indirect fire support systems. The Swiss Armed Forces presently have 133 M109 KAWEST self-propelled howitzers (SPH) in their inventory, and according to armasuisse, the M109 SPH is due to reach the end of its service life at the beginning of the 2030s, having been procured 50 years ago.

Armasuisse state in a press release that they had invited several manufacturers to submit their proposals based on Swiss requirements. After assessing the initial proposals two systems were downselected for further evaluation:

- ARCHER 8x8 self-propelled howitzer from BAE Systems Bofors AB, Sweden.
- RCH 155 AGM Howitzer from Krauss-Maffei Wegmann GmbH & Co. KG (KMW), Germany, with two possible carrier platforms (BOXER 8x8 or PIRANHA 8x8).

During the evaluation phase, the systems' technology, deployment potential and logistics are due to be tested and analysed in depth using functional prototypes. These tests are planned for 2023 and 2024, and



will take place both in Switzerland and abroad, according to Armasuisse. The final decision on which system will be procured is due to take place by the time of the Swiss Armed Forces Dispatch 2026.

The 155 mm ARCHER artillery system used in Sweden is based on a Volvo 6x6 truck platform with a protected cab. The system uses a 155 mm/L52 automatically loaded, remotely-operated gun, carries 21 ready rounds of



Photo: Armasuisse

ammunition and can attain ranges of 30-60 km, depending on the ammunition and propellant charge used. A crew of at least three is required for operation. For self-protection, a Kongsberg PROTECTOR remote weapon station (RWS) can be mounted on the vehicle cab. The sole user is the Swedish Army, which has 48 ARCHERs in its inventory and has ordered another 24 for delivery from the end of 2022.

The RCH 155 (Remote Controlled Howitzer 155) likewise uses an automatically-loaded and remotely operated 155 mm/L52 gun, albeit carrying 30 ready rounds and 144 modular propellant charges. KMW has publicly demonstrated the RCH 155 on the BOXER 8x8 platform during live fire testing in August 2021, which included a fire on the move demonstration. KMW has stated the gun's range to be 54 km, and an RWS is available for close-in self-protection. Targeting in direct fire mode can be conducted either with optional optronics or via the RWS. The system requires two crew for operation. For the RCH 155 base platform, armasuisse intends to investigate the PIRANHA IV 8x8 from GDELS and the BOXER 8x8 from ARTEC. The BOXER would require the establishment of a new logistics chain in the Swiss Armed Forces, while the PIRANHA IV would be able to draw from the existing chain.

■ Australian Army Unveils BUSHMASTER with Electric Drive

(Kristóf Nagy) On 10 August, the Australian Army unveiled an electrically-powered prototype of the BUSHMASTER wheeled protected vehicle at the Australian Chief of Army Symposium (CAS). The conventionally-powered version of the vehicle had recently

attracted attention as the Australian Government handed over 60 to the Ukrainian armed forces.

The BUSHMASTER vehicle is currently produced in twelve different versions by Thales Australia, based in Bendigo, Australia. Aside from Australia, the Netherlands is the largest user of the all-terrain and air-portable vehicle, which can be optionally equipped with protection up to STANAG 4569 Level 3. The prototype unveiled at CAS, referred to as the electric Protected Military Vehicle (ePMV), saw the 300 hp Caterpillar 3126E 7.2 six-cylinder diesel engine replaced with a new electric drive system. According to the manufacturer, the next development step is to increase the vehicle's range up to 1,000 km.

Col. Robin Smith, head of Robotic and Autonomous Systems Implementation and Coordination Office (RICO), expressed high hopes for the ePMV's development. The Australian Defence Force's RICO office, which specialises in unmanned systems, is responsible for the prototype and sees it as a precursor to future combat vehicles, some of which could operate unmanned. Smith sees the advantages of the ePMV over vehicles with internal combustion engines, which are already being realised, in greater acceleration, higher torque and lower maintenance requirements due to fewer individual mechanical components. Additionally, Smith noted that powering additional external systems is a relevant capability on the digitized battlefield of the future. Smith also pointed to the lower thermal and acoustic signature of electrical drive compared to conventional drive.

The ePMV program was carried out by RICO in the lead role, with Thales simply supplying the base vehicle for modification. The Australian Defence Force plans to approach industry

only after it has assessed the technical and tactical requirements and produced a set of specifications. That step will not happen for several years, according to Smith, and a potential award process would only occur once funding is secured.

■ India's Aircraft Carrier INS VIKRANT Commissioned

(mc) The Indian Navy's newest carrier, the INS VIKRANT, has been commissioned following four phases of sea trials of major equipment and systems between August 2021 and July 2022. The ship is powered by four General Electric Marine (GE Marine) LM2500 gas turbines, developing 88 MW and providing a maximum speed of 28 knots. The carrier is 262m in length, has 14 decks, can accommodate a crew of 1,700, and is capable of operating 30 aircraft.

The addition of the VIKRANT to the Indian Navy's fleet is a noteworthy accomplishment for the Government's 'Make In India' initiative, as 76% of the content is indigenous, adding India to a small group of nations with indigenously-built aircraft carriers.







Photo: Commonwealth copyright / Department of Defence Australia / Max Bree

Photo: GE Marine



The IAC (Indigenous Aircraft Carrier) project started in 2007, and following selection, GE Marine announced that LM2500 marine gas turbines would power the ship and be built by Indian partner Hindustan Aeronautics Limited (HAL). With the commissioning of the VIKRANT, the Indian Navy has 18 GE Marine engines in service, with additional engines in production to support the ongoing PROJECT 17A ship construction.

The LM2500 gas turbine kits were manufactured at GE's Evendale, Ohio, facility and were assembled and tested by HAL's Industrial & Marine Gas Turbine Division in Bangalore, India. GE stated that HAL assembles, inspects, and tests all LM2500 gas turbines built for the Indian Navy.

■ Boeing and Nammo Fire RAMJET 155 Artillery Projectile in Long-Range Test

(gwh) Boeing and Nammo have jointly tested a ramjet-powered artillery projectile developed on behalf of the US Army with a long-range test place which took place at the Andøya Test Centre in Norway. According to Nammo, the test was successful, and consisted of firing a Boeing RAMJET 155 projectile from a 155 mm gun, followed by successful ignition of its ramjet engine. Nammo stated that in flight, the projectile demonstrated stability in flight and a well-controlled engine combustion process. The company added that further tests and demonstrations are planned in the coming months.

Photo: Nammo



In operation, the projectile is fired out of a typical 155 mm gun and the ramjet is ignited shortly after it leaves the barrel, further accelerating the projectile and resulting in a range increase compared to conventional rounds. Accord-

ing to Nammo, the air drawn into the ramjet for combustion is compressed solely by the forward motion of the projectile at supersonic speeds.

The US Army's "Long-Range Precision Fires" LRPF programme is examining ways to support combat troops with long-range precision fires. One solution is artillery shells that are further accelerated by rocket propulsion after firing. Under the US Army's XM1155 Extended-Range Artillery Projectile (ERAP) programme, Boeing's Phantom Works division and Nammo were awarded a contract to further develop the RAMJET 155 projectile in July 2019.

The LRPF programme aims to develop a common projectile design for use in 155 mm L39 and L58 guns, according to Nammo. The company has previously unveiled a ramjet-powered missile with a range of 400 km at the DSEI 2019 exhibition.

Social Media Teaser: "Boeing and Nammo Successfully Test RAMJET 155 Artillery Projectile. Further Tests Planned for the Coming Months."

■ Bristow Awarded Contract for Manned-Unmanned Search and Rescue by UK Maritime Coastguard Agency

(mc) On 12 August 2022, Bristow was awarded a 10-year contract by the UK Maritime Coastguard Agency (MCA) to deliver the Second-Generation Search and Rescue

Photo: Schiebel



(UKSAR2G) programme. The contract includes the operational deployment of Schiebel's CAMCOPTER S-100 Unmanned Aerial System (UAS). The new contract expands and builds upon the existing capabilities Bristow has delivered to the MCA since 2015, most notably the search and rescue (SAR) helicopter service for HM Coastguard.

In January 2019, Bristow received its first Schiebel CAMCOPTER S-100 system, consisting of two aircraft, a ground control station and engineering and logistical support. This was intended as a proof-of-concept capability, to demonstrate the utility of combining unmanned with manned aviation in the SAR role. In 2022, Bristow took delivery of a second system, stationed on the south

coast of England to support MCA and HM Coastguard operations in the English Channel. Recently, Bristow trained additional pilots and engineers to maintain its fleet of CAMCOPTER S-100 in the UK. The CAMCOPTER S-100 Vertical Takeoff and Landing (VTOL) UAS can operate from unprepared launch zones and does not require supporting launch or recovery equipment. It is capable of day and night operation under adverse weather conditions with a range of payloads, with a maximum range of 200 km over land or sea.

■ Inventory of the Multinational A330 MRTT Fleet Grows to Seven Aircraft

(mc) With only three days between each delivery, the last two A330 multi-role tanker and transport (MRTT) aircraft from the first tranche have been handed over to the Multinational MRTT Unit (MMU). This gives the MMU seven aircraft that can be used for transport missions from the Eindhoven and Cologne operational sites, and declaration of initial operational capability (IOC) is expected soon. Deliveries of the second tranche of two aircraft are expected to begin in 2024. European procurement agency OCCAR ordered a total of nine transport aircraft from Airbus in 2016, with an option for two more on behalf of Belgium, the Czech Republic, Germany, Luxembourg, the Netherlands, and Norway. Under the programme, A330-200s are converted to the MRTT role in Getafe. Following acceptance, the aircraft become NATO property are managed by the NATO Support and Procurement Agency (NSPA). Since 2020, the aircraft have been delivered to the MMU via NSPA, and operational flights began as early as 2021, under the command of the European Air Transport Command (EATC). On 15 August, three A330 MRTTs are due to fly to Singapore alongside an air force contingent for the "Rapid Pacific" Exercise.

Each A330 MRTT is designed for 1,100 flight hours per year, and member nations are entitled to transport services in proportion to their financial contribution, providing the following flight hours: Germany (5,500 flight hours), the Netherlands (2,000 flight hours), Luxembourg (1,200 flight hours), Belgium (1,000 flight hours), Norway and the Czech Republic (100 flight hours each). In addition to this, Belgium reportedly intends to declare a requirement for an additional 1,000 flight hours, which could lead to the procurement of a tenth aircraft.

The Airbus A330-200 base aircraft is a strategic tanker/transport aircraft. The large 111-tonne base capacity enables the aircraft



Photo: NSPA

to perform aerial refuelling missions without the need for additional tanks in the passenger area. The aircraft is offered with a choice of air-to-air refuelling systems. Thanks to its true widebody fuselage, it can also be used as a pure transport aircraft, capable of carrying up to 267 soldiers or a payload of up to 45 tonnes. It can also be converted into a medical evacuation configuration capable of accommodating up to six intensive care units and 16 stretchers.

■ Polish Procurement Efforts: Poland Orders K2 MBTs, K9 SP Howitzers and FA-50 Aircraft from South Korea

(ghw) Poland's Deputy Prime Minister and Minister of Defence Mariusz Blaszczak has signed three contracts for the procurement of about 1,000 K2 BLACK PANTHER main battle tanks (MBTs), 650 K9 self-propelled howitzers and 48 FA-50 fighter aircraft from South Korea. The deliveries of these tanks and howitzers are to start this year with the first aircraft scheduled for delivery next year. The fast pace of deliveries and large transfer of technology to Poland are special features of the agreements, Blaszczak said. "The framework agreements will significantly strengthen the Polish Armed Forces. This strengthening is of great importance given



Photo: MoD Poland

Representatives of the Polish MoD and Korean companies during the contract signature ceremony

the situation on our eastern border. We have no time, we cannot wait. We need to arm the Polish Armed Forces," said Blaszczak. Hyundai Rotem has been contracted to deliver over 980 K2 BLACK PANTHER MBTs. The first batch covers 180 vehicles, due to be delivered to Poland in their current state of construction from the end of the year. By

2026, the definition of the dedicated military requirements for the Polish version of the K2PL is expected, which will be implemented to produce more than 800 tanks of the second batch. Upon completion of the production, the first batch is to be upgraded to the K2PL standard.

The contract with Hanwha provides for the procurement of 48 K9 self-propelled howitzers, the delivery of which is also due to start this year. From 2024, the delivery of a further 600 howitzers is set to take place. While the first K9s are to be manufactured in South Korea, participation by Polish industry is envisaged from 2026. All K9s will be equipped with Polish communication systems from the outset and connected to the TOPAZ integrated combat management system.

According to Minister Blaszczak, the K9 design was similar to the Polish KRAB SP howitzers and the Government would be continuing to order the KRAB systems, but Huta Stalowa Wola's production capacity was not sufficient to cover the requirement. Furthermore, the Minister stated that in the next few years, the objective would be to select the best of the KRAB design and the best of the K9 design so that this weapon becomes uniform for both countries.

The first twelve FA-50 training and combat aircraft are due to be delivered by Korea Aerospace Industries in 2023. Another 36 aircraft in the modern Block 20 standard are to follow. The aircraft will be configured according to the exact requirements of the Polish Air Force (IFF NATO). The FA-50s will replace Soviet-era aircraft and serve to intensify the training of Polish pilots. They can also be used to carry out various missions. From 2026, Poland plans to maintain the aircraft by itself and produce spare parts under licence.



Photo: Hyundai Rotem

The K2 BLACK PANTHER features a hunter-killer function, auto-target detection, and tracking systems, as well as electric gun and turret driving systems.

Pilots trained on the FA-50 could be re-trained within a few hours on the F-16 fighter, of which Poland has 48 aircraft in its inventory, Blaszczak noted in an interview with Defence 24. Additional F-16s could not be procured because Lockheed Martin was concentrating on the production of F-35s.

The procurement contracts signed by Poland are among the largest in Europe and are said to be South Korea's biggest arms deal. The Polish Defence Ministry has not disclosed contract amounts. Insiders estimate the financial volume at €15Bn.



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 Find out more on our YouTube channel


Photo: Hanwha Defense



The K9 THUNDER 155 mm self-propelled howitzer was designed and developed by the South Korean Agency for Defence Development and Samsung Aerospace Industries. It is manufactured today by Hanwha Defense.

Photo: KAI



The FA-50, part of the GOLDEN EAGLE supersonic aircraft family, was developed as a light combat aircraft by Korean Aerospace Industries (KAI) with the support of Lockheed Martin.

With this procurement effort, the country is arming itself against the threat it faces along its more than 1,200 km long eastern/north-eastern border, which it shares with Russia and Belarus, among others.

■ Milrem Robotics Delivers the First TheMIS Unmanned Ground Vehicle to the Spanish Army

(mc) Milrem Robotics has delivered the first TheMIS Unmanned Ground Vehicle (UGV) to the Spanish Ministry of Defence. The Ministry's Directorate of Armament and Material (DGAM) awarded the contract for one TheMIS UGV to A.Paukner, S.A., Milrem Robotics' representative in Spain. The TheMIS was acquired under framework of the SCORPION programme

Photo credit: Spanish MoD



launched in early 2021 to evaluate the capabilities of existing unmanned ground vehicles. According to Milrem, the first phase of the programme aims to define a

list of missions which could benefit from the use of unmanned ground systems. The TheMIS UGV can be configured to undertake various mission types intended to support dismounted troops. In one configuration it can serve as a cargo mule for an infantry squad's gear, while in a second configuration it can serve as a remotely operated weapons platform in the force protection role.

The system was previously deployed to the counter-insurgent operation Barkhane in Mali, making it the first unmanned system in its size class deployed to a conflict area. During its deployment, TheMIS was operational for over 330 hours, during which it traversed 1200 km in rugged terrain conditions, and in temperatures approaching 50 °C in the shade.

■ First STRYKER with 30 mm Turret Delivered

(mc) The US Army has taken delivery of the first STRYKER equipped with the 30 mm Medium-Calibre Weapon System (MCWS) unmanned turret from Oshkosh Defense at the Aberdeen Test Centre. According to Oshkosh, the system is due to undergo product verification testing before being released for serial production.

The base vehicle used is the most recent version of the STRYKER A1 double-hulled Infantry Carrier Vehicle V-shaped (ICVVA1), while the MCWS unmanned turret is based on the Rafael SAMSON turret design. For

Photo: Oshkosh Defense



the upgrade programme, Oshkosh has partnered with Pratt Miller Defense and Rafael Advanced Defense Systems.

In June 2021, the US Army awarded Oshkosh Defense a five-year framework contract for the upgrades. Reportedly, delivery of the first seven MCWS STRYKER vehicles is scheduled for September 2022, and product verification tests are due to be completed by June 2023. According to Oshkosh, the first upgraded vehicles are slated to be handed over to the I-2 STRYKER Brigade Combat Team (SBCT) as early as July 2023.

The US Army has a total requirement for 269 vehicles to be upgraded under the framework contract, which is scheduled for com-

pletion by 2027. In addition to this batch, a further 20 vehicles are earmarked for product verification testing (PVT), follow-on operational testing & evaluation (FOT&E) and logistics development.

■ Rolls Royce Selected to Supply MTU Engines for UK BOXER Programme

(mc) WFEL and Rheinmetall BAE Systems Land (RBSL) have each selected Rolls Royce Solutions UK to supply their MTU 8v 199 TS21 engine for the British Army's BOXER armoured vehicles, WFEL writes in a press release. Under both contracts, 523 units are to be produced in Rolls Royce's facility in East Grinstead, West Sussex, for the UK MoD's Mechanised Infantry Vehicle (MIV) programme. First deliveries are scheduled for later this year.

Photo: esut.de



Additionally, further engine contracts are expected, given that in April 2022, the British Army announced it had ordered an additional 100 BOXER armoured vehicles, bringing the total number on order to 623. According to the company, the MTU 8v 199 TS21 engine has been proven in military applications. Their rated power output of 600 kW is considered sufficient to meet the platform's mobility and on-board electronics power demands. The BOXERs for the British Army will be the first versions of the vehicle equipped with this engine variant, which develops 70 kW more power than the MTU engines in previous versions of the BOXER.

For the WFEL contract, the Rolls Royce engines will be delivered directly to Huddersfield-based David Brown Santasalo, who will then integrate the engines into the complete BOXER powerpack assemblies, which are then delivered to WFEL.

Under the RBSL contract, assembly and testing of the Boxer powerpack (transmission, engine and cooling systems) will take place at its manufacturing site in Telford. The powerpacks will then be integrated into Boxer vehicles as part of RBSL and WFEL's vehicle production plans at their respective UK facilities in Telford and Stockport.

■ iXblue & ECA Demonstrate Subsea Asset Tracking

(jh) iXblue and ECA Group recently demonstrated subsea asset tracking in shallow waters using iXblue's GAPS M7 USBL (Ultra Short BaseLine) positioning system and ECA Group's R7 ROV (Remotely Operated Vehicle), iXblue writes in a press release. Hosted by their local partner Thesta, a Polish company providing maritime navigation services and communication systems for the defence sector, the demonstration was organised for the Polish Naval Academy and NAVSUP 2022 attendees with the aim of showing that accurate positioning of underwater targets is possible in a potentially hostile and fast-approaching environment, in coastal regions characterised by shallow waters and often limited access.

According to iXblue, ECA Group's R7 ROV investigated objects and structures submerged in the shallow waters of the Baltic



Photo: iXblue

Sea in Gdynia harbour as part of the mission scenario. iXblue's GAPS M7 USBL acoustic positioning system was deployed to geolocate the R7 ROV and correct its trajectory in real time. A fixed transponder was also placed several hundreds of metres away from the vessel, at only 5 metres deep. The trials were carried out in water depths of 7 to 10 metres, surrounded by many docks and vessels causing significant acoustic echoes. Despite challenging acoustic conditions, the positioning of the ROV and the transponder was stable and accurate, the company emphasizes. The ROV inspection was successful despite the low visibility.

■ Firefighting Kit Demonstrated on A400M

(jh) Airbus has successfully tested a removable firefighting demonstrator kit on the A400M airlifter during a flight test campaign in Spain, the company writes in a press release. This took place in daylight conditions with a minimum operating height of 150ft, flight speeds as low as 125 knots and drops involving up to 20 tonnes of water from the current tank in less than 10 seconds. The



Photo: Airbus

main objective of the campaign is to validate the drop water quantity and time as well as the ability of the A400M to carry out this new role with the kit. The development of this prototype and the tests have been carried out in collaboration with the 43rd Group of the Spanish Air Force, as well as European authorities in Firefighting operations and the Ministry for Ecological Transition and Demographic Challenge.

The Airbus firefighting solution created for the A400M is a roll-on/roll-off (RORO) kit that requires no modification to the aircraft and therefore is interchangeable to any aircraft in the A400M fleet. The water is stored in a fixed tank in the cargo hold and retained by two independent doors. These doors are connected to two flood pipes, so when the discharge is triggered, the water is expelled through two sections at the end of the ramp. The introduction of this RORO solution allows a rapid reaction to unforeseen fires and reconfiguration of the aircraft to any of its other roles.

■ Second TROPHY APS Batch for US MBTs

(gwh) The US Army Contracting Command has ordered additional TROPHY Active Protection Systems (APS) from General Dynamics Land Systems, the prime contractor for the M1 ABRAMS Main Battle Tanks (MBTs), for about US\$280M. Developed by Rafael, TROPHY is marketed in the US in cooperation with Leonardo DRS.

At the end of 2020, the US Army had completed the fitting of 336 MBTs for the Armoured Brigade Combat Teams (ABCT) with TROPHY. According to official figures, the procurement cost US\$400M. A supplementary contract for almost €160M was concluded for operational support.



Image: Leonardo

Based on the above figures and contract volumes from the recent past, it can be assumed that about 250 to 300 TROPHY kits will be subject to procurement. This would be enough to equip the MBTs of at least three ABCTs. The TROPHY systems will be fitted to the latest versions of the vehicles designated M1A2 SEPv2 and M1A2 SEPv3. The converted tanks are to be delivered by July 2027.

TROPHY has been in successful use in Israel for 10 years on MERKAVA IV MBTs and NAMER IFVs, according to Rafael. The German Bundeswehr has ordered Trophy systems to equip 17 LEOPARD 2 A6 A3 MBTs for delivery with a focus on 2023. Last year it was announced that the UK intends to equip part of its CHALLENGER 3 MBT fleet with TROPHY as part of the ongoing modernisation. Initial trials have already been completed.

■ Textron Aviation Introduces Cessna CITATION Maritime Patrol Aircraft

(jh) Textron Aviation has announced a Maritime Patrol Aircraft (MPA) variant of its CITATION Longitude aircraft.

Textron Aviation has developed and has certified factory provisions for various mission equipment supporting maritime patrol and surveillance missions, the company writes in a press release.



Photo: Textron Aviation

According to Textron Aviation, the aircraft has an eight hour maximum endurance and 3,500 nautical mile maximum range and is outfitted with a transmissive belly radome for maritime radars, Beyond Line of Sight (BLOS) fairing, Electro-Optical/Infra-Red (EO/IR) sensor lift, and optional Night Vision Goggle (NVG) compatible lighting for surveillance missions over land and water, search and rescue, border patrol, and fishery monitoring.

■ Motorola Solutions Acquires Barrett Communications

(gwh) Motorola Solutions has announced their acquisition of Barrett Communications, a radio communications provider which primarily develops HF and VHF radio systems for customers in the civil security, border protection and coast guard industries. According to Motorola Solutions, the acquisition expands its portfolio and extends its reach into international markets.

■ Thales Group and Kraken Technology Group Announce Partnership

(mc) British maritime technology company Kraken Technology Group (KTG) today announced on 4 August 2022 that they had signed a Memorandum of Understanding (MoU) with Thales for the ongoing development and provision of systems for the Kraken K50 maritime platform.

According to KTG, Thales will provide the ability to integrate a range of sensor and weapons equipment with command and control, communication and networking systems. Thales has also identified the Lightweight Multi-Role Missile (LMM) as a candidate for integration onto the Kraken K50. LMM, also known as MARTLET, can operate in both air defence and surface at-

Photo: Kraken



tack roles. This integration effort is in conjunction with Thales' other partners MSI-DSL, who are developing a new lightweight launcher for LMM. KTG stated that further areas of collaboration and development with Thales will include the development of composite craft, in addition to electric and advanced hybrid powertrain solutions, all of which will be built at a new engineering and technology centre.

Social Media Teaser:

Thales and Kraken Technology Group announce partnership. The joint effort is aimed at provision of systems for Kraken K50 platform.

■ Greg Otsa to Join Milrem Robotics as the Head of Software Development

(jh) IT professional Greg Otsa will join Milrem Robotics' team as the head of the Software Development department in August 2022, Milrem writes in a press release. Otsa will join Milrem Robotics from

Photo: Milrem



Telia where he has held different positions for nine years, the last 1.5 years as the Chief Information Officer. According to the company, Otsa has experience with team leading, working in multinational teams, change management and has a technical background as a former system administrator. Prior to Telia, Otsa held different positions at Eesti Energia. Otsa also has an MSc in Information Technology from TalTech.

■ Draken Europe and Aero Vodochody Sign Teaming Agreement

(jh) Draken Europe has announced the formal signing of a teaming agreement with Aero Vodochody Aerospace (AVA). The two companies plan to work together in support of the RAF's new Interim Red Air Aggressor Training Service (IRAATS) and identify and develop maintenance, upgrade, training and support opportunities for Draken's Teesside-based fleet of civil-registered L-159E HONEY BADGER aircraft. Draken Europe's fleet of eight L-159E aircraft is shortly to be in service as the "enemy", flying against UK armed forces personnel as part of the Royal Air Force's recently signed Interim Red Air Aggressor Service, Draken writes in a press release. The service is the first of its kind

Photo: Draken



in the UK and represents the delivery of a new training capability for the RAF. The service is contractor-owned, contractor-operated, reducing the overall cost to the UK Government and enabling uniformed pilots and engineers to be utilised on front line units. The service is to include air-to-air, target, threat simulation and mission augmentation training over the next three years, with operations due to commence this summer. The contract represents an enhanced capability over the previous HAWK T1 service delivered by the RAF's recently disbanded 100 Sqn.

■ Defenture and KMW Sign MoU

(jh) Against the background of the German-Dutch procurement project for a new airborne vehicle platform (LuLa), KMW (Krauss-Maffei Wegmann) and Defenture have agreed an MoU, Defenture writes in a press release. LuLa is to replace the airborne forces' existing vehicles and forms part of the €100Bn special fund approved by the German Parliament. Defenture's GROUNDFORCE (GRF) vehicle is in service with the Dutch Army and forms the basis for the planned LuLa vehicle family.

Photo: Defenture



According to the company, GRF is a truly Military of the Shelf platform with a weight of five tons and a payload of two tons. Reportedly, the vehicle is certified for airlift in a CH-47F CHINOOK. GRF offers integrated and modular ballistic protection. Its turning radius is nine metres based on a four-wheel steering system. In the scope of the MoU, KMW is in charge of various equipment kits.

The Situation in Eastern Europe: Protecting NATO's Eastern Flank

Alex Horobets

Having proclaimed "360-degree defence", NATO paid special attention to its eastern flank, where the construction of a new defensive line has begun.

The situation on NATO's eastern flank was gradually becoming a crisis, eventually erupting in a full-scale Russian invasion of Ukraine, which the Kremlin branded a "special military operation" in order not to associate it with an actual war for its Russian audiences, and also to have more room for manoeuvre depending on developments. For example, without naming it a 'war' and failing to capture Kyiv in the first weeks of the invasion, Moscow announced the "second stage of the operation", focusing its efforts on trying to grab the entire Luhansk and Donetsk regions. However, this in no way diminishes the challenges NATO is facing, since the so-called Union State is already intending to deploy Russian tactical nuclear weapons on the territory of Belarus, while Alexander Lukashenka has repeatedly claimed that NATO, under the guise of exercises, is plotting to attack Russia via Ukraine and Belarus. Accordingly, in this situation, NATO is also facing a threat coming from Belarus, whose territory and airspace are at the full disposal of Russian troops.

NATO is already building up its presence in Eastern Europe. The existing units numbering up to 2,000 troops have been reinforced in Poland, Latvia, Lithuania, and Estonia. These represent the NATO allies bordering Russia and Belarus, where the risk of escalation and provocations is deemed the highest. That is especially the case given the Belarusian military exercise being conducted close to Polish borders and the recent crisis around transit restrictions through Lithuania to Kaliningrad. New NATO units have also been set up in Romania, Hungary, Slovakia, and Bulgaria. There are now 100,000 US troops currently stationed in Europe, 40,000 of which are under direct NATO command. However, the nations on the NATO eastern flank are now mulling the need to increase the number and deployment periods of the Alliance's multinational forces.



The NATO Summit in Madrid, Spain, in June 2022



French troops testing surface-to-air defence systems in Poland as part of exercise RAMSTEIN LEGACY 22

The Madrid Summit

The NATO Summit in Madrid held in June 2022 was largely devoted to the response to the Russian threat. The Allies discussed issues related to increasing their deterrence and defence capabilities in the long term, strengthening partnerships, adapting to the

emerging threats and challenges, ensuring transatlantic unity, and further support for Ukraine. All these aspects are reflected in the Alliance's newly-adopted Strategic Concept for the next decade. It defines the Russian Federation as a serious and immediate threat to NATO, while China is seen as a challenge to NATO interests and values.

Having proclaimed "360-degree defence", NATO paid special attention to its eastern flank, where the construction of a new defensive line has begun. As part of this development, the following steps are due to be taken in the near future. The headquarters of the 5th Army Corps of the US Armed Forces is being permanently deployed to Poland, two F-35 squadrons will be relocated to the UK, air defences will be strengthened in Italy and Germany, and a brigade numbering up to 3,000 military personnel and 2,000 civilian staffers will be

system capable of repelling Russia. As Estonian Prime Minister Kaja Kallas put it, in the event of a full-scale Russian invasion, Estonia would be "wiped off the map" if the existing NATO strategy remained in place. In the statement, made ahead of the Madrid Summit, the Estonian leader implied the size of Ukraine and the depth of Russian penetration there. According to the NATO strategy for the defence of the Baltic States at that time, the Allies planned to arrive with reinforcements following an actual invasion and liberate these territories

in his own propaganda. Having started a war under the guise of a "special operation" in Ukraine, allegedly in order to prevent NATO from approaching its borders through Ukraine's entry into the Alliance, Russia will apparently have new NATO allies on its borders anyway – up in the north. And now the Russians will have to further strengthen their northern borders. Considering that the majority of capable Russian army units are fighting in Ukraine, the Kremlin has so far resorted to their standard practices of threatening to deploy tactical nuclear weapons in the northern regions as a response to the deployment of NATO bases in Finland and Sweden.

However, Finland and Sweden pursued their course towards joining NATO. It has become clear to decision-makers in the West that the Kremlin takes into account other country's interests only when that country has a strong army in place. The Madrid Summit has approved a historic decision on NATO expansion as Finland and Sweden were officially invited to become NATO. The approval of their applications was initially in limbo due to the position of Turkey, which refused to give its green light due to the restriction by Sweden and Finland of arms exports to Turkey and their support for organisations that Ankara categorises as terrorist. However, as a result of negotiations between the countries involved, a tripartite Memorandum was signed on resolving the "legitimate issues" of Turkey and continuing Finland and Sweden's path to join NATO.

The accession of Finland and Sweden to NATO is beneficial for the Alliance as their armed forces already meet NATO standards. For example, the Finns have one of the best military training systems in Europe, as well as a powerful air force and navy. After the collapse of the USSR, Finland's leaders never reduced the country's military potential and neither did they abandon the military draft to bolster their defence forces. As a result, an army of about 34,000 servicemen is being formed in the country, of which 22,000 are conscripts. However, in case of any military threat, mobilisation of reservists will allow increasing the army's size to about 340,000 military personnel. In Sweden, too, conscription into the armed forces has resumed as the Swedes increase the size of their armed forces. In the event of a military threat, they intend to boost the number from the existing 55,000 to 80,000 in 2025, and to nearly 100,000 by 2030.

In addition to size, the armies of Finland and Sweden are high-tech, and systematically engaged in the acquisition of new weapons. In 2012, the Finnish Air Force

Photo: NATO



The exercise BALTOPS 22 is the premier maritime-focussed exercise in the Baltic region. The exercise provides a unique training opportunity to strengthen combined response capabilities that are to preserving freedom of navigation and security in the Baltic Sea.

stationed in Romania on a rotational basis. Also, two additional destroyers will be relocated to the Rota naval base in Spain. However, these are not the only steps agreed to strengthen NATO's defensive positions in Europe. The Alliance will work on improving its operational capabilities, namely, accelerating the deployment of equipment, optimising logistics, strengthening air defences, and enhancing defence planning. The number of spearhead forces will be increased from 40,000 to 300,000.

The defence ministers of Estonia and Latvia have signed a protocol of intent at the Madrid Summit as a basis for joint procurement of air defence systems. And this is besides the fact that Spain has recently deployed additional air defence systems to Latvia. The war in Ukraine has shown that a missile shield must be as effective as possible, especially given the small size of the Baltic States. By the way, it is precisely the size of Latvia, Lithuania, and Estonia that dictates the need for them to further work out a more effective collective defence

within 180 days. However, when the whole world saw the atrocities that the Russian soldiers committed in the occupied Ukrainian settlements, it became clear that the very assumption of the seizure of any territories of NATO member countries must be off the table, since this would mean filtrations, repression, and killings of the local population. Accordingly, the increased presence of NATO units in those countries bordering Russia and Belarus seems more logical now.

Finland and Sweden Joining NATO

After Russia's full-scale onslaught on Ukraine, Finland and Sweden unexpectedly began the process of acceding to NATO, thus leaving behind their neutrality policies. These two nations were already NATO partners, conducting multiple joint military exercises with the Allies. However, Finland shares a 1,300 km border with Russia, so Vladimir Putin has found himself entangled

Industrial Participation – a Strategic Key Enabler?

Governments and their respective authorities have been increasingly setting industrial participation requirements over the last years, which in many cases are mandatory criteria for being awarded a contract in the sphere of the defense industry. Currently, more than 100 countries worldwide require some form of localization projects in their defense acquisition programs.

The idea here is that major defense contracts are usually multi-billion investments through which countries wish to meet political, economic, and defense objectives by promoting military and technology self-efficacy, and taking advantage of the local industry being participated at least partly. In most cases, the prime contracts are handed to the global defense players, so the responsibility to create concepts and fulfill the requirements lies with them.

Vincorion with its long history in the defense and aviation industry and wide range of competencies in power generation and the management of electrical power is a company that offers its solutions to both: OEMs and governments. And since the defense landscape is very competitive, one can barely survive without forming partnerships and cooperating with other companies globally. Thus, the topic has already become of high importance to VINCORION in the past.

A Chance to Partner up

Prime contractors often request support from their suppliers to fulfill parts of the obligations and due to the complexity of the topic, many suppliers are struggling to support such requirements and often try to avoid them. However, VINCORION sees offsets as a further step to partner with its customers and support them not only with quality products, but also second them with the

whole challenge, as industrial participation is often considered.

"Understanding the requirements of each specific case to its full extent is the centerpiece," says Jenny Tsakalou, Senior Offset Manager at VINCORION. "If, and only if, we start working closely with the local industry and explore potential synergies, because unless you know you truly understand your partner's capabilities, concerns, and long-term goals, you cannot go into depth with your business relationship. These synergies could not only be related to the main program under consideration but might also have to do with our wider product portfolio or technology roadmap," adds the aeronautical engineer Tsakalou.

In doing so VINCORION seeks primarily for long-term relationships. The company works with existing subcontractors, but also wishes to identify suitable new in-country partners that it can do the extra mile with, increase competitiveness with cost reductions, improved lead times, co-develop new products, and pursue further opportu-

nities together in the country and globally. Furthermore, the company's quality department is experienced with qualifying new suppliers and the engineering department is prepared to provide the required technical assistance, support, and troubleshooting. VINCORION has already set high standards with its offset management in the past and is seeking more. Its aim is no less than to utilize industrial participation as a strategic key enabler for international growth. "We want to become a reference organization within the environment of international industrial participation by structuring, negotiating, and implementing offset projects with our primary objective to facilitate and support our own and our customers' long-term global growth strategy," comments Jenny Tsakalou.

Valuable Industrial Participation Performance Established

One good example VINCORION established was in Eastern Europe, specifically in Poland. Some years ago, the country decided to upgrade its tanks and had several localization requirements. Therefore, VINCORION worked closely with the local industry, explored its technical competencies, and successfully qualified local partners for component production, as well as acquiring lifetime maintenance and repair capabilities of the system.

Source: VINCORION

As similar professionals know, the risks associated with localization are high, since it is directly related to the main contract. A delay in the localization project may cause a delay in the main program and therefore in the overall program performance. Hence, spending a lot of time was essential for VINCORION to identify the best local partners and establish a relationship that meant all parties were satisfied.



signed a contract with Lockheed Martin for the supply of AGM-158 JASSM high-precision air-to-ground missiles for the F-18C/D HORNET aircraft; in 2014, US-made multiple launch rocket systems and 100 LEOPARD 2A6 main battle tanks were purchased from the Netherlands; and in 2017,

escalation, Russia's Kaliningrad, home to the Baltic Fleet's naval base, could be effectively blocked by NATO forces. The Swedish Armed Forces are also strengthening their presence on the Island of Gotland. In 2016, the Swedish military command, for the first time in 11 years, started talking about the

rejected the very possibility of a discussion of these matters. This is not surprising because certain requirements contradicted the fundamental principles of the Alliance, such as its open door policy.

The Russian demands were penned in the spirit of the classic Russian propaganda narratives, claiming that NATO was a threat to the Russian Federation, as the Alliance was deemed to be creeping toward Russia's borders. And this is despite the fact that NATO is based on defensive principles, that is, collective defence, rather than any offensive action. However, Russian demands hinted at their willingness to restore the USSR in the context of influencing countries that were once members of the Warsaw Pact, formed by the Soviet Union after World War 2 as a counterweight to NATO. Incidentally, now the Russian Army is actively using Soviet paraphernalia during the occupation of settlements in the east and south of Ukraine, which only confirms the desire of the Russians to restore the USSR in a new form. This, in turn, further confirms that in the long term, the Russian leadership is focused on more than just Ukraine.

Photo: Pixabay



The PATRIOT air defence system

155-mm K9 howitzers were bought from South Korea. Finland has one of the most powerful artillery forces in Western Europe, consisting of about 1,500 units of various systems. As the war in Ukraine has proven, in the conditions of large-scale hostilities, artillery remains an important element for offensive operations and deterrence.

Finland is also modernising its naval fleet and updating its combat aviation. In particular, the country planned to purchase 64 modern fifth-generation F-35A LIGHTNING II multifunctional fighters, while today, the Finns operate 64 McDonnell Douglas F/A-18 HORNET fighters.

Sweden has also been engaged in the purchase of modern weapons systems to strengthen its armed forces. In 2021, Lockheed Martin launched deliveries of the first batch of PATRIOT Advanced Capability-3 (PAC-3) Missile Segment Enhancement (MSE) anti-aircraft guided missiles for the earlier purchased PATRIOT systems.

In general, Finland and Sweden's accession to NATO means a significant strengthening of the northern borders of the Alliance. NATO will also improve its ability to control the airspace in the North of Europe and the Arctic. Moreover, due to their geographic position, the armed forces of these countries have gained experience in operating in the Arctic, which is also important for NATO. The balance in the Baltics will also change significantly, which will boost the defensive capabilities of Latvia, Lithuania, and Estonia. Russia's capabilities in the Baltic Sea will also be sharply limited. In the event of any

return of its troops to the island, and since early 2022, security measures have been strengthened there due to increased Russian military activity.

Security of Eastern Europe

Once Finland and Sweden complete their accession to NATO and the northern borders are strengthened, the Alliance's main focus will be on building up effective defence capabilities on its eastern flank and supporting the allies in countering Russian aggression. Here we should recall the events of December 2021, which preceded the start of the large-scale war between Russia and Ukraine. In December, the Russian Foreign Ministry published draft agreements with the US and NATO on security guarantees for Russia. Among other things, the Russian side wanted the United States to abandon any further deployment of military bases in post-Soviet nations and the termination of military cooperation with them. Russia also sought a halt to NATO's further eastward expansion and a ban on any post-Soviet country from joining the Alliance. Besides, Russia wanted a renunciation of NATO's military activity in Ukraine, Eastern Europe, Transcaucasia, and Central Asia, and non-deployment of NATO military and weapons outside the countries where they had been stationed in May 1997, that is, before the accession of Eastern European nations to the Alliance – except for "exceptional cases." As the Russian Foreign Ministry later stated, NATO

NATO and Partners in Eastern Europe

NATO Allies have realised that such a threat exists, which was confirmed during the Madrid Summit. The Allies recognised the war that Russia is waging against Ukraine as the cause of the greatest security crisis in Europe since World War 2. NATO supported Ukraine's right to self-defence and to choose its own security system. The Alliance has once again confirmed the political and practical support to Ukraine by forming a strengthened comprehensive Assistance Package, which includes supplies of non-lethal defence equipment, the improvement of Ukrainian cyber defences, modernisation of the country's security and defence sector, and transition to long-term interoperability. In particular, such assistance should include secure communications systems, supplies of medical equipment, body armour, demining equipment, means of protection against chemical and biological weapons, and systems for combating drones. NATO has also assured Ukraine of support for its post-war reconstruction and reforms. According to Spanish Prime Minister Pedro Sanchez, NATO is ready to provide various kinds of support to Ukraine until the last Russian soldier pulls from its territory.

Since NATO defence ministers have identified the need to strengthen the Alliance's eastern flank, that is, the territory from the Baltic Sea to the Black Sea, Ukraine, as an

ally, will play a crucial role to this end, given its geographical position. So far, NATO has realised the need for a radically quicker response to a crisis (60 days for the deployment of a rapid response force is clearly not enough, since the Russian troops tried to achieve their goals in a short time using the stun element), but in practice, this is difficult to achieve. Logistical problems remain, with an insufficient number of ports, trains, and bridges for a quicker shipment of heavy armoured vehicles from the United States and Central Europe to Eastern Europe. In such conditions, the Alliance should be interested in Ukraine moving in the long-term from Soviet-era weapons to modern NATO arms, and reach maximum interoperability with NATO armies. This will significantly increase the security and defence capabilities in Eastern Europe. In fact, with the ongoing arms supplies, the process has already kicked off. Since the full-scale invasion of Russia in 2022, NATO and allies have provided Ukraine with support at unprecedented levels.

It should be noted that NATO as an organisation does not supply weapons to Ukraine in order, as NATO Secretary General Jens Stoltenberg put it, to prevent further escalation and a direct

clash between NATO and Russia. However, such decisions on arms supplies can be made by individual allies, and coordinated with the actual needs of Ukraine, for example, within the framework of the US-initiated Ramstein negotiating platform for military support to Ukraine, which brought together at the inaugural meeting defence officials of 43 countries. In addition to this, NATO does not have any list of weapons that must not be supplied to Ukraine. Given the intensity of hostilities and the limited stocks of Soviet weapons in Ukraine, the only way for the embattled nation to survive is to switch to modern models of military equipment, including armoured vehicles and warplanes. Meanwhile, the transfer of M142 HIMARS and M270 MLR systems to Ukraine has already proven its effectiveness in destroying Russian military depots in the occupied territories, which has been confirmed by Pentagon officials. In the future, deliveries of American F-16 aircraft to Ukraine may also begin. It is already a fact that the United States will start training Ukrainian pilots to fly F-15 and F-16 fighters. The corresponding amendments to the

US military budget have been approved by the US House of Representatives, which allocated US\$100M to this end. Ukraine is also interested in mastering modern air defence systems, given the need to counter regular Russian missile attacks on peaceful Ukrainian cities. Media reports claim that in the future, Ukraine wants to purchase from Germany ten IRIS-T stationary air defence systems and 100 PANZERHAUBITZE 2000 self-propelled artillery mounts. Ukrainian officials also requested the Norwegian NASAMS missile defence system, which is capable of engaging targets at a distance of over 160 km. These systems may be included in the next package of heavy weapons that the United States will hand over to Ukraine.

Thus, the process of transition of the Ukrainian Armed Forces to NATO weapons and standards has already begun; this has laid the foundation for Ukraine's participation in the system of collective security in Eastern Europe in the post-war period. Its army will be fully compatible with the armies of NATO allies. Moreover, the deployment of an effective missile defence system in Ukraine will mean additional security for Europe, given the regular anti-Western statements coming from Moscow and Minsk. ■

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NATO 2030 Agenda: Readiness or Adaptability?

Andreea Stoian Karadeli

Since its formation, NATO has gone through a continuous process of development and change, constantly adapting to the evolution of the global threat landscape. Acknowledging both the struggle and the success of the Alliance in the last eight decades, the present geopolitical and security context unfolds a puzzle of challenging issues that are harder to predict and counter. Is NATO ready for the borderless threats of 2030?

The present threat landscape is rapidly evolving, leaving national governments, international alliances, and organizations with no other option than to develop their capacity to be able to adapt at the same pace. Terrorism, pandemics, cyberattacks, energy crises and climate change are just some of the complex, borderless challenges that require a constant update of strategies and tools. NATO's 2022 Madrid Summit came at a crucial moment for the alliance and the democratic world. NATO Heads of State and Government approved a new Strategic Concept on 29 June, setting out the alliance's priorities and approaches for the next decade. The Strategic Concept 2022 is an opportunity to renew the solidarity and commitment of NATO Allies to deal with current and future threats. In the shadow of the world's most recent challenges, there is a high level of uncertainty regarding the global challenges of 2030 and NATO's role in the security power game.

Photo: NATO



NATO General Secretary Jens Stoltenberg presenting the Strategic Concept which defines the security challenges facing the Alliance.

Evolution of NATO's Security Concepts

Since its formation, the Strategic Concept is a key document for NATO, serving as a reaffirmation of values and collective

Photo: NATO



At the Madrid Summit in June 2022, NATO Heads of State and Government approved the new Strategic Concept to set out the Alliance's priorities for the next decade.

Author

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assessment of the security environment. It also drives NATO's future political and military development. Due to the constant evolution of global dynamics, the Strategic Concept is reviewed and updated regularly, approximately every 10 years since the end of the Cold War, and eight total in the alliance's history.

The last four Strategic Concepts of the post-Cold War era have reflected a gradual development of the security concept based on specific crisis for geographic areas. For instance, in the context of the war on terror, in 2010 NATO adopted crisis management and cooperative security as core tasks, and its geographic focus shifted to the Middle East. Subsequently, NATO's role in this geographic area increased, and has led to various changes to the Alliance's strategy.

The previous Strategic Concept was adopted at the NATO Lisbon Summit in 2010. Since then, more than a decade has passed, and under the present security landscape it was necessary for Alliance to renew its Strategic Concept to match today's threats. Along with the Middle East Agenda, NATO acknowledged other components such as cyber security, information warfare, pandemics, climate change,

energy crises, and even outer space. Considering the spectrum of non-traditional security challenges facing NATO, the Strategic Concept 2022 was the hardest to draft in the past eight decades. The Russian invasion of Ukraine, together with the global challenges posed by China, and the domino effect of the COVID-19 pandemic, might be just a taste of what 2030 can potentially bring to the table, requiring preparation and rapid responses.

Understanding Security in 2030

Bearing in mind the potential for rapid and unpredictable changes to the global configuration of power, NATO must continue to adjust its understanding of security to dynamic contexts and evolving borderless threats. NATO's strategy for the next decade should start from the following question: What will "security" mean in 2030? By doing so, allies may be able to realise the need for a more inclusive understanding of security towards the 2030s. Acknowledging challenges such as climate change, technological supremacy, and re-emergence of frozen conflicts would form a valuable starting point.

Based on the reflections of NATO 2030 Young Leaders Group, NATO should feature non-traditional security challenges more prominently on its agenda. According to the Group, climate change has destabilising effects on international peace and security and, more fundamentally, on the very existence of life on earth. Moreover, the relationship between the empowerment of women and long-term global security and stability is also widely accepted and well documented. The NATO 2030 Young Leaders Group acknowledge that defending the Euro-Atlantic area is a moving target, and as challenges to NATO increasingly come from areas beyond its immediate neighbourhood, the alliance must expand its outreach and provide more equitable sharing of responsibilities between Europe and North America. Although NATO's mandate remains regional, it is vital for its mindset to be global and borderless.

Current Global Challenges and NATO's Response

Today, the challenges faced by the alliance come in various forms, many of

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Photo: NATO

In 2018, Ambassador Zhang Ming, Head of the Chinese Mission to the EU, visited NATO and met with NATO Deputy Secretary General Rose Gottemoeller. NATO faces strategic competition with a militarily powerful and technologically advanced China, which seeks to disrupt the established international order.

which are borderless. This includes pandemics, terrorism, climate issues, emerging technologies changing the nature of competition and conflict, as well as digital technologies that are transforming diplomacy and defence. Within the Alliance, the relationship between Turkey and Greece has been deteriorating rapidly, culminating in provocative declarations from both sides. From outside, NATO faces strategic competition with a revisionist Russia and a militarily powerful and technologically advanced China, both of which seek to disrupt the existing international order. The scale, complexity, and dependence upon economic, environmental, technological, and human flows, have increased dramatically.

Climate change is a borderless complex issue with the potential to cause domino effects over the short and long term. For instance, the rise of global temperatures causes ice to melt, affecting sea levels, and in turn weather patterns. More extreme weather events, such as storms, floods, and heatwaves, can lead to drought, famine, land degradation, loss of livelihood, and change in demographic trends. Such changes hold the potential to create further conflict and migration, while climate-related risks to military infrastructure, operations, and force readiness are already felt across the Alliance. Therefore, climate change impacts NATO's ability to fulfil its core mission. Last, but not least, the Russian invasion of Ukraine has started an energy crisis that will reach its zenith by the winter of this year. This combination has resulted in the most complex threat landscape in NATO's history.

"Ready or not, here I come."

Acknowledging that NATO has already done much of the theoretical work around the future traits of the global threat landscape, the Madrid Summit and the adoption of the Security Concept 2022 officially set the stage for a new decade in the Alliance's history. Many argue that this is a long overdue replacement for the 2010 Strategic Concept, which was an immediate casualty of Russia's annexation of Crimea in 2014. Given the crises of the past few years, the current Strategic Concept comes at the right time, when it is most needed by the Allies. However, it is merely a single step in a decade of uncertainty. While readiness might be considered a target, NATO also needs to develop its capacity to adapt, to be able to ensure security. Adaptability can serve the purpose of the Alliance better in a decade of flux. ■



Photo: Presidential Administration of Ukraine

Ukrainian President Volodymyr Zelensky has met several times with NATO General Secretary Jens Stoltenberg. Since Russia's invasion in 2022, NATO and Allies have provided unprecedented levels of support.

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This technology has become the benchmark in all major European Army programmes. With the broader availability of night vision devices, the challenge is to have the best performance image intensifier based equipment that is always more efficient than the one of the opposing forces.

In Europe, night vision equipment using the 4G technology in 16mm format has become the standard: Austria, Denmark, France, Germany, Poland, Spain, The Netherlands and The United Kingdom notably.

Turkey Imposes Obstacles to Nordic Countries' NATO Aspirations

Eugene Kogan

Sweden and Finland have long followed a policy of military neutrality so as not to incur Russia's wrath. However, the unprovoked Russian war against Ukraine has changed the attitude of these countries.

Both Sweden and Finland announced their wish to join the North Atlantic Alliance in mid-May. And then out of the blue came obstruction from Turkey with the claim that both countries were financing terror and supporting Kurdish "terrorist" groups that Turkey has been trying to eliminate for the last 40 years or so. One of the major handicaps of the North Atlantic Treaty was and still is the omission of information about a NATO country blocking the participation of non-NATO states in NATO activities or the joining of new NATO members into the Alliance. Admission of new NATO members requires the unanimous consent of all members and the subsequent ratification of protocols by their respective parliaments.

From Neutrality to Potential Membership

In other words, there is no such thing as official veto power embedded in the Treaty that President Erdoğan imposed on these Nordic countries wishing to join the Alliance. This imposition can be called an attempt at blackmail. What is evident is that Ankara is seizing the opportunity to score political gains both in domestic and foreign policy, even though Turkish officials will disagree with the author. There is no doubt that the Turkish presidential and parliamentary elections are very much on Erdoğan's mind. The President's party is doing badly due to the failing economy and the impulsive foreign policy that has isolated Turkey over the last decade. In addition, Ankara hopes to use both this membership bid by both countries to establish a precedent for current and future accession candidates

such as the Balkan countries to deliver supporters of Fethullah Gulen to Turkey. Finally, Turkey can make new demands not mentioned in the non-binding trilateral Memorandum of Understanding (MoU) Despite Turkish blackmail, Finland and Sweden agreed to ease some of Turkey's conditions. These conditions were spelled out in the trilateral MoU signed by the foreign ministers on 28 June.

What They Agree

At a press conference in Madrid on 30 June, Erdoğan said: "The agreement that was signed is just a beginning, an invitation. What is of essence is that promises that were made are put into action." Both countries have since updated their anti-terror laws that entered into force on 1 July. Both have agreed to lift the de facto arms embargo that was imposed on Turkey in October 2019 once they are treaty allies with Turkey and to establish joint security mechanisms. Both also agreed to "address Turkey's pending deportation and extradition requests of terror suspects expeditiously and thoroughly, taking into account information, evidence, and intelligence provided by Turkey."

Points of Contention

The document also notes that they will "establish necessary bilateral legal frameworks to facilitate extradition and security cooperation with Turkey in accordance with the European Convention on Extradition." Does this mean that if a terrorist case contravenes the European Convention the person will not be delivered to Turkey? This is not a clear-cut issue. Nevertheless, Turkey's Justice Minister, Bekir Bozdağ, said on 4 August: "I am awaiting the extradition of 33 terrorism suspects from Sweden and Finland." The other sources cited not 33 but 73 terrorists. The response of Sweden's



Photo: Maurice Fleisier / CC BY-SA

Turkey has tried to block Sweden and Finland's admission to the Alliance.

Foreign Minister, Ann Linde, was crystal clear: "We will not agree to any extraditions unless there is proof of terrorist activity. There is no reason for Kurds to think that their human rights or democratic rights are at risk." Well, if the answer from Sweden is No, then the response from Turkey is No for the Nordic countries membership in the Alliance.

Erdoğan warned at the same press conference: "Sweden and Finland must remain faithful to their pledges; otherwise, it is out of question that [their membership] would be brought before, and finally, approved by [the Turkish] parliament."

Should Turkey revert to playing hardball on the Nordic countries' accession and block the two countries admission to the Alliance, NATO member states should unite against Turkey. Under such circumstances, Erdoğan will be forced to consent to the Nordic countries' accession without any strings attached or, alternatively, Turkey will be isolated within the Alliance and its decision-making processes. Whether or not Erdoğan will decide to leave the military structure voluntarily while remaining a part of the political structure of NATO remains to be seen.

Author

Eugene Kogan is an Eastern European defence and security expert based in Tbilisi, Georgia.



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New Maritime Strategy for the United Kingdom

Hans Uwe Mergener

Europe is still facing a war within its borders, but the time seems to have come for new naval strategies.

After Russian President Vladimir Putin issued a new Maritime Doctrine for the Russian Federation on 31 July, the United Kingdom published a new version of its National Strategy for Maritime Security (NSMS) on 15 August 2022.

The document addresses new and emerging risks that the maritime sector will face over the next five years. It articulates five strategic objectives to be pursued by the Government with associated intentions to protect the UK and its overseas territories and crown dependencies. These comprise protecting the homeland, responding to threats, ensuring prosperity, promoting UK values, and advocating for the security and resilience of the world's oceans.

In addition to ensuring the free movement of goods and trade, as well as the security of borders, ports and maritime infrastructure, it addresses counter-terrorism, advocacy for the promotion of compliance with the rights and obligations of the UN Convention on the Law of the Sea (UNCLOS), including freedom of navigation. Among other things, London wants to promote sustainable management of the oceans by developing concepts for maritime security

Photo: Crown copyright



Britain's future flagship HMS QUEEN ELIZABETH sailed into her home port of Portsmouth for the first time on 16 August 2017. Sailors lined up on the 65,000-tonne carrier.

and enforcing environmental regulations. Over 116 pages the document also addresses the other forms of state threats, espionage, sabotage, cyber operations and theft of intellectual property and data; it states: "Increasingly, states are able to conduct single attacks or use a range of threats to affect our security, economy and society".

In addition, a paragraph on the importance of the South China Sea under the heading 'Freedom of Navigation' is noteworthy. To ensure that legislation goes hand in hand with the development of autonomous and remotely-operated technologies, a government draft on regulations in future transport is to be presented this year.

The new edition should be read in conjunction with the 'Integrated Review' ('Global Britain in a Competitive Age: The Integrated Review of Security, Defence, Development and Foreign Policy', March 2021) and with 'Maritime 2050' ('Maritime 2050: Navigating the Future', January 2019), according to the handout from the issuing Department for Transport. These strategies set out the

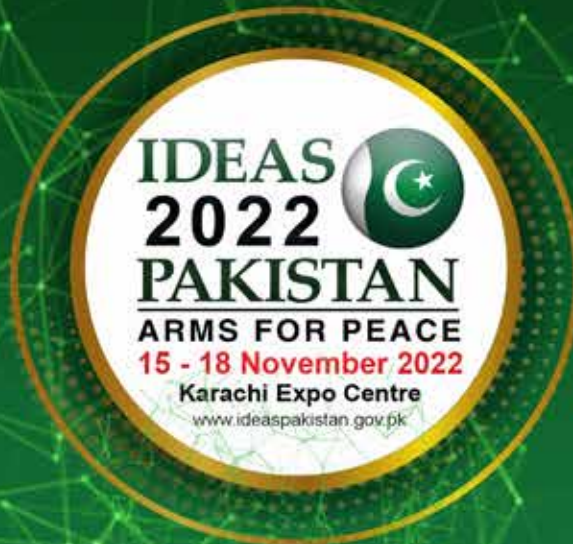
Government's overarching approach to national security and international policy. The implementation of the National Strategy for Maritime Security is to be overseen by an inter-ministerial steering group.

The new edition of the United Kingdom's Maritime Strategy illustrates anew the country's claim to be a leading trade and maritime power. Yet the future is uncertain, sustainable trade relations with the EU have not yet been established, and London's influence has weakened. Beyond trade, it will have to be seen how much 'Global Britain' the country can actually afford. This leads to the question of what contribution it can make to guaranteeing free maritime traffic worldwide at a time when threatening gestures are in vogue.

Furthermore, implementation of the new strategy will require not only budgets, but also internal changes, as the Dover-Calais voyage chaos in the summer of 2022 or the migration movements across the English Channel show. Despite these difficulties, the tasks set out should still be achievable.



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Finland – NATO and New Security Realities

David Saw

There was a time, and it was not that long ago, that even the suggestion that Finland would join NATO would be greeted with total disbelief.

It was just totally inconceivable. Yet in the 1980s, if you had insisted that the fall of the Soviet Union was inevitable and would likely happen soon, your views would have been dismissed without a thought. As we shall see, in recent years unexpected things have been happening in the European security environment far too often for comfort. Many ignored the danger signs, while others grew increasingly concerned until eventually they had to act.

This brings us to our starting point which took place on 5 July 2022 at NATO headquarters in Brussels, Belgium, when NATO ambassadors signed the Accession Protocols for Finland and Sweden in the presence of Finnish Foreign Minister Pekka Haavisto and Swedish Foreign Minister Ann Linde. This followed on from the Madrid Summit held in Madrid from 28-30 June, attended by the leaders of NATO Member governments where it was agreed to invite Finland and Sweden to join the NATO alliance. The signature of the Accession Protocols is the first stage of the ratification process for NATO membership which still has some months to run before the two nations become active NATO members, assuming that no obstacles arise.

NATO's Strategic Concept

What motivated Finland and Sweden to suddenly take the plunge and look for NATO membership? That becomes quite clear when you consider NATO's new 2022 Strategic Concept, adopted at the Madrid Summit, that states: "The Russian Federation is the most significant and direct threat to Allies' security and to peace and stability in the Euro-Atlantic area. It seeks to establish spheres of influence and direct control through coercion, subversion, aggression and annexation. It uses conventional, cyber and hybrid means against us and our partners. Its coercive military posture, rhetoric and proven willingness to use force to pursue its political goals undermine the rules-based international order. The Rus-

Photo: NATO



From left to right, Pekka Haavisto, the Minister of Foreign Affairs of Finland, NATO Secretary General Jens Stoltenberg and Swedish Foreign Minister Ann Linde at the press conference after NATO ambassadors signed the Accession Protocols for Finland and Sweden at NATO Headquarters on 5 July 2022.

sian Federation is modernising its nuclear forces and expanding its novel and disruptive dual-capable delivery systems, while employing coercive nuclear signalling. It aims to destabilise countries to our East and South. In the High North, its capability to disrupt Allied reinforcements and freedom of navigation across the North Atlantic is a strategic challenge to the Alliance. Moscow's military build-up, including in the Baltic, Black and Mediterranean Sea regions, along with its military integration with Belarus, challenge our security and interests."

A Challenge to the Alliance

The 2022 Strategic Concept continued: "NATO does not seek confrontation and poses no threat to the Russian Federation. We will continue to respond to Russian threats and hostile actions in a united and responsible way. We will significantly strengthen deterrence and defence for all Allies, enhance our resilience against Russian coercion and support our partners to counter malign interference and ag-

gression. In light of its hostile policies and actions, we cannot consider the Russian Federation to be our partner. However, we remain willing to keep open channels of communication with Moscow to manage and mitigate risks, prevent escalation and increase transparency. We seek stability and predictability in the Euro-Atlantic area and between NATO and the Russian Federation. Any change in our relationship depends on the Russian Federation halting its aggressive behaviour and fully complying with international law."

Without fear of contradiction, it was plain that both Finland and Sweden sought "stability and predictability" in their strategic area of interest as part of the post-Cold War/post-Soviet security environment in Europe. This has become harder and harder to achieve in the face of Russian actions in recent years. As with the majority of European nations, Finland and Sweden had believed that Europe had achieved a relatively benign security environment in comparison with the Cold War era. However, the warning

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signs were already there that all was not what it seemed with this benign environment.

Warning Signs

The first major warning sign came in August 2008 with the Russian invasion of Georgia in support of the Russian-backed separatist republics of Abkhazia and South Ossetia, with the invasion being described as a “peace enforcement operation” by Russia. Sweden was quite clear in condemning the Russian action but others were much less forceful, feeling that Georgia was not in Europe and therefore not a European security issue. Indeed, in 2009 the EU sponsored an independent report led by a Swiss diplomat that seemed to make strenuous efforts to avoid attaching any blame to Russia for the Georgia invasion!

For NATO members in the Baltic States and Eastern Europe, as well as Sweden and Finland, it was increasingly clear that Russia was no longer content to be passive and was starting to actively move towards challenging the post-Cold war strategic settlement in Europe. Others were far more forgiving of Russian intentions and for more interested in economic relations with Russia.

When Russia annexed Crimea in 2014 and started the war in the Donbas, the US and European response was much weaker than when it invaded Ukraine in February 2022. Although the Obama administration did provide some aid to Ukraine, they seemed unwilling or unable to consider the fate of



The Finnish Defence Forces acquired 100 LEOPARD 2A6NL tanks from the Royal Netherlands Army stocks between 2014 and 2019. These vehicles are the primary armoured assets of Finland. Previously in 2002, they acquired 124 LEOPARD 2A4 tanks from the Bundeswehr.

Ukraine as a core US security interest. The tepid response of the US in 2014 provided the cover for a limited European response and, in the main, it was business as usual with Russia. Dependence on Russian oil, gas and raw materials was already a major consideration.

The Past as the Future

Both Helsinki and Stockholm were being forced to re-evaluate the strategic threats that they faced and the available means that they had to confront those threats. It was plain that Russia had a new agenda as regards the Baltic and Eastern Europe. As

far back as 2005, Vladimir Putin had described the fall of the Soviet Union in 1991 as the “greatest geopolitical catastrophe” of the twentieth century. The agenda that Putin had was not based on nostalgia for the Soviet Union; its ideological underpinning is Russian nationalism and the desire to see Russia regain the former Soviet position of being a dominant power.

Russian nationalist ideology calls for a return to the borders of the former Soviet Union, meaning that, at a minimum, Ukraine and the Baltic States would need to become Russian client states or, preferably for Russia, absorbed entirely. There is more though talk of Russia returning to its “traditional borders” beyond the Soviet borders and also include the borders of Imperial Russia. This would require the dismemberment of Poland and the end of an independent Finland. Inevitably, Helsinki and Warsaw are extremely concerned by Russian nationalist ideology.

A History of Conflict

At this point, it is necessary to provide a brief historical background to relations between Finland, Sweden and Russia. Sweden and Russia have a history of conflict that dates back to the 12th Century. Both nations sought supremacy in the Baltic region, a struggle that continued through to the Finnish War of 1808/1809. Sweden under the auspices of the Baltic Crusades had come to dominate what we would today recognise as Finland by the end of the 13th Century. However, the price of Sweden losing the Finnish War of 1808/1809 was to cede control of what became known as the Grand Duchy of Finland to Tsarist Russia.



A Lockheed Martin F-35A Joint Strike Fighter (JSF) flies in tandem with a Finnish Air Force Boeing F/A-18C/D. In December 2021, Finland selected the JSF as their F/A-18C/D replacement under the HX programme, ordering 64 F-35A aircraft for delivery between 2026 and 2030. The F/A-18 will be retired in 2030.

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The collapse of Tsarist rule and the revolutions of February and October 1917 created a situation where Finland could declare independence in December 1917, with the Bolshevik regime of V.I. Lenin recognising Finnish independence in January 1918. Three weeks later, the Finnish Civil War broke out which lasted until May 1918 when White forces backed by the German Empire prevail over Red forces who wanted a Socialist Workers Republic and received support from Soviet Russia. Out of the post-war rubble, Finland emerged as a Republic led by an elected president. At the end of November 1939, the Soviet Union invaded Finland in what came to be known as the Winter War. Finnish resistance was courageous, but when the

forced the country to become a neutral power and have its freedom of action limited by the necessity to retain the goodwill of the Soviet Union, added to which the Soviet Union was Finland's main trading partner, a situation that became known as "Finlandization."

German reunification, the end of the Cold War and the collapse of the Soviet Union finally allowed Finland to make its own economic and foreign policy decisions. In 1995, they joined the EU and in 1999 joined the Euro. Main export markets for Finland are Germany, Sweden, the US, the Netherlands and China, with Russia accounting for five percent of Finnish exports. Main sources of imports are Germany, Sweden, Russia (13% of total imports), China and the Neth-

acquire 64 F/A-18C/D aircraft from the US, with deliveries commencing in 1995. The F/A-18C/D fleet is to be replaced under the terms of the HX Fighter Programme. In December 2021, the Lockheed Martin F-35A Joint Strike Fighter (JSF) was selected as the winner of HX and 64 aircraft ordered to be delivered from 2026 onwards.

As others in Europe downsized their militaries, Finland was able to acquire a whole range of advanced ground systems at very advantageous prices. For example, they obtained 100 LEOPARD 2A6NL tanks and 22 M270 MLRS fire units from the Royal Netherlands Army, TOW missiles from Denmark and 147 MT-LB armoured vehicles from Sweden. There were also major purchases from across Europe of new equipment, with Sweden emerging as one of the most important suppliers and later becoming a partner for defence collaboration.

Finland has also sought to further diversify its supplier base. For example, the Finnish Navy purchased the UMKHONTO air defence missile system from South Africa for the Mid-Life Upgrade (MLU) of its HAMINA class missile boats and HÄMEENMAA class minelayers. The HAMINA MLU also saw the IAI GABRIEL V anti-ship missile acquired, with the same weapon being selected for the four POHJANMAA class corvettes that are being built between 2022 and 2025. Finland also acquired SPIKE-MR/LR and SPIKE-ER missiles from the Eurospike consortium. In 2017, the Finnish Defence Force selected the Hanwha Defense K9 as its future self-propelled artillery system, ordering 48 systems from Republic of Korea Army (ROKA) surplus stocks and then placing a second order for 10 more systems.

Finland had maintained a robust defence capability while many others in Europe had allowed their defence forces to wither. As things have turned out, this defence investment showed a remarkable degree of foresight. That is not to say that they expected the security situation in the Baltic to turn critical, although a resurgent Russia with a nationalist ideology was in itself threatening, but Finland is used to managing its relationship with Russia.

In the end, what turned Finland and Sweden towards NATO membership was a spectacular foreign policy failure by Russia itself. Russian aggression in the Ukraine was decisive, but years of threats and aggressive rhetoric towards the three Baltic states and Finland and Sweden created a situation where the only sound security strategy was joining NATO. It is truly ironic that Vladimir Putin has not only breathed new life into NATO, but has also enlarged it as a result of his actions. ■



Photo: Puolustusvoimat/The Finnish Defence Forces

The Finnish Navy is to acquire four POHJANMAA class corvettes and these will become their major surface units. Build will be between 2022 and 2025, with commissioning close to the end of the decade. Armament includes IAI GABRIEL V anti-ship missiles and the Raytheon RIM-162 Evolved SEASPARROW Missile (ESSM) air defence system.

conflict came to an end in March 1940, Finland had to make major territorial concessions to the Soviet Union. In June 1940, Finland watched as the Soviet Union invaded Estonia, Latvia and Lithuania, eventually incorporating them into the Soviet Union. Feeling that it had few other options and looking to regain its lost territory, Finland embarked on the Continuation War in June 1941.

The Continuation War came to an end with the Moscow Armistice of September 1944. In the post-War settlement of the Paris Peace Treaty of 1947, Finland retained its national independence, but had to make further territorial concessions to the Soviet Union and pay reparations. This was followed by the signature of a treaty of Friendship, Cooperation, and Mutual Assistance with the Soviet Union in 1948. The treaty recognised Finnish independence but

erlands. Although 43% of Finland's electricity comes from hydropower and renewables, 17% comes from nuclear power and 43% from fossil fuels (oil and gas). Russia was the main supplier of oil and gas, it also supplied electricity via a connector. Russian supplies of oil, gas and electricity have now ended, forcing Finland to purchase oil and gas on international markets and also demonstrating its energy vulnerability.

Defence Capabilities

Finland had always been prepared to invest in its defence capabilities but it had been limited in the defence equipment it could acquire due to the terms of the Paris Peace Treaty. With the collapse of the Soviet Union, the treaty became void and Finland could acquire equipment from the US and other sources. This saw the Finnish Air Force

STAR-X: Bringing Military Grade Performance to OPVs

Offshore Patrol Vessels (OPVs) have become the platform of choice for many maritime forces tasked with monitoring and protecting territorial waters, including the Exclusive Economic Zone (EEZ). In fact, with budgetary constraints and fuel prices on the rise, these versatile, cost-effective vessels are increasingly preferred over larger, more expensive front-end vessels such as destroyers, frigates and even corvettes. Well over 1300 OPVs are currently in operation worldwide and more than 200 are expected to be built in the coming years. Examples include Batch II RIVER in the UK, HTMS KRABI in Thailand, and the US Coast Guard's LEGEND class cutter.

These ships constitute the backbone of littoral operations, guarding against a wide range of threats, including terrorism, smuggling, drug trafficking, illegal fishing and illicit immigration. They also play an important role in search & rescue, environmental protection, and in securing critical maritime infrastructure such as offshore oil drilling platforms. To effectively carry out their duties these ships require the accurate 3D situational awareness picture achieved with high performance ISR (Intelligence Surveillance and Reconnaissance) sensors, especially radar.

However, the deployment of sensors on these vessels is challenged by available space, payload, power and budgeting. So despite the increasing reliance on

OPVs, the limited ability to equip these vessels with the requisite ISR solutions has impacted their effectiveness. OPV commanders often face the challenge of performing the same missions as larger, more comprehensively equipped vessels; yet in many instances, the radars fitted to their vessels are commercial systems with rather limited performance.

In response, Israel Aerospace Industries' subsidiary ELTA Systems Ltd. has leveraged its rich technological heritage and culture of innovation to field the STAR-X 3D multi-function digital radar system, delivering military grade performance in a smaller, lighter package with lower power consumption and space requirements in comparison to legacy systems.

Operating in X Band, this powerful radar is able to simultaneously track over 1000 surface and aerial targets, has an instrument range of 150 km, and the ability to detect low visibility targets with a very low RCS. STAR-X performs wide area scans of the sea surface out to dozens of kilometres while simultaneously carrying out effective air and surface surveillance. In fact, an integrated IFF antenna and the unique capability to automatically detect, track, and classify low flying threats and high-flying targets at long ranges, enables STAR-X to deliver superior air surveillance. Moreover, with its ability to perform splash spotting, the easily integrated radar also offers an effi-

cient interface to gun system fire control. Finally, its ability to perform air surveillance against drones and UAVs is especially important given the increasing presence of these threats in the littoral arena. In contrast, commercial 2D radars lack these important capabilities. They simply are not designed to perform the tracking, classification or air surveillance required on modern OPVs.

STAR-X leverages the latest GaN technology to maximise performance while minimising size and weight. It also features AESA capabilities, including beam forming in elevation and superior ECCM features. In addition to offering class leading features and performance, this radar is also the most flexible with regard to growth potential and upgradeability; mainly through software-only updates to address new threats. Maintainability is another strongpoint. STAR-X incorporates ELTA's proven, advanced, Single Module Radar (SMR) technology, guaranteeing high reliability and effective long-term support extending to twenty years and beyond.

For over fifty years ELTA has continued to combine extensive design and development efforts together with the operational experience of users worldwide. Delivering unprecedented capabilities to OPVs and other compact ships at an attractive cost, STAR-X is positive proof of the virtues of this approach.

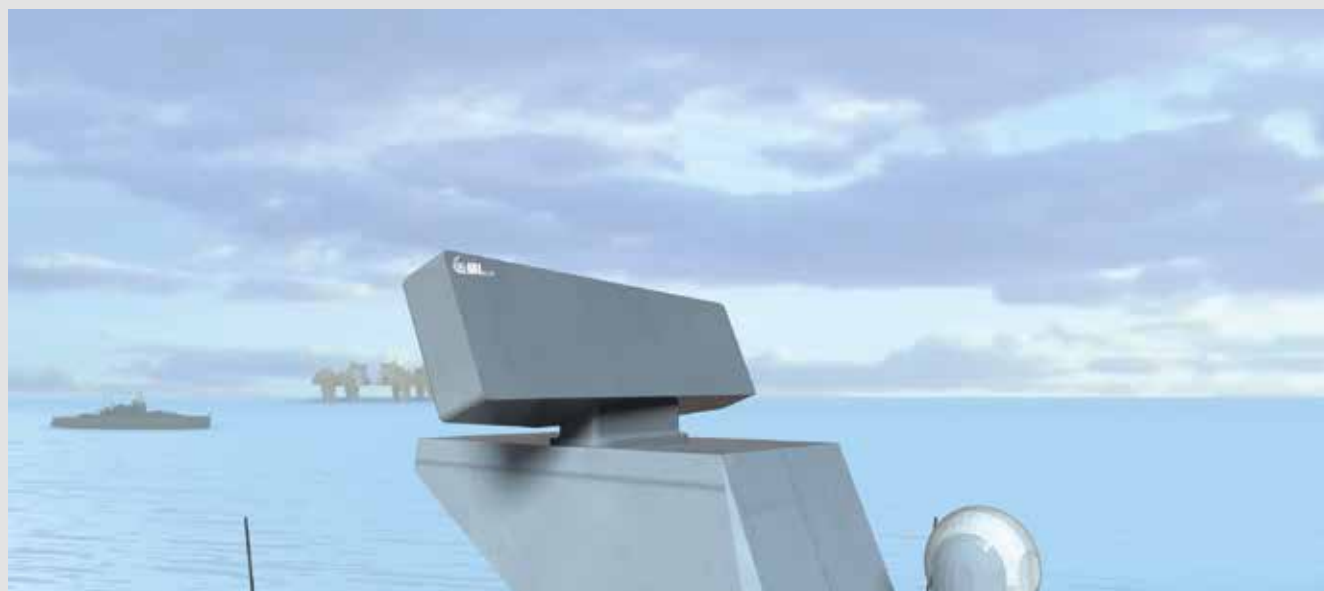


Image: IAI ELTA



“Finland meets the NATO guideline of spending 2% of its GDP on defence.”

Photo: Kristiina Olsson



ESD had the opportunity to talk to Kristiina Olsson, Director of Finance, at the Finnish Ministry of Defence.

ESD: Can you briefly elaborate on the tasks and responsibilities of the Finance Department in the Finnish MoD?

Olsson: The Finance Department is responsible for annual defence budgets, supplementary budgets and medium-term fiscal plans. In addition, we are responsible for budget execution and reporting, like the annual reports of the Government.

ESD: What are the lessons learned from the war in Ukraine? Has the war lead to a shift in priorities for your area of responsibility?

Olsson: In my area of responsibility, the war in Ukraine has led to a higher defence budget as Finland is improving the country's defensive capabilities. I took part in the swift process, in the scope of which the budget proposals of the Finnish defence forces were presented as government budget proposals and were later approved by the Finnish Parliament.

ESD: Has the Finnish MoD identified any new areas for priority spending? Are any spending areas now seen as less important?

Olsson: The spending priorities are made by Finnish defence forces as they are responsible for planning of the defence system.

ESD: What do you expect to be the economic impact of your country becoming a NATO member?

Olsson: Currently Finland meets the NATO guideline of spending 2% of its GDP on defence, as well as the guideline of spending 20 % on equipment and materiel procurement.

During the 2020s, the 2 % GDP level is partly based on payments in the scope the F-35 procurement. As the F-35 payments are expected to decline in the late 2020s, the 2% goal will require a new political budget decision.

ESD: What does the 2023 draft budget for the Finnish MoD look like? We understand that you expect significant increases in the funds assigned for procurement and operation.

Olsson: The 2023 draft budget for the Ministry of Defence's branch of the Government is €6.1 Bn, representing an increase of €1Bn or 20% compared to the current budget. The figure can be explained by a general growth of the defence forces' operating expenditures, in the area of defence materiel procurement and in support for the activities of national defence organisations. The increase is to respond to the changes in the defence forces' operating environment. The budget also includes an estimated exchange rate loss of F-35 procurement.

The budgetary increase would reinforce Finland's defence capability by adding 500 person-years to the Defence Forces personnel capacity in the next few years, by increasing the number of reservists

called up for refresher training exercises by approximately 10,000 people, and by improving the level of materiel maintenance.

For longer-term materiel procurements, a procurement authorisation of approximately €1.7Bn was approved by the Parliament for acquisitions to improve defence capabilities in the 2022 to 2027 timeframe. The execution of the procurement authorisation maintains the level of the budget for 2023. The funding will be used to purchase anti-tank and anti-aircraft weapons, personal equipment, artillery ammunition, field maintenance materiel, and anti-ship missiles and air defence missiles, among other things.

ESD: Compared to other European nations Finland's defensive capabilities are based on a huge number of civilian reservists. What effect does that have on procurement objectives and budget planning? Can you elaborate on the procedures for the "procurement" of infrastructure, namely bunkers?

Olsson: The spending structure is different in a defence system based in compulsory military service compared to other solutions. Generally, the planning system of Finnish defence forces defines the procurement objectives and that is reflected by the budget planning.

The questions were asked by Jürgen Hensel and Mark Cazalet.



Finland's Missile Defence Choice

Debalina Goshal

The War in Ukraine has brought forth the need for credible air and missile defence capabilities for states that are in close proximity to Russia. This need is especially important for Finland, having applied for NATO membership earlier in the year, and sharing a land border with Russia that is far longer than that of any NATO member.

Finland is also integral to Baltic Sea, which stretches from the middle of Finland in the North to northern Germany in the South. The Gulf of Finland, the easternmost extension of the Baltic Sea, is bordered by Finland, Russia, Estonia, and it holds strategic significance to all three countries. In August 2022, Finland and Estonia have discussed the possibility of integrating coastal batteries to deny Russian influence in the Gulf of Finland by blocking the Russian Navy.

Amid the growing threat from Russia, Finnish Defence Minister, Antti Kaikkonen, stated that Finland is preparing itself for a "number of scenarios". Among these, Helsinki is seeking a credible ground-based air defence (GBAD) capability. It would be wrong to assume that the War in Ukraine was the driving force behind Finland's interest in acquiring modern air defence systems, Finland's desire to strengthen its GBAD capabilities significantly predates the conflict.

To meet this requirement, in 2020 the Finnish Defence Forces Logistics Command sent out invitations to tender to five companies, comprising Diehl Defence (Germany), Israel Aerospace Industries (Israel), Kongsberg Defence and Aerospace AS (Norway), MBDA (United Kingdom), and Rafael Advanced Defense Systems (Israel).

Diehl's preliminary offer is the IRIS-T SLM system with a radar from the Saab GIRAFFE family (likely GIRAFFE 4A). Kongs-

Credit: Finnish MoD



A NASAMS II FIN system, known as ITO 12 in Finnish service. This medium-range system is armed with the AIM-120 AMRAAM missile family, and at present has the longest range of Finland's ground-based air defences, which largely consist of short-range systems.

berg's offer is based on the NASAMS with the AMRAAM Extended Range (AMRAAM ER) missile. MBDA's offer is the EMADS system with CAMM-ER missile and a radar from the Saab GIRAFFE family (likely GIRAFFE 4A). IAI is offering their BARAK MX system with BARAK ER missile and an ELTA radar (likely ELTA-2084 MMR). Rafael's offer consisted of the DAVID'S SLING system with STUNNER missile and an ELTA radar (likely ELTA-2084 MMR).

On 5 March 2022, the Finnish MoD made the decision to downselect IAI and Rafael's offers, stating that "[the] two selected systems were superior with regard to their capability", which was understood to refer to the missiles in both Israeli offers being in a longer range and higher altitude class than their competitors' offers. The Israeli systems also reportedly use the Link 16 communication protocol used by US and NATO systems, meaning interoperability is unlikely to be

an issue. A final decision between the DAVID'S SLING and BARAK MX is slated for 2023.

In June 2022, air and missile defence units of seventeen NATO allies and partners including Finland has also participated in Europe's largest integrated air and missile defence exercise 'Ramstein Legacy 22', which took place in the Baltic states. This demonstrated both Finland's commitment to joining NATO, but also its willingness to integrate its air and missile defence capabilities with those of NATO. The Baltic Sea is crucial to NATO as much as it is crucial to Russia. If Finland along with Sweden join the NATO, the Russian Navy's influence in Baltic Sea would likely be diminished, and would allow NATO to exert considerable control over the space. However, Finland cannot challenge Russian Navy's influence in the Baltic Sea without credible area defensive capabilities, among which air and missile defence ranks highly as a priority.

Author

Debalina Ghoshal, is a Non Resident Fellow, Council on International Policy. Her areas of specialization is on issues pertaining to nuclear, missiles, missile defence, space and artillery issues. She is the author of the monograph 'Missile Development in the Middle East' with the Middle East Institute.



The Finnish Defence Industry and Changes in the Security Environment

Tujia Karanko

Finland has a concept of comprehensive security which means that every actor, private or public, play a part in Finland's security. The Finnish industry as a whole is an important player providing some of the critical infrastructure and its security as well as enabling Finnish security of supply. Strong and credible national defence is a critical part of Finland's comprehensive security.

Finland's strong national defence is based on a general conscription model. Finland has a credible and pre-emptive threshold against potential use of force. A viable and competitive domestic defence industry is a fundamental element of credible national defence. Finnish technology expertise plays an important role in the entirety of the defence system and in military security of supply. Critical capabilities areas include

command, control and net-centric capabilities, intelligence, surveillance, target acquisition and reconnaissance capabilities, engagement and protection. The government sees these technologies as necessary in ensuring that Finland has the required technology and engineering know-how for life-cycle management, production, research and development, planning and design. This applies to our capability to integrate, maintain and repair systems, also in times of crisis.

A major part of army, navy and air force maintenance has been outsourced to domestic companies, which act as close partners to the Defence Forces. The Finnish Public-Private Partnership model relies on companies carrying out their responsibilities to secure military capabilities. A possible NATO membership does not diminish

the need for a strong national defence and defence industry.

The changes in the European security environment have an impact on all defence industries and this applies also in Finland. It is important that the national defence industry can support Finnish defence during these times. The companies are highly prepared as they have planned and practiced to be able to carry out their tasks in all security situations.

The Finnish defence, security and aerospace industry see a possible NATO membership positive and an enabler for enhanced cooperation especially in research and development. The Finnish industries are already involved in many NATO activities, but a full membership would, naturally, bring more opportunities for the companies. ■



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Results of a Summit

Hans Uwe Mergener

In a joint meeting of the European Parliament's Foreign Affairs Committee and Subcommittee on Security and Defence on 13 July 2022, NATO Secretary General Jens

Stoltenberg described the NATO Summit in Madrid as "historic and transformative". He elaborated on the Summit's decisions and discussed EU-NATO cooperation with MEPs. This is proof of how intensive the cooperation between the EU and NATO has become at the high political level.

The New Strategic Concept

Indeed, many observers see the decision-making emanating from the NATO Summit, including the new Strategic Concept, as a kind of general overhaul. Thanks to Putin, NATO is not experiencing 'brain death', but a kind of revival. The "biggest overhaul of our deterrence and defence since the Cold War" (Jens Stoltenberg) envisages, among other things, an increase in the troop strength of the NATO Response Force from 40,000 to 300,000. More prepositioned equipment and weapons stocks will invigorate forward defence. NATO Battlegroups in the eastern part of the Alliance will be strengthened and expanded to brigade level, which would increase missions (in the Baltic States, Bulgaria, Poland, Romania, Slovakia and Hungary) from the current 643 to 1,887 to between 3,000 and 5,000 troops.

In addition, the Alliance wants to establish more forward capabilities, including air defence, and an efficient command organisation. The US is expected to station more forces in the Baltic States.

The nine pages (excluding the preface) with 49 sections contain several new lines of allied strategy. What stands out is the clear statement citing Russia as a significant and direct threat and no longer as a partner or challenge or competitor. In doing so, NATO remains true to its 360-degree view – that security is all-encompassing and extends across all domains, includes all threat types and concerns all regions geographically. Observers underline the mention of the threat situation for the southern member states (Italy, Spain). Another profound change relates to two sections dedicated to China and its attempts to challenge the interests, security and values of NATO member states. At least, the concept includes the offer of dialogue to reduce tensions through transparency. However, the possible implementation, such as the establishment of a NATO-China Council or a similar permanent mechanism, remains (still) unmentioned. NATO is also addressing climate change as a crucial challenge of our time. As much as the confirmation of security risks directly or indirectly related to climate change is to be acknowledged, there is at the same

time a concern that NATO will not fully address this issue in view of the war in Europe.

Resilience Building

The points made on resilience building are similar. They must now lead to concrete programmes in the member states in order to remain more than just lip service.

Some observers find the remarks on nuclear deterrence marginal. In paragraph 28, the replica from the 2010 precursor document (paragraph 17) states: "The circumstances in which NATO would have to consider the use of nuclear weapons are extremely remote. Not only in view of the war in Ukraine and the Russian threat, critics would go further to emphasise Western credibility.

In contrast, there is a sense of further development when the security, demographic, economic and political challenges are described as interconnected and multidimensional. Here the door is opened to an integrating approach of other policy areas beyond defence policy: Diplomacy and development cooperation. Analysts see this as a departure from the earlier, more military-oriented approach.

As much as one may be happy about the new Strategic Concept and other results of the Madrid Summit, truth and fiction will be proven in the implementation. Permanent bases generate expenditure to a different extent than troop rotations. For the time being, the focus is on the East. As security situations change, desires may arise in other regional focal points. Member states on NATO's southern flank like to point to security threats close to them and Russian attempts at intimidation.

Alexander Vershbow, former US Ambassador to Moscow and Deputy Secretary General of NATO from 2012 to 2016, recommends rebalancing the Alliance. While Washington's focus of interest has been shifting to the Western Pacific for some time now, thus also shifting resources to the Indo-Pacific region, the Europeans will have to assume greater responsibility in collective defence. "Europe must prepare to be the first responder to crises on NATO's periphery," he said in an interview with Politico, adding that this would mean "greater European strategic responsibility – as opposed to autonomy".

This notwithstanding, NATO is currently faced with a balancing act between, on the one hand, an effective defence posture that meets the expectations of the Eastern member states, without, on the other hand, crossing Russia's red lines, which are fuelled by fears of encirclement, and without evoking the risk of a confrontation. Without mutual dialogue, this hardly seems achievable. The changed geopolitical architecture around the Baltic Sea may hold the key to a new approach. From its threat perception, Moscow could find interest in questions of conventional arms control and confidence-building measures. Brussels should be prepared for this.

Poland Builds Deterrence Potential

Grzegorz Sobczak

A couple of years ago, there were discussions about defence requirements in Poland, but decisions about procurement or reorganisation of the armed forces were minor. In the summer of last year, matters began to significantly speed up. Many processes have since been accelerated again.

The first sign of any new openings in Polish defence policy was a press conference in June 2021, where National Defence and Defence Affairs Committee of the Council of Ministers Jarosław Kaczyński and Polish Minister of Defence Mariusz Blaszczak, announced the intention to purchase 250 M1A2 SEPv3 ABRAMS MBTs for the country's Land Forces. At the same time, they announced a new defence policy that would start with new regulations in major national defence aspects. Furthermore, a new concept for the country's defence was announced.

The most important change has been the clear message from the MoD about NATO support should Poland be invaded by Russia – the armed forces need their own capabilities in order to defend the country during an invasion for a couple of weeks, in order to allow NATO members time to react and provide military support. The other aspect was to bring US forces to Poland with as many troops and as much equipment as possible. The third aspect was deterrence capabilities.

New Legal Regulations

In legal aspects, the Polish Government has prepared new regulations called the Homeland Defence Act. The Polish Council of Ministers accepted the bill on 22 February this year. At first, the new regulations replace the 14 existing acts related to national defence and better organise the regulation system with some acts remaining in force since 1966 and 1967; the second is to improve certain personnel matters; and

Photo: Polish MoD



In the last days of May 2022, a Polish MoD delegation visited the Republic of Korea to identify areas of possible cooperation between the defence industries of both countries.

the third is to increase the Army's size and funds for modernisation. The most heavily emphasised aspect is to increase the amount of funds for the modernisation of the Army that has increased from 111,000, with an additional 30,000 Territorial Defence Force members at that time, to a total of 250,000 with an additional 50,000 Territorial Defence Forces members.

Personnel and armament procurement costs will be covered by the MoD's budget, but funds for modernisation will come from the Armed Forces Support Fund financed by treasury bonds, government-secured bonds issued by BGK (Bank Gospodarstwa Krajowego), the state budget and profits of the central bank NBP (Narodowy Bank Polski). BGK, which will also govern this fund, is a state development bank – the only institution of this type in Poland to support the government's social and economic development programmes, owned by the State Treasury. Polish Prime Minister Mateusz Morawiecki declared shortly after that, that Poland will spend on defence about 3-4% or even up to 5% of GDP, in the coming years without any tax increase.

Shadow of Russian Invasion

The Russian aggression against Ukraine accelerated some processes and changed

priorities, especially in the acquisition process. From the first days of the war, Poland donated significant numbers of armaments from its own stocks to Ukraine. Poland has delivered over 200 T-72 MBTs shortly after the invasion, and a few months later another delivery of over 200 PT-91 MBTs. Also significant was the delivery of an undisclosed number of post-Soviet 2S1 GVOZDIKA SPHs, as well as 18 of the most modern KRAB SPHs, directly from Polish Army units. Since then, the most urgent need has been to fill the gap in the Polish military arsenal.

Initially Poland would make use of the German offer to receive a number of LEOPARD 2 MBTs. It quickly turned out that negotiations would not be easy. The Germans announced that they cannot meet Polish needs to deliver the most modern LEOPARD 2A7s because of the limited number of these tanks in the Bundeswehr. The Polish MoD answered that was interested in LEOPARD A4s, not A7s, also because 142 tanks in this version are already in Polish Army service. Finally, the Germans offered 20 LEOPARD 2A4s with delivery due from April 2023 with one tank per month and from October, three tanks monthly. Finally, in mid-July, after negotiation with the German Government over a few months,

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the Polish Ministry of Defence decided to purchase M1A1 SA ABRAMS MBTs from US strategic stocks. Poland will receive 116 tanks (two tank battalions) used previously by the US Armed Forces, with delivery in 2023-2024, in addition to 250 M1A2 ABRAMS SEPv3 MBTs with delivery scheduled in the years 2025-2026.

The Polish MoD has begun the purchase process of six PATRIOT batteries (in addition to two batteries ordered earlier) and about 500 HIMARS launchers (besides the 20 ordered in 2019) in the US.

On 1 June, Minister Błaszczak signed a contract with Leonardo Helicopters for 32 AW149 multirole helicopters with some combat capabilities (laser guided anti-tank missiles and HYDRA missile launchers). The initial batch will be delivered from the Vergiate facility of Leonardo, but most of the helicopters will be manufactured in Poland by PZL-Świdnik, a company owned by Leonardo Helicopters. Deliveries are scheduled from 2023 to 2029.

Korean Connection

However, the real game-changer in Poland's defence systems procurement is the agreement with the Republic of Korea. During the NATO Summit in Madrid in May this year, when the presidents of Poland, Andrzej Duda and Republic of Korea, Jun Suk-Yeol, declared their intention to pursue a policy of close cooperation.

In last days of May, a Polish MoD delegation visited the Republic of Korea to identify areas of possible cooperation. The result of this visit is a framework agreement signed in the last days of July in Warsaw. Poland decided to purchase 180 K2 MBTs with delivery scheduled in 2022-2024. The tanks



Photo: Polish MoD

US Army ABRAMS SEPv2 temporarily shared with Poland for training purposes, on the way to the "ABRAMS Academy" in Poland. The US Army will deliver 28 tanks for Polish personnel training.

will be delivered in the K2 version for the Korean Army because of the short delivery time. But this is only a "gap filler" to replace Polish tanks delivered to Ukraine. Because Poland is increasing the size of its Army, the future contract is much wider – in the years 2025-2030, Korea will deliver 400 tanks in the K2PL version developed to conform to Polish specifications. Hyundai Rotem will open a service centre and transfer production of K2PLs to Poland where 420 tanks will be manufactured from 2026. Finally, the first 180 will also be upgraded to K2PL standard. Poland will receive a total number of 1,000 K2 MBTs.

The agreement also contains K9 SPHs. Poland will receive 48 K9A1 SPHs in Korean Army configuration in 2022-2023, also as

a "gap filler". The next 624 K9PLs in Polish specification will be delivered by Korean Hanwha Defence from 2024 and from 2026, also made by Polish Huta Stalowa Wola (HSW).

Poland has also decided to acquire 48 KAI FA-50s combat-training aircraft to temporarily replace capabilities lost with Su-22s and MiG-29s, which should be withdrawn in the next few years. The FA-50s will be a supplement for the F-16s and already the ordered F-35s.

The Polish MoD and Armament Agency says that Poland is also interested in purchasing heavy IFVs from Korea.

Polish Defence Industry Growth

According to Minister Błaszczak, procurement of South Korean equipment will have no impact on the purchase process of domestic products. The production of KRAB SPHs by HSW will be continued with a maximum production rate to complete the current contract, but also newly ordered howitzers.

Before the Russian invasion of Ukraine, HSW received orders for 122 KRABs with delivery set for 2025. The order for an additional 48 KRABs is expected to be signed this year, with delivery foreseen roughly for 2026 or later. Moreover, a delivery of 54 KRABs for Ukraine has also already been ordered. The Polish Army already received about 80 KRABs, with 18 of them since donated to Ukraine. The K9s will be manufactured by HSW in parallel with the KRABs. To fulfil production requirements, HSW facilities will be expanded with new in-



Photo: Grzegorz Sobczak

The Polish MoD signed a contract to acquire 32 AW149 multirole helicopters. Most of them will be manufactured in PZL-Świdnik – a Polish subsidiary of Leonardo Helicopters.



The CAMM Missile Launcher System, based on the Polish JELCZ P882 8x8 truck chassis, is one of the elements of the NAREW SHORAD system, which will be delivered to the Polish Armed Forces in advance of the complete NAREW system, in readiness for operational evaluation and training purposes.

infrastructure or even whole new plants. Even then, the number of products to be ordered in the near future in HSW suggest that new production capabilities can also be fully absorbed.

Lt. Col Krzysztof Płatek, spokesman of the Polish Armament Agency, revealed in his interview to Polish media, that BORSUK amphibious IFVs, which HSW are starting to manufacture in the near future, will be ordered in the amount of about 1,000 vehicles, even when Poland purchases Korean heavy IFVs. According to Lt. Col Płatek, the heavy IFVs will be intended to support ABRAMS operations. Developed by HSW, the lighter BORSUK IFVs will support K2PL MBTs with more manoeuvre capabilities.

Industrial cooperation will not be limited to Korean MBTs and SPHs manufacturing. Minister Błaszczak says, that based on KRAB and K9 SPHs design and experience gained by the KRABs in Ukraine, Polish and Korean industries will jointly develop a new SPH programme. Similarly, on the base of the K2PL, and on Polish experience with ABRAMS MBTs, Polish and Korean companies will develop a new joint tank programme. Moreover, the Polish defence industry will be involved in export production when orders for Korean origin tanks and SPHs from third countries appears. In this way, the Korean defence industry obtains an

open door to the European market for its products.

Because of a lack of specific contracts for KRABs and BORSUKs, some experts do not believe in the continuation of domestic programmes. Bartłomiej Zajac, CEO of HSW, announced that he had left his position a few days after the Korean framework agreement was signed. There is no official reason for this decision, but it is difficult not to connect the two facts.

The high numbers of equipment expected to be ordered in the next few months and years will imply some requirements in production capabilities. Sebastian Chwałek, CEO of PGZ (Polish Armament Group) containing most of the important defence industry organisations says that some new manufacturing capabilities will be needed. The areas where HSW is located can offer some growth potential, however, new locations of HSW facilities are taken into consideration because of protection requirements – locating new production facilities away from the eastern Polish border line, as well as in regions with higher potential to find enough numbers of qualified personnel.

According to Sebastian Chwałek, it is also possible to join another civil heavy industry company from the western part of Poland to PGZ to increase manufacturing potential.

New Systems Absorption

The Polish Armament Agency, which is responsible for procurement processes, changed its way of dealing with domestically developed defence systems. Only those systems which fulfil all requirements proven in test programmes will be able to be delivered early. This is beside those systems such as the GLADIUS, developed by WB Group, which contains the WARMATE 2 loitering munition, and the FT-5 UAVs or PIORUN MANPADS, of which 3,500 have been ordered; these are systems which are already fully operational. In the case of some important products, the Agency approves deliveries only when the most important compliance requirement is confirmed.

The best example is the NAREW SHORAD air defence system. The Armament Agency approved the delivery of some elements of this system, when the complete NAREW system is not yet operational. As a result, the Polish Armed Forces will receive elements of the NAREW with a limited air defence capability, able to evaluate the system in real operational use, as well as perform personnel training before the delivery of a fully capable system. The first elements of two fire units, including MBDA's CAMM missile launchers and Polish PIT-RADWAR SOLA radars, will be delivered in 2002 and 2023. It gives more time to develop CAMM-ER – the final missile version for the NAREW, fire control radars SAJNA and integrate the IBCS battle management system and others.

A similar process is scheduled for the BORSUK amphibious IFV. The initial tranche of four pre-serial vehicles (platoon of mechanised infantry) will be delivered for operational testing in a regular Army unit to confirm full capabilities and collect operational experience for any potential upgrade before full serial production.

Deterrence Potential

All activities aimed at increasing Poland's defence potential are largely based on the experience of Ukraine in defending itself against Russia. This is the reason behind the strong development of artillery systems. The acquisition list is of course much longer, but all of that is designed to build Poland's own deterrence capabilities. Poland is building the largest land forces among NATO member countries as a demonstration of determination. According to the Polish MoD, the increase of the Army's capabilities is not to invade others, but to show potential aggressors that an invasion of Poland will simply be very expensive. ■

Globalne rozwiązanie artyleryjskiej dominacji – Hanwha Defense K9

W lipcu rząd Polski podpisał szereg dużych porozumień obronnych z Republiką Korei i jej przemysłem zbrojeniowym. Na ich mocy Polska pozyska lekkie samoloty bojowe, czołgi i artylerię samobieżną. To jednak coś więcej, niż tylko bezpośrednie pozyskanie wyposażenia z Republiki Korei. Dla koreańskiego przemysłu obronnego umowy te otwierają drogę do długofalowej współpracy strategicznej z polskim przemysłem obronnym i do transferu technologii oraz wiedzy. To również możliwość wspólnego, polsko-koreańskiego, rozwijania przyszłych systemów sektora obronnego.

Dla Hanwha Defense najważniejszy element polsko-koreańskich programów zbrojeniowych to decyzja o zakupie 48 samobieżnych haubic K9, których dostawy przewidziane są na okres 2022/2023, oraz 624 systemów artyleryjskich K9PL. W pierwszym okresie, od 2024 roku, systemy K9PL mają być dostarczane z Republiki Korei. Ma to być najnowszy wariant K9A2, ale wyposażony w polską łączność, zintegrowany system zarządzania walką Topaz i inne polskie rozwiązania techniczne. Wtedy też w Polsce zostanie utworzone centrum produkcyjne, które będzie odpowiedzialne za produkcję większości systemów artyleryjskich, przewidzianych dla polskiej armii.

Warto pamiętać, że Hanwha Defence nie jest obca owocna współpraca obronna z Polską. W latach dziewięćdziesiątych Polska zainicjowała program rodzimego, samobieżnego systemu artyleryjskiego, który z czasem doprowadził do stworzenia AHS Krab. Opracowana na początku platforma nie spełniła rygorystycznych wymagań.

Bojowy wóz piechoty Hanwha Defense Redback podczas prób wojsk lądowych Republiki Korei na początku tego roku. Polska planuje przetestować Redbacka w październiku.

Rozwiązanie znaleziono w 2014 roku, kiedy to w Republice Korei zamówiono kadłuby K9. Pierwszych 24 kadłubów dostarczono z Republiki Korei, ale dzięki stworzeniu fabryki w Polsce, a także dokonaniu transferowi technologii, Polska mogła uruchomić własną produkcję. To bez wątpienia przykład udanego programu i dowód na to, że współpraca obronna pomiędzy Hanwha Defense a Polską działa.

Należy mieć również na uwadze, że współpraca z Hanwha Defense w zakresie K9/K9PL to dopiero początek. Przed K9 znajduje się bowiem ścieżka rozwoju, w której Polska może wziąć udział. To chociażby przyszły wariant K9A3, ale Republika Korei ma szersze ambicje. Planowane jest rozwinięcie przyszłej generacji K9 z wykorzystaniem zaawansowanych technologii, co pozwoli zredefiniować osiągi haubic samobieżnych. Istnieje plan, który ma wprowadzić system K9 w lata czterdzieste XXI wieku, a nawet dalej. Nasza wizja zakłada aktywny udział polskiego przemysłu obronnego, który odgrywa kluczową rolę w opracowaniu nowych rozwiązań dla systemu K9. Inna możliwość współpracy dwustronnej dotyczy wozu bojowego piechoty Hanwha Redback – Polska planuje przeprowadzić jego testy na swoich poligonach na początku października 2022 roku.

Historia K9 rozpoczęła się pod koniec lat osiemdziesiątych, kiedy to koreańska, rządowa Agencja Rozwoju Obronnego (ADD, Agency for Defense Development) prowadziła prace przemysłowe z partnerem, późniejszym Hanwha Defense, w zakresie zaprojektowania i rozwinięcia samobieżnej haubicy kal. 155 mm z lufą o długości 52 kal.



Najnowszy wariant K9A2 posiada automatyczny system ładowania i inne unowocześnienia. Zgodnie z planami K9PL dla Polski ma być oparty na wariantcie K9A2, który zostanie zintegrowany z konkretnymi, polskimi systemami.

Miała ona oferować optymalne połączenie siły ognia i mobilności. Zasadniczą cechą K9, którą zaimplementowano już na samym początku prac projektowych, jest potencjał rozwojowy. Dzięki temu każdy użytkownik może mieć pewność, że K9 będą mogły być modernizowane do najnowszych standardów operacyjnych przez cały cykl ich życia.

Co do wojsk lądowych Republiki Korei to K9 doprowadził do rewolucji w ich artyleryjskich zdolnościach. System ten oferuje wysoką precyzję i możliwość rażenia celów z dużego dystansu. Efektywność systemu jest wzmacniana dzięki pojazdom wsparcia, takim jak wóz amunicyjny K10, czy też wóz kierowania ogniem K77. Wojska lądowe Republiki Korei skorzystały z potencjału rozwojowego K9, wprowadzając do służby w 2018 roku wariant K9A1. Kolejny przewidziany do wdrożenia operacyjnego model to K9A2, który charakteryzuje się jeszcze lepszymi osiągnięciami. Plan zakłada również wariant K9A3.

K9 to przykład udanej historii również w aspekcie międzynarodowym. Ten rozdział rozpoczął się w 2001 roku, kiedy to Turcja wykorzystwała technologię K9 i jej systemy jako podstawę do opracowania rodzimego systemu artylerii samobieżnej T-155 Firtina. Od tego czasu system K9 został wybrany przez Polskę, Indie, Finlandię, Norwegię, Estonię i Egipt. K9 wyrósł na dominujący system artylerii samobieżnej w perspektywie globalnej.



Zdjęcia: Hanwha Defense

CBRN in Europe: Prospects and Developments

Dan Kaszeta

The overwhelming narrative in European defence and security is the war in Ukraine. In military affairs, the best news involving CBRN is that, in fact, there has been no news in CBRN.

The ongoing conflict has not seen the use of CBRN weapons or materials. The handful of reported incidents have, so far, been erroneous reporting or situations being taken out of context. Even the occupation and liberation of the contaminated area around Chernobyl seems to have been largely a non-issue.

realise that actually fighting wars on the ground, in their own country or nearby, is still very much a thing in the modern era. Defence policy is not about vague commitments and occasionally sending a company or battalion on an EU, UN, or NATO mission somewhere else. It is, and always has been, about defending

answer. The optimistic answer is that a rising tide will raise every boat. Expansion of force structure and modernisation of land forces would necessitate additional spending on CBRN force protection, at least in theory. The pessimistic answer would be that the exigencies of the Ukraine crisis point to a wide variety of small and large deficits in defence capability and capacity. Money spent on respirators and decontamination units is money that could be spent on tanks, artillery, ammunition, and, well, everything else. Eventually, CBRN defence expenditures may lose out to other, necessary imperatives. It is too early to tell which way this will break, but we have a few hints in a new NATO document.

Collective Efforts: NATO

The conflict has had many effects on NATO, but has it affected NATO's CBRN defence policies? It is rare that we get a quick response to a NATO-based question. The answer is yes. On 14 June 2022, NATO published a new policy document entitled "NATO's Chemical, Biological, Radiological and Nuclear (CBRN) Defence Policy." Replacing a document from 2009, the new policy includes some interesting material. The paragraphs on Russia cite "Novichok" agents and the Skripal and Navalny poisonings. The document shows that there is consensus among the NATO members that Russia remains a serious CBRN threat. The document is the closest thing to a formal accusation of Russian non-compliance with treaties that this correspondent has seen. The NATO policy gives appropriate attention to threats posed by new technologies, such as nanotechnology and pharmaceutical developments, whereas older policies on CBRN often looked back in time at cold war-era threats and technologies. The new policy establishes 2 "core principles and commitments." The first is "Enhanced and Integrated CBRN Military Capabilities" and the

Photo: US Air Force



A US Air Force officer walks through a decontamination line during the Aircrew Contamination Mitigation course on Ramstein Air Base, Germany, Sept. 19, 2017. The course taught AFE Airmen how to decontaminate equipment.

Defending Territory

What has happened, though, as has been discussed in every outlet for serious defence journalism, has been a cosmic realignment in defence priorities and budgets in Europe. As Ukraine faces invasion, the rest of Europe has started to

territory. Some people are just now re-learning this harsh fact. Furthermore, the potential war in front of us all is not another Afghanistan conflict, with negligible CBRN threats. Many practical CBRN deficits exist in European militaries, and years of underinvestment lead to gaps in capability or capacity.

To the veteran observer of CBRN defence and security, the logical question to ask is just how much of this epiphany results in additional expenditures on CBRN defence and security. It is too early to learn the answer to the question. But there are at least two possible ways to venture an

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Photo: Avon Protection

The Avon Protection FM50 respirator mask

second is "Improved Resilience against CBRN Threats." Of significant interest is that the document spends much effort talking about civilian response and population protection and not just military CBRN defence. Five or ten years ago, one might be forgiven for a bit of cynicism about such a document emerging from NATO. But the Ukraine crisis has been a moment of clarity for NATO. Things are suddenly being taken more seriously, so this policy document will have some clear traction. On a related note, Sweden and Finland joining NATO also will have some effect on the alliance, as both of these countries take CBRN defence rather seriously.

More long-standing NATO efforts have contributed to the overall CBRN operational climate in Europe in recent years. NATO's standardisation efforts are essential to the CBRN industry. NATO fields a Combined Joint CBRN Defence Task Force consisting of a Joint CBRN Battalion and a CBRN Joint Assessment Team. NATO's CBRN Centre and school in Vyškov (CZ) is well regarded. NATO also consistently conducts multinational CBRN exercises across the region. CBRN in a broader NATO context was discussed in issue 06-2017, but the subject is worthy of a re-visit in future issues.

EU Efforts

NATO is not the only collective body in Europe. The European Union (EU) has had a CBRN Action plan for some years now, ana-

lysed in detail in issue 08/2018 of this publication. This plan sets strategic directions, and nothing in it is out of place or incorrect. But in a more direct sense, the EU is taking action on CBRN in the context of the Ukraine war. The EU announced in June that it has used the rescEU component of its Civil Protection Mechanism to send €11.3M worth of CBRN defence kit, such as suits and decontamination supplies, to Ukraine. These were drawn from reserve stockpiles in member states, but even merely replacing this outlay would represent, by recent European standards, a medium to large CBRN procurement.

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Photo: Master Sgt. Joy Dullen / US Army

A US Army serviceman decontaminates another serviceman as the last step in a training scenario during exercise TOXIC VALLEY 2021 in Zemianske Kostol'any, Slovakia, 14 September 2021. TOXIC VALLEY is a Slovak Armed Forces-led live agent CBRN exercise that provides training for multinational CBRN units stationed throughout Europe.

A more long-standing effort is the European Union CBRN Centres of Excellence (CBRN CoE) programme. Now into its second decade of life, the CoE have worked extensively to project EU-based expertise to other parts of the world, funding 91 projects through 8 regional secretariats and 62 partner countries. The global COVID-19 pandemic saw a bit of a pivot by CBRN CoE, but arguably pandemics lie within the 'B' of CBRN.

The CBRN space is one that is heavily driven by science and technology. Within the European Union (and some associated countries), a major force in research and development has been European Union expenditures. The current mechanisms for such are Horizon 2020 and its successor Horizon Europe, replacing older funding programmes like FP6 and FP7. There have been many grants directly in the CBRN space for decades now. Projects like EU-RADION, TERRIFFIC,

eNOTICE, Proactive, EU Sense and many others push the frontiers of knowledge in CBRN response. Readers wanting a full accounting of EU-wide research efforts are encouraged to look up the ENCIRCLE project, which attempts a full accounting of the entire situation.

A common criticism of such EU-funded projects is that they often result in little beyond a website and reports. The European Commission acknowledges some problems historically with this and is further stressing actual impact in the real world as part of its proposal review process. However, it is too early to tell what long-term impact many of the current generation of Horizon projects will have in CBRN. In fairness, it should be noted that a number of Horizon 2020 and Horizon Europe projects not specifically naming CBRN in their titles or mission are also in adjacent spaces with possible applications in CBRN defence. Various projects in border security, aviation security, fighting crime and terrorism, and disaster resilience have had both direct and indirect applications in the CBRN space.

National Efforts

Most practical spending on training and equipment in CBRN happens at the national level. But despite all the broader developments mentioned above, actual procurement tenders and contracts in CBRN equipment and services remains only moderate. Perhaps some of the biggest activity recently has been by Avon Protection, the UK-based respirator and protective clothing manufacturer. Avon is the manufacturer of the FM50 mask, adopted in the USA as the M50 Joint Service General Purpose Protective Mask. This adoption by the USA has been leveraged into significant uptake elsewhere. Avon has recently reached a figure of 100,000 FM50 masks sold to NATO members through NATO's Support and Procurement Agency. Furthermore, Latvia and Netherlands have made the decision to adopt this mask.

Looking through current procurement and tenders, the range of opportunities at the time of writing (July 2022) remains modest. Luxembourg appears to be procuring CBRN detection equipment and decontamination equipment, according to various sources. CBRN laboratory equipment appears to be sought by Hungary and CBRN training services are being sought by Romania. This correspondent has also heard talk of German procurement of CBRN equipment for civil defence in Germany. The aggregate value of all of these appears modest, and one awaits broader developments from the overall rise in defence spending.



US Army soldiers suit up in CBRN gear during exercise TOXIC VALLEY 2021 in Zemianske Kostol'any, Slovakia, in September 2021.

EU CBRN Industrial Base

As various articles in this publication have been keen to note for a number of years, much of the world's industrial base and technical expertise in CBRN is based in Europe. The output, both economically and intellectually, of this CBRN industrial and technical base, has traditionally exceeded domestic European demand and competes well in the export market. For detailed analysis of the major sectors of the CBRN industry, this correspondent has done a number of sector-specific articles over the past five years, but it is worth a quick tour of the space as there are clearly Europe-based industry leaders.

Decontamination systems and solutions is a segment with three global leaders from Europe. Kärcher (DE), OWR (DE), and Cristanini (IT) are decontamination manufacturers with global uptake and firmly established European clients. Any uplift in CBRN spending will almost certainly increase business for all three. The detection instrument market also has European leaders. Military chemical warfare detection has consistently been a rivalry between Smiths Detection (UK)

and Brüker (DE), with Environics (FI) and Proengin (FR) somewhat behind them in size of market share. All of them produce chemical warfare agent detectors of hand-held size, as well as a variety of other detector systems. In terms of total units in service, Smiths by far is the chemical detection market leader with its LCD series of detectors.

Respiratory protection and CBRN protective clothing are a significant percentage of CBRN defence spending, both in Europe and in the broader export market. Avon Protection (UK), mentioned above, is one of the global leaders in this space. At Eurosatory this year, Avon also unveiled their "Exoskin" line of CBRN boots and gloves. Nonwovenn (UK) and OPEC-CBRNe (UK) are very active in the CBRN protective clothing arena. Blücher (GE) and Paul Boyé (FR) are very active in the suit manufacturing space. Dräger (DE) provides a wide range of gear in both civil and military market spaces.

Several larger defence conglomerates have branches or divisions that do some CBRN work, particularly Rheinmetall (DE) and Saab (SE). But there are a wide range of smaller firms in various segments of the European CBRN industrial

space. Kromek (UK) and Serstech (SE) are merely two up and coming players in the detection segment. Various Czech firms leverage long-existing expertise left over from the Cold War. Some European firms have become world leaders in their specific CBRN niches. Bruhn Newtech (DK) is one of the finest vendor-neutral integrator of other manufacturers' CBRN detection systems. Hotzone Solutions (NL) is a world-class training provider, with access to live agent facilities in Czechia.

Conclusion

Roughly half of the world's CBRN budget and activity is in the North America market, but perhaps 25% is in the broader European space, if history is our guide. The general consensus within the CBRN industry is that the conflict in Ukraine will result in somewhat increased CBRN industrial activity directly, but that there will likely be large opportunities in the following years as force modernisation and force expansion across Europe start to take hold. The only serious arguments and speculation will about what percentage of the general uplift will be devoted to CBRN. ■



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The UK BOXER Programme Moves Ahead

Christopher F Foss

So far, the UK MoD has confirmed four BOXER MIV variants.

These are infantry carrier, specialist carrier, command post vehicle (CPV) and ambulance.

After numerous cancellations, the UK finally selected the ARTEC BOXER (8x8) Multi-Role Armoured Vehicle (MRAV) to meet its future Mechanised Infantry Vehicle (MIV) requirement. The UK Defence Equipment & Support organisation (DE&S) placed the contract with the Organisation for Joint Armament Cooperation (OCCAR) who in turn placed the contract with ARTEC in Germany which is a joint venture between Krauss-Maffei Wegmann and Rheinmetall Landsysteme. These in turn placed contracts with their UK elements Rheinmetall BAE Systems Land (RBSL) at Telford and WFEL in Stockport who are both classed as Tier 1 suppliers. RBSL is a joint venture between BAE Systems UK (45%) and Rheinmetall (55%). WFEL is 100% subsidiary of Krauss-Maffei Wegmann.

Photo: RBSL



Baseline UK BOXER (8x8) MIV will be fitted with a Kongsberg P4 PROTECTOR remote weapon station typically armed with a 12.7 mm machine gun.

Major Investments

These two contractors are already making major investments in their existing manufacturing facilities such as installation of production lines with new manipulators and painting facilities as well as training for the production team. BOXER Drive Module for the UK production is already underway at WFEL. The first welders, for example at WFEL, have already been trained in Germany who will then come back to the UK and train additional welders as the production process gets underway.

The original £2.8bn UK contract was placed in November 2019 and covered the supply

of 523 BOXER MIV and variants, plus an initial support package, which were originally earmarked for the British Army Strike Brigades. This was followed by a second contract in April 2022 for an additional 100 BOXER (8x8) MIV which brought the total up to 623 units of which 80% will be built in the UK but as some elements will come from abroad around 60% of the original contract value will be spent in the UK.

The first 105 UK BOXER MIV are being built on the German production lines in Munich (KMW) and Rheinmetall (Kassel). There is no current requirement for the UK to undertake the demanding Reliability Growth Trials (RGT) as these have already been completed for the original customers. The first of these UK BOXER from Germany are due to be delivered towards the end of the first quarter of 2023 to go into trials and acceptance to allow for British Army to start training during 2023 before production starts in UK facilities in 2023.

It is understood that the current yearly production rate will be around 60 units, but this could be accelerated. According to

Rory Breen, Sales Director at RBSL, "in the longer term there is potential for the UK to export members of the Boxer family".

As a result of the Integrated Defence Review (IDR), the Strike Brigades have now been dispensed with. The Armoured Infantry Brigades were to have CHALLENGER 3 main battle tanks (MBT) and WARRIOR infantry fighting vehicles (IFV) ungraded by Lockheed Martin UK under the Warrior Capability Sustainment Programme (WCSP). The latter programme has now been cancelled even though Reliability Growth Trials (RGT) had almost been completed with very good results.

The BOXER MIV will now equip the Armoured Brigade Combat Teams (ABCT) who will also have the latest CHALLENGER 3 MBT being developed by RBSL at Telford. The UK MoD has firmly stated to European Security & Defence that the BOXER MIV is NOT the replacement for the cancelled WCSP and "these are distinct capabilities employed in different tactical functions." WFEL will fabricate and assemble all of the BOXER Drive Module hulls and a smaller

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number of Mission Modules for final assembly and delivery of complete BOXER vehicles to the UK MoD. RBSL will fabricate and assemble Mission Modules and undertake final assembly and delivery of complete BOXER vehicles as well. Both WFEL and RBSL will undertake functional tests before delivery to the UK MoD.

Following functional trials at the Telford test track, RBSL will deliver these BOXER to the Army for acceptance and integration with Government Furnished Equipment (GFE) such as the General Dynamics UK Bowman digital communications equipment and weapons will be installed.

The steel required for UK BOXER is not available in the UK; so this will be supplied by Swedish Steel who already supply this high hardness armour steel for many European armoured fighting vehicle (AFV) programmes. In addition, BOXER MIV will have an applique passive armour package and spall liners.

The Latest Version

UK will have the latest version of the BOXER designated the A3 with an integrated power pack consisting of engine, transmission and cooling system. On 3 August 2022, it



Photo: Krauss-Maffei Wegmann

The British Army will also deploy the ambulance version of the BOXER which will have a raised roof line for greater internal volume for its more specialised role.

was announced that RBSL and WFEL had selected Rolls Royce Services Limited to supply diesel engines for the UK BOXER MIV programme. This will be the latest MTU 8V 199 TS21 rated at 600 kW and the UK will be the first user of this engine which

gives 90kW more power than earlier engines fitted to BOXER.

For the WFEL BOXER, the Rolls Royce facility in East Grinstead will deliver these engines directly to David Brown Santasalo who will integrate engines into the complete power

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Photo: WFEL



There are many more specialised versions of BOXER currently at the prototype stage including this one which can transport and launch the LEGUAN horizontally launched bridge.

packs and deliver these to WFEL. For RB-SL, assembly and testing of the complete BOXER power pack will take place at their Telford facility. The complete A3 version of BOXER has a gross vehicle weight (GVW) of 38.5 tonnes and new wheels and tyres. A BOXER has been demonstrated at the Millbrook Proving Ground in the UK rated at 41 tonnes, showing that the Boxer has plenty of growth potential to meet future UK requirements. There are many sub-contractors for the BOXER MIV programme in the UK and overseas with the former including the Nasmyth Group for precision engineering, GuS Periscopes for periscopes and window systems, AeroGlow International for the HalO vehicle egress lighting system, Atec for power distribution boxes and Renvale for CAN-Node electro-mechanical devices.

The largest UK sub-contractor is Thales who early in 2021 were awarded a GBP 180 million contract by RLS/RBSL to supply the latest PROTECTOR RS4 remote weapon station (RWS) and options for the ACUSONIC shot detection system (SDS) for the BOXER MIV. The UK has used earlier versions of the PROTECTOR RWS for some years on their MASTIFF (6x6) protected mobility vehicles,

but the latest RS4 RWS features a stabilised weapon which can be a 7.62 mm or 12.7 mm machine gun (MG) or a 40 mm automatic grenade launcher (AGL), with these weapons being GFE. The PROTECTOR RS4 RWS also features a Thales CATHERINE EZ thermal imager (TI) module as well as a CELT3 laser rangefinder. Lower down on the RWS are two banks of electrically operated multi spectral smoke grenade launchers.

The ACUSONIC SDS is also installed on the General Dynamics Land Systems UK AJAX family of tracked vehicles which as of early August was still an active programme, although had been under threat of cancellation for some time. Acusonic SDS systems, can if the capability is supported and enabled, alert the crew to an incoming threat and automatically lay the Protector RS4 RWS onto the target with the operator then making the final decision as to whether to engage the target or not. So far, the UK MoD has only confirmed four BOXER MIV variants. These are infantry carrier, specialist carrier, command post vehicle (CPV) and ambulance, with the latter having a raised roof line for greater internal volume for its specialised role. In all BOXER versions, the dismounts can enter through a large power-operated ramp at the rear.

In addition to the infantry fighting vehicle (IFV) and command post (CP) versions, the British Army currently deploys a number of more specialised versions of the WARRIOR including ambulance, mechanised recovery vehicle (repair), mechanised combat repair vehicle, mechanised artillery observation vehicle and battery command vehicle.

With the phase-out of the Warrior IFV and its variants, there could potentially be more specialised versions of BOXER MIV for the UK in the future even though they have different missions as previously stated. There

are already a number of more specialised versions of the BOXER, some of which are in service while others have been developed as a private venture in anticipation for future requirements.

These include cargo (deployed by the Netherlands), Driver Training Vehicle (deployed by Germany, Lithuania and the Netherlands), engineer (Netherlands), prototype of an Armoured Vehicle Launched Bridge (AVLB) with the Krauss-Maffei Wegmann LEGUAN horizontally laid bridge system, prototype of Rheinmetall Air Defence SKYRANGER air defence system, pre-production models of the Krauss-Maffei Wegmann REMOTE CONTROLLED HOWITZER 155 mm/52 calibre and fitted with Rheinmetall High Energy Laser (HEL).

While BOXER MRAP is used as an APC and specialised versions by Germany and the Netherlands, it is now being promoted as a IFV with both Krauss-Maffei Wegmann and Rheinmetall offering unmanned and manned turrets armed with a 30 mm cannon, 7.62 mm co-axial MG and options for anti-tank guided weapons (ATGW). It has also been fitted a Kongsberg RCT armed with a 30 mm cannon and 7.62 mm MG to meet requirements of Germany Army.

BOXER supplied to Lithuania are fitted with an RAFAEL Advanced Defense Systems SAMSON RCT armed with a Northrop Grumman 30 mm dual feed cannon, 7.62 mm co-axial MG and SPIKE-LR anti-tank guided weapon (ATGW). Latest customer for BOXER is Slovenia who ordered 45 in May 2022. BOXER has also been shown with the rear mission module fitted with a John Cockerill Defense C3105 two person turret armed with a 105 mm high pressure rifled gun and 7.62 mm co-axial MG. Other BOXER versions include being fitted with the Saab ARTHUR artillery locating radar while FFG has developed and tested a recovery module.

Rheinmetall Norway has developed the RAGNAROK mortar system which is already deployed by the Norwegian Army for a batch of its CV90 fitted with an 81 mm mortar (as used by British Army) or a 120 mm mortar.

Logistical support for the currently delivered BOXER (8x8) MRAP fleet is provided by the NATO Support and Procurement Agency (NSPA) PSA which aims to reduce through life cycle costs by maximum use of purchasing power direct from the suppliers. Within NSPA, there is a firmly established Boxer System Management Group (BSMG) which is their centre for Life Cycle Management and Integrated Logistic Support (European Security & Defence June 2020).

When the DE&S announced its " Voluntary ex-ante transparency notice" back in July 2018 it stated that it was to procure an initial batch of 400-600 vehicles in four variants plus a driver training vehicle but there were options to increase this up to 1,500 vehicles by extending the contract by another nine years to up to 24 years. It also mentioned additional potential variants including a medium calibre cannon.

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The British Army Artillery Renaissance – The Mobile Fires Platform

David Saw

According to the latest 'UK Armed Forces Equipment and Formations' tabular data published by the Ministry of Defence (MoD) on 9 September 2021, the British Army currently operates a total of 89 AS90 155 mm/L39 self-propelled guns. Unfortunately, the reality is somewhat different. There might be 89 AS90 on paper, but the actual number of operable AS90 systems is significantly less. Depending on who you talk to and how frustrated they are, real operational AS90 probably number at less than 20 and possibly even closer to 10 or fewer systems that can actually take the field!

The 'Artillery System for the 1990s,' otherwise known as the AS90 had the misfortune to come into service as the Cold War had just ended. The British Army of the Rhine (BAOR) and the continental commitment that had been the primary mission of the British Army in the post-1945 period was coming to an end. Uncertainty surrounded the size and structure of the post-Cold War British Army, on top of which there was the reduction in defence spending across the course of the 1990s, with the exception of 1991 where spending was briefly boosted due to the Gulf War.

By the end of the 1990s there was a plan to upgrade the AS90, but this project failed to yield satisfactory results and was cancelled. Year on year, the AS90 fleet started to decline in terms of numbers and capability, a situation not helped by the fact that spare parts availability became increasingly uncertain. If a self-propelled 155 mm artillery system had been seen as a critical capability then things might have been different, but as time went on systems that were essential for high intensity conventional conflicts, such as the AS90 and tanks, were seen as diminishing in relevance, and numbers were significantly reduced.

With the British Army embroiled in asymmetric conflicts and with conventional threats seemingly less and less likely, where was the need for systems such as the AS90? With a limited budget, the British Army had to use its resources in areas that mattered and self-propelled artillery did not. Then in early 2014, Russia seized Crimea from Ukraine and in August of that year, conflict



Photo: Crown Copyright

The current AS90 fleet is to be replaced by a new artillery system in the form of the Mobile Fires Platform (MFP). The structure of the MFP programme is still unclear, never a good thing in the chaotic world of British defence procurement. On the other hand, MFP funding exists!

opened up in the Donbas, with Russian troops actively supporting separatists in Donetsk and Luhansk. Suddenly the threat of conventional conflict in Europe started to emerge as a real possibility and gradually the UK's thoughts turned to what would be required to confront conventional threats. While there might have been thinking about conventional threats, there was little in the way of new funding to meaningfully confront such threats. Indeed, the British Army, like many others in Europe, found itself expected to do more with less and in that environment a great deal of effort was put into trying to define a new structure for the Field Army that would allow it to confront increasing conventional, as well as other threats, within the existing limits of its funding.

Gradually programmes that focussed on weapons for conventional high intensity conflict began to appear, though sadly the funding constraints that had hampered the British Army had not disappeared. The end result was that many programmes would emerge, of these very few would survive to enter the procurement phase, and even then cancellation always remained a threat, the fate of the WARRIOR Capability Sus-

tainment Programme (WCSP), awarded in 2011 and cancelled in March 2021, being a case in point.

The Artillery Problem

In the midst of all of this, an artillery programme started to emerge and eventually this became known as the Mobile Fires Platform (MFP). The fundamental objective of this programme is to replace the AS90 with a modern self-propelled artillery system. According to the 'Defence in a Competitive Age' defence command paper issued in March 2021: "Investment in longer range artillery will mean the Army is able to deliver a more precise and lethal response and attack potential adversaries at greater depth, providing greater protection." The paper continued: "In addition the Army is spending over £800 million over the next ten years on a new automated Mobile Fires Platform that will deliver enhanced close support artillery systems and greater operational mobility."

The fact that a funding allocation is mentioned in an official document is very good news for those intending to compete for the programme, another positive sign is



Photo: Norwegian Army

K9 155 mm/L52 self-propelled artillery system of the Norwegian Army on exercise, the K9 replaced the earlier M109A3GNIGNM in Norwegian service. Hanwha Defense and its partners in Team Thunder are marketing a solution based on the K9A2 for the Mobile Fires Platform (MFP).

that the ceiling for the number of MFP systems to be acquired is up to 116. Where things get complicated is that at this point there is no official operational requirement for MFP, it is still being drafted, but the competitive process for the MFP programme should get underway by January 2023. This means that a lot of steps in the procurement process will have to be fitted into a relatively short timescale, especially since the MFP contract award is expected to be in 2026.

In the early stages of trying to define performance parameters for MFP, there were some very ambitious requirements being spoken about, these included a maximum range of some 80 km and an extremely high rate of fire. In fact, the British Army Land Deep Fires capability is due to be provided by 44 MLRS launchers that will be upgraded to the M270B1 standard and utilise the Guided Multiple Launch Rocket System – Extended Range (GMLRS-ER) rocket, which will boost engagement ranges from 84 km out to 150 km. This means the starting point for MFP will be 155 mm/L52 Joint Ballistics Memorandum of Understanding (JBMOU) compliant ordnance, meaning that there is a 40 km baseline maximum range requirement.

A new range of artillery ammunition is to be acquired for MFP under the Close Support Fires Programme (CSFP), natures to be acquired are likely to include: a guided munition, a Rocket Assisted Projectile (RAP), a High Explosive, Base-Bleed (HE-BB) nature and an anti-armour area munition using sensor-fuzed submunitions. Another separate but related MFP contract will cover the provision of a training system for the programme.

Timings for MFP are interesting, the out of service date for the AS90 was to be 2030, although it now appears to be 2032, which is rather strange considering that there are hardly any functional AS90s these days. So how do they intend to sustain a capability that has virtually wasted away for another ten years?

If we assume that the MFP enters service in around 2029, it is expected to remain in service through the 2050s. The variant of MFP that first enters service will reflect the current level of technology of self-propelled artillery systems. However, remaining viable across its envisaged service life will require the MFP to have substantial growth potential, to be capable of ‘forward capability insertion.’ This could include new ordnance capable of increased range engagements, new ammunition, an improved autoloader,

automotive improvements such as a hybrid engine and perhaps even autonomous operation. Bearing in the mind that the service life of the MFP will be at least 30 years, and most likely longer, the ability of the of the artillery system to evolve across its service life will be a critical discriminator in the selection of the MFP.

Lessons and Requirements

In asymmetric conflicts post-2000, British Army artillery generally found itself operating from static positions. It will now have to learn the lessons necessary for mobile operations on a modern battlefield, where artillery systems will be a key target for opposing forces. The starting point is the recognition that because the British Army has been so resource-constrained over the last 25 years, it desperately needs to modernise its land-based fires. This modernisation process is finally underway, as previously noted 44 M270B1 systems will fill the long-range fires requirement, followed by MFP to replace AS90, and finally there will be a replacement for the L118 105 mm Light Gun. There were 126 of these in service, but 36 have recently been transferred to the Ukraine.

Although the requirement for artillery modernisation has been accepted, how it can best be achieved remains a fluid concept. Discussions of future artillery utilisation have been underway for some time, but now the role of artillery in the current conflict in Ukraine has provided a stream of new data to analyse and evaluate. First and foremost, the conflict in Ukraine has confirmed the essential role of artillery on the modern battlefield. However, it has also demonstrated that the UK’s older concepts



Photo: KMW

The KMW RCH 155 (Remote Controlled Howitzer 155 mm) is a 155 mm/L52 gun system in a module that can be integrated with the BOXER armoured vehicle. With BOXER being selected for the British Army Mechanised Infantry Vehicle (MIV) and being seen as a successful programme, a BOXER-based artillery system could be attractive.



Loading the 155 mm/L39 gun of the AS90 on exercise. In an ideal world British Army AS90 guns would have gone through a comprehensive mid-life upgrade, but there was never the priority for artillery upgrades nor the funding.

of artillery employment are no longer feasible, the artillery will have to learn to fight their guns differently on future battlefields. Mobility, both tactical and operational, is an essential characteristic for the future MFP. Static gun lines are a thing of the past, artillery must move about the battlefield, and dispersal is essential for survival. MFP must be capable of rapidly entering its fire position, conducting its fire mission, and then repositioning rapidly. An autoloader system is also crucial to keeping its time at the fire position as low as possible. Connectivity is equally important, guns will need to be linked to a command and control (C2) network, with targeting data acquired from multiple Intelligence, Surveillance, Target Acquisition, and Reconnaissance (ISTAR) sources and then transferred from command levels to the gun systems to allow multiple dispersed gun systems to engage single or multiple targets.

While mobility aids survivability, there are other aspects that can add to the survivability picture. The platform itself needs a respectable level of armour protection and its own close-in protection, such as a Remote Weapon Station (RWS) mounting a 7.62x51 mm or 12.7x99 mm machine gun. Another useful capability would be an effective Counter-UAV capability, since armed UAVs will be a major threat to artillery. A further addition could be equipping the MFP with an Active Protection System (APS), high value systems such as tanks and now IFVs are being given APS installations, given the importance of artillery systems should they not receive the same protection priority?

Another important issue for the MFP system is crew size, especially given most European armies are having to cope with limited personnel numbers. In the context of MFP, the ideal crew size is three, which can be achieved with an autoloader and other technologies to reduce crew workload. In

future the level of automation in MFP will inevitably increase, with the possibility that MFP eventually evolves into a completely autonomous unmanned system, though such a capability will be many years into the future.

To summarise then, the MFP will be a revolution in self-propelled artillery for the British Army, with the revolution continuing through the service life of the system thanks to the insertion of new technology. In conjunction with GMLRS-ER, MFP will finally give the British Army a land-based fires capability that can truly support its operations on the modern battlefield. Until that situation is reached, the British Army will remain dependent on allied nations for the majority of its land-based fires.

Industrial Aspects

It is expected that the MFP operational requirement will be written in such a way that it can accommodate both tracked and wheeled solutions, which will open up MFP to the broadest spectrum of candidate systems. One contender that has already built up a fair degree of momentum as regards MFP is KMW, with their RCH 155 (Remote Controlled Howitzer 155 mm) 155 mm/L52 gun system in a module that can be integrated with the BOXER armoured vehicle. With BOXER seen as one of the few procurement relative success stories in Britain in recent years, a further BOXER-related capability is seen, at the political level at least, as a very good thing. On the other hand, with a new Prime Minister due to be selected, the current political leadership of the MoD might not necessarily be in place by the end of the year.

Then there are the other wheeled solutions to consider, these will doubtless include BAE Systems with the ARCHER, Nexter with CAESAR and Elbit with their

ATMOS or ATHOS solutions. Rheinmetall is also seen as a potential contender for MFP, although they are also seen as a strong candidate for the supply of future 155 mm ammunition to support the MFP. Other ammunition suppliers that are seen as credible candidates include BAE Systems and Nexter.

Then there is a major challenger for the MFP programme in the shape of Team Thunder, their proposal is centred on the Hanwha Defense K9A2 system. Other members of Team Thunder include Lockheed Martin UK, Pearson Engineering, Leonardo, Soucy Defense and Horstman. The case for the K9 and Team Thunder was strengthened in July when Hanwha signed a framework contract for 672 K9 systems! Other countries with the K9 in service or on order include: Australia, Egypt, Estonia, Finland, India, Norway, the Republic of Korea (ROK) and Turkey. The fact that the system is in service with NATO partners aids with interoperability and supportability, plus joining the K9 user group will reduce the cost of future K9 spiral development.

Where Team Thunder could have an edge in MFP is that Hanwha Defense have a very credible record in the transfer of technology, establishing local production with their partners and integrating local content in K9 systems. A strong economic acquisition case is one thing, where K9 could also have an advantage is there is a development roadmap in place for the system that adds improved operational capabilities through the 2040s and beyond, for example the integration of a 155 mm/L58 gun. Selecting the K9 for MFP would allow the British Army and British industry to participate in these future K9 developments.

Hanwha Defense also intends to base a 'Centre of Excellence' in the UK for the maintenance and upgrade of European K9 systems, creating further business opportunities for British industrial partners. Beyond that, should the British Army require early MFP delivery, Hanwha Defense could potentially support that because the ROK Army will achieve Initial Operating Capability with the K9A2 in 2027.

In the end, winning MFP will come down to who has the best offer to meet the operational requirement, and who can present the most convincing case on the evolutionary possibilities of their system over the MFP's service life. The other critical selection criteria will be who presents the most compelling industrial and economic offer. Undoubtedly, MFP is a fascinating programme and as far as the British Army is concerned it is also an essential programme. ■

HANWHA DEFENSE & UK Team Thunder – the Future of Mobile Fires

At the end of the 1990s the Republic of Korea Army (ROKA) decided that it needed an advanced self-propelled artillery system, this requirement was driven by the fact that they faced a massive conventional and rocket artillery threat. To overcome this threat, ROKA needed a system that offered high levels of mobility and protection, that could move quickly into and out of firing position, and then rapidly conduct fire missions with high levels of accuracy on targets out to extended ranges. Equally important for ROKA was that they wanted a system with growth potential that could take advantage of advances in artillery and automotive technology, as they envisaged an extended service life for their future artillery system.



To answer this ROKA requirement, the Agency for Defense Development (ADD) joined with what is today Hanwha Defense, to develop the K9 artillery system. This was followed by the provision of support vehicles for the artillery system, these include the K10 ammunition resupply vehicle that carries 104 rounds and 504 charges for rapid transfer to the K9 gun, and the K77 fire direction centre acting as a battery command post for the K9.

The K9 itself mounts 155 mm 52 calibre Joint Ballistics Memorandum of Understanding (JBMOU) compliant ordnance and can therefore utilise all NATO standard ar-

tillery ammunition and charges (both bag and modular). Performance is a range of 40 km with a K307 or equivalent HE-BB nature, using the K315 HE-RAP nature a range of over 50 km can be achieved. Operationally the K9 takes 30 seconds to get into firing position, 30 seconds to acquire the target, lay the gun and load, a fire mission of six to eight rounds is actioned in 60 seconds, 30 seconds after that it is ready to redeploy and within 90 seconds it moves off.

Right at the start of the K9 programme the technologies and systems being developed by ADD and Hanwha Defense were so advanced that they were attracting export customers. Turkey was looking to progress an indigenous 155 mm

self-propelled artillery programme, to reduce their development risk and speed up their programme they turned to Korea and it can justifiably be said that the Turkish T-155 Firtina system is based on Korean technology. Poland was another country that turned to Korean technology to progress an indigenous self-propelled artillery system programme, ordering and later producing under license the K9 chassis for the AHS Krab artillery system.

Impressive as the K9 was, further development allowed ROKA to field an enhanced variant in the form of the K9A1 from 2018 onwards. Changes include automatic fire control system enhancements to improve ease of use and add real time ammunition status management, navigation and positioning system enhanced with INS and GPS, driver night vision system improved and a rearview camera installed and, finally, an auxiliary power unit is also fitted.

Even as the K9A1 came into service with ROKA, Hanwha Defense was already working on the next evolution of the K9 system, which would become the K9A2. This conclusively demonstrates the growth potential that is built into the K9 system, as existing K9 systems can be upgraded to the K9A2 standard and beyond. A major change is the installation of an ammunition autoloader that substantially increases rate of fire to over nine rounds per minute. This



The K9A2, the latest version of the K9 artillery system, is being proposed by Hanwha Defense and their partners in Team Thunder to meet the requirements of the British Army Mobile Fires Platform (MFP) programme for a future artillery system.

also allows a reduction of crew numbers from five down to three, plus crew comfort is improved by the installation of an air conditioning system. The fire suppression system is enhanced and a Remote Controlled Weapon Station (RCWS) is fitted for close-in defence.

The K9A2 provides the basis of the Hanwha Defense and Team Thunder proposal to the UK for the Mobile Fires Programme (MFP). Team Thunder members are Lockheed Martin UK, Pearson Engineering, Leonardo UK, Horstman Group and Soucy Defense. Hanwha Defense has committed to transfer at least 50% of the manufacture of the British variant of the K9A2 to its Team Thunder partners to create or sustain over 800 jobs.

The current K9 user community of nine nations including NATO members (Norway, Poland, Estonia, Turkey and Finland) provides significant strategic and operational opportunities for international collaboration, interoperability benefits and through life operating and upgrade efficiencies. These could include, increased gun tube length, new ammunition natures, protection, fire control enhancements and performance and emission improvements to the engine and fuel system.

With Poland placing a massive order in July for 672 K9 systems under a framework contract, K9 continues to define modern self-propelled artillery!

Right from start the K9 artillery system was designed with growth potential in mind to provide an extended service life with major capability upgrades. The K9 development roadmap goes more than 20 years into the future.



Photos: Hanwha Defense

The Challenge of HIMARS for Russia

Mark Cazalet

Over the month of July, there have been several articles, and social media posts circulating online stating that S-400 has been failing to protect Russian armed forces arms caches and command posts from High Mobility Artillery Rocket System (HIMARS). This narrative is largely meaningless.

While HIMARS does demonstrably pose a number of problems for Russia, the S-400 system has precious little to do with the success of HIMARS. The narrative around S-400's purported 'failures' has broadly arisen from a misunderstanding of both the ammunition natures Ukraine is using with HIMARS as well as the S-400's role and capabilities. To understand why this is the case, we must first take a closer look at both systems, and then examine the systems which could be used to defend against HIMARS, in the tactical and operational context of Ukraine.

Photo: US Army



A US Army M142 HIMARS system prepares for launch during a training exercise near Camp Buehring, Kuwait, in June 2021.

Understanding S-400

The S-400 is a very large and complex air defence system which was, broadly speaking, developed as a successor to the S-200 series in role, and has much in common with the S-300P family, which it can be thought of as a heavily-upgraded version of. It is operated by Russia's Aerospace Forces (VKS), and is primarily intended for protecting high-value points such as command posts,

vital national infrastructure, and population centres from aerial and ballistic threats. In Russian service, the S-400 system has five main missile models it can be armed with: As the table shows, these missiles are mostly very long-range weapons, with fairly decent maximum altitude charac-

teristics. Given the S-400's range of weapon options, its preferred target set with 48N6, 48N6M/48N6P-01, 48N6DM, and 40N6 consists of mostly large and high-value air-breathing targets, such as airborne early warning and control (AEW&C) aircraft, dedicated large electronic warfare (EW) aircraft, strategic bombers, and high-altitude reconnaissance aircraft. To a lesser extent, the target set also includes cruise missiles and short-range/theatre ballistic missiles. When equipped with 9M96M, the preferred target set changes slightly to favour aircraft and fighter aircraft, cruise missiles, and short-range ballistic missiles.

It is worth noting that although this range of munitions is theoretically available to Russia's S-400s, the reality is a bit more complex. The newer and more capable 40N6 missile has not been observed very often in S-400 formations, with the older 48N6M/48N6P-01 and 48N6DM with semi-active seekers being much more commonly seen in Russia's arsenal. Likewise, the smaller 9M96M missile has been shown being fitted to S-400 in training, but does not seem to have been widely distributed to S-400 formations. Instead, Russia seems to have mostly reserved this missile for its S-350 systems, which began to enter service from February 2020 onward.

Missile designation:	48N6	48N6M/48N6P-01	48N6DM	40N6	9M96M
Max. range:	150 km (for aerial targets)	200 km (for aerial targets)	250 km (for aerial targets)	400 km (for aerial targets)	120 km (for aerial targets)
Max. altitude:	27 km	27 km	30 km	40 km	30 km
Guidance:	Semi-Active Radar; Track-via-Missile	Semi-Active Radar; Track-via-Missile	Semi-Active Radar; Track-via-Missile	Active Radar	Active Radar
Max. quantity per transporter erector launcher (TEL):	4	4	4	4	16

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teristics. To provide an intuitive frame of reference for comparison, the typical cruising altitude of a civilian passenger jet is around 10.5 – 11.5 km, while the high-altitude U2 spy plane was capable of reaching an altitude of around 22 km. Most civilian and military aircraft fly well below this latter figure.

Yet even if Russia's missile inventory contained plenty of the newer models with active radar seekers, none of the S-400's possible missile loadouts are really intended for the counter-rocket, artillery and mortar (C-RAM) role. Firstly, the radar horizon will limit the ranges at which the system can detect and track targets, which means that at long ranges, the system's radar may not detect the rockets, or if it can, they might not remain above the horizon sufficiently long to be engaged. Secondly, artillery rockets will have a fairly low frontal radar cross section (RCS), which will make the rockets more challenging for the system's radars to detect and track at longer ranges. Finally, engaging numerous and low-cost artillery projectiles with large and expensive long-range missiles is not economically or industrially sustainable.

For these reasons, C-RAM systems typically operate at Very Short Range Air Defence (VHSORAD) or Short Range Air Defence (SHORAD) ranges, while medium- and long-range systems are usually reserved for dealing with high altitude air-breathing targets and ballistic missiles.

A Closer Look at HIMARS

Ukraine has evidently attained noteworthy success using the M142 HIMARS system in the Donbass. This has been made evident with numerous pieces of testimony, as well as photos and video footage shared by both sides shared on social media. The picture formed from open sources is broadly that HIMARS has been quite effective, having been used to destroy a number of Russian Armed Forces ammunition caches, command posts, and other important objects.



Photo: USMC

A US Marines M142 HIMARS carries out a fire mission during training in Camp Lejeune, North Carolina in April 2022.

HIMARS can be loaded with various ammunition types, and a single vehicle can be armed with either six 270 mm guided artillery rockets from the M30 GMLRS family, with a maximum range of approximately 84 km, or a single 610 mm Army Tactical Missile System (ATACMS) family quasi-ballistic missile with a maximum range of 300 km. Both the GMLRS and ATACMS family are available with various warhead types, including submunition, unitary pre-formed fragment, and unitary explosively-formed fragment variants. As footage from the front and official announcements have both shown, Ukraine has only been provided with GMLRS series rockets so far. This is important because, of these two ammunition families, only the ATACMS could realistically be considered part of S-400's target set.

The primary benefit of HIMARS for the Ukrainian military has been the system's combination of accuracy and range. Ukraine previously operated Soviet-era rocket artillery including the 122 mm GRAD, 220 mm URAGAN and 300 mm SMERCH systems, of which the latter SMERCH system has a range of 90 km, similar to HIMARS with GMLRS' range of 84 km. However, Ukraine's SMERCH systems (and indeed the majority of Russia's, with the exception of the newer

TORNADO-S systems), use unguided rockets. These lose accuracy the further they go from their point of launch, resulting in a much larger circular error probable (CEP) when launched at more distant targets.

HIMARS armed with GMLRS rockets by contrast does not suffer from this loss of accuracy thanks to the rockets' combined inertial/GPS guidance, and this has enabled the Ukrainian Armed Forces to conduct both long-range and accurate strikes. The systems' value is further enhanced by US intelligence provided to Ukraine, which has been reported by the New York Times to include targeting data.

The result is that Ukraine has been able to strike high-value Russian targets at safer distances, outside the range of most Russian artillery platforms. This limits the Russian response to either throwing air power at the problem and risking attrition of aerial platforms, expenditure of precious cruise or short-range ballistic missiles, or relying on longer-range systems such as SMERCH batteries for counterfire, where they will be operating at a relative accuracy disadvantage. None of these are ideal solutions to the problem.

Being able to strike from safer distances also generates secondary problems for Russia. For starters, it greatly complicates the task of Russian reconnaissance teams when it comes to locating the launch sites, since the area which needs to be searched becomes much larger when compared to shorter-range artillery. Secondly, it pressures Russia to position its munitions stockpiles further back from the front lines, which increases resupply distances and complicates logistics, making it more difficult for Russia to conduct high-intensity operations, and so slowing down the pace of the advance.

The HIMARS has undoubtedly shown itself to be a valuable asset for Ukraine, however this has nothing to do with S-400. In large part this is because Ukraine has only been provided with GMLRS series rockets. The S-400 was never intended to serve as a C-RAM system, and consequently it is illogical to claim the system is failing at a task it is not performing and was not intended to perform. Since S-400 is not a solution to GMLRS strikes, it is time to examine what C-RAM solutions the Rus-



Photo: USMC

A US Marines M142 HIMARS shown with a partially-empty loadout of GMLRS rockets during an exercise at the Bradshaw Field Training Area in Australia in August 2021.

sian Armed Forces have, and what factors impact their effectiveness in Ukraine.

Setting Expectations for C-RAM

Despite incurring losses during the first phase of the invasion, Russia still maintains a large and diverse fleet of air defence systems geared towards many different threat types, including artillery rockets. In the case of HIMARS, Russia's TOR and PANTSIR-S SHORAD system families would probably be the most likely candidates capable of reducing the effectiveness of GMLRS salvos. GMLRS missiles do not perform complex manoeuvres and it should be possible for

For starters, it is worth tempering expectations about what even very good C-RAM systems can realistically achieve. The Israeli IRON DOME system for instance is often regarded as the posterchild successful C-RAM system. Yet a sizeable part of its success can be attributed to the system operating under conditions as close as possible to optimal for a C-RAM system – its targets are largely crude and inaccurate artillery rockets which are launched from highly predictable directions, typically 70-80% completely miss their targets and are therefore ignored by the system and not intercepted. Additionally, the electromagnetic spectrum in their area of operation is not contested by hostile jamming, minimal airspace deconfliction

C-RAM in peer- and near-peer conflicts is very difficult, and expectations of success should be adjusted accordingly.

The Difficulties of C-RAM on the Ukrainian Front

With this context in mind, we can turn our attention to TOR and PANTSIR-S SHORAD systems. On paper, both of these systems have the capability to engage GMLRS rockets, however the real-world performance of both systems would appear to be unequal. While PANTSIR-S has been criticised perhaps a bit too harshly in popular media, which ignored important context behind many of its losses in Syria and Libya, some criticism seems justified, not least that provided in Russian sources.

The closest basis for a head-to-head comparison of TOR and PANTSIR-S was the performance of both of these systems while defending Khmeymim Airbase in Syria during the period from April – October 2018. In Syria, their targets consisted mostly of small UAVs, but were understood to have also included some types of artillery threat such as mortar rounds. According to Viktor Murakhovsky, editor of the Arsenal Otechestva magazine, during this period the deployed TOR-M2U (also known as TOR-M1-2U) systems managed to intercept 80 hostile targets, with a rate of 80% successful interceptions, compared to the PANTSIR-S systems' rate of 19% successful interceptions during the same period. This figure should be treated with a little bit of caution, since it has not been officially confirmed, but it aligns with other anecdotal comparisons between the two systems in Russian sources. Broadly speaking then, the TOR family seems to have enjoyed more operational success than the PANTSIR family and would be expected to be more reliable in the C-RAM role.

According to The Military Balance 2022, Russia possessed over 136 TOR family Transporter-Launcher and Radar (TLAR) vehicles (equating to 34 batteries), and 80 PANTSIR-S self-propelled anti-aircraft gun and missile (SPAAGM) vehicles (20 batteries) prior to the outbreak of the war. According to open sources, Russia has lost approximately 16 TOR TLARs and 8 PANTSIR-S SPAAGM vehicles, leaving around 29 batteries of TOR and 18 batteries of PANTSIR-S remaining. Even if we make the unrealistic assumption that Russia would deploy its entire remaining fleet of these vehicles, they would be required to defend a front over 1,100 km long in the most active portion of the warzone – the Donbass and the South. The land area occupied by Russia is approximately 126,610 km², which is equivalent to ~35%

Photo: Russian MoD



A TEL used with S-400 shown in transport configuration

Russia to intercept a percentage of them. Indeed, some images, and footage shared on social media suggest it may have already done so, though many of the claims are hard to verify. While it is certainly possible to conduct C-RAM successfully, there are a range of tactical and operational challenges which complicate this task.

is needed, and Israeli air power has total freedom to hunt down and strike launch sites within minutes of launches being detected. IRON DOME's interception record is pretty good, estimated at between 75-90% depending on the conflict, yet even under these near-optimal conditions, hostile rockets still can and do get through the defences, often causing damage to civilian infrastructure.

In modern peer- and near-peer conflict conditions, rocket artillery tends to be far more accurate than that of non-state armed groups, meaning the defender has a relatively greater quantity of threats to target, and strikes can come from less-predictable directions. On top of this, the rockets typically fly faster and their warheads are typically more lethal compared to crude designs used by militant groups. This combination of factors means that even a single rocket can cause catastrophic damage if it is accurate enough to hit an ammunition stockpile or important command post. As such, even under optimal conditions it would be unrealistic to expect any C-RAM system to be 100% effective in dealing with a high-volume threat such as a GMLRS barrage.

Photo: Russian MoD



A 9A331MU TLAR from the TOR-M2U system shown conducting a launch

of Germany, or ~50% of the UK. Of this total, roughly 92,400 km², or 72% of this area would be within GMLRS range. While not all this land is used by the Russian military, it nonetheless contains many points to defend, often with long distances between them.

While it would be theoretically possible to cover the length of just the front line using all of Russia's remaining TOR and PANTSIR-S systems, such broad coverage would spread these assets very thinly, resulting in an overall low density of cover, and would ultimately not help with regard to C-RAM where ideally the defensive system should be positioned relatively close to the target it is intended to protect, and in sufficient numbers to resist saturation attacks. For reference, a battery of four HIMARS could output 24 GMLRS missiles in a matter of seconds, which could easily overwhelm insufficiently dense C-RAM. Assuming a probability of kill (pK) of 0.7, this salvo would require at least 35 missiles to intercept, which is more than the total ready missiles carried by a battery of the older TOR family variants (including TOR, TOR-M1, and TOR-M2U). It therefore makes the most sense to concentrate these systems where

they are needed most, but doing so will inevitably leave gaps in other places which could be taken advantage of. Given the US's formidable intelligence-gathering capabilities, it is highly likely that they would be able to identify Russian points with weaker defences, assisting Ukraine's target selection and increasing the odds of GMLRS strikes successfully destroying their targets. Indeed, it would be surprising if this were not already happening.

Alongside gaps in coverage, there will also be gaps in availability caused by human and mechanical factors – crews need sleep, radars cannot be left switched on permanently, and sometimes the vehicle may need to be switched off to conserve fuel. These gaps in availability generate further opportunities for artillery strikes to pass through the defences.

A Challenging Task Ahead

In summary then, conducting effective C-RAM in peer/near-peer warfare is extremely difficult. Russia should not be expected to be capable of completely resolving the problem of GLMRS strikes, but there are practical steps it can and likely will take toward

decreasing its vulnerability to them. These will probably include positioning some supply caches and command posts further back to decrease the number which need to be heavily defended, while ensuring the caches which have to be within HIMARS range are less densely-packed to reduce the risk of sympathetic detonation destroying an entire stockpile, and increasing C-RAM density around these critical points.

The Russian advance may have been slowed to a crawl in recent weeks, but they have not lost the capacity to adapt to their circumstances. The rapid success of HIMARS is in some part down to the fact that it is new to the theatre, and the Russian Armed Forces have so far not had sufficient experience in organising themselves in response to this capability. Once the relevant operational and tactical solutions are implemented, it is probable that HIMARS strikes will begin to decrease in effectiveness, though they are unlikely to ever be nullified completely. The key question therefore becomes whether HIMARS systems will manage to inflict sufficient damage to meaningfully alter the battlefield during this window of effectiveness. ■

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Medium Tactical Vehicles – The 6x6 Sector

David Saw

Although in terms of wheeled armour, the 6x6 vehicle might have been overshadowed by the larger 8x8, it would appear that the 6x6 is gaining more momentum in the marketplace. This comes from offering much of the capability of an 8x8 system at reduced cost.

Currently, at the wheeled armoured vehicle marketplace, there is an immense variety of solutions to practically any conceivable mobility/protection requirement. A potential customer can select from 4x4, 6x6 and 8x8 options, and can then apply a host of criteria to select a vehicle that most closely meets their operational requirement. That being said, the bigger the vehicle the higher the acquisition and sustainment cost. For this article, our interest is in the Medium Tactical Vehicle sector, which for our purposes is a 6x6 armoured vehicle.

The VBCI

Firstly, we need to position where the 6x6 vehicle fits in terms of the wheeled armour spectrum. At the top end of that spectrum comes the 8x8 vehicle. The French Army Véhicule blindé de combat d'infanterie (VBCI) is a classic example of a vehicle in this category. The VBCI for France is an Infantry Fighting Vehicle (IFV). It can weigh up to 32 tonnes and has a turret mounting a Nexter M811 25 mm cannon. The majority of vehicles in French service are the VBCI variant. There is a second variant though – the VPC command vehicle which has a Remote Weapon Station (RWS) mounting a machine gun instead of a turret. Apart from France, the VBCI has been exported to Qatar.

The BOXER

Another European 8x8 contender that is worthy of note is the BOXER. In the early 1990s, France and Germany started working on a wheeled armoured vehicle design. Britain joined the programme in the mid-1990s and it appeared that a cooperative European wheeled armour solution was in prospect. Things did not work out as planned. In 1999 France withdrew from the programme and went on to develop and acquire the VBCI. The Netherlands joined the programme in

Photo : PATRIA



One of the PATRIA 6x6 pre-series vehicles that are being delivered to the Finnish Defence Force. The PATRIA 6x6 provides the basis for the Common Armoured Vehicle System (CAVS) a Finnish-led programme to provide a 6x6 platform for Finland, Estonia, Latvia and Sweden, with Germany intending to join the programme.

Photo: Exército Brasileiro



The Brazilian Army selected the GUARANI vehicle to meet its Viatura Blindada Transporte de Pessoal – Média de Rodas (VBTP-MR) medium armoured vehicle requirement to replace existing Engesa URUTU and CASCAVEL vehicles. Based on an Iveco platform, the GUARANI has also been ordered by Ghana and the Philippines.

2001, but the British left in 2003, leaving Germany and the Netherlands to proceed with the programme. This led to the BOXER vehicle that we know today. It is a big vehicle with a combat weight in excess of 36 tonnes. Uniquely, BOXER can be

fitted with mission modules to meet different operational requirements. The two original BOXER customers, Germany and the Netherlands, have since been joined by numerous export customers such as Australia, Britain, Lithuania and Slovenia.

The PIRANHA

There are other significant European 8x8 systems to consider as well, for example the General Dynamics European Land Systems (GDELS) PIRANHA, the latest variant of which is the PIRANHA 5, a 33-tonne vehicle, as used by Denmark, Romania and Spain. The PIRANHA also provided the basis for the STRYKER and LAV 8x8 vehicles used by the US military. Also notable in the 8x8 sector is the PATRIA AMV as used by Finland and Sweden amongst others, as well as being built under license in Poland as the ROSOMAK and in South Africa. Elsewhere, Italy has a range of 8x8 solutions to offer, as does FNSS in Turkey, with its PARS family of vehicles available in 4x4, 6x6 and 8x8 configurations.

China, India, Israel, Serbia and the Ukraine are amongst the many countries who produce 8x8 armour, but one should also take into account the Russian BTR-82A. There are vast numbers of BTR-60/BTR-70 and BTR-80 vehicles spread all over Africa and Central Asia and many other locations. Potentially this creates a major market for a replacement vehicle and in many cases, this will not be confined to 8x8 vehicles. These might be too overspecified and costly for the requirements that might be generated in these markets.



Photo: Armée de Terre

The Engin Blindé de Reconnaissance et de Combat (EBRC) JAGUAR, armoured reconnaissance and combat vehicle, will replace the AMX-10RC and the ERC-90 SAGAIE, both 6x6 vehicles, in French Army service. The JAGUAR, this particular vehicle is from the Foreign Legion, will continue the French commitment to 6x6 armour.

The VAB MK3

In the 1970s, the French Army required a new wheeled armoured vehicle and this led to the development of the Véhicule

de l'avant blindé (VAB). The VAB for the French Army was a 4x4 vehicle and was acquired in large numbers, some 4,000, and in multiple variants. The VAB as intended for the French Army was a 4x4 vehicle with

Product Feature: EVPÚ Defence

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EVPÚ Defence is an electro-optical specialist whose reputation for high quality surveillance systems is well established. However, the company's visions and ambitions go far beyond the security industry and over the years it has developed an interesting portfolio of remote controlled protection, fire-control and sighting systems for military applications. Capable of providing increasingly complex solutions, EVPÚ Defence also offers products adapted for naval use.

The MANTIS remote controlled weapon station, for example, is a high-tech system that enables daytime and night-time surveillance, target detection, identification and tracking, and remote firing at targets that include low-flying objects such as helicopters or UAVs. It provides extra protection to the crews of medium sized naval vessels, such as coastal defence ships, cruisers or patrol vessels.

MANTIS has a modular design which comprises a stabilized pan tilt with an integrated gun carriage for a 7.62 – 12.7 mm calibre machine gun and an electro-optical sight equipped with a Full HD day zoom camera, cooled thermal imager and laser rangefinder. The whole system is operated remotely via a control panel that can be installed anywhere inside the vessel. The fact that the electro-optical sight moves along its own two axes (so-called superazimuth and superelevation) allows the weapon station operator to always keep his sights on target, independent of the ballistic correction for the weapon and ammunition.

Small sized gun boats and patrol boats can be equipped with the super lightweight MANTIS MINI station which carries a 5.56-7.62 mm calibre gun and weighs less than 90 kg. If the application calls for perimeter protection rather than a firing capability, EVPÚ Defence can meet this

Photo: EVPÚ



requirement with its gyro-stabilized CMS-1 commander sight. This system consists of day and night observation channels and a laser rangefinder protected by an Armox shield. CMS-1 has successfully passed tests for ballistic protection Level II in compliance with STANAG 4569 and AEP-55. More information is available on www.evpudefence.com

a combat weight of more than 13 tonnes. Over the years, the vehicle has been subjected to a number of modernisation efforts. These included a new transmission and other automotive upgrades, improved protection and where applicable weapon system upgrades.

The VAB has been an excellent servant to the French Army and continues in service to this day, but the vehicle had already reached the limits of its potential. The more you upgrade the more you must upgrade. Increase the armour and you increase the weight, increase the weight and you need to increase the power to

the 6x6 version had one key advantage that the 4x4 did not, and that was significant growth potential. That contention is proven by the latest development of the VAB in the form of the VAB MK3. According to Arquus, who developed and produce the VAB MK3, growth potential is critical for the longevity of the design and its adaptability to evolving operational requirements. For example, in comparison to when the VAB emerged back in the 1970s, the French soldier of today is taller and heavier. Add in all of the extra equipment required these days and you have a significant extra weight burden to support.

ambulance or riot control vehicle. The VAB MK3 equipped with a turret-mounted 25 or 30mm cannon might not have the protection of the VBCI as used by the French Army, but it can carry out more than 80% of the VBCI mission at less than half the procurement cost, according to French industry sources.

Market Potential

Arquus sees a strong international market potential for the VAB MK3. They point to Eastern Europe where there are strong requirements for protected mobility, with many applications not requiring the over-specification and extra cost of an 8x8 vehicle with its heavier weight. Another market area of considerable interest is in Africa, where the VAB MK3 would be the obvious successor to a range of Soviet-era wheeled vehicles such as the BTR-60/BTR-70/BTR-80. The performance advantages of a modern 6x6 over these elderly and limited 8x8 vehicles are obvious.

The arrival of the VAB MK3 also offers existing VAB users a new upgrade path for their vehicles. Qatar has a large fleet of VAB MK1 vehicles acquired more than 25 years ago, rather than replace them with a new vehicle Qatar looked at options to extend the service life of their existing fleet. This led Qatar to establish a VAB rebuild facility locally. The automotive element is the installation of the complete VAB MK3 driveline from Arquus. In parallel, protection is improved, as is internal wiring and other components. The end result is an armoured vehicle with enhanced capabilities, plus the possession of the infrastructure needed for maintenance and support of the vehicle fleet in-country.

The VAB MK3 is also making a contribution to indigenous wheeled armoured vehicle programmes in Indonesia. The Indonesian Army or Tentara Nasional Indonesia Angkatan Darat (TNI-AD) had developed a requirement for a new 6x6 armoured vehicle family with multiple variants, with indigenous company PT Pindad being charged with the development and manufacture of the vehicle. The path to the development of the new 6x6 vehicle started in the early 2000, when Pindad developed a number of wheeled armour solutions, based on commercial chassis, for the TNI-AD. These efforts led to the development of a 6x6 solution in the form of the ANOA.

The ANOA

The ANOA prototype entered testing in 2007 by which time it was clear that this was a military specification vehicle. The



Photo: Bundesheer

Austrian Bundesheer PANDUR 6x6 armoured vehicles have been in service since the mid-1990s. The Bundesheer acquired 34 of the latest PANDUR EVO variant in 2016 and then ordered 30 more from GDELS in October 2020. The PANDUR EVO is a modular vehicle with increased mine and IED protection.

have the same level of performance and so on... You eventually reach a point where the vehicle has maxed out; there is nothing further that can be added. Once you reach the weight limit of a 4x4 system, the game is at an end.

The VAB was not solely a 4x4 armoured vehicle. For export markets there were two versions, a 4x4 and a 6x6. The VAB 6x6 was exported in multiple configurations which included an APC, a 81mm mortar carrier, an anti-tank vehicle with the HOT missile system, an air defence vehicle with two 20mm cannons, an anti-riot vehicle and a maintenance/recovery variant. The VAB was particularly successful in Africa and the Middle East, where major customers included Oman and Qatar.

The 6x6 version of the VAB was a larger and heavier vehicle than its 4x4 sibling, but

This heavier weight demand creates a dilemma. You do not want to reduce the number of dismounts you can carry because that reduces your operational capability. You have to find a weight saving somewhere, so you could look at reducing protection, but that would be self-defeating. Then you might try reducing fuel capacity to save weight, again a self-defeating action. Or you come up with a 6x6 vehicle that can inhabit the 20 to 25 tonne weight category and offer the broadest range of configurations, with optimum levels of protection and mobility. The VAB MK3 is available in multiple variants which include: APC, Infantry Combat Vehicle mounting a turret, from John Cockerill or Nexter for example, mounting a 20/25/30mm cannon, Fire Support Variant with a 90mm low pressure gun, mortar carrier (81mm or 120mm), command post,

design was obviously influenced by that of the VAB; indeed the driveline selected for the ANOA was that of the Arquus VAB MK3 which was a sensible solution as it de-risked the mobility elements of the vehicle. The first ANOA vehicles entered service with the TNI-AD in 2009. Many hundreds have been purchased since then and the vehicle remains in production at Pindad.

The ANOA has an empty weight of 12.5 tonnes and a combat weight in the region of 14.5 tonnes, with protection meeting STANAG 4569 Level III requirements. Variants include: standard APC, command vehicle, mortar carrier with 81mm mortar, recovery vehicle, logistics vehicle and an amphibious variant. A fire support variant of the ANOA known as the BADAQ was also developed. The initial version mounted a turret taken from a TNI-AD SCORPION 90 tank with a John Cockerill 90mm gun. The latest version of the BADAQ is equipped with a John Cockerill turret mounting a 90mm low pressure gun.

The TNI-AD has assembled an eclectic mix of 6x6 armoured vehicles. For example, the SALADIN armoured car and the SARACEN APC were acquired from Britain in the 1960s and remained in service



Photo: Armée de Terre

French Army GRIFFON 6x6 vehicles parked up by the Arc de triomphe for the parade on 14 July 2022. The French Army had received 339 GRIFFON by the end of 2021 and will receive 113 in 2022, orders placed thus far cover 892 vehicles and 54 mortar carrier versions.

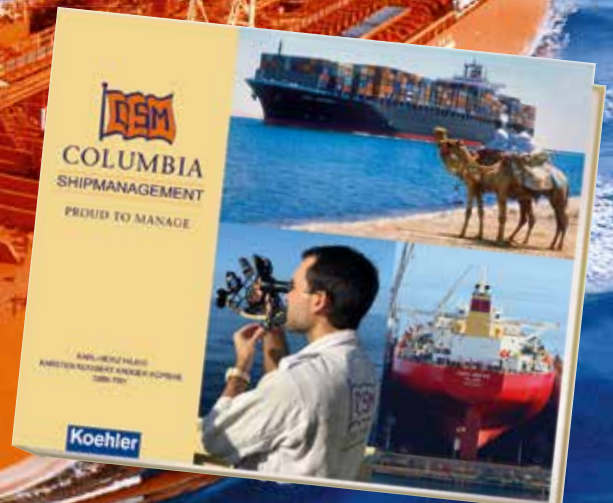
for many years, with a number of different local upgrades. The arrival of BADAQ will see the retirement of the SALADIN by the TNI-AD, while the SARACEN will continue in service until eventually re-

placed by the ANOA. Interestingly, the TNI-AD also purchased a small number of WZ551 6x6 vehicles from China. This was despite the fact that the ANOA was available at that time.



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What is clear about the 6x6 armoured vehicle sector is that there are a profusion of choices available from multiple manufacturers. For example, Paramount Group offer a range of wheeled armoured solutions, including the 6x6 MBOMBE 6 vehicle. Elsewhere, there are other 6x6 solutions. In France, the Nexter TITUS has an empty weight of 17 tonnes, an operational weight of 23 tonnes and a maximum weight capability of 27 tonnes, indicating growth potential. The vehicle is based on a Tatra truck chassis from the Czech Republic, with the Czech Army ordering 62 TITUS vehicles. The Czech Republic has turned into an important customer for Nexter, ordering 52 CAE-SAR artillery systems mounted on an 8x8 Tatra truck in 2020.

The Republic of Korea Army (ROKA), perhaps inspired by the US Army STRYKER Brigade organization, decided that it needed a family of wheeled armoured vehicles. Rather than purchase the STRYKER 8x8 from the US, in 2012 they decided to turn to local industry to develop a suitable solution. By this point, the majority of ROKA armoured vehicles were locally designed and manufactured. The ROKA requirement was for a total of 600 6x6 and 8x8 vehicles, with Hyundai Rotem being selected as offering the best design for the programme.

The Hyundai Rotem vehicles were the K806, a 6x6 system, and the K808, an 8x8 system. Once selected by ROKA, production began in late 2018, with the K806 being designated as the KW1 and the K808 as the KW2. The majority of vehicles acquired by ROKA were the 8x8 KW2, although 100 KW1 in three variants were ordered. Hyundai Rotem has also looked to achieve export orders for both their 6x6 and 8x8 vehicles.

FNSS in Turkey has had great success with its PARS wheeled armoured vehicle family. Originally developed to meet the requirements of the Turkish military, the PARS has gone on to obtain major export orders. The first export breakthrough was in Malaysia where the 8x8 variant of the PARS was manufactured under the license as the AV8 GEMPITA, in multiple variants with Malaysian-specific equipment fits. Both the 6x6 and 8x8 versions of the PARS would be acquired by Oman, while Libya would be supplied with both 6x6 and 8x8 vehicles. Turkish Land Forces Command (TLFC) have acquired the PARS in both 6x6 and 8x8 configurations.

Another Turkish company with wheeled armour interests is Otokar. They devel-

oped the ARMA vehicle available in both 6x6 and 8x8 configurations, initially to meet TLFC requirements. The first export order came in late 2010 from Bahrain, followed by a second order in June 2011. In total, 73 ARMA were acquired by Bahrain. The 8x8 variant was selected by the United Arab Emirates (UAE) as the RAB-DAN. Initially, the vehicles were supplied from Turkey and later locally produced in the UAE. The initial batch of vehicles numbered 400 examples, with the total purchase expected to reach 700 vehicles.

European Activity

Earlier in this article we mentioned the PATRIA AMV in the context of 8x8 vehicle solutions, but the Finnish company is equally active in the 6x6 vehicle sector. In the 1980s, the XA 6x6 vehicle was developed to meet Finnish Defence Force requirements. The initial variant was the XA-180. This was followed by product improved versions such as the XA-185/XA-186, then came to XA-188 and the final variant was the XA-200 series. Apart from Finland, the vehicle was acquired by Austria (UN missions), Denmark (UN missions), Eire (UN missions), Ghana (UN missions), the Netherlands, Norway and Sweden. The 90 XA-188 units in the Netherlands were then sold on to Estonia.

PATRIA then went on to develop a successor to the XA, this would be a modular 6x6 vehicle utilising the best features of both the XA and AMV, which eventually evolved into the Common Armoured Vehicle System (CAVS). Back in October 2020, Finland and Latvia signed an agreement covering R&D for the CAVS vehicle. Then in August 2021, Latvia signed an agreement to acquire over 200 CAVS vehicles and the first CAVS vehicles were delivered to Latvia in October 2021. Finland then stated its intention to order 160 CAVS vehicles.

The scope of CAVS expanded further at the end of 2021 when Sweden announced its intention to join the programme. Its participation became official with the signature of an agreement in June 2022. By this point, Estonia had joined CAVS and in June 2022, Germany signed a Statement of Intent to join CAVS. In terms of the future of European 6x6 armour, the CAVS programme has obtained a great deal of momentum in a very short time.

JAGUAR and GRIFFON

If there is one European country that has always shown its commitment to 6x6 armour, that would be France. Under the

SCORPION programme, two 6x6 vehicles are entering service. These are the Engin blindé de reconnaissance et de combat (EBRC) JAGUAR, an armoured reconnaissance and combat vehicle, and the Véhicule blindé multi-rôles (VBMR) GRIFFON. The JAGUAR will replace two 6x6 reconnaissance vehicles in the form of the AMX-10RC and the ERC-90 SAGAIE, as well as the version of the VAB mounting the HOT anti-tank missile system. A total of 62 JAGUAR had been ordered between 2017 and 2020, with 20 delivered at the end of 2021. 18 more JAGUAR are due to be delivered in 2022. The Direction générale de l'armement (DGA) ordered a further batch of 88 JAGUAR vehicles in May 2022.

The GRIFFON will replace the VAB fleet in French Army service. The DGA ordered 319 GRIFFON in 2017, followed by an additional 271 in 2020, with 339 vehicles delivered by the end of 2021, in 2022 a total of 113 GRIFFON are due to be delivered. The DGA placed an order for 302 GRIFFON in May this year, as well as an order for 54 of the mortar carrier variant, the Mortier embarqué pour l'appui au contact (MEPAC), which carries a 120 mm mortar.

The JAGUAR and the GRIFFON have received their first export order in 2018 when Belgium selected these vehicles for its Capacités Motorisée (CaMo) programme. Here the Belgian Land Component will equip its mechanised brigade primarily with French materiel, a total of 60 JAGUAR and 382 GRIFFON are to be acquired. Belgium will now also acquire two batteries of MEPAC mortar vehicles under the CaMo programme.

With JAGUAR and GRIFFON, France has adopted two advanced 6x6 armoured vehicle solutions that will benefit from an extended production line due to the size of French Army orders and, of course, the Belgian CaMo programme. This would seem to indicate that there is great potential for export orders for these 6x6 vehicles.

Although in terms of wheeled armour, the 6x6 vehicle might have been over shadowed by the larger 8x8, it would appear that the 6x6 is gaining more momentum in the marketplace. This comes from offering much of the capability of an 8x8 system at reduced cost. However, in an ideal world ground forces would be able to utilise both 6x6 and 8x8 vehicles as they do provide the most effective force mix. Into the future though, with 6x6 systems such as JAGUAR, GRIFFON and CAVS, it would appear that the 6x6 could become the answer to most protected mobility questions. ■

East European Armoured Vehicle Programmes

Robert Czulda

Even before the outbreak of the current war in Ukraine, most Eastern European states had plans to acquire new armoured vehicles. Now, in a response to that war, some of them have already intensified their efforts. More purchases should be expected in the near future.

The war in Ukraine came as a shock to many Western European states and their societies, which naively believed in Russia's peaceful approach and hoped that a major conventional war in Europe was impossible. At the same time, the states belonging to Central/Eastern Europe – from Estonia to Poland and the Czech Republic, to Romania and Bulgaria – have long looked at Russia more soberly. Hence the modernisation programmes initiated in recent years, often also in the field of armoured vehicles. Almost all states from the region decided to boost their land forces according to their own assessments and financial capabilities. This article presents the most important initiatives.

Bulgaria

Bulgaria is among those Eastern European countries, which still has to make binding decisions. Sofia's arsenal is composed of legacy systems, including the T-72A/M2 tanks (up to 90 in total). In 2020, it was agreed that 44 T-72s would be modernised locally at the facilities of the Terem Khan Krum EOOD, located in Targovishte. Another batch is expected to be upgraded in the future. Tanks are receiving HF/VHF radios with a built-in encryption module and a new fire control system (Elbit's TIFCS). In order to enhance situational awareness, the 1K13 sight (designed for target observation, search and detection in daylight and at night) is being replaced by the TIFCS-GS (Thermal Imaging Fire Control System-Gunner Sight). Another



Photo: Hungarian Defense Forces

Hungary also purchased 218 LYNX KF41s for €2Bn. They are intended to replace the ex-Soviet BTR-80/80A wheeled vehicles



Photo: HSW

Poland's flagship project is locally developed BORSUK. However, there are some rumours that Poland could procure AIFVs from South Korea

improvement is Elbit's E-LAWS laser warning system. Tanks keep their original guns (smoothbore 2A46 125 mm cannons). The first modernised T-72 was presented in late June 2022 during the HEMUS 2022 defence exhibition held in Plovdiv. This is the first ever upgrade of such complexity involving Bulgarian T-72s since the 1980s when they entered service. When it comes to wheeled vehicles, the situation remains much more uncertain.

The government wanted to acquire 150 wheeled (both 8x8 and either 6x6 or 4x4) armoured vehicles for €1.46Bn to replace its Soviet-era wheeled vehicles: BTR-60PB/MDs and the BRDM-2s (also tank-hunters with 9P148 KONKURS ATGMs). The list of bidders included Patria's AMV-XP and GDELS-MOWAG's PIRANHA-5, but they both exceeded the estimated budget by 30-50 per cent. The whole project was cancelled, while at the same time the

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government asked state-owned local company, Terem, to prepare a report on the capabilities of local industry to independently carry out a similar project. Nevertheless, Bulgaria has been able to procure some new vehicles – the first batch of 45 GUARDIAN XTREME (4x) MRAP vehicles was handed over to the Bulgarian Joint Special Operations Command in January 2022. By the end of the year, Sofia is expected to receive 98 vehicles in ten variants. Deliveries are carried out by Samel-90, a local company based in Samokov. A design was provided by its industrial partner from the United States – International Armored Group (IAG). The company also promised to invest at least €10.2M in the city of Burgas and to construct facilities which will manufacture the entire range of the company's products, including its latest armoured infantry vehicle RILA 8x8. The main production hall is expected to be completed in 2024.

Czechia

The Czech Republic (Czechia) is armed with T-72M4Cz tanks, serving in one battalion (only 30 were modernised to this standard, while in the mid-1990s, Prague had a plan to upgrade over 300 T-72s. It is estimated that the Czech Republic has approximately 90 T-72M1s in stock. In 2017, a contract for maintenance and repairs was signed between the Ministry of Defence and VOP CZ. The main goal of this deal was to "restore [the] combat capabilities and operational value" of the T-72M4Cz tanks. It is worth noting that a plan to modernise them was controversial due to a significant disparity between planned and actual costs. This effort was

Photo: Slovak MoD



Slovakia will sign a government-to-government deal for 152 CV90 Mk IV vehicles

subsequently affected by several delays and numerous obstacles.

At least a dozen Czech tanks have been sent as a donation to Ukraine. In order to fill the gap created, Germany has offered 15 LEOPARD 2A4 tanks (in this context it is worth mentioning that it was previously reported that the Czech Republic would receive LEOPARD 1s). Germany is willing to cover all costs, while the Bundeswehr is ready to train Czech tank crews. Prague has also agreed to buy up to 50 LEOPARD 2A7s. They are expected to be jointly produced by KMW and the Czech defence industry, while the older 2A4 tanks are to be modernised to 2A7 standard in the near future. This procurement and a final withdrawal of outdated T-72s will help Prague achieve its plan of establishing a heavy mechanised brigade.

The Czech Republic has already modernised its fleet of wheeled vehicles – the PANDUR II 8x8 KBVPs (Kolového Bojového

Vozidla Pěchoty) has replaced Soviet-era OT-64 SKOTs. The Czech Army plans to modernise these vehicles and increase their number. A desire to procure more PANDUR IIs was officially announced in April 2022. An order is expected next year, while a modernisation is planned between 2024-2027. Possible upgrades include weapon systems, communication and ballistic protection.

At the same time, Prague had serious problems with finding a replacement for tracked BVP-2s (they were serially produced in Czechoslovakia from 1987 to 1989 with a total of 344 units produced) and complement the PANDUR 2 wheeled vehicles currently in service. It was expected that Prague will acquire 210 vehicles in seven variants. Most of them would be standard AIFVs with a turret armed with a 30 mm automatic cannon. Other expected variants include command, reconnaissance, engineer, rescue, medical, and artillery observatory vehicles. Despite the fact that in 2018, three vehicles were shortlisted (CV90, ASCOD and LYNX), in 2021 it was announced that none of them met the requirements. The tender was cancelled when two bidders declined to accept new terms. A happy outcome occurred only in July 2022, when the government gave the Ministry of Defence a green light to start negotiations for the purchase of the CV90s.

Estonia

Estonia has already completed its major armoured vehicle programme: between 2016-2019, the government in Tallinn received 44 CV9035 AIFVs. In addition, Estonia purchased the CV90 Mk1 chassis from Norway. Under an agreement signed in 2021 with two local companies – Sca-

Photo: Czech MoD



The Czech Republic has already modernized a fleet of wheeled vehicles – the PANDUR II 8x8 has replaced Soviet-era OT-64 SKOTs

nia Eesti AS and AS Ühinenud Depood – roughly 37 Estonian CV90 Mk1s will be rebuilt into nine different combat support roles.

Moreover, in the near future, Estonia plans to buy new wheeled armoured vehicles (4x4 and 6x6). Before they are delivered though, Estonian troops will rely on vehicles already in service, such as the XA-180 and XA-188. The former is expected to remain in service until 2038, while the latter until 2048.

Hungary

Hungary is at an advanced stage when it comes to introducing new tanks and major armoured vehicles. Budapest has already procured 44 LEOPARD 2A7+s (2A7HUs) and 12 used 2A4s (2A4HUs) as a replacement for unmodernised T-72M1s (more than 120 in reserve, a small number still in service but they are now being phased out). New tanks have already been deployed to the 11th Tank Battalion in Tata (part of the 25th Infantry Brigade “György Klapka”) mainly for training purposes. Ultimately this tank battalion, the only one in the Magyar Szárazföldi Haderő (Hungarian Ground Forces), is expected to be equipped with the 2A7+s. Deliveries are planned between 2023-2025. The whole package with the 24 PzH2000 howitzers and support vehicles is worth approximately €1 Bn.

Additionally, in March 2022 Budapest ordered from Germany’s Rheinmetall various types of ammunition for several hundred million Euros. Deliveries, planned between 2023-2031, include ammunition for infantry fighting vehicles (30 mm), main battle tanks (120 mm), artillery (155 mm), machineguns (12.7 mm and 7.62 mm), as well as 40 mm and 76 mm decoy cartridges for the ROSY and MASKE smoke/obscurant systems. Most of the production will be undertaken by Rheinmetall’s majority-owned ammunition factory in Várpalota. Hungary also purchased 218 LYNX KF41s for EUR €2Bn, which are intended to replace the Soviet-era BTR-80/80A wheeled vehicles. The first batch of 46 vehicles will be produced in Germany and delivered from 2023, while the rest will be manufactured in Hungary (a joint venture between Germany and Hungary was established in 2020 – with the factory located in Zalaegerszeg). They will be armed with Rheinmetall’s manned LANCE 30 mm turrets and the STRIKESHIELD active protection system (APS) from the same company.

A third important and recently made procurement is the acquisition of the GIDRÁN wheeled (4x4) vehicles, which are based on



Photo: srg. sp. leva Budzeikait

In July this year Lithuanian National Radio and Television reported that the BOXER vehicles (43 already in service) suffer from a poor integration with Israeli-made turrets

the Turkish EJDER YALÇIN vehicles by Nurool Makina. The first ten vehicles were officially presented in Tata in late 2021 with the Turkish company set to deliver an additional 40 vehicles. In total, Hungary plans to introduce more than 300 GIDRÁNs, but the majority will be manufactured locally. In March 2022, Nurool Makina opened its facilities in Hungary. Budapest will use GIDRÁNs in various configurations; one of them – with Rheinmetall’s RAGNAROK 120 mm mortar – was tested in April this year.

Latvia

Latvia, similar to Lithuania, does not have any armoured combat vehicles. Its light infantry is now using recently procured Patria wheeled (6x6) vehicles. This procurement was made within a framework agreed in early 2020 between Finland and Latvia in a

joint development programme to improve mobility of the ground forces. The first batch of four vehicles was handed over in late 2021. Deliveries for the Latvian Army and the National Guard of more than 200 vehicles for €200M are planned to be completed in 2029. This is the largest modernisation effort in Latvian history and a great opportunity for the local defence industry. Production and maintenance will take place in Latvia as soon as 2023. It is planned to build a new plant in Cēsis this year and six Latvian companies have already been involved in the project.

Poland

The Russian aggression against Ukraine has significantly changed Polish plans; modernisation efforts have been sped up. With at least 240 T-72M1/M1Rs donated to Ukraine,



Photo: srg. sp. leva Budzeikait

The same source (LRT) claims that Israeli and German engineers are now working in Lithuania to remove technical deficiencies of the BOXER vehicles

Photo: Patria



Slovakia selected Patria's AMV (8x8) as its new wheeled AIFV. 76 vehicles in three variants are planned to be procured during the first phase (2023-2025)

Poland faces an urgent need to fill the resultant gap (it is also highly likely that an unspecified number of the PT-91 TWARDY tanks was also sent to Ukraine). As a result, Poland requested 116 older ABRAMS tanks to replenish those units after their tanks were donated to Ukraine. Deliveries to two battalions are planned for 2023. Poland will cover costs of restoring the tanks to service, their technical reviews and be responsible for logistical support. Most likely it will be the M1A2SA variant, which would be later upgraded to the latest model.

In April this year, Warsaw finally ordered 250 new M1A2 SEPv3 tanks with 26 M88A2 recovery vehicles and 17 M1074 bridge-layers. Deliveries are planned between 2025-2026 with the total contract value, which includes training, logistical support and ammunition, worth approximately €4.66Bn. The first batch of

28 tanks of the SEPv2 variant – which are now being used for training – arrived in Poland in mid-July 2022.

At the same time in late July 2022, Poland confirmed that it would buy K2 BLACK PANTHER tanks from South Korea, which have been offered to the Polish WILK programme (future Polish MBT). South Korea will deliver 180 K2s with deliveries starting this year. During the second phase, Poland will introduce additional K2PLs, likely to be more than 800 vehicles. Production in Poland is expected to be launched in 2026. Poland currently has 13 tank battalions, but soon the Polish Army is expected to grow by one additional battalion (4 x LEOPARD 2A5/2PL, 4 x M1A2 SEPv3, 2 x M1A1SA, 3 x K2), but ultimately Poland wants to rely on two types of tanks only: the ABRAMS and K2, while the LEOPARDS would be phased out.

South Korea will also become a supplier of some tracked vehicles, but the negotiations are still ongoing. It was revealed that Poland prefers to acquire “perspective” rather than “interim” solutions – thus it might mean that Warsaw will receive the AS-21 REDBACK AIFV instead of the older K-21. However, there are voices claiming that the purchase of South Korean vehicles will seriously threaten a domestic project, known as the BORSUK. This vehicle will be armed with the ZSSW-30 remotely-controlled turret fitted with a 30 mm BUSHMASTER II Mk 44S cannon and SPIKE-LR ATGM launcher. In late April 2022, it was agreed that four additional BORSUK prototypes would be delivered by the producer (HSW) to the Polish Army. Preliminary trials of the first prototype have already been completed. It is expected that roughly 588 BORSUKs will be procured by 2035 as a replacement for the Soviet-era BMP-1s. According to the producer, up to 100 vehicles could be delivered annually.

Romania

Romanian armoured capabilities also need a major rejuvenation. As a result of the Russian aggression against Ukraine and the deteriorating security environment in the region, the Ministry of National Defence announced that “fast and efficient solutions” have to be found in order to speed up the process of technical modernisation. The ground forces have been included in those plans, but in reality, only few details have been revealed so far.

This year, a contract to start local production of the PIRANHA 5 8x8 wheeled (8x8) vehicles will be signed. Under a 2018 deal, Romania ordered 227 vehicles in six variants for €895M. In March 2022, it was agreed that a local branch (GDLS-Romania) will establish an industrial consortium with locally-based UMB (Uzina Mecanica Bucuresti), which is owned by Romania's leading defence group Romarm. It will be responsible for maintaining and assembling the PIRANHA-5s at its Bucharest plant. This year, it was announced that UMB might be purchased by General Dynamics.

It is expected that the MLI-84 tracked AIFVs (based on the BMP-1), particularly those in a basic configuration, will be replaced. This programme has already been approved and will be initiated between 2022-2025. Romania also plans to phase out old vehicles: TAB B33, TAB-77 or TABC-79. The future of Romania's tank fleet remains unknown, however. Bucharest has the TR-85/M1 (the latter variant is partially compatible

Photo: MoD Romania



Romania also plans to phase out old vehicles: TAB B33, TAB-77 or TABC-79. Binding decisions have yet to be made

with NATO standards), TR-580 and even some T-55s tanks (in reserve). Some decisions in this regard are expected in the near future. Already in 2018, it was rumoured that Romania was willing to acquire up to 60 new tanks, most likely the LEOPARD 2, which would then be upgraded to the 2A7+ configuration.

Slovakia

Slovakia has been looking for up to 32 new tanks as a replacement for the T-72M1s (22 tanks are deployed in the 2nd Mechanised Brigade's tank battalion in Trebišov). No decisions have been taken yet, but Bratislava has hinted that it was ready to hand over its T-72s to Ukraine in exchange for LEOPARD 2 tanks in a deal similar to the one between Berlin and Prague. It was reported that Germany was willing to supply Slovakia with only 15 tanks, an idea which was rejected by Bratislava, which needs at least 30 tanks to restore its tank battalion.

A major modernisation initiative is the planned replacement for the BPV-1/2/2Ms tracked AIFVs; a procurement procedure was launched in late 2021. Bratislava is expected to receive 152 vehicles, including 110 in an AIFV configuration, 15 command vehicles, 9 reconnaissance vehicles, 3 vehicles for sniper groups (anti-material rifles), 9 vehicles for grenade launcher groups, 3 recovery vehicles and 3 repair vehicles. First deliveries are planned between 2023-2024. During the second phase, with deliveries between 2027-2030, Slovakia wants to acquire 71 vehicles: 5 combat vehicles, 10 recovery vehicles, 9 repair vehicles, 9 engineer demining vehicles, 9 engineer minelaying vehicles, 9 engineer



Photo: MoD Romania

The GEPARD air defence systems are still in the Romanian service – they were deployed to Poland in 2020.

support vehicles and 20 units of 120 mm self-propelled mortars. Four products were under consideration: BORSUK (PGZ from Poland), CV90 Mk 4 (FMV + BAE Systems), ASCOD 2 (GDELS) and LYNX KF 41 (Rheinmetall). Finally, in late June this year, Bratislava selected 152 CV9035s, which will be armed with a 35 mm gun. The total deal, including infrastructure costs, is worth roughly €1.69Bn.

At the same time, Slovakia has been refurbishing its fleet of wheeled vehicles, known as BOV (Bojové Obrnené Vozidlo). In order to integrate its military much closer with NATO allies, Bratislava selected – for the second time – Patria's AMV (8x8) as its new wheeled AIFV. Those vehicles will give Slovakia new capabilities. The contract is worth €447M. A total of 76 vehicles in three variants are planned to be procured during the first phase (2023-2025). Some AMVs will be armed with the TURRA-30 turret from the Slovakian

company EVPU with a 30 mm cannon and ATGMs. The Patria 8x8 AMVXPs will see service in the Heavy Mechanised Brigade, which is being raised under Slovakia's Allied commitments.

Lithuania

Among all Central/Eastern European states, Lithuania is one of the most successful when it comes to modernising its armoured fleet. The Lithuanian Army does not have any tanks and relies on the VILKAS (BOXER) wheeled (8x) vehicles. The first deal worth €385M – then for 88 vehicles – was signed in 2016. This was the largest procurement contract in Lithuanian history. In April 2022, Lithuania announced its plan to procure more than 120 additional vehicles. Deliveries would take place between 2023-2024. The Lithuanian variant, which is already in use, is armed with the Rafael SAMSON Mk II RCWS, Orbital ATK MK44S 30 mm gun and Rafael SPIKE-LR ATGMs. Vehicles from the new batch will have some modifications compared to the initial variant, but details have not been revealed – it was only hinted that those changes are a result of a lesson learnt from the Russian-Ukrainian War.

These procurements might help Lithuania speed up the process of retiring its tracked M113s; at least 20 were recently handed over to Ukraine. The rest will continue to be used and for now, there are no specific decisions or timing regarding either a modernisation or retirement of this platform in the near future. Moreover, Lithuania also purchased 200 joint light tactical vehicles (JLTV) for €142M (deliveries are planned between 2020-2024). The first batch of 50 vehicles was handed over to the Geležinis Vilkas Brigade in Rukla in January 2021.



Photo: MoD Romania

The TR-85 is a development of the T-55. According to some rumours, Romania has been interested in the LEOPARD tanks

“Aluminium is the Best Combination of the Disadvantages of Materials.”

Photo: GDELS



Christian Kauth,
Managing Director of GDELS

Mobility, both in logistics and on the battlefield, is an indispensable prerequisite for the defence and effectiveness of armed forces. The company General Dynamics European Land Systems-Bridge Systems GmbH (GDELS-Bridge Systems) has made it its business to make significant contributions to supporting mobility in the armed forces. In this interview, the company's managing director, Dr Christian Kauth, talks about capabilities, requirements and perspectives.

ESD: What is the importance of military bridge systems for the mobility of armed forces? Why are they needed?

Dr Kauth: That is quite easy to answer if you consider that the self-sufficient obstacle crossing capability of a military vehicle ends at 3 metres at the most. This type of obstacle is widespread. This also includes irrigation ditches on agricultural land. Likewise, existing bridge infrastructure is very often one of the first targets, especially of defending forces, to stop an advance.

ESD: Against this background, are there any insights or new findings for you that should be mentioned in connection with the current war in Ukraine?

Dr Kauth: At the beginning of the attacks, it was the Ukrainians themselves who destroyed the existing bridge infrastructure in order to stop the Russian advances. Since then, one has seen repeated attempts by Russian forces to move its forces over water obstacles, almost all of which have been unsuccessful so far, and most recently also ended in a major disaster for Russian forces when an attempt was made to build a pontoon bridge of about 80 metres over the Donets River. In the attack movement, the decisive factor is speed and good planning with air and artillery support. According to initial information, the bridge-building took place in the most obvious place and the

construction was very slow, which may be due to the quality of the equipment used as well as the level of training. In addition, the aforementioned necessary support was lacking. Another factor may have been the insufficient quantity of bridge equipment. When you have too little, you become predictable about where you can cross a body of water, and apparently the Ukrainian forces then had these places well in view and could then cover them with artillery fire. A bridge is always a bottleneck where everything gathers, with a high concentration of vehicles and soldiers. The destruction was correspondingly significant.

ESD: How do you assess the current equipment status of the German Bundeswehr and NATO with military bridge equipment?

Dr Kauth: Without going into detail now – one should not make it too easy for the potential opponent and point out his weaknesses or the extent – the equipment is more than insufficient. Not in terms of the quality of the material, but rather the quantity. The fact that the crossing of the Vistula during Exercise ANAKONDA 2016 with two bridge crossings required that a large part of the heavy floating bridge capacity available in NATO was pooled says a lot about this equipment gap. Unfortunately, after the end of the Cold War, the procurement efforts for bridging systems

were always lower in priority, also because they did not play a significant operational role in the past conflicts in which the Allies were involved.

ESD: Do you see cooperation within NATO, such as the German-British Engineer Battalion, as a model for the future? What impact does this have on your business?

Dr Kauth: This is partly a rediscovery of the past. The M3 amphibious vehicle was already specified and procured jointly by Germany and the UK. Now they have gone one step further and have also merged the associations. These things naturally promote and demand interoperability, also when it comes to the procurement of new systems, and have a positive effect on costs. And what should also be considered is that because we are in principle the last remaining system house that is able to design, develop and manufacture a new bridge and also support it in use, it naturally makes sense to specify and procure things together in order to make optimal use of the industrial capacities. Since we have not lost a floating bridge competition as a contender for more than 20 years, we have now created a de facto standard for heavy floating bridges among the allies with the Improved Ribbon Bridge (IRB) and the amphibious M3. Even without being required to do so, we have always focused on the interoperability of the equipment,

not only within a product series, but also of the products in relation to each other and also to the predecessor systems that are still in use in individual countries.

ESD: How many BIBER (BEAVER) bridges are currently in use, both in the Bundeswehr and internationally? Since when and how has the bridge proven itself overall so far? Perhaps there are examples you can mention.

Dr Kauth: How many are still in use is difficult to quantify, because the BIBER was a very successful product. We have produced more than 300 bridges since 1972, and most of them are still in use, even if not by the first customer who received them, but in some cases now also in third-party applications via country levies. The bridge has therefore been used successfully for 50 years. A recent example of this also shows the potential of the product: The Estonians bought bridges from Dutch surplus stocks, and we overhauled them in a factory overhaul and recertified them to MLC 80. The product was developed at a time when we did not yet have mature calculation methods, which means that at that time we worked with significantly more safety margins, and this enables us today to raise the bridge far above the performance level specified at that time. This means that we know the structure very well, and when we receive a bridge, we know exactly



The ANACONDA Bridge System

where we need to look and what we need to repair, so that we can immediately recertify the bridge afterwards. This is an attractive way to close the existing quantitative gap, at least temporarily.

ESD: Is such an upgrade in the form of a post-certification, which obviously does not actually involve physical changes to the bridge, also planned for the Bundeswehr with regard to MLC 80? Is there a timetable for this? What would be the financial requirements?

Dr Kauth: We are not aware of any plans to carry this out for the Bundeswehr. We have worked out the concepts. No additional budget is required because it is part of the normal factory maintenance that the product is still undergoing and will continue to undergo in the next few years.

ESD: And are there any plans or proposals regarding a successor to the BIBER?

Dr Kauth: Yes, from what I just said, that the BIBER had very large reserves, it is not really necessary to change major parts of



Interoperability - German and British M3s crossing the Vistula river during EX ANAKONDA '16



Photo: GDELS

The HYDRA dual-use bridge system

the design of the bridge, so we are thinking more about new concepts for carrier vehicles here and are also working on how, for example, the 22-metre bridge can be moved by a standard 8x8 truck. The bridge itself is more than sufficient for today's and also future challenges and has, I think, also proven itself many times over the last 50 years, so the discussion is primarily focussed on the carrier vehicle.

ESD: The bridges of GDELS-Bridge Systems are made of aluminium. What are the advantages of aluminium as a material for military bridge equipment and where are the possible limitations?

Dr Kauth: Let me describe it like this: Aluminium is the best combination of the disadvantages of materials. Various things have to be taken into account in the development: the weight, the strength, the ability to diagnose damage, but also the maintainability and finally, of course, the costs in procurement and operation. Of all materials, aluminium represents the least bad compromise, so to speak. For every single characteristic, you will find materials that are better than aluminium, but so much worse in the other areas that we believe aluminium will remain the material of choice today and in the near future when it comes to mobile military bridge systems.

ESD: You have also built bridges from other materials?

Dr Kauth: Yes, we re-evaluate it over and over again. We are actually constantly

trying to get rid of what we are good at, and that is aluminium and the welding of aluminium, because it is quite an expensive technology and production method. Every few years we try to approach new materials, whether it's composites – we have even worked with magnesium, and of course with new steels. We approach it anew every few years, but we always come to the same conclusion: aluminium is the best.

ESD: At the Eurosatory exhibition this year, you presented the HYDRA system for the first time, as far as we know. The term "dual use" is used in this context. Can you explain that a little?

Dr Kauth: Well, we only presented HYDRA digitally at Eurosatory. Because of its dual-use character, the focus was actually on another trade fair that took place a week later, namely the world's largest disaster control trade fair, Inter-schutz. Dual-use because the requirements of the disaster control forces for a floating bridge/ferry device are quite similar to those of the military, with a few compromises, which are ultimately decisive for the cost and complexity of the device. On the other hand, the fact is that this HYDRA product, which we developed primarily for civilian use, is very well suited as a floating bridge system for medium forces up to MLC 50 with a few modifications. In most countries where the armed forces also have the task of disaster control, it is in principle a product

that we consider dual-use. In Germany, we have a stronger organisational separation of these tasks.

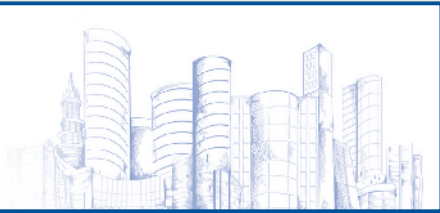
ESD: A question about the situation of the company. How is GDELS-Bridge Systems doing economically at the moment? What is the importance of Germany as a location for GDELS? Can you break down your turnover by region?

Dr Kauth: We have no reason to complain at the moment. We won a big competition in South Korea last year, and we also recently signed a contract with Sweden for the delivery of M3s and additional IRBs, which, together with winning the competition for the German Medium Protected Ambulance – that's another area we are in – puts us in a pretty good position. Compared to previous years, where we had to fight our way through a cycle of very low demand for bridge systems, we notice that these are coming more into focus in some countries and we expect to be quite busy in the next few years as well. As the German location of General Dynamics, and especially of the European group, we are also in a position to offer the entire land system portfolio of the group in Germany, free of ITAR. Of course, this also includes the corresponding creation of value in Germany, including user support by German specialists.

ESD: Last question: You yourself are a doctor and hold a PhD in Biology. How did you deal with the challenges of the pandemic?

Dr Kauth: In January 2020, I was in South Korea for negotiations, and that was in the week when the first cases of the infection, which had previously been confined to China, also appeared in Korea. When the first cases in Germany appeared a short time later and I had read the first specialist articles about the virus, it quickly became clear to me that something big was coming. We reacted very quickly and implemented many measures that were later introduced throughout Germany very early on, so that we did not have any closures or interruptions of activities here at the site and could be available to our customers at all times. Now in the last Omicron wave, despite a high vaccination rate of over 90 per cent, it did hit us a bit, but not to an alarming degree. We had already introduced things like home office or mobile working before, so we were able to adapt quite quickly to doing this on a somewhat larger scale, so that overall, we got through quite well.

The interview was conducted by Jürgen Hensel.



Viewpoint from Tel Aviv

Photo: via author



Fragile Politics Creating New Security Challenges

Tamir Eshel

In recent months Israel has been facing increasing security challenges that seem to occur separately from each other but could be associated with Israel's internal political situation, which locally exacerbates the influences of regional and global trends. It began with a wave of terror attacks in city centres that swept Israel in early 2022. At first, it was difficult for the fragile centre-left coalition government to take decisive actions to stem the attacks. Still, as these terrorist acts increased, the government had to react against the centre of this terrorist activity – concentrations of Hamas, Islamic Jihad Movement in Palestine (PIJ), and other Islamic militia factions in the Gaza Strip. The Israeli move to dismantle the extremist activity in Samaria has been ongoing since April, yielding hundreds of arrests that contribute intelligence value but create significant friction with Palestinians, causing further inflammation of this political powder keg.

The Political Power Keg

This situation has become even more complicated with the political crisis that collapsed the government, leading to the fifth election in two years, scheduled for November 2022. Surprisingly, this crisis contributed to more stability, as the pressures on the government from left-wing and Islamic parties who were part of the government diminished. In August a two-day conflict was fought against PIJ in Gaza, without Hamas entering the fray.

Dealing with the different threats from multiple theatres, the Israel Defence Forces (IDF) are stretched thin to face the growing peril of Iran's nuclear ambition. Stirring and inflaming every conflict in the region, Iran is arming and financing militias and terror groups in Gaza, West Bank, Yemen, Iraq, Syria, Lebanon, and Sudan, equipping these forces with missiles, drones, and loitering munitions. Iran has increased its naval presence in the Red Sea, trained commandos in underwater operations, and provided them with modern underwater weaponry. Israel has worked to stem these activities throughout the Middle East, and in doing so Israel collaborates with its Arab neighbours that have realised the mutual threat they face from Iran. In its fight with Iran, Israel is in a race against time. As long as Iran lacks nuclear weapons and is under sanctions, Tehran can be attacked, but when they reach the critical nuclear threshold, the potential of regional opponents, including Israel, to attack Iran or Iranian interests will diminish dramatically.

Whomever wins the November elections, defence matters will be high on their agenda. As the friction with the Palestinians grows, and Iran is getting closer to developing nuclear weapons, Israel will have to determine a new course to improve security. A new balance of power could rely on increasing military might or establishing a new balance of power with other regional powers, based on the nuclear capabilities Israel is known to have but has never admitted to. Sometimes, showing your sword deters your enemy from drawing his.

Coastal Defence Missile Systems

A ground-based anti-access/area denial, anti-ship capability

Luca Peruzzi

This article is a survey of in-service or under-contracted development of main anti-ship missile weapon systems built by US, European and Israeli companies.

As seen with the recent anti-ship operations in Russia's war against Ukraine, the latter's forces attacked the Russian Black Sea Fleet's flagship, the missile cruiser MOSKVA and also a re-supply ship with land-based anti-ship missiles, resulting in the sinking of both ships in two different events. Related to the attacks, a comment made by the US Chief of Naval Operations Admiral Mike Gilday, who underscored the need for the US Navy to put more resources into fleet defence, when asked about new developments the service is pursuing as a result of the more dangerous security environment. In his comments, Gilday highlighted the importance of the threat posed by mobile coastal defence systems (MCDS) equipped with anti-ship missiles as a capable ground-based anti-access/area denial, anti-ship capability. The latter are easy to be deployed and difficult to be detected; they are located according to their mobility and when available, have stand-alone surveillance and targeting capabilities, if not integrated into the national or theatre of operations' surveillance and targeting network.

HARPOON

While continuing to pursue campaign opportunities for the latest versions of its family of shipborne and air-launched HARPOON weapon systems, after the US State Department's approval of the possible foreign military sale in October 2020, Taiwan became a new customer of a Coastal Defence System based on the Boeing missile system. After an initial US\$220M non-recurring engineering contract awarded in September 2021, the US Naval Air Systems Command awarded Boeing a US\$498,3M order in March 2022 for the production and delivery of the HARPOON Coastal Defense Launch System (HCDS) in support of the Government of Taiwan. Running through December 2028, the contract includes the supply of 100 launcher transport units, 25 radar units and HCDS training equipment.

Photo: US DoD



While continuing to propose the ship- and air-launched version of the HARPOON weapon system, in March 2022, Boeing was contracted by US NAVAIR to provide the HARPOON coastal defence system to Taiwan, together with up to 400 RGM-84L-4 HARPOON Block II surface-launched missiles.

Photo: Republic of Singapore MoD



According to Ukrainian sources, confirmed by US officials, Ukraine's forces successfully launched HARPOON missiles from land-based launchers against a Russian re-supply tugboat. This followed the sinking of the Russian Black Sea Fleet's flagship MOSKVA cruiser by locally made NEPTUNE anti-ship missiles.



Photo: U.S. Marine Corps – Maj. Nick Mannweiler

The Navy/Marine Corps Expeditionary Ship Interdiction System (NMESIS) consists of two Naval Strike Missile (NSM) provided by Raytheon/Kongsberg Defence & Aerospace (KDA) and a launcher/weapon control system integrated on to a ground based, teleoperated carrier called ROGUE-ROGUE Fires carrier.

In the previous determination to approval statements, the request was for delivery of up to 400 RGM-84L-4 HARPOON Block II surface-launched missiles and four RTM-84L-4 HARPOON Block II exercise missiles. This is in addition to 411 containers and the same number of launcher transport units, 25 radar trucks, spare and repair parts, support, and test equipment, alongside personnel training and equipment, technical assistance, and logistics support services. The total estimated programme cost was valued US\$2.37Bn. Taiwan is the latest customer of a HCDS after the Danish MoD retired two coastal mobile batteries of the Boeing missile in the 2000s (Denmark used the system on board its ships). Although no details were provided about the used HARPOON version, Denmark was the first international customer of the Block II version upgrade kits, which were installed by the Danish Naval Materiel Command on about half of in-service HARPOONS with deliveries of upgraded missiles from April 2002. The initial HARPOON Block IC (HIC) version, with an approximate range of 120 km, entered service in 1977 with the US Navy together with the Block II version (AGM/RGM/UGM-84L) in 1998, which then saw wide international success, but was not acquired by the US DoD, which instead procured the air-launched Block II + model. Incorporating the low-cost inertial measuring unit (IMU) from the Boeing Joint Direct Attack Munition (JDAM) programme and the software, mission computer, integrated Global Positioning System/Inertial Navigation System (INS/GPS), GPS antenna and receiver from the Standoff Land At-

tack Missile Expanded Response (SLAM ER), the BLOCK II provides both anti-ship and land attack capability, maintaining compatibility with in-service launching systems. With the Russian invasion of Ukraine and following naval operations causing the sinking of the MOSKVA by locally-made NEPTUNE anti-ship missiles, the Ukraine MoD acknowledged in May the delivery of an undisclosed number of HARPOON-based Coastal Defence System launchers

and munitions from NATO members. They also announced the successful combat use of these weapons against a Russian Navy re-supply tugboat, which was confirmed by US officials in a Pentagon background briefing. On 15 June, after the US DoD announced new security assistance funding for Ukraine's near-term defence capabilities, including two HARPOON coastal defence systems in a Pentagon background briefing on the same day, senior officials told reporters that the US will provide a new launch capability. This will be able to be truck-mounted with a contracting action in the next couple of months and will be married up with missile capabilities provided by allies and partners.

NSM and TOMAHAWK

As the US Marine Corps' first Ground Based Anti-Ship Missile (GBASM) capability, the Navy/Marine Corps Expeditionary Ship Interdiction System (NMESIS) will be employed by the Medium-range Missile (MMSL) batteries serving as part of the Marine Littoral Regiments (MLR) conducting Expeditionary Advanced Base Operations (EABO). Providing a ground-based anti-access/area denial, anti-ship capability, the NMESIS consists of two Naval Strike Missile (NSM) provided by Raytheon as prime contractor, together with Kongsberg Defence & Aerospace (KDA). It also consists of a launcher/weapon control system integrated on to a ground-based, teleoperated



Photo: Thales Australia

To satisfy the Australian Army's future Land 4100 Phase 2 deployable land-based anti-ship weapon requirement, Kongsberg Defence Australia and Thales Australia jointly developed the STRIKEMASTER solution which marries Thales Australia's BUSHMASTER 4x4 flatbed utility vehicle and a twin-pack launcher for the Block 1A NSM missiles.

Photo: US DoD



The US Marine Corps is developing and fielding a ground-based TOMAHAWK launcher to be equipped with an initial batch of 54 Block V Tactical TOMAHAWK vertically launched missiles to be delivered by 2025 under a contract assigned to Raytheon in May 2022.

Photo: US Navy/Chief Petty Officer Edward Kessler



The US Army battery level Mid-Range Capability prototype with tractor-trailer mounted four-cell VLS launchers (four in total) for TOMAHAWK and SM-6 missiles based on the US Navy's Mk 41 design, is expected to form the basis for the US Marine Corps land-based solution.

carrier called ROGUE-ROGUE Fires carrier, weapon control system (WCS), and Command and Control (C2) connections, to enable the transport and firing of NSMs. The NMESIS makes extensive use of proven sub-systems, such as the Joint Light Tactical Vehicle (JLTV) chassis, the US Navy's Naval Strike Missile and its WCS. Developed by KDA to meet the Royal Norwegian Navy's requirements, the NSM entered service with the latter in 2012 and was selected and procured by the US Navy in 2018, being designated NSM Block 1 (US designation RGM-184A). With a low-observable composite-made 3.96-metre-long airframe, equipped with a turbojet engine and fuel

tank enabling an operational range in excess of 200 km, weighing approximately 400 kg, the NSM features a 227 kg insensitive munition warhead and an advanced passive guidance package that combines GPS-aided multi-sensor navigation with an advanced dual-band imaging infrared (IIR) seeker with ATR and seeker-generated aim point for terminal guidance, in addition to programmable endgame manoeuvres. On 22 December 2021, Raytheon's Missiles and Defense was contracted by the US Marine Corps Systems Command to provide production representative models of the NMESIS, which will conduct ballistic and guided flight tests in Q3 FY 2023.

The system entered service in a CDS initially with Poland and was then ordered in 2021 by Romania. It comes in a baseline core configuration, which includes the Kongsberg Fire Distribution Centre (FDC) providing Battle Management Command Control Communication Computers and Information (BMC4I), in addition to an NSM launcher fire unit with four missiles and radar sensor module, customer selectable in terms of vehicles, number of launchers and sensors suite. More recently, based on the Australian Army's future Land 4100 Phase 2 deployable land-based anti-ship weapon requirement, Kongsberg Defence Australia and Thales Australia joined forces to develop the STRIKEMASTER solution. This marries Thales Australia's BUSHMASTER 4x4 flatbed utility vehicle and a twin-pack launcher for the KDA Block 1A NSM latest variant. Selected by Canada, in addition to Norway, Poland, Germany, Malaysia, and the US, KDA announced last July the NSM procurement by Australia for shipborne operations. Under a joint acquisition programme announced in July 2021, Norway and Germany are developing the NSM Block 1A, which forms the basis of the upgrade of the in-service Norwegian munitions inventory, plus new missiles under a contract awarded to KDA in October 2021, while Germany will acquire new munitions. According to KDA, the Block 1A model (US designation RGM-184B), is a modified version of NSM Block 1 (RGM-184A), including a number of technology updates, new engine and various performance improvements, such as extended range. The NSM also comes in an air-launched version with modified airframe called Joint Strike Missile (JSM) for the F-35 internal transportation acquired by Norway, Japan and Finland. In addition to the NMESIS, MMSL batteries serving as part of the Marine Littoral Regiments (MLR), the future base unit of the US Marine Corps, will also be equipped with longer-range munitions, such as the TOMAHAWK Land Attack Munitions, Maritime Strike TOMAHAWKs and SM-6 containerised anti-ship missile, according to the USMC Commandant statement delivered in 2021 to the Senate Armed Services Committee. In May 2022, the US Naval Air Systems Command awarded Raytheon a US\$217.1M contract for 154 full-rate production BLOCK V Tactical TOMAHAWK All Up Round Vertical Launch system missiles, including for the first time 54 for the Marine Corps and 30 for the Army. The Marine Corps, according to the same NAVAIR press statement, is developing and fielding a ground-based TOMAHAWK launcher, without providing additional details. Scheduled to be delivered by 2025,

the full-rate production Lot 18 missiles will be in the Block V configuration, which features a NAV/COMMS upgrade that maintains the capability for in-flight updates and improved navigation. According to the NAVAIR press statement, the future Block V capabilities will include the Maritime Strike TOMAHAWK (MST) variant and the Joint Multiple Effects Warhead System (JMEWS). The MST variant (designated as Block Va), according to US Navy documentation, will add a new suite to provide midcourse and terminal guidance based on third party and a new multimode seeker to prosecute maritime targets. The NAVAIR TOMAHAWK Weapon System Program Office (PMA-280) is working closely with the US Army's Rapid Capabilities and Critical Technologies Office (RCCTO), based on the PMA-280 ongoing modernisation effort, investment strategies and joint test events for the Army's Mid-Range Capability programme, a system that is on track to be delivered to its first unit in FY 23. No further details were provided, but the US Army battery level MRC prototype with on tractor-trailers' mounted four-cell VLS launchers (four in total) based on the US Navy's Mk 41 design, is expected to form the basis for the land-based solution.

New MCDS and EXOCET, MARTE ER, TESEO Mk 2/E

By the end of 2021, MBDA delivered the components of the first new generation anti-ship mobile coastal defence system (MCDS) to its launch customer represented by the Qatar Emiri Naval Forces (QENF). Under an undisclosed value contract awarded in September 2016, and the long experience accumulated with in-service CDSs launching the same company's EXOCET MM 40s and OTOMAT/TESEO Mk 2 Block IV, alongside proven MARTE Mk 2/N, MBDA is delivering an unrevealed number of MCDSSs. In its basic configuration, an MCDS comprises a mobile sensor unit (MSU) with both surface search radar and EO/IR sensors on telescopic mounts, a mobile control unit (MCU) with a non-disclosed number of operator consoles and a flexible number (up to four) of mobile firings units (FUs), each equipped with four missiles, together with mobile maintenance and reloading units as required. Each FU has been developed to accommodate the weapon firing and mission electronics containerised module and the inclined ramp on a single platform. The latter can house either up to four EXOCET MM 40 Block 3 missiles or alternatively the same number of MARTE ER missiles, allowing the same



Photo: MBDA

MBDA completed development and qualification firing of the MARTE Extended Range (ER) in November 2021, opening the way to deliveries and entering into Qatari service as the Qatari MoD launch customer for both land-based and helicopter-launched applications.



Photo: Luca Peruzzi

The MBDA MCDS can also accommodate the under-development TESEO Mk 2E long-range anti-ship, land-attack missile, further expanding the potential customer base. It will be the first European ASCM equipped with a new generation AESA-based RF seeker jointly developed by MBDA and Leonardo, alongside a semi-active laser (SAL) channel.

vehicle and launcher platform together with the same sensors and control units to be used for different weapon systems. The MCU is networked by design and can be interfaced with over-the-horizon surveillance and targeting platforms, as specified by the customer. The CDSs are continuing to be delivered in 2022 to the QNEF alongside both the EXOCET Block 3 and the MARTE ER munitions and are offered on the international market. The MBDA MCDS can also accommodate the under

development TESEO Mk 2E long-range anti-ship, land-attack missile, further expanding the potential customer base. The MBDA group and the French MoD further developed the family of ship, air, land and underwater-launched EXOCET missiles to cope with current and future operational scenarios and threats. The latest upgrade is the MM40 Block 3c version due to be delivered to the French Navy later this year in the form of new missiles and an upgrade of in-service munitions, with Greece as the first

Photo: Saab



In addition to Sweden, coastal defence systems based on the Saab RBS 15 family of missiles were procured and are in service with Finland and Croatia in different battery and vehicle configurations, while the same weapon system in different models has been procured by Swedish and international navies and air forces.

international customer to equip the new Defence and Intervention Frigates (FDI HN). The Block 3c version, where the 'c' stands for 'coherent', introduces a new digitised package centred on a new coherent active RF seeker developed by Thales, together with a digital radar altimeter and a new GPS receiver, alongside an internal Ethernet bus. Coherent radar introduces significant improvements in target sensitivity (low

signature targets) and electronic counter-countermeasures (ECCM) performance. In addition to the French Navy, the MM 40 Block 3 (which entered service in late 2010), equips or has been ordered by more than ten customers. Characterised by a less than 6-metre-long airframe (with booster) and weighing 780 kg, the Block 3 version features a powerful SAFRAN TR40 turbo-jet. This provides an extended operational

Image: Saab



The Swedish Defence procurement agency contracted Saab in 2017 for the development and initial production of a fourth generation version of the RBS 15 to equip the Navy's VISBY class corvettes and Air Force JAS-39 GRIPEN E multi-role fighters to be delivered in the mid-2020s.

range of around 200 km and a guidance suite, including an active non-coherent RF seeker and an advanced hybrid INS/GPS navigation package, alongside a new launch and mission planning infrastructure. MBDA completed development and qualification firing of the MARTE Extended Range (ER) in November 2021, opening the way to deliveries and entering into operation to the Qatari MoD launch customer to equip the new MCDS in 2022 alongside a helicopter-launched variant for the under-delivery NHIndustries NFH90 naval helicopters by Leonardo. A latest generation, extended range variant of the MARTE anti-ship missile family, the ER model has been conceived as a multi-platform munition capable to be launched by coastal mobile/naval, rotary-wing/slow speed fixed wing and fast jet platforms. The MARTE ER weighs approximately 300 kg (<345 kg with boosters), is 3.6 m long and has a 316 mm large fire-and-forget weapon system equipped with a new turbo-jet. This is based on the WJ-24-8G engine supplied by Williams International, which delivers a high-subsonic munition with an effective range of 'well beyond' 100 km. Equipped with a 70+ kg semi-armour piercing HE insensitive warhead and a navigation and guidance suite centred on an INS/GPS and a new solid state RF Seeker developed and produced by MBDA Italia, the MARTE ER maintains the same launch control system and canister technology of the MARTE Mk2/N model. As a multi-platform munition, the MARTE ER munition comes also in a fast-jet variant, the latter being initially proposed to be implemented on the Eurofighter TYPHOON platform.

Based on its long experience with TESEO and MARTE families of weapon systems, MBDA is now developing for the Italian MoD a completely new long-range missile weapon system called TESEO Mk 2/E, featuring an innovative dual mode head section including a new generation Active Electronically Scanned Array (AESA) RF seeker, capable of long anti-surface and deep land-attack operations. The new missile is expected to complete qualification and industrialisation phases by end-2026/beginning-2027. The Mk2/E version has a 4.77-metre-long transonic and stealthy shaped airframe to reduce overall signature. The airframe features enhanced aerodynamics and flight controls and a new propulsion system centred on a Williams International turbofan with a fuel-tank and anti-g system package, alongside a single coaxial booster. This is designed to facilitate a future potential deployment from vertical launching systems. The Mk2/E version will also have a high subsonic cruise speed and high-G terminal manoeuvrability with an effective range of 350 km at sea-



Image: Israel Aerospace Industries

The Estonian Centre of Defence Investment (ECDI) awarded in October 2021 a contract to the Proteus Advanced Systems joint venture between Israel Aerospace Industries (IAI) and ST Engineering for developing Estonian coastal defence capabilities centred on the BLUE SPEAR fifth generation surface-to-surface missile (5G SSM).

skimming level. Weighing circa 700 kg 'in the cruise phase', plus the booster weight and a new single-shot lightweight canister, the Mk2/E will feature a state-of-the-art navigation suite. This will include a new two-way SATCOM data link system, focusing on target update, reassignment and mission abort and an innovative terminal guidance based on a dual mode head section including an RF seeker and an E/O sensor. The TESEO Mk2/E will be the first European ASCM equipped with a new generation active-electronically scanned array (AESA)-based RF seeker jointly developed by MBDA as prime, together with Leonardo, alongside a semi-active laser (SAL) channel for surgical attacks, in addition to a scalable insensitive warhead and an advanced mission planning system.

The RBS 15 Family

In February 2022, the Swedish Ministry of Defence announced that their National

Armed Forces have increased their presence on the country's southern coast, including Gotland Island, as well as at sea. In addition to a higher-than-usual operational tempo at sea, the Swedish Armed Forces also deployed coastal defence systems based on the Saab RBS 15 anti-ship missiles in the nation's southern region. This capability was re-introduced into the Swedish Armed Forces in 2016, with part of the equipment coming from a former coastal mobile battery, but much has been modernised and adapted to current requirements. In addition to Sweden, coastal defence systems based on the RBS 15 family of missiles were procured and are in service with Finland and Croatia in different battery and vehicle configurations. The same weapon system, in different models, has been procured and is in service with the navies of Sweden, Algeria, Croatia, Finland, Germany, Poland and air forces of Sweden and Thailand. Jointly produced and marketed by Saab and Diehl Defence, the latest in-service RBS15 Mk 3 version is 4.35 m in length, has a 0.50 m fuselage diameter, and weighs (in flight) about 660 kg. It has a range of over 200 km, possesses all-weather and fire-and-forget capabilities, providing stand-off attack with flexible trajectory characterised by multiple 3D waypoints. Furthermore, it is equipped with an advanced navigation suite with INS/GPS, together with a terminal guidance based on an active radar seeker with built-in electronic counter-countermeasures (ECCM) and a lethal (roughly 200 kg) blast and fragmentation warhead triggered by delayed impact or proximity fuse function,

allowing not only the successful engagement of vessels, but also shore-based targets. The Swedish Defence procurement agency contracted Saab in 2017 for the development and initial production of a fourth generation version of the RBS 15 to equip the Navy's VISBY class corvettes and Air Force JAS-39 GRIPEN E multi-role fighters to be delivered in the mid-2020s. Branded GUNGNIR (Odin's Spear) by Saab at system level for the different versions, the new RBS 15 Mk 4 is externally similar to current versions but will use a new composite launching box canister (different from the current hexagonal shaped canister) to simplify integration on naval platforms. It has been redesigned and re-architected internally, introducing technology enhancements in the airframe, navigation suite, on-board processing, and active radar seeker to improve the all-weather capabilities, survivability and develop a significant range enhancement. The new version will have a range of more than 300 km in a sea-skimming surface-to-surface flight profile, while upgrades have been applied mainly to the Saab-developed multi-purpose computer, navigation suite with an anti-jam GPS and an expanded terminal phase manoeuvring envelope alongside a new active radar seeker, which incorporates significantly improved ECCM functionalities, alongside growth capabilities including data-link.

BLUE SPEAR

In October 2021, the Estonian Centre of Defence Investment (ECDI) awarded a contract to the Proteus Advanced Systems joint



Photo: IAI

Launch of a GABRIEL missile

Photo: Roketsan



In July 2022, the Turkish Ministry of Defence and Roketsan announced the successful test firing of the new coastal variant of the national industry developed ATMACA (Hawk) anti-ship missile.

venture between Israel Aerospace Industries (IAI) and ST Engineering for developing Estonian coastal defence capabilities centred on the BLUE SPEAR fifth generation surface-to-surface missile (5G SSM). According to Proteus Advanced Systems, the advanced and versatile missile can perform a variety of long-range precision strike options in congested scenarios, against both ship and land targets in all-weather conditions. The BLUE SPEAR is one of the most recent developments and bespoke derivatives of the latest IAI Gabriel family technology. It first saw international success in July 2018 when the Finnish MoD contracted IAI to provide a new-generation anti-ship missile to be installed on the Navy's new POHJANMAA class corvettes, upgraded HAMINA class missile fast attack craft and a vehicle defence system. No details have been provided on the weapon's dimensions and weight by

the joint venture's two mother companies, but the BLUE SPEAR airframe and flight controls are very similar to those of the missile images shown by the Finnish MoD/ Navy, the latter referring to a 1,250 kg and 5.5-m-long subsonic airframe. The BLUE SPEAR also bears similarities with the SEA SERPENT SSM, which has been proposed to satisfy the requirements of the UK MoD for an Interim Surface-to-Surface Guided procurement programme. The SEA SERPENT "has been developed in parallel with similar missile systems in service with the Israeli Navy and selected to provide powerful strike capabilities for Finland's SSM2020 programme", said IAI, presenting the customised solution. Capable of operating in all weather conditions, both day and night, the BLUE SPEAR features a 'jet propelled engine' allowing the missile to achieve high-subsonic speeds and a maximum range of 290 km. The new missile features accurate INS-based

navigation capabilities and a robust system, which is immune to GPS disruptions offering "maximal accuracy target acquisition". The system is equipped "with a variety of deception means to achieve its mission and cope with the different battlefield challenges". Thanks to a state-of-the-art radar seeker, an advanced weapon control system, together with a fully automated mission planning and execution, exploiting multiple way points and complex trajectories to achieve the maximum penetration of layered and point defences, the missile has beyond line of sight strike capabilities against both mobile and stationary targets. It has a 150 kg high explosive insensitive munition warhead, and is also equipped with an advanced data link, to prevail in contested, congested and complex situations.

ATMACA

In July 2022, the Turkish Ministry of Defence and Roketsan announced the successful test firing of the new coastal variant of the locally developed ATMACA (Hawk) anti-ship missile. The first ever test of the land-based version of the missile was conducted against a sea target in the Black Sea on 2 July from a truck-mounted four-missile launcher. Unlike the ship-based version, the missile was equipped with an imaging infrared seeker (IIR) as disclosed by the video footage of the live firing. In March, Roketsan announced it was working on a coastal defence system, developed around the ATMACA anti-ship missile, but equipped with an IIR seeker, without providing further details on the new version. Delivered to the Turkish Navy from last December, the ATMACA anti-ship missile was developed as a long-range, surface-to-surface, precision-strike anti-ship missile, capable to be integrated into assault boats, frigates, and corvettes. It is 5.2 m in length with the booster (4.3 m in flight) weapon system, and equipped with a turbojet engine providing an over 220 km declared range. Weighing less than 750 kg at launch, it features an autonomous INS/GPS guidance suite, a barometric and radar altimeter to give it sea-skimming capabilities. In the final attack phase, the system activates its RF seeker while a data link ensures target update if needed, as well as re-attack or mission abort. It features a 220 kg high explosive-fragmentation warhead ensuring effective penetration against naval and land targets. An advanced 3-D mission planning allows time-on-target, designated time-on-target, simultaneous time-on-target, and salvo modes. ■

Photo: Roketsan



In March 2022, Roketsan announced it was working on a coastal defence system of the ATMACA anti-ship missile, developed around the same weapon system, but equipped with an IIR seeker, which was tested with live firing in July.



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Urgency and Importance in Prepositioning Equipment and Supplies

Tim Guest

This article looks at the evolution of pre-positioning strategies in Europe and globally and how APS in Europe have been activated since the start of Russia's heinous actions against a NATO ally.

In the light of Russia's invasion of Ukraine, NATO has drawn up and announced its New Strategic Concept, which, amongst many things, reaffirms existing alliance values and its assurance of collective defence underpinned by credible and rapidly available reinforcements, enhanced command and control and, crucially, pre-positioned equipment.

For any troops deploying to a distant theatre of operations, to be able to hit the ground running and perform tasks with optimum effect immediately on arrival is of paramount importance. Waiting for vital equipment assets, vehicles and materiel supplies to join the troops before they can get to work is not an option. Hence, a core element of NATO support in Europe is therefore pre-positioned stock. The US Army established its Army Pre-positioning Strategy in the early 1960s and called it POMCUS – the 'Pre-positioning of Materiel Configured in Unit Sets'. Today, pre-positioning falls under the banner of Army Pre-positioned Stocks (APS), intended to support any strategic global power projection plans by the US and its allies.

A NATO Fundamental

On 29 June 2022, NATO Heads of State and Government participating in the meeting of the North Atlantic Council in Madrid issued a statement endorsing the Alliance's new Strategic Concept, drawn up due to the new and developing security environment facing the Alliance. The June statement described numerous aspects of the new concept, one of which outlined a 'new baseline for deterrence and defence posture', which will

Photo: US Army, Cameron Porter



A long line of APS-2 Enhanced Heavy Equipment Transporters stands ready at APS-2 Zutendaal in Belgium, March 23, 2022. Army Field Support Battalion-Benelux's APS-2 site at Zutendaal was tasked with preparing nearly 4,500 APS-2 vehicles and other kit to support US troops deployed to Europe.

rely heavily for its success on effective pre-positioning of equipment. It stated, 'NATO will continue to protect our populations and defend every inch of Allied territory at all times. We will build on our newly enhanced posture, and significantly strengthen our deterrence and defence for the long term to ensure the security and defence of all Allies... Allies have committed to deploy additional robust, in-place, combat-ready forces on our eastern flank, to be scaled up from the existing battlegroups to brigade-size units where and when required, underpinned by credible, rapidly-available reinforcements, 'pre-positioned equipment', and enhanced command and control ... We will enhance our collective defence exercises to be prepared for high intensity and multi-domain operations and ensure reinforcement of any ally on short

notice. All these steps will substantially strengthen NATO's deterrence and forward defences. This will help to prevent any aggression against NATO territory by denying any potential adversary success in meeting its objectives.'

Today, the US Army's Pre-positioned Stock programme is a cornerstone of its ability to rapidly project power and send a clear signal of US commitment. Sets of equipment, such as all the tanks and wheeled vehicles of an armoured brigade combat team, are strategically pre-positioned in climate-controlled facilities, worldwide. These stocks, identified as APS-1 (US), APS-2 (Europe), APS-3 (Afloat), APS-4 (Northeast Asia), and APS-5 (Southwest Asia), are available to support all combatant commanders' missions, not only operationally, but also for major exercises and humanitarian missions.

Author

Tim Guest is a freelance journalist, UK Correspondent for ESD and a former officer in the British Forces.



Photo: US Army, Maj. Allan Lagui

Dozens of M2 BRADLEY infantry fighting vehicles are loaded onto German rail cars at the Coleman worksite in Mannheim, 14 March 2022. These APS-2 supplies were received by the 1st ABCT, 3rd Infantry Division at an ECHA. US soldiers have deployed to Germany in the face of Russian aggression with more than 100,000 service members now in Europe.

Pre-positioning Evolves

In Europe, pre-positioned POMCUS assets have had an evolving presence throughout the Cold War and since, so pre-positioned stocks in the European theatre of operations are more mature than those in regions like the Indo-Pacific theatre. However, with the rise of a hostile China, establishing more APS in the

APAC region is becoming increasingly urgent and while APS already exist in locations such as Japan and South Korea, the whole Pacific Theatre requires a more comprehensive constellation of sites, such as those now in Europe aimed at deterring Russia. This will require the US Army and its allies to agree on establishing powerful new sites that will help act as part of the deterrence 'whole' against

China, as well as bolstering the west's own interests and influence in the region. Unlike Europe, however, the force structures and equipment relevant to Pacific operations differ and APS, as a result, will differ, especially as smaller materiel sets will be needed in more numerous locations, with equipment relevant to the region's geography.

Challenges Impacting APS Effectiveness

As a result of protracted wars and post-war operations involving US and allied forces during the first two decades of the 21st Century, capabilities and readiness of US forces in Europe have, to a degree, been eroded as APS stocks have been commandeered, piecemeal, by constant needs from units in Afghanistan and Iraq, where much equipment was either damaged or destroyed. As a result, modernising these resources has been a major ongoing requirement. One of the challenges of maintaining an effective pre-positioned stock is ensuring that it keeps up with equipment modernisation and upgrades. Units arriving in theatre to use APS need vehicles and systems with which they are familiar, ideally exactly the same as they operate day to day and are trained to use. Any lag between issuing a unit with new equipment and the pre-positioning of the same, will hinder rapid deployment and the immediate effectiveness against an already mobilised enemy.



Photo: US Army, Spc Elizabeth MacPherson

Civilians assigned to AFSB-Germany unload a Joint Light Tactical Vehicle on 23 February 2022, at Grafenwöhr. The vehicle is part of an ABCT set drawn from the APS-2 Coleman work site in Mannheim.

Cold War Lessons

During the Cold War, large amounts of US military supplies and equipment were stored at various locations in West Germany under the POMCUS programme. As part of the US Army's general defensive plan for Europe within the context of NATO, this pre-positioned stock materiel was stored in unit configurations so that, in the event of hostilities breaking out with the Soviet Union and Warsaw Pact nations, US troops deployed by plane from the US could hit the ground running when they arrived, using the primed and oven-ready kit waiting for them.

Initially, equipment such as vehicles stored under POMCUS was largely maintained in outdoor, above-ground locations, fenced off for protection under guard. Eventually, from the 1960s until the fall of the Soviet Union, those outdoor facilities were upgraded to covered warehousing where combat-ready armour and other kit was protected not only from the elements – thereby lowering maintenance requirements – but also shielded from electro-magnetic pulse (EMP) radiation that would damage electronics, ignition systems, as well as communications equipment; such an attack by the Soviets was expected to take place in the early stages of any conflict at that time.

At the end of the Cold War, however, the POMCUS programme began to expire, as a naïve west believed the threat from the east no longer existed. Some kit did, however, remain in theatre, enough to equip three, or so, brigades under an evolved strategy of APS. In more recent time, APS have provided ready training sets for deployed forces on major joint NATO exercises. In the 1980s and 1990s, REFORGER exercises tested troops arriving from the continental US (CONUS) in, amongst other skills, the use of APS stocks, providing them with the experience of deploying and collecting equipment from various APS locations. REFORGERs ended in 1993, giving way more recently to Exercise DEFENDER, the latest of which – DEFENDER EUROPE 2022 -- took place during May alongside Exercise SWIFT RESPONSE, and was conducted over nine NATO territories, with both exercises involving some 18,000 troops from 20 NATO members. The deployment, use and testing of APS resources and the whole pre-positioning structure is a major reason for these manoeuvres.

Photo: US Army, Cameron Porte



Keeping APS-2 kit functioning perfectly, a T&M support specialist checks a piece of test equipment in Zutendaal, Belgium, on 23 March 2022, having deployed to Europe from Fort Stewart, Georgia, as part of the 87th Combat Sustainment Support Battalion, 3rd Infantry Division Sustainment Brigade, providing support to the 405th AFSB.

Photo: US Army, Spc Ellison Schuman



Soldiers assigned to the 3rd ABCT, 1st Cavalry Division unload equipment after arriving in Poznan, Poland, 14 July 2022. The division is working alongside NATO allies and regional security partners to provide combat-credible forces to V Corps, the US forward deployed corps in Europe.

Why We Need APS

In response to the 2014 annexation of Crimea, the US and its NATO allies undertook to bolster security in Central and Eastern Europe with an increased rotational military presence, additional exercises such as DEFENDER, as mentioned, and training with allies and partners. In addition, enhanced pre-positioning of US equipment among alliance members has been undertaken in recent years. This brings us to the present and Russia's terrible and ongoing hostilities against Ukraine. At time of writing, the importance of APS in preparation for potential large-scale, ground combat operations has escalated rapidly and underlines the *raison d'être* for APS: if heavy forces can deploy rapidly during the early stages of a conflict, this may be enough to disrupt enemy plans and avert potential disaster. Combining rapid air movement of US ground troops arriving from CONUS with mission-ready APS can deliver ready and fully operational armoured and mechanised units to the battlefield, quickly. As the first engagement of a conflict is critical, for US Forces to be able to join their NATO counterparts in Europe as rapidly as possible will be crucial in so many aspects. To arrive in theatre and collect modern, familiar, ready-and-waiting equipment, and then deploy quickly to the fight can prove decisive, either by defeating, or certainly delaying enemy forces. Any lack of APS in critical locations and scenarios may result in first battle defeats, as well as potentially costly, strategic complications.

And since 24 February, Europe and NATO have been on a war footing; certainly, a new Cold War footing, though awareness to, and preparations for, what was about to happen were discretely well underway well before the first shot was fired. As well as the various levels of Allied responses in bolstering the Ukrainian military with equipment and supplies destined for the front, NATO has shifted several gears deploying troops and materiel to, from and around the alliance, including from APS locations in Germany, to those member states, such as the Baltics, on NATO's eastern flank.

February 2022 – A Month that will Live in Infamy

US intel at the start of the year about Russia's impending invasion of Ukraine was spot on. So, it will come as no surprise that in the second week of Feb-



Photo: US Army, USAF Airman 1st Class Joseph Morales

In addition to drawing on APS stocks in providing assistance to Ukraine, materiel is being sent from CONUS to bolster both assistance to Ukraine as well as maintain APS stock levels.



Photo: US Army, USAF Senior Airman Faith Schaefer

For use with certain APS-2 equipment already deployed, pallets of ammunition bound for Ukraine are secured onto a commercial plane during a security assistance mission at Dover Air Force Base, Delaware, 21 July 2022.



Photo: US Army, USMC Chief Warrant Officer 4, Izzei Sanchez

APS equipment is often deployed and used on joint exercises with allies. Pictured: A military vehicle rolls off a landing craft from the US Navy's KEARSARGE Amphibious Ready Group and embarks for the 22nd Marine Expeditionary Unit during the Estonian Exercise Siil 22 in Saaremaa, Estonia, 20 May 2022.



Since Russia's invasion of Ukraine, US forces have deployed to multiple NATO nations to reassure allies and deter further aggression in the region, with APS-2 pre-positioned equipment waiting for them in Europe.



In addition to the 'big stuff', other critical supplies provided to inbound forces on arrival include rations. Pictured: USAF personnel put MREs, (meals ready to eat), onto an aircraft in Poland, 18 March 2022. The 435th Contingency Response Group deploys to establish airfield operations in contingency environments, such as supporting expedited delivery of aid to Ukraine.



A bi-weekly inspection on the M230 automatic gun of an AH-64D APACHE helicopter at Lielvarde Air Base, Latvia, 3 April 2022. V Corps provides combat-ready forces, executes joint and multinational training exercises, and retains command and control for all rotational and assigned units in the European Theatre; its equipment will now remain in Latvia as part of NATO's response to the war in Ukraine and the urgent requirement to position and retain equipment stocks, aps-2, on the ground on the Alliance's eastern flanks.

ruary, in Kaiserslautern, Germany, with effectively no notice, the US 405th Army Field Support Brigade (AFSB), had already been tasked with outfitting an entire armoured brigade combat team that was being deployed to Europe from CONUS. To do so, the 405th fully activated its Army Pre-positioned Stock-2 sites for the first time in its APS-2 programme history. The 405th AFSB is assigned to US Army Sustainment Command and is under the operational control of the 21st Theater [sic] Sustainment Command, US Army Europe and Africa. The brigade is headquartered in Kaiserslautern and provides materiel enterprise support to US Forces throughout Europe and Africa, providing theatre sustainment logistics, acquisition synchronisation, logistics and technology, and joint force support.

In that first half of February, before the war started, hundreds of vehicles and pieces of equipment were prepared and moved from the respective APS-2 sites overseen by the four battalions assigned to the 405th AFSB. Once that 'extraction' phase of the activity was complete the AFSB was tasked with supporting the 1st Armoured Brigade Combat Team (ABCT), 3rd Infantry Division, which deployed by air from Fort Stewart, Georgia, to Germany. Drawing on the APS-2 equipment and vehicles, mostly from the Coleman work site in Mannheim, has been conducted at the direction of the Commander, US European Command, US Army Europe and Africa.

During the initial draw of APS-2 in early February, more than 600 pieces of equipment, including HUMVEEs, heavy expanded mobility tactical trucks, medical equipment, generators, containerised systems, construction equipment and other support and sustainment equipment was drawn from the 405th AFSB's APS-2 sites and sent forward to US forces to augment command and control, life support and sustainment capabilities in Eastern Europe.

Then, in March, with thousands more items of APS-2 stock and equipment prepared and removed from its ware-



Photo: US Army, USAF Senior Airman John Wright

Forward-deployed airmen and Lithuanian air-field operations personnel move an aircraft maintenance air conditioning unit with a heavy-lift crane at Siauliai Air Base, Lithuania, 26 February 2022, in support of NATO's collective defence, and the delivery and positioning of assets necessary for enhanced air policing from forward operating locations in the Baltic region.

housing, the draw of the armoured brigade combat team's-worth of kit, along with enabling systems and ancillary equipment, was loaded onto military and commercial line-haul trucks and transported to the Grafenwöhr Training Area in Bavaria, the largest US Army training area in Europe and the base of the 7th Army Joint Multinational Training Command; some APS-2 vehicles were also sent by rail. This APS-2 kit from Mannheim included tracked vehicles such as the M1 ABRAMS MBT, M2 BRADLEY fighting vehicles, Joint Light Tactical Vehicles, PALADINs, Heavy Expanded Mobility Tactical Trucks, as well as generators, palletised load systems, load handling systems, and more.

Tasked with reception and staging of the APS-2 in Grafenwöhr in preparation for issue to the 1st ABCT at an Equipment Configuration and Hand-off Area, (ECHA), was the 405th AFSB's Army Field Support Battalion. APS-2 ECHA operations are very involved and challenging and the AFSB's efforts were supported by participants from the US Army Garrison Bavaria, 7th Army Training Command, 624th Movement Control Team, 16th Sustainment Brigade, 409th Contracting Support Brigade, 21st Theater Sustainment Command, US Army Sustainment Command and other units, all enabling the AFSB team to rapidly receive, stage and issue an ABCT's-worth of equipment to 1st ABCT, 3rd Inf Div in support of its intended operations in Europe.

Throughout February, March – and since -- the 405th AFSB has planned and executed a successful APS-2 mission in support of US Army Europe and Africa and US European Command, ensuring the right types and quantities of pre-positioned APS-2 equipment and vehicles have been operations-fit, at the right place, at the right time to equip appropriate, ready-and-waiting units, rapidly. ■

Masthead

European Security & Defence

Issue 09/2022, September 2022

ISSN 1617-7983 · www.euro-sd.com

Published by



Mittler Report Verlag GmbH

A company of the TAMM Media Group

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Production:

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Cover Photo: Hanwha Defense has been contracted by the Polish MOD to deliver a first batch of 48 K9A1 Self-Propelled Howitzers between 2022 and 2023. The K9PL variant for Poland will be manufactured in South Korea from 2024 before production moves to Poland in 2026. Subsequently, the first 48 South Korean-built K9A1s will be upgraded to the K9PL standard. Both versions will be equipped with Polish communication systems and WB Group's TOPAZ Integrated Combat Management System. The K9PL will be a development of the latest K9A2 SPH, with a new automatic loading system increasing the sustained rate of fire from 6-8 to 9-10 rounds per minute. The crew will also be reduced from five to three members. Poland has also ordered K10 armoured resupply vehicles and K11 command vehicles. (Photo: Hanwha Defense)

Annual subscription rate: €82.50 incl. postage

Reduced annual subscription rate for distribution in Germany:

€64.90 incl. postage

The Riot Act – Radio Monitoring

Thomas Withington

Radio monitoring technology could help enhance law enforcement during violent disturbances, provided the technology is used with forethought.

As these words were being written, the United States' House Select Committee on the 6th of January Attack was receiving evidence regarding the violent scenes witnessed at the US Congress in Washington DC in 2021. The committee is investigating the attack on the Congress by supporters of outgoing President Donald Trump. For Mr. Trump, the stakes are high. On 12th June, the committee announced it had sufficient evidence for him to be indicted by the US Justice Department. There is the possibility that Mr. Trump could face trial for obstructing electoral certification procedures. A conviction might not only bar him from public office, torpedoing any hope of running for president in November 2024, it could also see him sentenced to up to 20 years in jail.

Crowds of Mr. Trump's supporters began to gather in the early morning of 6th January in central Washington DC to hear a speech by the outgoing president. By 08.51 local time members of the US Secret Service, tasked with protecting the president and other political leaders, noted that over 10,000 people had gathered. They were close to the White House from where Mr. Trump would give his address. "Some members of the crowd are wearing ballistic helmets, body armour and carrying radio equipment and military grade backpacks," the service reported. Television viewers around the world will now be familiar with the sight of individuals involved in the disturbance wearing tactical-style clothing. The inclusion of radios is a small, yet not insignificant, detail.

Smartphones are usually seen as the preferred means of communications for the extremist groups supporting Mr. Trump. As for most of the population, these devices are useful for sharing information on social media and accessing social networks

Photo: TapTheForwardAssist / CC-BY SA 4.0



Protestors gather on the step of the US Congress ready to force entry into the building following claims by President Donald Trump that the presidential election had been rigged.

to coordinate any violent actions at a protest. The 'radio equipment' referred to by the Secret Service seems surprising. Why would protestors resort to such seemingly archaic technology?

According to a report by the Cable News Network on 18th January 2021, the Facebook and Twitter social media platforms had removed several people using these networks to plan attacks, spread hate speech or conspiracies. Mr. Trump was himself banned from Twitter on 8th January. The Parler social network used by neofascists was banned by Amazon, Apple, and Google. Such actions have progressively restricted the communications channels available to Mr. Trump's supporters to spread propaganda or plan violent actions.

use for spreading propaganda due to the comparatively limited audiences they reach compared to the online world. A report on 29th June 2022 by the Slate website said several civilian radio frequencies were identified as being used by neo-Nazis in the US. These include Citizens Band (CB), the Family Radio Service (FRS) and the Multi-Use Radio Service (MURS). The US Federal Communications Commission (FCC) allocates 40 ten kilohertz/KHz-wide channels at frequencies of between 26.965 megahertz/MHz and 27.405MHz for CB. For those intent on law breaking, CB is attractive. It is unlicensed by the FCC, meaning that "anyone, regardless of age, can operate a CB station – except a foreign government, a representative of a foreign government, a federal government agency or someone who has received an FCC a cease-and-desist order that is still in effect. Anyone who is eligible may operate a CB station for personal or business use, in accordance with the rules" in the commission's own words. The FRS is, as its name suggests, is intended for use by families for short-range communications. 22 channels

Author

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Civilian Two-Way Radios

The fallback, it seems, for some has been to use civilian two-way radios. Although basic in comparison to today's smartphones, these radios are ideal for organising criminal actions. Nonetheless, they have limited

12.5KHz wide are made available by the FCC on frequencies between 462MHz and 467MHz. Like CB, an individual can use an FRS radio without a licence, provided they are not a representative of a foreign government. Finally, MURS is used for short range communications with 'walkie-talkie' style handheld radios. Five channels between 11.25KHz and 20KHz wide are made available by the FCC across frequencies of 151.820MHz to 154.600MHz. As with FRS and CB, provided an individual is not working for a foreign government, they can use MURS sans licence.

While the Federal Communications Commission says CB, FRS and MURS can all be used without a licence it warns that these networks cannot be used to help break the law. In the wake of the Capitol Riots, the FCC's enforcement bureau said it had become aware "of discussions on social media platforms suggesting that certain radio services regulated by the Commission may be an alternative to social media platforms for groups to communicate and coordinate future activities." The bureau warned that "individuals using radios in ... this manner may be subject to severe penalties, including significant fines, seizure of the offending equipment, and, in some cases, criminal prosecution."

Nonetheless, before any arrest or prosecution can take place, individuals using radios in this manner must be identified and located. The first step is ensuring it is legal for a country's law enforcement organisations to monitor these types of communications. Laws differ from nations to nation. "In some countries ... verbatim transcription of intercepted communications requires a court order, although in most, passive monitoring is permissible and can be hugely successful" says a statement provided to the author by COMINT Consulting. Assuming it is legal for law enforcement to do so in certain situations, police and domestic intelligence agencies have several capabilities they can use to keep tabs on radio traffic moving between persons of interest.

Radio Monitoring

Using radio monitoring to locate and track potential troublemakers is not new. This technology has "long been used by law enforcement agencies for active prosecution and passive monitoring of extremists, militias, gangs, organised criminal groups, narco-traffickers, arms and human traffickers, protection of vital installations and other roles," says COMINT Consulting. The first step is to use a radio which can be tuned to the wavebands used by these persons. Provided the latter radios are in

physically in range, they should be easy to detect and listen to. Radios using the bands mentioned above transmit across Line-of-Sight (LOS) ranges. That means two radios must have an imaginary uninterrupted straight line stretching between them. Any obstructions such as buildings, terrain or even the horizon can degrade or stop transmissions altogether. Typically, a person who is 1.6 metres/m (5.2 feet) tall, with carrying a handheld radio with a one metre (three feet) antenna will have a height of 2.6m (8.5ft). This will give their radio a LOS range of 6.6 kilometres (four miles). If the



Photo: CIES Corp

The US Department of Homeland security flies light turboprop aircraft believed to perform cellphone monitoring during civil disturbances.

person is standing on a building 20m (66ft) high, this increases to 18km (eleven miles). However, the same problem will exist for the person on the building wanting to talk to a person in the streets below if buildings or other obstructions are in their way.

One solution to is to have a radio monitor mounted on an aircraft flying above the area where the persons of interest either are, or are thought, to be. Radio transmissions radiate outwards from an antenna much like ripples from a pebble dropping into a pond. Unlike obstructions on the ground caused by buildings or terrain, radio waves will also move upwards into the air. A radio receiver on an aircraft flying at 10,000ft (3,048m) altitude should be able to detect radio transmissions across a 123 nautical mile (227km) range. One caveat to this is that the range a radio can achieve will depend on how much power is put behind the transmission. Generally speaking, a CB radio can generate between four and twelve watts of power, according to FCC regulations.

Law enforcement aircraft carrying radio monitors are already operating in the US. In September 2020 two Department of Homeland Security aircraft flew surveillance orbits Louisville, Kentucky. These Cessna C-206 aircraft were deployed during disturbances there. Angry scenes had followed

the failure of a grand jury to indict three police officers accused of killing Breonna Taylor in her apartment that March. Sources said the C-206s were gathered communications intelligence during disturbances which accompanied the protests. These aircraft were thought to be collecting intelligence on cellphone traffic accompanying the disturbances. Platforms like these could easily accommodate radio monitoring equipment collecting intelligence from civilian radios. It may be possible to modify existing equipment carried by these aircraft with software that can demodulate these

transmissions and appropriate antennas for capturing the signals. Demodulation is the process by which a radio signal is electronically discombobulated to tease out the relevant intelligence.

Considerations

Harnessing radio monitoring to enhance law enforcement is easier said than done. Firstly, the bad guys may understand how to use their radios to help evade monitoring. "Many criminal, terrorist, trafficking and other organisations are much more technologically-savvy than law enforcement," says COMINT Consulting. "Having awareness of the construction of networks" thus becomes essential for law enforcement radio monitoring. Put simply, you must know what you are looking for before you start, one spectrum expert shared. Let us suppose police are keen to identify potential troublemakers involved in a protest. First, they need to know that their persons of interest have radios and what type they are using. This could be done by having undercover officers mixing in the crowd. Alternatively, a signal scanner could betray the presence of these radios. Nonetheless, to know what abnormal looks like you need to recognise normal, the source continued. Officers maybe convinced they have dis-



COMINT Consulting produces several systems that can be used by law enforcement for radio monitoring. These include the company's Krypto-1000 software, the user interface of which is shown here.

covered a group of potential troublemakers using CB radios on a street corner. A closer inspection reveals that this is a taxi company with several cabs parked near the office. Analysing radio traffic is all about patterns of life. Collecting traffic from the same part of the city over several days would have quickly eliminated the taxi office as this radio traffic would be regular and predictable. Conversely, the sudden burst of CB traffic around a closed kindergarten might be suspicious and worth investigating. Traffic pattern-of-life recognition is further complicated for law enforcement by the random nature of civil disturbances. These might not always happen where you expect. They may happen sporadically, unpredictably and may quickly dissipate. Moreover, scanners would need to be in

range of these radios, bearing in mind that transmissions could be blocked or distorted by large buildings and other obstacles. "Finding and locating handheld radios in a city is tough," the source advised. They added that radio monitoring needs skilled practitioners. Such individuals are few and far between, and expensive to employ. In addition, law enforcement must ascertain an end state before it starts using radio monitoring for crime prevention during civil unrest. Do you want to simply hear what potential bad guys maybe planning? Do you want to follow where the bad guys going by locating and tracking their transmissions? Do you want to jam their communications if they announce they are going to do something illegal? Concerning the latter, is it legal to jam their

communications, even if they are planning to commit a crime? To further complicate matters, they will certainly not discuss such action sans code, no matter how simple. A person of interest saying they are 'going to the store to buy a soda' could mean they are about to break the law. It could also mean they are thirsty. Are police monitoring professionals suitably acquainted with the persons of interests' modus operandi and chatter?

Exercising Your Rights

None of this is to say that traffic collection and exploitation has no role in helping stop crime during civil disturbances. It does however underscore the need to develop legal, precise, and workable concepts of operations if communications intelligence gathering is to yield results in such scenarios. Radio monitoring equipment, people and training is not cheap. It may also be necessary to overcome institutional resistance in some cases. "Overcoming an anti-technology/anti-intelligence mentality in some law enforcement agencies can be a greater impediment" than using the technology, COMINT Consulting's statement notes. At the same time, police services have a myriad of competing budget priorities. Meanwhile, politicians may like to keep a purse string on a tight leash. The right to protest is a legitimate and vital part of a vibrant democracy. No-one wants protests marred by violent, law-breaking thugs no matter what the cause. Radio monitoring has a role to play in helping keep lawful demonstrations and the general public safe. However, it must be harnessed in a practical, cost-effective, and efficient way. ■

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Viewpoint from New Delhi

Photo: Suman Sharma



China's Call for BRICS Expansion Aimed at Countering US

Suman Sharma

BRICS, an acronym denoting the member nations in this economic grouping, namely Brazil, Russia, India, China, and South Africa, has had its share of upheavals since its inception in 2009. But it has survived as a bloc formed to counter the US-led western economic system and is now aiming at expansion. Together, the BRICS nations form 27 per cent the world's land mass, 41 per cent of global population, 16 per cent of global trade, 33 per cent of the world's food and 24 per cent of global GDP. In June 2022, the five leaders met at a virtual Summit, with each participant owning an agenda. While India was focussed on post-pandemic economic recovery and shared interests, Russia was looking for markets to circumvent western sanctions, and China, with expansionism up its sleeve, aimed at targeting US and the US-led post WW-II establishments, turned out to be the most ambitious. Among the chief takeaways from the XIV BRICS Summit were Russian President Putin's proposal of a new currency to be developed as a counter to the dollar-based system and a BRICS payment scheme as an alternative to the Swift payment system.

BRICS Expansion

Argentina and Iran have both applied to join the BRICS, as they both technically qualify, being emerging economies, rich in natural resources and being politically and ideologically non-aligned to the West.

With a bid to create an alternate order, it is China who wants BRICS expanded so as to flex its political muscle on the world stage, aimed at countering G-7 and G-20, which are dominated by the US-led West. Former Additional Secretary Jayadev Ranade said, "Over the years China has gradually tried to assume the leadership role and for the past few years has been the leader. Moscow appears reconciled to this. China's efforts to add members must be viewed in this backdrop."

Going by numbers, China enjoys the maximum clout in BRICS. With the collective GDP of BRICS being US\$27.5Tn, China's contribution is almost 70 per cent, with India coming second at 13 per cent, Brazil and Russia both at seven per cent and South Africa with three per cent. Understandably, any expansion will only strengthen Beijing's power-grip on the bloc.

Both Iran and Argentina are part of China's 'Belt and Road Initiative' (BRI), besides which Iran also has a 25-year cooperation agreement with China, signed in 2021, which mandates China to invest

US\$400Bn in Iran. Besides Iran and Argentina, other nations which have shown interest include Kazakhstan, Egypt, Indonesia, Saudi Arabia, the UAE, Thailand, Senegal and Nigeria.

On new members being admitted, in its statement, India stressed 'consultation and consensus', thereby signalling that it will not be easy for Beijing alone to admit its allies and partners to build a power-bloc against the West. India's posture in the joint statement appeared as if New Delhi was trying to stonewall BRICS expansionism, as the bloc might provide a platform to Beijing to counter the West. It is interesting to note that some of these aspiring countries are India's partners and key western allies, such as the UAE and Saudi Arabia. Ashok K Kantha, Director of Institute of Chinese Studies, New Delhi, says, "It is not a process which will be fast-tracked. India will not let China dominate by underlining its centrality. New Delhi will defend its interests. Expansion will be done in a balanced manner through consultation."

Russia

For Russian President Vladimir Putin, BRICS represented a comeback on the world stage, as this was the first major global event in which he participated in following the Russian invasion of Ukraine.

China has been buying 55 per cent more oil from Russia and India has signed up for 25 times more Russian oil. Clearly BRICS offers a platform where Putin could be seen scouting for new markets for his energy reserves, through bypassing western sanctions.

The founding principles of BRICS are having an alternate monetary system, greater representation in global economic institutions, financial reforms and United Nations Security Council (UNSC) reforms. The bloc was raised to basically challenge the western order but not through a Cold War by giving rise to political groupism or supplanting the present order with a Chinese one.

New Delhi has largely focussed on the financial aspect of BRICS, and steered clear of political power play. India's strategic autonomy and independent foreign policy helps New Delhi reject any anti-US rhetoric within BRICS and at the same time keeps it away from any anti-Russia campaign in the Quad. While India has maintained its neutrality, Russia sees the grouping as a lucrative market, more so after being hit by a post-war economic downturn with China envisioning BRICS as another anti-US forum.

BRICS was founded as a group of developing economies, in which Russia and modern-day China may not fit in, unlike the Quad and G-7, which appear more relevant as these groupings share political alignment and a common vision.

Rotary Wing Forces

Ian Frain

The Austrian Bundesheer Luftstreitkräfte has come a long way since their first forays into rotorcraft, and continues to evolve with the twenty-first century.

The Bundesheer, or Austrian Armed Forces, has operated a variety of American, British, French and Italian rotary wing platforms over seven decades. The Luftstreitkräfte, or Air Force part of the Bundesheer, currently operates nine (Lockheed Martin owned) Sikorsky S-70 BLACKHAWKS, in use since 2001, and several legacy air frames consisting of the single engine Aerospatiale (now known as Airbus Helicopters) ALOUETTE III, Bell OH-58C KIOWA and the twin engine AgustaBell 212 Twin HUEY. In 2017, the newly established Kommando Luftstreitkräfte, or Air Force Command, which is headquartered in Salzburg, had the responsibility for overseeing the readiness and preparation of the air force assets.

The rotary wing fleet assets are spread across the country, from the east in Schwaz in the state of Tyrol, to Linz-Hörsching Flughafen (Airport) in Upper Austria, to Allentsteig in Lower Austria, and in the south at Klagenfurt in the state of Carinthia, and finally to the borders at Punitz, in Burgenland state.

Alpine Pioneers Post-War

The very first rotorcraft seen in Austria was in the early 1950s, a Sikorsky (S-51) H-5 DRAGONFLY from the newly established United States Air Force (USAF). In the post-war period Austria was allowed to re-arm in 1956: they took on their first helicopter (and also their first turbine powered craft), which was the AgustaBell AB-47 single piston engine helicopter, which was licenced and built in Italy by what was then Agusta (now Leonardo) from Bell Helicopters. The Bell 47, with its iconic bubble canopy, was made famous during the Korean War as a liaison and Casualty Evacuation (CASEVAC) helicopter with the US Army.

This was followed by a training helicopter in liaison with the US Navy, the French-

Photos: Ian Frain



The Bundesheer Bell OH-58C KIOWA

built Aerospatiale ALOUETTE II three seat observation helicopter powered by the Turbomeca Astazou engine, and then the British Westland WHIRLWIND medium lift helicopter. The piston engine WHIRLWIND was licensed and built in the United Kingdom from the American Sikorsky S-55. The S-55 served across the US Air Force, Army, Marine Corps and Navy and had seen combat for the first time during the Korean War from 1950-1953. The Bundesheer entered the turbine helicopter world with the introduction of the Sud Est (Aerospatiale, which then became Eurocopter and Airbus Helicopters today) ALOUETTE II three seat (bubble canopy again) observation with sixteen airframes ordered, which stayed in service until 1975. This also began a closer relationship with France, as later they ordered the larger ALOUETTE III in 1967.

In 1960, the Austrians again took delivery of the iconic piston single engine Bell OH-13 SIOUX (Bell 47), then in 1963, the AgustaBell 204B Huey, which was again manufactured under licence in Italy by Agusta from Bell Helicopters in the United States, and the aircraft was not retired until 2001. They also ordered the AgustaBell 206 JET RANGER (licensed built variant of the popu-

lar Bell 206B JET RANGER) in 1969, which served for four decades.

Sikorsky – Short but Strong

In 1969, the Austrian Air Force selected the large twin engine Sikorsky S-65O STALLION, which was finding fame with the US Marine Corps, Air Force and Navy at the time in the South-East Asian conflict. Two of these heavylift helicopters entered service, albeit for a relatively short period between 1972 and 1981, before being retired and sold to Israel. The STALLION was entering service with their German neighbours with the army aviation (Heeresflieger) around the same time. It would be three decades before a Sikorsky airframe returned to the inventory.

The Dawn of the HAWK

In February 1999, a large avalanche hit the village of Galtur, south of the famous ski resort town of St Anton, in Austrian Tyrol. Thirty one people had already lost their lives to this accident by the time the emergency services were at the scene. There was an international response with

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the Sikorsky UH-60A BLACKHAWK 'Dust-off' Medical Evacuation (Medevac) from the United States in Europe (USAREUR) based in Germany, along with the German Federal Border Guard (Bundesgrenzschutz) Eurocopter AS332L1 SUPER PUMA. The German Army Aviation (Heeresflieger) provided the single engine Dornier-Bell UH-1D Huey, and twin engine heavylift Sikorsky CH-53G STALLION, while the Swiss Armed Forces (Schweiz Armee) sent their Eurocopter AS532 COUGAR, as did the French Air Force (Armée de l'Air). These came to supplement the Bundesheer AB-204B, AB-212 and ALOUETTE III and local civilian helicopters. In the aftermath of the avalanche, there were public inquiries as to why the disaster happened in this supposedly safe zone, and, more importantly for our interest, it highlighted the inadequacy of the Bundesheer rotary wing force at the time. The result was the launch of a competition for a medium utility helicopter, and the airframes offered ranged from the three engine EH Industries EH101 MERLIN (now known as the Leonardo AW101 Merlin), the S-70 BLACKHAWK from Sikorsky, and the new twin engine H-92 SUPERHAWK. Eurocopter offered the SUPER PUMA/COUGAR, and, in a surprising move, the Russians offered Kazan Helicopters MI8/17, considered as reparations from World War Two.

In October 2000, the Austrians selected the Sikorsky S-70 BLACKHAWK, purchasing nine airframes that were delivered in 2002, making them the second European customer after Turkey at the time. The Austrian BLACKHAWKs were one of the first export models to have a digital cockpit.

The A is in Austrian and AceHawk

The BLACKHAWK fleet continued to evolve. During December 2013, the United States Defence Security Cooperation Agency (DSCA) with the State Department, approved a possible Foreign Military Sale (FMS) of three UH-60M BLACKHAWKs. The Austrian requirement included a trio of Aviation Survivability Equipment (ASE) with seven T700-GE-701D Engines (six with one spare), a trio of Aviation Mission Planning Systems and a Transportable BLACK HAWK Operations Simulator (TBOS). Finally, there were going to be eight AN/AVS-9 Night Vision Goggles (NVG), and an Aviation Ground Power Unit, along with eight Embedded Global Positioning Systems (GPS) with Inertial Navigation in the whole package.

However, in 2017, American company Ace Aeronautics LLC of Huntsville, in Ala-



A Bundesheer Sikorsky S-70 BLACKHAWK



The Bundesheer AgustaBell AB212



The Bundesheer ALOUETTE III performing hoist operation

bama, was awarded a US\$40M contract to upgrade the avionics of nine BLACKHAWKS in the inventory with their Ace-Hawk package. This package comprises a Garmin 5000H cockpit, with four 12-inch UltraHD displays which are NVG compatible, and two touchscreen controllers. In November 2020, the first modified, upgraded BLACKHAWK was delivered from Ace Aeronautics to Austria.

In 2019, the Austrians had approached Ace Aeronautics and ordered an additional three UH-60 platforms to be equipped with the ACE DECK VL-60 cockpit, with similar features to their AceHawk package. In 2020, the Austrians purchased three former Royal Jordanian Air Force (RJAF) BLACKHAWKS, and after obtaining approval from the United States for the transfer, the three BLACKHAWKS will be sent to Huntsville for the modification and are expected to be delivered by the end of 2022.

Legacy of Leonardo

A strong relationship continues between the Austrians and the Italians to this day, as the Federal Ministry of Defence (known as the Bundesministerium für Landesverteidigung, or BMLV), in September 2020, selected the Leonardo AW169M as the next generation Light Utility Helicopter (LUH). This six tonne Pratt & Whitney multi-engine powered helicopter is primarily to replace the legacy ALOUETTE III in the trooping/ utility role, as well as Search And Rescue (SAR), and supporting special forces, amongst other missions.

In January 2022, Leonardo and the Italian Secretariat General of Defence/ National Armaments Directorate signed the Acquisition Contract for the supply of AW169M Light Utility Helicopters (LUH) to the BMLV. The Austrian Bundesheer is the third customer for the AW169M after the Italian Finance Police or Customs Service (Guardia di Finanze,) and the Italian Army Aviation (Aviazione dell'Esercito). The AW169M is the military version of the popular AW169 which was unveiled to the aerospace community at Farnborough Air Show 2010, when the company was known as AgustaWestland. A mock-up of an armed AW169M was shown at Farnborough 2014, on static at the chalet. The AW169 made its maiden flight in May 2012 and is often found in the parapublic role, be it police air support or Helicopter Emergency Service (HEMS), around the world. The first AW169M went to the Guardia di Finanze in 2019 and appeared at the Austrian Airpower 2019 Air show at Zeltweg air base.

Ascending Higher and Higher

In spite of being a neutral country, the Bundesheer does have international contacts across the borders. For example, Austrians have pioneered high altitude mountain flying from the late 1950s onwards, and the Bundesheer runs a High Altitude Mountain Pilot Course, to which several NATO members sent their helicopter crews. Pilots from the British Royal

has run the Helicopter Tactics Instructor Course (HTIC), on both the academic and the flying sides. The academic/ simulator part of the course was initially run from the United Kingdom at RAF Linton-on-Ouse in Yorkshire, as the EDA had a pair of whole-crew mission simulators built by Selective Fidelity Simulation (SFS) on the base. These had dual flight controls and were modular so they could emulate different types of rotorcraft platforms. The



A first production Leonardo AW169M (Guardia di Finanza) on static display.

Air Force (RAF), and from the Boeing CHINOOK and Aerospatiale PUMA community would fly in the Aerospatiale ALOUETTE III, while Army Air Corps (AAC) pilots, used to flying the then Westland LYNX and GAZELLE, would fly in the Bell OH-58C KIOWA, for the duration of the course. The course teaches everything from whiteout to experiencing landing at 10,000 feet or above in the mountains, and how to acclimatise with or without oxygen. The Germany based USAREUR helicopter crews (primarily then using Sikorsky UH-60A/L and Boeing CH-47D CHINOOK twin rotor heavylift) have come to do the course, as have the Italian Army Aviation Air Cavalry (the AgustaBell 206 and AgustaBell 205/212/412). Neutral nations Sweden and Switzerland have also sent students to attend his course. In recent years, the Bundesheer, as part of the European Defence Agency (EDA),

practical flight stage of the course took place at various locations, such as Vidsel Air Base in Sweden, and the Bundesheer would send their AB-212 Twin Huey, S-70 BLACKHAWK and OH-58C KIOWA to participate. As of 2021, the academic and simulator phase takes place at Sintra Air Base in Portugal, and the flying element at Papa Air Base in Hungary.

The Austrian Bundesheer Luftstreitkräfte has come a long way since their first forays into rotorcraft, and continues to evolve with the twenty-first century. The improved BLACKHAWK fleet and the introduction of the AW169M makes it one of the most modern air forces in western Europe. This, coupled with the continuing focus on education and the honing of tactics and skills of the air crews with the EDA HTIC, gives Austria a trusted and valued place within global rotorcraft communities.



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Loitering Munitions Update

Tamir Eshel

Loitering munitions have been used in combat for more than a decade, but have only recently entered the limelight, most notably during the 2020 conflict between Azerbaijan and Armenia.

In Nagorno-Karabakh, loitering munitions emerged as a weapon of choice for strikes at the tactical and operational levels, due to their ability to provide a small force with persistent presence and rapid strike capabilities at relatively low risk. This trend continues somewhat in the War in Ukraine, albeit to a much lesser extent due to the different tactical environments of the two war zones.

Loitering munitions combine the attributes of missiles and Unmanned Aerial Vehicles (UAV) to provide a 'hunter-killer' weapon system, combining several tasks previously assigned to different platforms – aerial reconnaissance, target acquisition, battle management, attack and battle damage assessment. Loitering munitions can be operated individually, in groups, or in collaborative teams with other UAVs, enabling a few operators to remotely roam the battlespace, seeking targets of value, and eliminating those targets shortly after detecting them.

Loitering Weapons for the Individual Soldier

Today, loitering munitions are available in different shapes and sizes, from miniature platforms armed with hand grenade-sized warheads to effectively small aircraft with warheads closer to those of cruise missiles. The smaller types are often based on vertically launched or rotary winged quadcopter platforms. These include the STM KARGU, Rafael SPIKE FIREFLY, and IAI ROTEM L. Although very convenient for use by dismounted infantry, some quadcopters may require partial assembly before deployment. For more rapid deployment, forces can look to tube-launched loitering munitions, employing fixed-wing drones that are typically faster and are pre-packed in tube launchers with no assembly required. These include AeroVironment's SWITCHBLADE 300, STM ALPAGU, and Uvision's HERO 20. Most of these loitering munitions have been used in combat, and the US-made PHOENIX GHOST recently deployed to Ukraine most likely uses this configuration.

Photo: IAI



Smaller types of loitering weapons are often based on vertically launched or rotary winged quadcopter platforms. Shown here is IAI's ROTEM-L quadcopter.

Photo: STM



STM's ALPAGU fixed-wing tactical UAV is designed for both reconnaissance and surveillance and for striking targets outside the line of sight.

Based on the lessons learned with the first generation of small loitering munitions and the rapid advancement of drone technology, hybrid systems combining miniature rotorcraft and tube-launched systems have emerged; the Spear NINOX 40 MT and De-

fendtex DRONE40 represent such systems. Both offer the capability to fold a miniature quadrotor platform into a compact cylinder, then launch it from a handheld tube or standard underbarrel rifle grenade launcher. All three weapon classes are designed



Photo: Elbit

Elbit's SKYSTRIKER uses a deployable wing design which allows for fixed-wing flight performance in a design sufficiently compact to be canister-launched.

for use by the individual soldier. They have limited loitering time, use a simple camera adequate for close-range operation, use automated functions to simplify operation, and small warheads intended primarily for engaging unprotected targets. Their task is to provide their combat team with local situational awareness and the ability to strike soft targets of interest at relatively close ranges.

Hunter Predators

The next level of loitering munitions also function as 'hunter-killers', which effectively provide extended-range anti-tank and anti-matériel capabilities. The larger body diameter of these weapons allows mounting larger electro-optical assemblies, engines, and warheads, enabling them to provide higher-resolution imagery from higher altitudes, and greater effect on target than their smaller equivalents. The additional size and weight also allows mounting specialised warheads, such as anti-armour or anti-structure warheads, to allow more effective engagement of different target types. This class of loitering munitions can be divided into two subcategories – rail-launched and tube-launched loitering munitions. The first generation of this weapon class consisted of field assembled, rail launched munitions, such as the Elbit Systems' SKYSTRIKER, Aeronautics' ORBITER 1K, Zala KYB and LANCET, and WB Group's WARMATE. These munitions can operate independently or rely on surveillance pro-

vided by other UAVs. An example of such a concept is the combination of ORBITER 3/ORBITER 1K to perform different roles. Alternatively, users can also opt to use the same base platform configured with different payloads, as with the Warmate family of loitering weapons. The WARMATE R is a drone which can be configured with a reconnaissance payload using either day or thermal cameras with pan/tilt control and laser target designator, or alternatively the WARMATE R can be configured as a loitering munition when fitted with a warhead and a forward-looking camera.

As operational requirements have matured, operators have demanded faster deployment and quick launch capabilities. The HERO family of loitering munitions was the first to introduce a tube-launched loitering munition as the company moved from the rail-launched fixed-wing platform design to a cruciform-winged platform design. Other tube-launched weapons include Raytheon's COYOTE, Aerovironments' SWITCH-BLADE 600, and Elbit Systems' canister-based SKYSTRIKER. IAI's MINI HAROP (also referred to as GREEN DRAGON) represents a larger version of this platform type, intended to be stored as part of a cluster of 16 canister launchers that can be carried on vehicles or small ships. With a range of 10+ km and the ability to mount shaped charge warheads for dealing with armour, it isn't surprising that loitering weapons are becoming mounted on armoured vehicles. Rheinmetall has recently unveiled their future main battle tank, the KF-51 Panther, equipped with a 130 mm cannon, integrated mini-UAV, and a pop-up launcher in the turret bustle capable of housing up to four HERO 120 loitering munitions. The US Marine Corps (USMC) has also selected the HERO 120 to fulfil their Organic Precision Fires- Mounted (OPF-M) requirement. As part of the requirement, UVision are providing their modular MULTI-CANISTER LAUNCHER (MCL), presently available in an eight-cell configuration, but slated to become available in four- and six-cell configurations. The USMC plans to integrate these MCLs on their LIGHT ARMORED VEHICLE-MORTAR (LAV-M) 8x8, JOINT LIGHT TACTICAL VEHICLE (JLTV) 4x4 and



Photo: Uvision

Here UVision's eight-cell MULTI-CANISTER LAUNCHER for HERO 120 loitering munitions is shown mounted on the rear deck of a USMC LAV-M 8x8.

LONG-RANGE UNMANNED SURFACE VESSEL (LRUSV) unmanned craft.

Seeking High-Value Targets

Larger loitering munitions can be deployed at the operational level to locate and destroy targets of high value – such as command posts, communications nodes, radar and air defence sites, ballistic missile launchers, or smaller naval vessels. To execute these attacks, loitering munitions must be capable of operating at long ranges, with long endurance and must possess a relatively large warhead that matches the target type – for example high-explosive fragmentation (HE-

tem. HAROP and HARPY NG are launched from truck-mounted containers; each unit carries nine missiles operated from a remote-control shelter. MINI HAROP and MINI HARPY can be deployed on tactical vehicles or small naval vessels, and additionally Israel and South Korea are jointly developing air-launched versions of those UAVs configured for launch from helicopters.

The Iranians employ truck-mounted launchers for their SHAHED 136 loitering munition. Each launcher consists of an ISO-type container with six UAVs stacked in a slanted launch position on launch rails. The SHAHED 136 loitering munition uses a rocket-assisted launch system and

defence assets, with the possibility of engaging them even when they turn off their radars.

Other drones like the Aerovironment BLACKWING and Spear NINOX 103 are designed to be deployed from submarines. Although both are presented as reconnaissance assets, sub-launched drones could likely be armed and used as disposable reconnaissance-strike systems, thus becoming loitering munitions.

Riding with UGVs

UGVs are becoming a popular choice for loitering munitions, as they can carry several loitering munitions to forward launch positions, keeping the operators protected from danger. As the UGV has all the necessary equipment to support loitering munition operations, such a deployment is valuable for operating swarms, as it enables the deployment, control, and coordination of multiple munitions with minimal risk to the operators. Another advantage of UGVs is their ability to route a UAV's command links to other loitering munitions via its existing connection to the operator, thus extending the munition's effective range without consuming additional spectrum resources. Such UGVs could also be equipped with sensor payloads to support missions, particularly before the loitering weapons deployment. Typical examples are Rheinmetall's MISSION MASTER UGV fitted with a six-cell MCL containing HERO 120 or WAR-MATE loitering munitions.

Such operations often involve different roles for airborne assets – primarily these would be divided into reconnaissance and strike assets. Reconnaissance drones are optimised for covering wide areas and performing close inspection of the potential targets. As expendable assets, strike assets would typically use less sophisticated payloads to verify and engage detected targets while the reconnaissance assets flying above would monitor the attack and perform post-strike battle damage assessment.

Future Directions

The future of loitering weapons seems likely to be the swarm – almost all developers of loitering weapons are already testing some types of swarming munitions, using dozens or even hundreds of platforms. Such operations are too complex to execute by human operators, therefore they are largely autonomous, with members of the swarm continuously sharing their status, position, attitude, and intent with all other swarm members. However, these



Photo: Rheinmetall

Rheinmetall's MISSION MASTER UGV can be configured as a launch platform for loitering munitions, shown here with a six-cell launcher.

FRAG) for area targets, or shaped charge warheads for engaging armoured or hardened targets. This class of munitions often use typically use sophisticated sensors and/or software, and may include elements of artificial intelligence to automate target acquisition.

Typical systems from IAI are the HARPY NG, HAROP, and MINI HARPY, designed to facilitate autonomous strikes at air defense or naval targets, employing the loitering weapon technologies. HAROP was employed in combat by Azerbaijan during the Nagorno Karabakh conflict. These assets were credited with successfully eliminating system elements of air defense systems, including S-300PS Transporter, Erector, Launcher (TEL) vehicles and a Transporter, Erector, Launcher, and Radar (TLAR) of the TOR-M2KM sys-

tem. HAROP and HARPY NG are launched from truck-mounted containers; each unit carries nine missiles operated from a remote-control shelter. MINI HAROP and MINI HARPY can be deployed on tactical vehicles or small naval vessels, and additionally Israel and South Korea are jointly developing air-launched versions of those UAVs configured for launch from helicopters. The Iranians employ truck-mounted launchers for their SHAHED 136 loitering munition. Each launcher consists of an ISO-type container with six UAVs stacked in a slanted launch position on launch rails. The SHAHED 136 loitering munition uses a rocket-assisted launch system and

is powered by a pusher propeller driven by a small internal combustion engine (ICE), providing a reported range of approximately 2,000 km, and capable of precision targeting, effectively making this weapon equivalent to a small cruise missile. Iran also developed a faster loitering missile using a jet-propulsion. Known as the TYPE 358 missile, it has missile-like cruciform wing arrangement and is powered by a small turbojet engine which provides it with a range of approximately 100 km. The TYPE 358 was understood to be primarily intended for the engagement of low- and slow-flying aircraft.



Image: GDLS

The TRX is intended to allow swarming operations with minimal levels of risk for the operator.

are dependent on a human in the loop to make the decision to engage. The swarm manages all members in a distributed man-

ner, allocating tasks such as lookout, decoy, and strike, enabling simultaneous strikes against multiple targets to come from mul-

multiple different directions. Use of such tactics could enable the rapid saturation of targets such as air defence systems. Since swarm operations require considerable setup, automating the launch sequence is a necessary part of the process. Raytheon has developed such a launcher for its LOCUST loitering weapon system and has demonstrated its operation with several dozens of loitering munitions. The Halcon company of the UAE Edge group is also developing a 21-cell swarm launcher for HUNTER 2-S loitering munitions.

The TRX tracked UGV – a concept vehicle designed by General Dynamics Land Systems (GDLS), is a further example of development in the field of the swarm concept. TRX can carry 26 SWITCHBLADE 600 loitering weapons along with 24 SWITCHBLADE 300s. A tethered quadcopter UAV is also deployed from the platform to provide an elevated view of the battlefield. With up to 50 loitering weapons deployed, TRX will be able to deploy a swarm of loitering weapons to cover a battlefield sector from above, providing a small number of remote operators the capability to locate and engage targets with minimal risk. ■

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Challenging Times for the French Defence Industry

David Saw

France has long recognised the importance of a highly capable national defence industry. The defence industry provides France with 'strategic autonomy' meaning that it can meet a substantial part of its own defence needs without dependence upon external suppliers.

This also provides a positive economic impact through expenditure in the domestic economy. The fact that aerospace and defence is a high technology industry raises the technology level of French industry as a whole, thus making it more competitive and successful in a global context.

A Diplomatic Tool

The significance of the French industry goes far beyond 'strategic autonomy' and domestic economic impact. Internationally, the strength of the French industry provides Paris with an extremely important diplomatic tool to meet its foreign policy objectives and exert its influence. Then there are the economic implications. Exports sustain the French defence industrial base and its workforce, contribute to the cost of defence research and development and provide a welcome influx of funding to the benefit of France's balance of payments thus boosting the health of the national economy.

How important is the French industry in an international context? According to the Stockholm International Peace Research Institute (SIPRI) in its Fact Sheet of March 2022, France remains one of the major defence exporting countries. SIPRI data lists the top ten defence exporting countries from 2017 to 2021 as follows: United States, Russia, France, China, Germany, Italy, United Kingdom, Republic of Korea, Spain and Israel. Using SIPRI figures between 2017 and 2021, French defence exports accounted for 11% of the global total. This 2017 to 2021 total marked a 59% increase compared to the level of exports achieved between 2012 and 2016. SIPRI stated that in the 2017 to 2021 period, 47% of French exports went to Asia and Oceania and 37% to the Middle East. Aircraft made up for 56% total defence exports, with ships accounting for 15%.

SIPRI data has France delivering defence equipment to 65 different countries between 2017 and 2021, with the three largest markets being India, Qatar and

Photo: Dassault



A Dassault RAFALE of the Qatar Emiri Air Force (QEAF), the QEAF fleet will number 30 RAFALE. In total eight countries have now ordered the aircraft. France is due to order a fifth RAFALE batch of 30 aircraft, plus an additional 12 aircraft to replace the French Air Force aircraft supplied to Greece.

Photo: 40e Régiment d'Artillerie



Gunners from the 40e Régiment d'Artillerie, French Army, work on their Arquus TRM10000 truck. The French Army is on the cusp of ordering a whole new logistic support vehicle fleet, a total of some 9,390 trucks, in an order with a potential vale of two to three billion euros.

Egypt who together accounted for 56% of French defence exports in this period. India was a key market for France; it was the destination for 29% of French defence exports. SIPRI states that, "France's arms exports to India in 2017-21 were almost 11 times higher than in 2012-16 and reached their highest level for any five-year period since 1950." Turning to Qatar, SIPRI figures indicate that French defence sales to Qatar were 25 times higher in 2017 to 2021 than in 2012 to 2016.

The primary driver of French defence export success, according to SIPRI, has been the Dassault RAFALE. Between 2017 and 2021, India received 54 RAFALE, Qatar 30 and Egypt 18, a total of 102 aircraft. In 2021 orders were received for 188 aircraft; Croatia (12), Egypt (30), Greece (24), Indonesia (42) and the UAE (80). Without question, RAFALE has transformed the fortunes of French defence exports and its success has opened the way for increased business in these major markets.



Image: Naval Group

In March, Naval Group signed a contract to supply the Greek Navy with three Frégates de Défense et d'intervention (FDI HN), 4,500 ton displacement frigates, the first two will be delivered in 2025 and the third in 2026. Greece has emerged as a major market for the French defence industry.

Global Footprint

The best picture of the French defence industry can be gained from looking at a 2021 MoD report submitted to the French

Parliament titled "Rapport au Parlement 2021 sur les exportations d'armement de la France". The report provides a country-by-country breakdown in millions of euros

of French defence exports and it includes financial data from 2011 through to 2020. Euro costs are denominated at current value as of 2021:

Area	North Africa	Countries	Total: € 1,984.7 million
Largest customer	Morocco € 1,363.4 million		
Area	Subsaharan Africa	34 countries	Total: € 1,650.2 million
Largest customer(s)	Senegal € 361.3 million, Botswana € 326.1 million		
Area	Central America + Caribbean	4 countries	Total: € 226.9 million
Largest customer	Mexico € 226.7 million		
Area	North America	2 countries	Total: € 3,113.3 million
Largest customer(s)	US € 2,589.1 million, Canada € 524.2 million		
Area	South America	10 countries	Total: € 2,487.3 million
Largest customer	Brazil € 1,237.4		
Area	Central Asia	5 countries	Total: € 857.1 million
Largest customer	Uzbekistan € 393.3 million		
Area	Northeast Asia	3 countries	Total: € 3,612.3 million
Largest customer	Republic of Korea € 1,672.3 million		
Area	Southeast Asia	8 countries	Total: € 5,940.2 million
Largest customer(s)	Singapore € 1,956.9 million, Indonesia € 1,671.8 million		
Area	Oceania	3 countries	Total: € 1,350 million
Largest customer	Australia € 1,335.4 million		
Area	Other Europe	19 countries	Total: € 4,139.9 million
Largest customer	Britain € 1,409.4 million		
Area	EU Region	25 countries	Total: € 8,874 million
Largest customer(s)	Belgium € 3,191.7 million, Spain € 1,357.7 million, Germany € 1,015.9 million		

Photo: Nexter



France has supplied 18 CAESAR 155/52 mm artillery systems to the Ukraine from French Army inventory. As a result, in July 2022, the Direction Générale de l'Armement (DGA) placed an order for 18 new CAESAR Mk1 systems for the French Army, with deliveries to be completed by mid-2024 at the latest.

It should be noted that the 2022 version of the "Rapport au Parlement sur les exportations d'armement de la France," is in preparation at the time of writing and this will include defence sales figures for 2021.

Looking at the figures, it is clear that defence exports continue to make a major contribution to French export numbers. The two key market areas for France are the Middle East and South Asia, confirming the SIPRI data sets discussed earlier. Then comes the EU region in third place, with the French government and industry looking to increase sales and market in that region if they possibly can. After the EU region, in fourth place is Southeast Asia and then comes non-EU Europe as the fifth most important defence market for France. One would imagine that sales post-2020 will be boosted in EU Europe by RAFALE sales and naval sales to Greece, with Southeast Asia sales boosted by the RAFALE victory in Indonesia. Despite this, there is ample evidence that the Middle East and South Asia marketplaces remain as the two leading export territories for French industry post-2020.

A Question of Economics and Money

The world that existed on the first day of January 2022 is no more. All of the forward-looking statements that existed at that point in the context of politics and economics now have little relevance. The same is true of defence both in terms of national defence and security requirements

and also the situation of national defence industries. Unfortunately, everything has turned out worse than expected in early 2022 and there are very few indicators that the global economic situation will improve across the remainder of the year.

The impact of the human tragedy caused by COVID is one aspect of the problem. The actions taken to combat COVID roiled countries around the world, causing massive economic disruption, exorbitant increases in government spending, the disruption of global supply chains, rising oil and gas prices, inflationary trends. In early 2022, there were hopes for signs of economic growth and concrete action to recover the global economy. Instead, there was a war in Europe, and the Russian invasion of Ukraine this February dashed any hopes of a global economic recovery.

While in February Moscow may have dreamed of a short, victorious war, the fact as of August Ukraine was still fighting, and the horrendous losses in personnel and materiel on both sides, indicate that the conflict will continue for the foreseeable future. Ultimately, it will come down to the staying power of the combatants, and at the moment there are no signs that either side is seeking a peaceful resolution.

Before the invasion, France had desperately tried to find a diplomatic solution but the diplomatic approach failed. For our consideration, the impact of the conflict on the economic situation of the French government and the consequences for French defence policy and the French defence industry are of importance. The global economic picture was not positive prior to February

2022 but since then, matters have only gotten worse. As far as France was concerned, cautious optimism prevailed at the end of 2021. Although the French economy had contracted by eight percent in 2020, the economy had grown by seven percent in 2021. France is the seventh-largest economy in the world and the second-largest in the euro zone after Germany. However, the French economy was no protection against the systemic shocks that would hammer European economies.

Rising energy costs are a damaging factor for the French economy. Rising costs and limited supplies of fertilizers are also damaging, as agriculture is a major industry in France. All of this contributes to the inflationary pressures France is beginning to face. Inflation in France was 6.1% in July, up from 5.8% in June, and is the highest inflation rate since July 1985. Inflation in the eurozone as a whole reached 8.9% in July, according to official data, which is not good news for the French economy. So far, however, the government has done a good job of managing the economy.

The problem is that toward the end of the year, energy costs will undoubtedly rise, leading to more inflation, which will raise producer prices and food prices, and as things stand now, the outlook for the economy looks bleak. But things could get worse: Rising energy costs are one thing, but what if energy demand can no longer be met? That's a real possibility and could be very destructive in economic terms. For example, what if the German economy began to shrink because energy demand could not be met? Germany is the economic engine of Europe, and if the German economy falters, the shock waves will hit the Eurozone, and even the strongest European economies will be in trouble.

But not only in Europe, but also in the U.S., the economy is in recession, whether the government wants to admit it or not. The Chinese economy is also in the doldrums. Growth rates are very low, due in part to the zero COVID policy of sealing off and quarantining entire cities. All of this adds up to a negative picture for the global economy. Even worse, this is happening before the major economies have really had a chance to recover from COVID.

All economic indicators suggest that the economic situation will get worse before it gets better, increasing the pressure on national governments to allocate resources to initiatives that reassure the electorate. This is a situation in which it may be difficult to increase defense spending significantly. In the case of France, it is clear that the Macron government is committed to increasing defense spending. However, having lost ef-

fective control of the National Assembly, it will be even more difficult to push through a significant increase in defense spending. At this point, the trajectory of French defense spending is unpredictable, as is the level and duration of the economic downturn. Unfortunately, too many unknowns tend to create a situation where bad policy decisions become the norm.

Searching for a Solution

Although the future is fraught with uncertainty, the French government and Ministry of Defense are taking concrete steps to improve the defense situation in the short term. Work is currently underway on a new Loi de Programmation Militaire (LPM), which will replace the current LPM published in February 2018 for the period 2019-2025. The new LPM will take into account changes in the security environment that require an evolution of French strategy and will contain the basis for defense financial planning and major procurement programs. However, the state of the economy and the government's ability to successfully push legislation through the National Assembly will determine the final fate of the new LPM.

Apart from questions of strategy and economics, there are ongoing programme issues that need to be resolved, arguably the most important of which is the Système de combat aérien du futur (SCAF) or Future Combat Air System (FCAS) for France, Germany and Spain. The problem is that the industrial aspects of the programme are stalled. Dassault seeks programme leadership, while Airbus is resisting this solution. The end result is zero progress which halts movement on the technology demonstrator, with first flight delayed to 2027 or even 2028. With both Dassault and Airbus muttering about having 'Plan B' solutions, SCAF/

FCAS remains in peril. By implication, this could impact on the Main Ground Combat System (MGCS), the replacement for the LEOPARD 2 and LECLERC tanks, delivering a major blow to Franco-German defence collaboration. Resolving problems between contractors is a critical task.

More positively for Dassault, France is to order its fifth RAFALE batch later this year or early 2023. This will amount to 30 aircraft. In addition, an order will be placed for 12 additional RAFALE to replace the 12 aircraft from French Air Force stocks supplied to Greece. Also benefitting from the replacement of French equipment supplied overseas from stock is Nexter. France supplied an initial batch of 12 Nexter CAESAR 155/52 mm artillery systems to the Ukraine from French Army stocks, subsequently a second batch of six more CAESAR was delivered to the Ukraine. Nexter has now received an order from the Direction Générale de l'Armement (DGA) to supply 18 CAESAR MkI systems to the French Army, with deliveries to be completed by mid-2024 at the latest. This sets the scene for the next generation CAESAR MkII artillery system is to be delivered to the French Army from 2026 onwards.

One long-awaited program that many believe will be included in the new LPM is the procurement of trucks for the French Army. This is a large program for logistic vehicles, originally valued at two to three billion euros. The DGA has not yet issued a full technical requirement. At best, something could come out in September; at worst, by the end of the year, industry sources said. The really significant thing about the truck program is that, at this point, the DGA intends to award the entire program to a single company. Simply put, whoever loses this competition will essentially be shut out of supplying the French Army with logistics vehicles for a generation.

The structure of the truck requirement is 1,400 4x4 trucks, 5,600 6x6 trucks, 450 fuel tankers (there is an urgent requirement for fuel tankers), 240 heavy haulers and 1,700 8x8 trucks. This is by European standards a truly major truck requirement. Conforming with EU regulations, all of the contenders for the French requirement are European companies. Contenders that have emerged thus far are Arquus, currently the primary source of military trucks for France, Scania, Iveco, Mercedes, Rheinmetall MAN Military Vehicles (RMMV) and DAF working with Tatra Trucks.

The DAF + Tatra combination is a new potential factor in the race for the French truck order and the fact that they are being considered as a contender comes from DAF winning major trucks orders from the Belgian Armed Forces in 2021. The first order covered 636 4x4 trucks and 243 8x8 trucks initial deliveries 2022 and last units to be produced in 2025. A second order in December 2021 covered the supply of nine heavy tractor/trailer combinations in 2024. The trucks feature a Tatra chassis, with engines produced by DAF at Eindhoven and cabs produced by DAF at Westerlo in Belgium. The trucks will be supported by the DAF dealer network in Belgium.

The issue of support could be crucial to the fate of the French truck contract, as the winning contractor will be expected to support the new truck fleet for at least 20 years. This could well work to the advantage of Arquus, which has already supported the French military truck fleet and proven that it has the support infrastructure required. In addition, Arquus has established a logistics center for the rapid delivery of spare parts and support to the military customer, and is providing life extension for the French fleet. The French truck contract is undoubtedly the most significant European program currently offered in this industrial sector. ■



Photo: Naval Group

BANI YAS (P110) was the lead ship of a class of two GOWIND corvettes ordered by the United Arab Emirates (UAE) in 2019 from Naval Group. BANI YAS was launched at Naval Group Lorient in December 2021, with the second unit Al Emarat (P111) being launched at Lorient in May 2022.

Battlefield Potential of Laser Communications

Tim Guest

Free-Space Optical (FSO) Wireless, or laser communications, has been in use in the commercial sector for years. It's potential on the battlefield, though yet to be fully exploited, is now being taken evermore seriously.

Imagine a means of line-of-sight communications that is totally secure, cannot be intercepted, eavesdropped, or disrupted by EW and jamming. Well, the commercial sector has been developing and using FSO technology over the past 30 years or more for a wide range of applications and this article takes a look at the technology, its development, and its potential in defence.

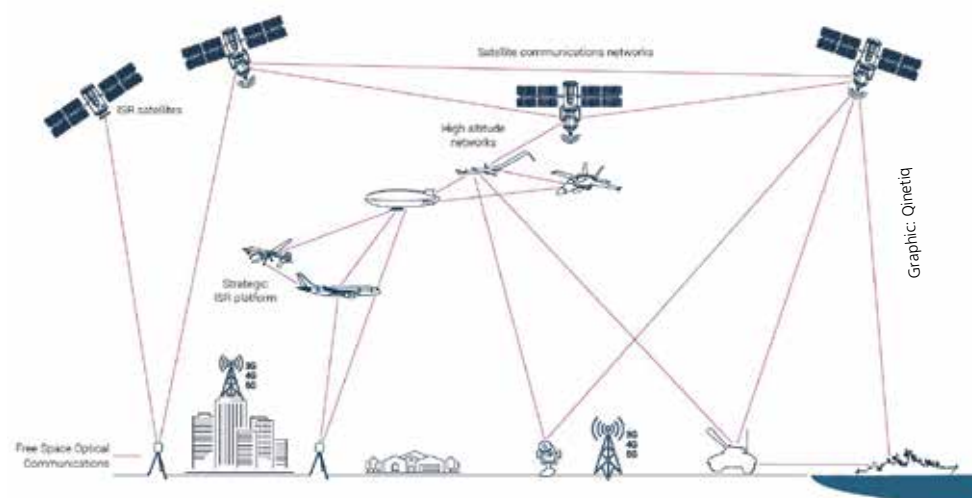
Photo: Tesat



The commercial sector has been developing and using FSO technology over the past 30 years or more for a wide range of applications including in space.

The Technology

FSO technology uses laser beams via a line-of-sight optical bandwidth connection to transfer data, video or voice communications across areas ranging typically from 100m to a few kilometres at throughput bandwidths up to 1.5Gbps at frequencies above 300GHz of wavelengths, typically, 785nm to 1550nm. Using FSO wireless networks eliminates the need to secure licensing found with RF signal solutions and also the expensive costs of laying fibre-optic cable. The practical side of FSO communication requires a pair of transceiver units housing an optical receiver and transmitter, allowing the sending and receiving of data simultaneously. The unit at one location transmits a beam of focused light carrying/delivering information directly to the receiving location where the light beam is transferred to an optical fibre from a high-sensitivity receiver. FSO systems offer various advantages over normal RF wireless networks; they don't suffer from RF interference or band saturation, their operation is licence free, no software is needed on client devices, indoor installation is possible and unaffected by operation through glass and, importantly for the defence sector, FSO provides a very high level of security – the technology is already certified in governmental and defence ap-



Graphic: QinetiQ

Author

Tim Guest is a freelance journalist, UK Correspondent for ESD and former officer in the UK Royal Artillery.

On today's increasingly-connected battlefield, unprecedented levels of secure bandwidth and connectivity are required on land, in the air, at sea and in space. Sole reliance on traditional RF communication is vulnerable and laser communications offers a very real alternative and complementary technology.

plications for transferring confidential and classified information.

Due to the signal strength being affected by atmospheric conditions over increasing distance, the most efficient terrestrial FSO wireless network ranges are typically between 100m and 2km. However, when combined with LAN or WLAN networks they can provide very effective solutions to many scenarios, for example, by providing a bridge between WLAN-to-WLAN connections on campuses at Fast Ethernet or Gigabit Ethernet speeds to cater for many subscribers simultaneously. Alternatively, FSO can provide a bridge between LAN-to-LAN connections and they can also create a wireless link across an area where no physical access is possible. They can also be used to quickly re-establish high-speed network connections after incidents, as in disaster-recovery scenarios.

The speeds delivered by FSO are, today, comparable to those of optical-fibre connections, but with the flexibility and practicality of being part of a wireless network providing bandwidth speeds up to 10Mbps, 100Mbps, 155Mbps and 1.5Gbps; speeds of up to 10Gbps are likely in the future. Currently, the only other wireless technology capable of such speeds is Millimetre-Wave RF Wireless Networking, which, in comparison, requires licensing and can be affected severely by rain.

That is not to say FSO doesn't have some atmospheric drawbacks. Unlike rain and snow, which generally have little effect on FSO communication, it is fog and water vapour droplets that hinder FSO operating performance; small water droplets can prevent light beams being received due to absorption, refraction, scattering, or even complete reflection, which can significantly lower data rates. Line-of-Sight obstructions also interfere with FSO wireless transmission. As light can't travel through opaque mediums, objects such as birds, planes and people can momentarily interrupt the service by blocking the beam, with service resuming instantly when the light path is cleared. Multi-beam technology can counter this problem to an extent. On occasions, building sway due to wind can also be a problem; it disrupts alignment between two transceiver units causing signal loss. On the safety side of FSO, the technology is strictly controlled, standards are followed and dangers limited, with equipment typically meeting Class 1M, eye-safe certification.

Commercial Sector Expertise

For the defence sector to see how far FSO has come, a look at progress and devel-



Photo: Wireless Excellence

FSO technology uses laser beams via a line-of-sight optical bandwidth connection to transfer data, video or voice communications across areas ranging typically from 100m to a few kilometres at throughput bandwidths up to 1.5Gbps.



Photo: Wireless Excellence

The speeds delivered by FSO are comparable to those of optical-fibre connections, but with the flexibility and practicality of being part of a wireless network. Pictured: CableFree urban installation in Kuala Lumpur.

opments through the eyes of one of the technology's leading pioneers over 25 years is worthwhile. CableFree Solutions, now named Wireless Excellence, developed some of the world's first successful FSO links, including the first commercial 622Mbps wireless link in 1997 and the first Gigabit Ethernet 1.25Gbps wireless link in 1999. In 2003, the company launched a range of Enterprise Laser Connectivity

products, the LaserHop family, for short-range communications of around 0.5 km for corporate campus or urban applications requiring high-speed, high-capacity transmission between different sites. Those plug-and-play systems were all Class 1M eye safe and delivered E1 and T1 service interfaces for voice, as well as fast Ethernet and Gigabit Ethernet for the transmission of high-speed backbone data.

With such advances almost 20 years ago, it is not as if the defence industry has to re-invent the wheel when considering adapting FSO for military applications. Today, FSO tech from Wireless Excellence is used in thousands of mission-critical customer networks worldwide, with diverse applications including: 4G/LTE backhaul, CPRI fronthaul, 3G and 2G networks, corporate networks, finance, energy, oil and gas exploration, power utilities, education, healthcare, broadcast with HD-SDI video, perimeter security and CCTV networks. One of the company's highest profile involvements in recent years was at the 2012 London Olympics, where it supplied the BBC with high-definition Gigabit wireless video links to transmit live interviews with Team GB participants.

If further convincing is needed as to the potential of FSO as a secure means of communications in defence applications, Stephen Patrick, Wireless Excellence CEO, told ESD, "Of all current wireless technologies, FSO remains the most inherently secure technology for secure communications. Virtually impossible to detect, intercept or jam, the ultra-narrow beams used by FSO communications contrast with the much wider beams used by contemporary microwave, millimetre wave, or radio links. With almost limitless spectrum available, FSO has potential for huge bandwidth, as well as dense spatial re-use in busy urban areas without risk of congestion. For applications where FSO can't meet requirements alone, the technology can be combined into hybrid RF+FSO solutions, where the diverse technologies can yield far higher uptime, range and capacity than any technology alone."

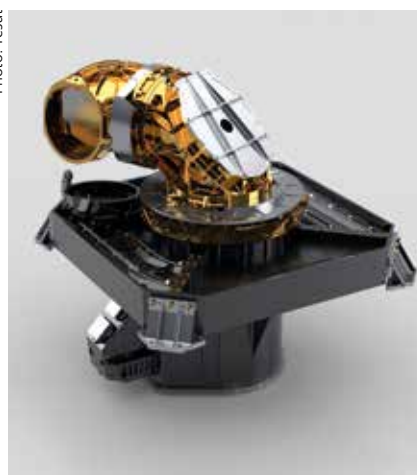


In defence scenarios requiring enhanced connectivity, FSO offers a real alternative to transform the military battlespace by replacing much slower legacy communications with a fibre-optic-level of experience and multi-Gigabyte data capabilities.

Potential on the Battlefield

The full potential of FSO in the defence sector is now being researched and promoted by allied military/US DoD and defence industry players for both battlefield communications and space-based purposes. On today's increasingly-connected, though threat-compromised battlefield, unprecedented levels of secure bandwidth and connectivity are required to maintain basic tactical communications, as well as disseminating large amounts of data from the growing numbers of battlefield sensors aboard vehicles and individual soldiers, securely and often in real time. Whether on land, in the air, at sea or in space, reliable high-capacity, high-speed connectivity are essential in each domain.

Photo: Tesat



The European Data Relay System uses Tesat's LCT135 optical link (pictured) on its LEO Earth observation satellites and its GEO satellites. and multi-Gigabyte data capabilities.

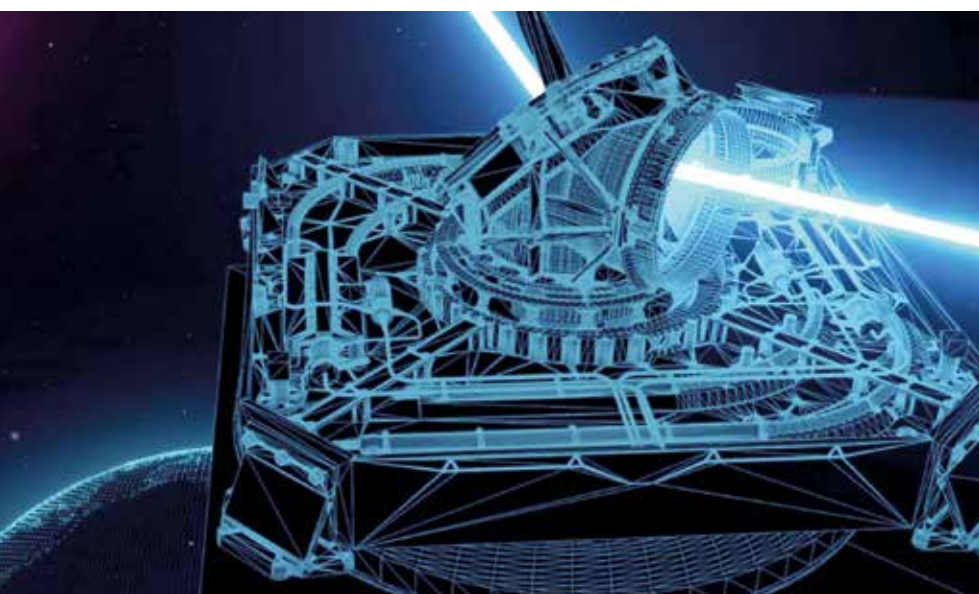


Image: Tesat

Tesat is working on FSO solutions for major constellations that are delivering global Internet access from space.

Sole reliance on traditional RF communication, however, is vulnerable to detection and intercept and in highly contested and congested battlespace, gives adversaries the chance to jam or intercept critical communications, or to direction-find and engage. That is why new, complementary technologies need to be embraced to overcome these technological weaknesses and deliver military advantage. One leading defence player taking FSO tech very seriously, as a result, is QinetiQ. It sees FSO offering true innovation to potentially unlock quantifiable increases in military capability. In defence scenarios requiring enhanced connectivity, QinetiQ sees FSO offering a real alternative to transform the military battlespace by replacing much slower legacy communications with a fibre-optic-level of

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Photo: Wireless Excellence



FSO offers true innovation to potentially unlock quantifiable increases in military capability and is inherently secure.

experience with multi-Gigabyte data capabilities. And echoing the sentiments of the commercial sector about inherent security, Qinetiq recognises that whilst not intended to replace RF communication, there are scenarios where a direct and secure transfer of data makes more sense, with FSO best placed to complement RF technologies as part of an overall network architecture. FSO communications are almost impossible to intercept or detect; the laser beam travels directly from platform to platform over a very narrow path. For it to be intercepted would require an adversary to get physically in the beam's path – something extremely difficult and easily detected. Improved survivability is another plus for FSO. In modern conflicts, precision targeting using RF communications signatures is widespread, but using FSO the overall RF signature of any forces will vastly reduce, greatly increasing survivability by limiting RF footprint and, thereby, the ability of an adversary to intercept, jam, spoof, direction-find and strike. In addition, as FSO technology has an inherently low probability of detection or intercept, the need for complex encryption/decryption is reduced. This means that reliance on nationally-sovereign cryptography is lessened and interoperability of data exchange between allies can be increased. There is also an ISR capability that can be enhanced through the use of FSO wireless, with FSO equipment potentially being configured to switch between communications mode and ISR sensing functions.

At this time, Qinetiq has developed core FSO wireless technology that's working

across all domains, with FSO wireless concepts being developed and prototypes fielded. All these developments are being supported by modelling and simulation highlighting FSO's ability to deliver information advantage to the user. Evaluation includes accurate cueing, pointing, vibration mitigation, target tracking, turbulence mitigation and other areas required to create a domain-appropriate FSO communication system suitable for military use. The company is currently looking at a core FSO wireless module that militaries can integrate into existing capabilities; such a module would provide a communications link and sensing modes scalable for different applications, incorporated into ruggedised housings to suit different deployment conditions and platforms, ultimately providing a rapid route to early adoption of an FSO communications capability.

FSO in Space

The use and potential for FSO in the space domain is huge. One leading pioneer, delivering telecommunication payloads for satellites, is Tesat, which has been using space-based laser communications for years. Its FSO terminals can transmit data and images between satellites and from satellites to earth with high transfer rates of 5.5 Gbps, equivalent to 200,000 pages of information per second. Head of Communications at Tesat, Nina Backes, told ESD that the company demonstrated FSO communication in space for the first time in 2007 between two satellites in LEO or-

bit. "This was the starting point to develop products for different use cases." Today, one major user is the EDRS (European Data Relay System) uses Tesat's LCT135 optical link on its LEO Earth observation satellites and its GEO satellites, to provide fast access to the data of the LEO bird.

"In this system the laser connection is between the LEO and the GEO satellite, therefore on both satellites one LCT135 is mounted. In the EDRS System TESAT has installed six of its LCT135s, which have the function to transmit data in the GEO Relay Mission." In addition, she said that Sentinel satellites of the Copernicus Mission and two Pléiades Neo satellites also use the company's laser communication terminals. "In 2023, TESAT will deliver LCTs for Compasso and Titania, as well as for a programme with the US Government."

As to the challenges and threats of ensuring uninterrupted line-of-sight between laser origin and target in orbit Backes said that TESAT develops its own PAT (pointing acquisition and tracking) scheme, to allow a beaconless acquisition. "The accuracy of optical light needs to be really high. Most of us have used laser pointers during presentations in school or university. Even at this short distance of metres the light point makes little jumps on the board. Imagine Tesat having to handle these over a distance of 80,000 km." She said calculations are made to lessen this issue and determine satellite position and the direction the LCT unit needs to point in, even if a satellite isn't visible at a given moment.

Currently, Tesat is working on solutions for major constellations that are delivering global Internet access from space. For this, Tesat has developed its SCOT80 (Scalable Optical Terminal), which consists of an optical head and an electronic unit, produced in line with what Backes calls the 'New Space approach', which aims to work with COTS (commercial off the shelf) parts as much as possible. As to what's next in the defence space sector, Backes told ESD that with the US DoD's SDA (Space Development Agency) currently working on a huge satellite constellation programme, the main goals are to develop higher data rate capabilities for FSO in space and to increase the distance between two counterparts. NASA's ARTEMIS programme, to put a permanent base on the Moon, is also in Tesat's FSO sights. "Another important topic," Backe added, "is quantum encryption and the transmission of quantum-encrypted data via laser links. Tesat will manufacture the quantum payload for the first European quantum satellite, EAGLE." ■

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Defending NATO's Northern Approaches

Security Risks on NATO's Northern Flank

Alex Horobets

With the accession of Finland and Sweden into NATO, some of the previous restrictions on defence will be removed as the alliance will be able to cover large swathes of the North. Further militarisation of the region is ongoing.

In the defensive paradigm of NATO, the North is a complex area with several important areas for security. These include the Arctic, the Baltics, and the GIUK gap, a strategically important water area in the North Atlantic between Greenland, Iceland, and the UK. In each of these regions NATO has faced increasing challenges over recent years, against the backdrop of deteriorating relations with Russia. The higher risk of confrontation between the Alliance and the Russian Federation has led to a build-up of the respective parties' military potential, especially in the Arctic. The West began to react after Russia started rebuilding a network of military bases and airfields, including establishing new bases, along its Northern borders, and modernising their icebreaker fleet, while generating rhetoric that large parts of the Arctic should belong to them. Further anxiety arose in the Arctic following Russia's illegitimate annexation of the Crimean peninsula in the spring of 2014. After Russia showed that it is ready to alter the internationally-recognised borders by force, NATO Allies have been increasingly reviewing their security agenda, particularly in areas bordering Russia. However, NATO's ability to effectively respond to challenges in the North is complicated by climatic conditions and vast areas of water. In particular, the need to manufacture new icebreakers to ensure year-round navigation in remote areas of the Arctic has been repeatedly raised by the United States, since the Allies have significantly fewer icebreakers compared to Russia. This complicates year-round navigation in the Arctic, although it remains possible to deploy submarines and air patrols. Much attention is also paid to preventing the Russian Northern Fleet, especially their submarines, from entering the Atlantic through the GIUK gap.

Another area that NATO is paying more and more attention to is further militarisation of the Baltics, since nuclear-capable ISKANDER-M short-range ballistic missile



USS KEARSARGES visiting Stockholm, 2022

launchers have been permanently deployed in the Russian exclave of Kaliningrad. The deployment was confirmed in 2016 after the Russian Ministry of Defence issued the relevant order – a move the Kremlin claimed was a response to “NATO actions.” Until recently, the likelihood of a conflict on NATO's northern flank was assessed as unlikely, however due to Russia's recent actions, this is no longer guaranteed, and military activity in the region has been consistently intensifying.

When Russia invaded Ukraine in February 2022, one of the stated goals of their “special military operation” was to prevent NATO's eastward expansion. However, it was precisely the Russian war in Ukraine that pushed Finland and Sweden to apply to join the Alliance. Russia's actions seem to have led to the opposite result, with this expansion shifting the balance of power in favour of the Alliance on its northern flank. Despite this, it cannot be guaranteed that Russia won't launch military campaigns against these countries, and the possibility remains that Moscow could start an armed conflict with NATO as a whole.

Secondly, it is possible that a conflict that erupting in Eastern Europe could poten-

tially spill over to NATO's northern flank. Given the belligerent Russian rhetoric suggesting a nuclear threat to NATO, Allies will become more and more focused on the alliance's northern frontiers.

The Current Situation in Northern Europe and the Arctic

Prior to Finland's and Sweden's bids to join the North Atlantic Alliance, the United States and NATO were working to strengthen Norway's defence capabilities and boost collective defence capabilities on NATO's northern flank. In 2017, 330 US Marines were deployed in Norway, and by 2018 their number had increased to 700 and the same year Trident Juncture, the largest NATO exercise since the Cold War, was held in Norway. The exercise's scenario assumed an Article 5 joint response by allies to an act of foreign aggression.

In 2021, the Oslo agreement on regulating American defence operations in Norway was revised, allowing the United States to build defence facilities at three airfields and a naval base. The deal permitted a rapid

increase in American military presence in Norway in the event of a crisis or war.

In the wake of the Russian invasion of Ukraine, NATO's land, naval, and air forces held the Cold Response 2022 exercise in Norway and the Norwegian Sea. About 30,000 troops from 27 countries, including partner states, took part in the drill. Although the exercises had long been planned, aiming to test allied capabilities to operate in severe climatic conditions of the North, Russia saw such manoeuvres as a threat to itself, primarily due to their common border with Norway and proximity to the facilities of the Russian Northern Fleet. Such a reaction was not unexpected against the background of Russian claims of NATO "encroaching" on Russian borders.

Now the focus is switching to Finland and Sweden, with Finland's planned accession to NATO due to add more than 1,200 km to Russia's existing land border with NATO members Estonia, Latvia, and Norway. As of 29 July 2022, two-thirds of the Allies have already ratified the relevant protocols on Finland and Sweden's accession. Turkish President Recep Tayyip Erdoğan has threatened to freeze the two bids if the aspiring nations fail to comply with Ankara's condi-

tions. However, so far it appears that the issue will be resolved for the applicants.

Boasting capable and modern armed forces, Finland and Sweden will radically change the security architecture in the North of Europe and the Arctic, as well as the balance of power in the Baltics. After such an expansion, NATO will attain de facto control of most of the Baltic Sea coastline, which, in the event of a crisis, would allow the alliance greater control over Russia's presence in the region.

The Balance of Power

The latest NATO expansion is also changing the balance of power in the Norwegian Sea. To Russia, this area is seen as important because in the case of a conflict unfolding, control over the Norwegian Sea provides a passage to the North Atlantic. It should be noted that NATO Command has been cooperating with the Swedish and Finnish armed forces for years. This interaction has intensified after the 2018 establishment of the new Atlantic Command in Norfolk, Virginia to protect maritime routes between Europe and North America, as a response to the growing Russian threat. Norway was one of the NATO members who advocated

the re-establishment of the Atlantic Command. The same year, the US Second Fleet was restored, with 75 warships assigned to the naval base in Norfolk, Virginia, including six aircraft carriers and several nuclear attack submarines.

Meanwhile, NATO's zone of responsibility is also increasing, given the length of the Finnish-Russian border. Recognising that the Baltic Sea is becoming a NATO-dominated area, Russia vowed a symmetrical response to the deployment of NATO bases or strike weapons in Sweden and Finland. The relevant proposals were voiced by Dmitry Medvedev, Deputy Chairman of the Security Council of the Russian Federation. However, given how the military situation in Ukraine has developed, NATO Command will soon change its approach to threat response by increasing their available rapid reaction forces. Previously, NATO had planned to send reinforcements to Norway or the Baltic states only in case of invasion and war, but Latvia, Lithuania, and Estonia had reservations about this arrangement. The Baltic states argued that if the Russian leadership decided to start a military operation against one of these nations, this could pose a threat to their very statehood. Given the pace of Russia's initial advances

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Photo: NATO



Two Norwegian F-35 fighters getting ready to be refuelled by the Multirole Tanker Transport aircraft (MRTT) during Exercise COLD RESPONSE 2022.

in Ukraine relative to the size of the Baltic nations, a several-week delay in the deployment of NATO forces could have irreversible consequences.

NATO will work to improve flexibility in responding to such challenges. For example, the United States Marine Corps (USMC) has recently been deploying and participating in exercises in Finland, Norway, and Sweden, with their equipment permanently stored near Trondheim. With the full accession of Finland and Sweden to NATO, this infrastructure will only improve. However, this is clearly not enough, since in the event of a real invasion, crucial events can happen in a matter of hours, rather than days or weeks. Consequently, the alliance announced an increase in their rapid reaction force troops from 40,000 to 300,000 at their 2022 Madrid summit, as well as an increase in the number of troops permanently stationed in NATO's Eastern European member states.

A Symmetrical Response

In addition to Russia's threats of a symmetrical response to NATO expansion in the North, Moscow's response could also opt for asymmetric responses such as blocking maritime traffic, with Moscow presently preparing the legislative framework to do so. In 2019, Russian officials said they were drafting new rules for passage along the Northern Sea Route shipping lane. According to the new rules, foreign warships must notify Moscow of their plans for passage 45 days prior, while a Russian pilot must be present on board any warship passing through the area. If a warship tries to pass through what the Russian government refers to as the "Russian Arctic" without an

official permit, such vessel could be subject to seizure or destruction.

The new edition of the Russian Naval Doctrine, signed by Vladimir Putin late in July 2022, states that the Russian Federation plans to intensify maritime activities in the Arctic and deploy control over the military activity of foreign states in the waters of the Northern Sea Route shipping lane. The updated military doctrine also expands the sphere of Russian strategic interests to include the Atlantic in addition to previously-listed Arctic and the Pacific. This means that Moscow will likely try to ensure its presence in the Atlantic Ocean by deploying nuclear submarines.

At the end of July 2022, the Russian Ministry of Defence prepared amendments to Russian Federal Law regulating the passage of foreign civil and military ships through the Northern Sea Route. If the amendments pass, notifying Russian authorities about the planned passage will no longer be enough. The new legislation will also require that the vessels ask for transit authorisation, with applications to be submitted 90 days prior, rather than 45 days in advance originally planned in 2019. Additionally, submarines will only be allowed to pass through the Northern Sea Route while surfaced and flying their respective country's flag.

Russia has already applied a similar permit system for the passage of foreign ships through the Kerch Strait, in order to monopolise the Sea of Azov, and has repeatedly closed the passage for foreign-flagged warships and government vessels. In 2018, a notorious incident took place during which Russian Coastguard vessels fired upon and seized a group of Ukrainian Navy craft attempting to

navigate the Kerch Strait on their way from Odesa to Mariupol. Russia claimed that the Ukrainian vessels had not filed an application for passing through the strait, while the Ukrainian side claimed that such a request was indeed sent, but was refused, and that the boats were engaged as they were already heading back.

In terms of the United Nations Convention on the Law of the Sea, the Sea of Azov is semi-enclosed and contains no neutral waters, while the Kerch Strait is an international strait, since it directly links the exclusive economic zones of the Sea of Azov and the Black Sea. However, Ukraine and the Russian Federation have never agreed on the delimitation of borders in the Sea of Azov and the Kerch Strait. Moscow considers the strait part of Russia's territorial waters, while Ukraine, along with the international community, has not recognised Russia's annexation of Crimea, and insists on the strait's international status. Now, by adopting appropriate amendments regarding the regulation of passage through the Northern Sea Route, Russia is laying grounds for similar incidents in the Arctic, when foreign vessels attempt to pass through the Northern Sea Routes in Russia's jurisdiction.

Concluding Thoughts

With the accession of Finland and Sweden into NATO, some of the previous restrictions on defence will be removed as the alliance will be able to cover large swathes of the North in deeper defence cooperation. In the short term, although there is a relatively low risk of military conflict between NATO and Russia in the Arctic, further militarisation of the region is ongoing, increasing the region's potential to see armed conflict in the future. Additionally, there are no guarantees that a conflict won't spill into the Arctic from an adjacent region. Russia is presently busy with the war in Ukraine, but unfriendly statements toward the Baltic countries have already been voiced in Moscow, and the Russian Federation is likely to continue to gradually increase its military presence on the western and northern borders adjacent to NATO member states. Therefore, security problems in said areas can be seen as complex and long-term, since Russia may potentially remain a threat to the West for the decades to come. As such, the security situation in the north is likely to remain unpredictable and deserving of serious attention. ■

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Towards a European Army

Alex Horobets

For the past six months, tensions have been mounting across the globe and European security is facing new realities.

Threats to both Taiwan from China and to Ukraine from Russia have been increasing simultaneously in recent months. As we can see, one threat has already manifested in the form of a large-scale Russian invasion of Ukraine in a gross violation of the European security order, while the remaining threat around Taiwan may be realised in the near future. It is believed that in many ways, the Western reaction to Russian aggression can directly impact Beijing's resolve to launch a military operation in Taiwan.

The War in Ukraine

On 24 February, Russia unleashed a new level of aggression against Ukraine, radically different from the hybrid attack that unfolded back in 2014. At that time, the occupation, and later annexation, of Crimea was carefully covered up as if it was the local population who sought accession (although the sham referendum in Crimea was held practically at gun-point with the massive presence of Russian military wearing no insignia), while the so-called "people's republics" in parts of Luhansk and Donetsk regions of Ukraine were created under direct supervision of Russian intelligence and with the covert support of Russia's regular forces confronting Ukrainian troops. But this February, Russia's act of aggression against Ukraine was undisguised and large-scale, although the Kremlin tried to offer some pseudo-historical justifications, claiming non-subjectivity of Ukraine and presenting their goals of "demilitarisation" and "de-Nazification" of the country – something rather incomprehensible even to many Russians.

However, there is one important aspect to be noted here. Accusing Ukraine of allegedly preparing an attack on the so-called "LPR/DPR" ["people republics"], the Russians at the same time put forward demands for the inadmissibility of NATO's eastward expansion and demanded that a package of new security guarantees be developed in Europe. Therefore, it is not surprising that today, Russia is already threatening NATO coun-

Photo: Ssolbergi / CC BY-SA 3.0



The coat of arms of the European Union Military Staff

tries – over their support for Ukraine, and over Finland and Sweden's plans to join NATO – something that wasn't even on the table before Russia invaded Ukraine. But the main problem for Europe is that if Russia wins in Ukraine, Moscow's next target will be nations on NATO's eastern flank. First of all, it's Finland, the Baltic States, and Poland.

Therefore, the war in Ukraine led to the most important shifts in the first half of the 21st century in terms of security issues for both Europe and the world. Many raise a question about NATO's real capabilities to stand up to Russian aggression, if required. This refers to the speed of decision-making by all Allies and the promptness of deploying multinational contingents for the sake of collective defence. Also, a hot topic in recent years was how prepared the Allies are to spend the mandatory 2 per cent of GDP on defence annually. Since the United States had recently paid considerable attention to China as a persistent and key threat, considerable American military resources have been directed to the Pacific region. One might have the impression that the United States has shifted the focus away from the European continent.

A Blitzkrieg Capture of Kyiv

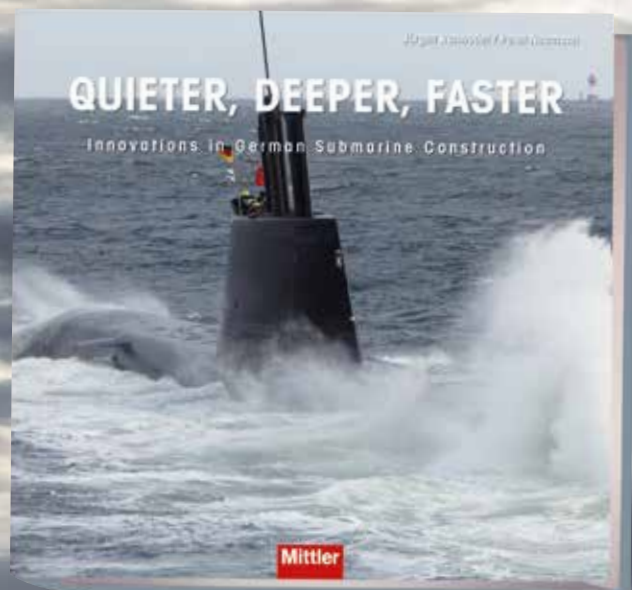
Nowadays, many observers are reflecting on the latest developments. In fact, Ukraine is fighting against the Russian Army, which, in various ratings, occupied leading positions in terms of overall pow-

Photo: ADC LR, Drah/SIRPA Terre



A French military exercise features a combat group entering the town centre of Sarrebourg.

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er (based on a set of criteria). Since 2008, the Russian Army has been improving, apparently readying for the 24 February invasion, having invested billions in reform efforts thanks to favourable global prices for hydrocarbons – Russia's main exports. The Kremlin was in a position to secure both sufficient social welfare payments and a host of defence projects.

when the war in Ukraine ends and the current regime in Russia remains in place, Europe will not be immune from seeing Putin first patch up his wounds and then start another "small victorious war" somewhere in Europe. We are already observing verbal attacks on the Baltic States and Poland, as well as threats to Finland and Sweden over their NATO

began with the invasion by the international coalition forces led by the United States and Great Britain, the leaders of Germany, France, Belgium, and Luxembourg drew up a seven-point plan to create a single European Army and reduce dependence on the US and NATO. In June 2008, French President Nicolas Sarkozy proposed that a single European Navy fleet be set up based on the aircraft carrier group operated by France and Great Britain. However, none of these plans ever came to fruition.

The idea of a European Army has become even more relevant after Russia occupied Crimea and incited a war in eastern Ukraine's Donbas region. The EU reassessed Russia's foreign policy, seeing it as highly aggressive. Amid mounting tensions with Russia, the then-European Commission President Jean-Claude Juncker called for a pan-European Army to send Russia a signal that the EU was serious about protecting its values. German politicians were also open to the proposals put forward by the EU head. At that time, German Chancellor Angela Merkel and Defence Minister Ursula von der Leyen said that Europe needed in-depth defence cooperation. However, it was more about projects for the future than about the need to create a European Army immediately.



Photo: Armée des Terres / Flickr

The multi-logistics unit of the French detachment in Kosovo on the parade ground of the Novo Selo camp for the 14 July ceremony.

Largely based on these facts, miscalculated assessments were circulating, suggesting that Kyiv would fall in a matter of days.

Now, according to British intelligence, the number of Russian soldiers killed over the past two months amounts to 15,000, which is more than the USSR lost in the ten years of its war in Afghanistan. The estimate of Russia's death toll, offered by the Ukrainian Army's General Staff is even higher – more than 25,000. This means the number of wounded is approximately twice this figure.

Russia's plan for a Blitzkrieg capture of Kyiv to topple the Ukrainian Government failed due to a combination of reasons. In many ways, Ukraine's success (especially in the long run) is largely driven by the unprecedented support provided by the West, where the allies are now as united as ever.

However, a question arises here. Again, according to British intelligence, after the war in Ukraine ends, the Russian Army will need years to recover to pre-war levels. But will the Kremlin's anti-NATO and anti-European rhetoric, along with the nuclear threats, disappear? And even

plans. Moreover, there's turbulence in the Balkans due to Russia's influence in the region. Meanwhile, Russian national television has aired an animated clip presenting how the POSEIDON underwater drones Russia is developing could practically wipe out the British Isles, turning them into a "nuclear desert." And it is precisely maintaining the idea of a "NATO threat" that helps the Kremlin rally the population around the need to "tighten their belts." Therefore, the Russia-related security problem for Europe does not seem to be resolved anytime soon.

Prospect of a European Army

Under such conditions, the prospect of creating a European Army may seem quite relevant. This is not a new idea, actually. As early as the 1950s, France, Germany, Italy, and the Benelux nations sought to create a European Defence Community, but the arrangement was never ratified by the French Parliament. Then a similar idea repeatedly emerged on the agenda, especially after the end of the Cold War. On 29 April 2003, after the outbreak of the war in Iraq, which

A Massive Transition

The peculiarity of the idea of a European Army is that there are 28 armies in the European Union, totalling approximately 1.5 million service personnel. Defence is organised primarily at the national level, which both poses new challenges and also creates new opportunities.

The challenges are about organising such a massive transition, highlighting the strengths of each of the 28 armies and optimising them for effective operations within a single structure. The opportunities lie in the fact that the organisation of defence mainly at the national level leads to duplication of bodies and functions, as well as high costs, respectively. Therefore, one of the arguments for creating a European Army may be that the cooperation of all EU Member States will help them save on R&D and acquisition of modern weaponry and redistribute tasks so that each nation has its own military specialisation. The only question is whether all EU members will agree to transfer to Brussels the authority to deploy their troops. However, such an association could create an impetus for modernisation of defence industries,



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while the combined potential will significantly enhance the EU's defensive capabilities.

European Defence and PESCO

It should be mentioned that in 2017, the Permanent Structured Cooperation (PESCO) programme was launched, a mechanism that allows EU members to cooperate closely in defence policies, while not being an alternative to NATO. Since this is about defence, which is the responsibility of each member state, participation is voluntary. The programme includes various projects that relate either to the development of various weapons and equipment or to increasing combat readiness of defence forces. There are 20 commitments made by all programme participants, including to regularly increase defence budgets and spending on new arms. There is a nuance that the countries have some similar obligations to NATO. But there are also areas that are important for the Alliance, including simplifying the procedure for transporting troops across the EU. Meanwhile, one of the problems for NATO's eastern flank is precisely the issue of rapid deployment of troops in the event of conflict.

There is another important aspect in creating a European Army. The lack of its own armed forces prevents the EU from acting as a single player. Russia, on the contrary, is interested in establishing contacts not with the entire European society, but with each nation individually, which, as a result, increases Moscow's influence in Europe.

As can be seen, when it comes to both European defence projects and creation of a European Army, the allegations of "competing with NATO" are immediately brought up. Such fears arise due to the fact that the total potential of the all-European Army will be inferior to that of NATO. But this would only pose a problem if NATO were to withdraw from Europe, which won't happen. Within the framework of European integration, a whole network of parallel unions appeared, which are difficult to navigate, but in the end, new arrangements only improved cooperation rather than replaced old forms with new ones. Therefore, it is necessary to develop a form of interaction where European defence cooperation or a European Army complements NATO, and does not superimpose its functions over those of the Alliance. By the way, another recent trend should



Photo: Federal Armed Forces/Jana Neumann

An NH-90 transport helicopter drops paratroopers in Putgarten during the military evacuation exercise FAST EAGLE in May 2022.

be recalled. This is about more flexible small defensive alliances. For example, in September 2021, the US, Australia, and the UK announced an AUKUS alliance to strengthen security and stability in the Indo-Pacific region, cooperate in the field of cybersecurity, and develop artificial intelligence. It is clear that all this is happening against the backdrop of China's rise in the region. And in January 2022, a tripartite alliance between the UK, Poland, and Ukraine was announced. The main purpose of such an alliance was to counter the Russian threat. By design, this should become part of Ukraine's broader strategy to create smaller alliances with Lithuania, Poland, Georgia, Moldova, and Turkey. Such alliances are precisely designed to supplement the missing elements in the European security system that NATO cannot fully ensure.

A Strategic Compass for Security and Defence

After Russia invaded Ukraine, Europe started taking concrete actions to strengthen both NATO defences and those at the EU level. On 25 March, EU leaders revised and approved a more powerful military strategy, the so-called Strategic Compass. This is a notable shift in military ambitions, as previously it was characteristic of either individual nations or NATO capabilities. Work on the project was launched two years ago, but developments accelerated dramatically after Russia's attack on Ukraine this February. So now the EU will begin work on the implementation of the project, which is

also new for the Union. Here, Josep Borrell (EU High Representative for Foreign Affairs and Security Policy) stressed in advance that defence projects within the EU are not an alternative to NATO and are not set to duplicate it. On the contrary, this, in the vision of EU leaders, should make the bloc a "stronger partner" both with NATO and with "partners around the world."

As part of the strategy, this is not about creating a European Army. Among the features of the Strategic Compass is creating a rapid response force of up to 5,000 soldiers, which is certainly a positive trend, but the Russians had gathered 120,000 troops on Ukraine's borders prior to invading. Despite questions about the professionalism of the Russian Army, the Kremlin is still able to commit massive human resources. What will the response be if, say, the conflict flares up at once at several points on the borders of the EU?

Conclusions

However, at the moment, the Kremlin has already done enough to keep the EU moving towards further development of defence initiatives. Events that were previously considered unrealistic are already happening. Germany has announced that it will dramatically increase its defence spending and send arms to Ukraine. The European Union, which previously relied on diplomatic methods, has already sent military, humanitarian, and financial assistance to Ukraine totalling €12.8Bn. The same unexpected turn may occur with the creation of a European Army. ■

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