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It is tempting in these days of endless personal opinions masquerading as expert advice, of factual uncertainty posturing as mainstream media's demonstrable truth, and of endless torrents of fear- and hate-driven social media posting ever more unqualified interpretations of questionable, often unsupported data or commentary, to decline to mention the COVID-19 pandemic as at late-April 2020. But that would be to deny EUROPEAN SECURITY & DEFENCE its place in our world, so...

One of the fundamental characteristics of "Security" is, for most modern democracies, "stability". One of the more stable democratic institutions of the modern world has been, for many years, the European Union, and its attendant sub-domains such as the European Commission, the European Parliament, the European Courts and the European Central Bank. But what have these institutions delivered in the way of stability in recent weeks? Or indeed of leadership? The European Parliament has "lost" the United Kingdom, fallout from BREXIT threatening to infect even France and The Netherlands, not to mention Greece, Spain, Portugal and Ireland. Various "EXITS" aside, the Euro itself remains a fundamental problem: the European Central Bank has failed to deliver a solution that marries southern Europe's desperate economic needs with potential northern European-funded solutions. The Court of Auditors and the Court of Justice have failed to lead the nations of Europe in the fight against organised crime, or even the application of common sense to The Law. And the European Commission's "apologies on behalf of Europe" towards Italy go nowhere, at the time of writing, towards helping that nation to address its COVID-19 consequences – unless reducing Italy's economy to that of a vassal state, somewhat like Greece, is part of a Grand European Plan. Emergency funding allocated by the EU "gave" Italy (population 60 million, COVID-19 deaths around 30,000) Euros 2.3Bn: and "gave" Hungary (population 10 million, COVID-19 deaths around 300) Euros 5.6Bn. This suggests a staggering level of incompetence. NATO has warned that numerous European countries and their industries will be so economically weakened by Europe's shut-down response to the coronavirus that their acquisition by definitively hostile actors is a very real possibility – Belt and Road, anyone? But what is NATO? An organisation created to deliver stability through a network of inter-dependent commitments, that delivered peace in Europe for over 50 years – whose time is past? The Alliance is only as strong as its members, but why are there calls in Europe for a European Army, whose purpose can only be to duplicate and thus to weaken NATO? As if that were not enough, NATO's 29 European political leaders are, with perhaps eight notable exceptions, unable to secure the bare minimum of "promised" funding for the organisation that exists to guarantee their security, and their stability. NATO without the USA is not a feasible option, but NATO is no longer able to respond quickly, or decisively, or forcefully, because precisely those qualities are missing from Europe's political leaders, and from the institutions they have created that merely insulate them from the real world. Two truisms finally come home to roost: a "European Army" will indeed reflect European society; and society gets the Armed Forces it deserves. Today, these are Bad Things. The malaise extends to OCCAR and EDA. Although classic European "arrangements" have been made to allow the two to complement each other, it should have been possible, in the six years between their respective creation, to build an expanded, streamlined, single organisation that would, efficiently and cost-effectively, execute the mission. In modern Western Europe the problem is simple. Mature societies with no experience of war, and little experience of hardship. With no concept of total loss and absolute defeat. Encouraged, ultimately, to dismiss and tear down the achievements of their predecessors. And incited to – or scared into – political correctness, political moralising and political posturing without the slightest thought for the consequences, or the alternatives. Among civilians these, too, are Bad Things; among politicians, they're worse.

Stephen Barnard

NATO's Counter-Terrorism Role

Photo: US Army



NATO's fight against terrorism remains a difficult task because terrorist groups change their behaviour frequently.

Page 10

Heavy Transport Helicopter

Photo: Bundeswehr



Germany has launched a procurement programme to replace its ageing fleet of CH-53G helicopters.

Page 62

■ SECURITY POLICY

- 10 **NATO and the Counter-Terrorism 'Roller Coaster'**
Andreea Stoian Karadeli
- 14 **Belarus Says Welcome to China, Iran and North Korea**
Reuben F. Johnson
- 18 **Dilemma between Strategic Migration and Coronavirus Pandemic – the Syrian Refugee Crisis**
Korhan Özkilinc

■ ARMED FORCES

- 23 **"We believe that privatising public services is fundamentally a mistake"**
Interview with Wolfgang Hellmich, Member of Parliament, Chairman of the Defence Committee of the German Bundestag
- 28 **"I see submarines becoming even more relevant than today"**
Interview with RADM Andrea Petroni, Commander of the Italian Navy's Submarine Force (MARICOSOM)
- 34 **Turkish Air and Missile Defence Capabilities**
Kubilai Han

■ ARMAMENT & TECHNOLOGY

- 38 **"Any nation willing to participate in an OCCAR programme may do so"**
Interview with VADM Matteo Bisceglia, Director OCCAR (Organisation Conjointe de Coopération en matière d'Armement / Organisation for Joint Armament Co-operation)

- 43 **FCAS – Europe's Most Ambitious Defence Programme**
Giulia Tilenni
- 50 **Italy's Parliament in Support of Defence Programmes**
Luca Peruzzi
- 54 **Armoured Vehicle Programmes in the Central and Eastern European Region**
Michał Jarocki
- 62 **German Heavy Transport Helicopter Approaching**
Andre Forkert
- 67 **Shorter Waves, Better Performance**
Thomas Withington
- 70 **Eastern European Tactical UAS Programmes**
Alex Horobets
- 76 **Countering Drone Weapons**
Tamir Eshel
- 80 **European Artillery Locating Radar Capabilities**
Tim Guest

■ INDUSTRY AND MARKETS

- 84 **Azerbaijan's Defence and Security Industry**
Korhan Özkilinc
- 88 **"We are now working on an 'ILA goes digital'..."**
Interview with Dirk Hoke, President of the German Aerospace Industries Association (Bundesverband der Deutschen Luft-und Raumfahrtindustrie e.V. – BDLI)

VIEWPOINT FROM ...

- 13 **Tbilisi**
Eugene Kogan
- 22 **Tel Aviv**
Tamir Eshel
- 33 **Berlin**
Wolfgang Labuhn
- 74 **Rome**
Luca Peruzzi

COLUMNS

- 1 **Editorial**
- 4 **ESD Spotlight**
- 41 **Masthead**
- 87 **Exhibition Update**
- 92 **Firms & Faces**

Index of Advertisers

AAD 2020	73
Aeronautics	71
ARMS & SECURITY 2020	37
AVIASVIT 2020	81
Bofors Test Center	57
Collins Aerospace	49
Diehl Aviation	47, 63
Diehl Defence	8/9
ESG	25
Eurofighter	2 nd cover
General Dynamics European Land Systems	55
IDEAS 2020	17
KADEX 2020	31
Lockheed Martin	4 th cover
NIMR	3 rd cover
Northrop Grumman LITEF	43
Sensoror	3
SMM 2020	23
Systematic	39
Taurus	27
Theon	29, 45

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■ AeroVironment Awarded \$10.7M PUMA 3 AE Contract

(jh) AeroVironment, Inc has announced its receipt of a US\$10,677,987 firm-fixed-price contract award for PUMA 3 AE systems and spares for the US Navy and Marine Corps Small Tactical Unmanned Aircraft Systems (SUAS) programme. Delivery is anticipated by April 2020. The AeroVironment PUMA 3 AE is a man-portable unmanned aircraft system designed for land and maritime operations. The hand-launched PUMA 3 AE has a wingspan of 2.8 metres, weighs 6.8 kilograms and can operate for up to 2.5 hours at a range of up to 20 kilometres with a standard antenna, and up to 60 kilometres with AeroVironment's Long-Range Tracking Antenna (LRTA). Capable of landing in water or on land, the PUMA, with its MANTIS i45 EO/IR sensor suite, empowers the operator with extended flight time and an unmatched level of imaging capability.

■ ASELSAN to Expand its Presence in NATO

(ck) ASELSAN has signed a contract for sales of Advanced Remote Controlled Stabilised Weapon Stations and Gunshot Detection Systems for the use of a NATO member country. With this new contract, Advanced

Photo: ASELSAN



Remote Controlled Stabilised Weapon Stations, which are designed and manufactured by ASELSAN, have been supplied to 20 different countries. So far, ASELSAN has successfully manufactured and delivered more than 3,000 units of Stabilised Advanced Remote Weapon Stations.

■ Bittium Delivering SDR Handheld™ Radios to the Finnish Defence Forces

(jh) Volume deliveries for Bittium TOUGH SDR Handheld radios have started. The deliveries are based on a procurement contract signed in December 2018, according to which Bittium will supply the Finnish Defence Forces with TOUGH SDR Handheld and Vehicular radios and their accessories. The value of the contract is approximately €10.5M (excl VAT). The software-defined Bittium TOUGH radios enable broadband data transfer and the radios support the reformed combat doctrine of the Finnish Defence Forces. The TOUGH radios will be

used by the Army and the radios will replace the analogical field radios in phases. A part of the performance of the software defined radios will be created through the waveform software used in the radio. This way the performance of the radios can be developed throughout their whole life cycle with software development. Bittium TOUGH SDR radios are compatible with the software defined Bittium Tactical Wireless IP Network™ (TAC WIN) system already used by the Finnish Defence Forces. Under the terms of the contract, the Finnish Defence Forces have an option to purchase additional tactical radios and their accessories, training and system management for the use of the Army, Air Force and Navy. If the optional additional purchase amounts materialise in full, the total value would be approximately €207M (excl VAT) at the maximum.

■ Fassmer Corvettes for the Ecuadorian Navy

(ck) Fassmer is supplying MPV70 MKII (MPV – Multi Purpose Vessel) units to the Ecuadorian Navy. The ASTINAVE EP shipyard selected the Fassmer design for the new multipurpose combatant programme of the Armada del Ecuador. A similar OPV design from Fassmer is in service with the Colombian and Chilean navies and with the German Bundespolizei (Federal Police and Coast Guard). The MPV70 MKII is based on the OPV 80 design, sharing some characteristics with the larger OPV2020. In addition to the convex bow shape, features include the crane arranged above a loading bay, the pyramid mast and the flight deck for an eleven-ton helicopter. With its capability for replenishment at sea (RAS) and the ability to accommodate 12 containers (20 feet), the shipyard portrays the MPV70 MK II as an asset to provide a combination of support capabilities at fleet-level and a patrol unit. According to the Berne-based shipyard, the MPV70 MKII will be equipped with the ORION combat management system from ASTINAVE EP. The digital radar integrated in the mast is co-developed by Virtualabs SRL from Italy and ASTINAVE EP. The vessel accommodates two mission boats that can be moved laterally in the stern area. Armament elements comprise a 76mm turret on the

Photo: Fassmer



forecastle as well as two 20mm guns in the aft foredeck area. Fassmer will also provide technical support and material packages. The vessels will be built in Guayaquil. With the new vessel, the Ecuadorian Navy intends to improve its logistical capabilities, its humanitarian aid capabilities, and its presence in the Exclusive Economic Zone (which extends beyond the Galapagos Islands, thus far into the Pacific Ocean). In addition to search and rescue (SAR) and the protection of fisheries and natural resources, the Navy is also involved in the fight against illegal drug trafficking.

■ Boeing Delivers First CH-47F CHINOOK to Royal Netherlands Air Force

(jh) Boeing recently delivered the first CH-47F CHINOOK with an upgraded cockpit to the Royal Netherlands Air Force (RNLAf), continuing a track record of on-time deliveries to customers. The RNLAf will operate a fleet of 20 CH-47F CHINOOKs, the newest configuration in use by countries around the world. The 20 CH-47F CHINOOKs will be a fleet equipped with the same state-of-the-art technology as the US Army, including digital automatic flight controls, a fully-integrated Common Avionics Architecture System (CAAS) glass cockpit, and advanced cargo handling capabilities. The common configuration leads to lower overall life cycle costs. The RNLAf currently flies a mix of F-model CHINOOKs with the Advanced Cockpit Management System (ACMS) and CH-47D CHINOOKs. Deliveries to the RNLAf are expected to continue into 2021. CHINOOKs are currently in service or under contract with 20 international defence forces, including the US Army, US Special Operations Forces and eight NATO member nations.

■ HUNTER Phase 2 Contract for ST Engineering

(jh) ST Engineering's Land Systems business unit has secured a Phase 2 contract for the production and supply of the HUNTER Armoured Fighting Vehicle from the Singapore Ministry of Defence. Under the contract, ST Engineering will also provide integrated logistics support, which includes spares, training and documentation. Outside of this contract, there are others that the group has secured which have not been disclosed due to customer confidentiality. In response to the COVID-19 pandemic and evolving circumstances, the group is discussing with its customers the adjustment of delivery schedules and/or order cancellations. As at the end of 1Q, the group's order book remains robust.

The above developments are not expected to have any material impact on the consolidated net tangible assets per share and earnings per share of ST Engineering for the current financial year.

■ GA-ASI Flies SKYGUARDIAN as Part of NASA Demonstration

(jh) On 3 April, General Atomics Aeronautical Systems, Inc (GA ASI) flew its SKYGUARDIAN Remotely Piloted Aircraft (RPA) above Southern California as part of a joint flight demonstration with NASA. GA-ASI was selected to participate in NASA's Systems Integration and Operationalization (SIO) activity, which includes multiple flight demonstrations focusing on different types of Unmanned Aircraft Systems (UAS) and their respective flight environments. GA-ASI and NASA have worked collaboratively since 2014 to prove the safety of flying large UAS in the

National Airspace System (NAS). GA-ASI demonstrated ways in which SKYGUARDIAN can be used for a variety of commercial and public services applications, using its onboard sensors. Services featured in the demonstration included inspections of hundreds of miles of rail, power line, communica-

tion and canal infrastructure, agriculture monitoring and topological surveys, as well as wildfire and flood monitoring. After taking off from GA-ASI's Gray Butte Flight Operations Facility near Palmdale, California, SKYGUARDIAN flew through the NAS in Southern California towards Yuma, Arizona while being operated by a remote pilot based at Gray Butte. The pilot used the GA-ASI-developed Detect and Avoid System (DAAS) to provide situational awareness of air traffic near the UAS. The DAAS includes a Traffic Alert and Collision Avoidance System (TCAS II) used in manned aircraft that fly in civil airspace. It also has an air-to-air, "Due Regard" radar to provide detection and tracking capability of any nearby aircraft which may not have active transponders. Using the DAAS, the remote pilot was able to "see" and navigate around airborne traffic just like an airborne pilot. GA-ASI's technology partners for the demonstration include Honeywell (supplied the TCAS II for the DAAS), and Collins Aerospace for the Command and Non-Payload Communications (CNPC) datalink radios, which is part of the command and control datalinks system.



Photo: GA-ASI

■ Unmanned Long-Range Operations at Sea

(ck) BMT has released details of its PENTAMARAN platform for autonomous applications at sea. The PENTAMARAN can be custom configured for military, patrol, intelligence surveillance and reconnaissance (ISR), anti-submarine warfare (ASW) and hydrographic survey work. Designed for long-range autonomous operations, the PENTAMARAN has been optimised by BMT



Photo: BMT

to reduce fuel consumption and increase its adaptability across multiple applications. Tests have shown that the PENTAMARAN, designed to reduce drag as much as possible, offers significant improvements compared to conventional hull forms such as mono-hulls, catamarans and trimaran. The vessel features a slender central hull and two smaller hulls or "sponsons" on either side. The sponsons are set one behind the other and when the vessel is operating on flat water, the forward sponsons are not submerged, as they provide roll stability effect in waves only. Compared to a trimaran there is less volume permanently immersed and therefore less resistance through the water. As a result, for applications where fuel economy matters, the PENTAMARAN hull form is more efficient than conventional full forms, which makes it well suited for autonomous applications.

■ Cobham Secures Anti-Jam Satellite Signal Contract

(ck) Cobham Aerospace Connectivity has announced that it has been awarded a contract by the UK MOD's Defence Equipment and Support (DE&S) to research advanced anti-jam techniques for the protection of navigation signals received from the Global Navigation Satellite Systems (GNSS). The contract will see Cobham conduct research to develop means to provide assured and resilient Position Navigation and Timing (PNT) information derived from the GNSS multi-constellation. The research is set against a backdrop of increasing reliance on GNSS navigation signals in the nation's critical infrastructure and national security and frequent interruptions of the signals either accidentally or intentionally. The more sophisticated interruptions involve the falsification of the navigation signal infor-

mation for nefarious reasons such as piracy, civil disruption and military advantage. The DE&S-backed research feeds into the company's goal of taking already developed anti-jam capability and developing a miniaturised system capable of providing advanced means of protection of the navigation signals received from the GNSS multi-constellation network. The anti-jam system will combine the use of advanced Controlled Radiation Pattern Array (CRPA) antenna technology with intelligent digital signal processing techniques not only to ensure reliable and assured navigation information, but also to derive important signal intelligence and domain awareness information regarding the source and nature of the interference and the best means of mitigation.

■ Protected Ambulance Vehicles for Germany

(ck) The German procurement agency BAaIN-Bw has awarded General Dynamics European Land Systems (GDELS) a contract for the delivery of 80 highly protected EAGLE 6x6 vehicles for the German armed forces' Joint Medical Service. First deliveries will start in 2021 and continue throughout 2024. The EAGLE was selected in a competitive tender process under the Medium Protected Ambulance Vehicle Programme ("Mittleres Geschütztes Sanitäts-



Photo: GDELS

fahrzeug"), which will close the gap between the German army ambulance corps' light and heavy ambulance vehicle fleet. The EAGLE 6x6 is the latest and largest member of the EAGLE family. In its 6x6 configuration, the vehicle provides a more spacious user compartment and more payload. Reduced cost of ownership is achieved through its high degree of commonality with the 4x4 version and its maintenance-friendly design. Germany is the second customer for this new EAGLE version after the Swiss Army. GDELS will manufacture the EAGLE at its sites in Switzerland and Germany.

■ C2 Systems for the Swiss Armed Forces

(ck) The Swiss procurement agency Armasuisse has contracted Elbit Systems to provide Command and Control ("C2") systems for the Tactical Reconnaissance System ("TASYS") of the Swiss Armed Forces. The contract will be performed over a three-year period and has a total value of approximately US\$15M. Elbit will provide the reconnais-

Photo: Elbit Systems



sance battalions and forward observers of the Swiss Army with C2 systems that improve target acquisition, prioritising and data dissemination capabilities and will enable the generation of a common operational picture, thereby facilitating rapid decision making and effective engagement.

■ Detect and Avoid Systems for MQ-9 RPA

(ck) The US Air National Guard (ANG) has contracted General Atomics Aeronautical Systems (GA-ASI) to supply its Detect and Avoid System (DAAS) for one MQ-9 Block 1 and one MQ-9 Block 5 Remotely Piloted Aircraft (RPA). The DAAS is an integral part of the certification effort that will allow RPA from GA-ASI to fly in non-segregated, controlled airspace. The DAAS consists of GA-ASI's Due Regard Radar (DRR) and processor, and a Traffic Alert and Collision Avoidance System (TCAS). For the ANG, GA-ASI will upgrade the software in the DRR to add a tactical weather mode, in addition to the air traffic surveillance capability. GA-ASI's DAA system also enables safe access to uncontrolled airspace and will comply with Due Regard procedure when operating in international airspace. The DAAS avionics will be integrated into the new Centreline Avionics Bay (CAB). The CAB provides additional volume and mission infrastructure for integrating future capabilities. The CAB's modular design and additional infrastructure will enable the MQ-9 Block 1 and Block 5 aircraft to be a more open and extensible platform for integration of other emerging capabilities.

■ GA-ASI to Install PREDATOR Mission Trainer

(ck) General Atomics Aeronautical Systems, Inc (GA ASI) has installed a new PREDATOR Mission Trainer (PMT) at its Flight Test and Training Center (FTTC) in Grand Forks, North Dakota. The aircraft flight simulator, produced by CAE, will be used to train operators of MQ-9 Block 5 Remotely Piloted Aircraft (RPA). GA-ASI offers a range of pilot and sensor operator training at the FTTC for operators of GA-ASI's family of RPA systems. The new PMT

extends the training capability of the FTTC, which already features a Block 1 simulator and Ground Control Systems (GCS). "The PREDATOR Mission Trainer will be used to advance the quality and capability of our RPA training at the FTTC," said David R. Alexander, President, GA-ASI. "The PMT will increase training efficiency because it allows us to focus our training and repeat training events in the simulator more easily than on an actual flight system." The PMT provides high fidelity training across the full spectrum of mission training, allowing GA-ASI to update its syllabus to rely more heavily on simulator training and reduce potential airspace and weather impacts. GA-ASI anticipates that this PMT will be the first of several to be fielded for its customer base.

■ Field Kitchens for the Bundeswehr

(ck) Kärcher Futuretech will supply modern mobile field kitchens to the German Armed Forces to provide catering for their task forces. Kärcher Futuretech has won the tender for a contract worth hundreds of millions of euros, which was published in February 2019 by the German procurement authority BAAINBw. The order is the largest single order in the history of the company; it covers a total of 400 field kitchens to be supplied by Kärcher Futuretech over a period of 16 years. With

Photo: Kärcher Futuretech



the procurement project "Mobile Field Kitchen", the German Armed Forces intend to replace their field kitchen TFK 250, which has been in use since the 1980s. The "field kitchen of the future" is highly mobile and will be equipped for operation in various climate zones of the world whilst meeting modern food regulations. Key requirements include an integrated drinking water supply, equipment for personal hygiene, waste water treatment and waste collection, comprehensive equipment for food preparation, storage and refrigeration of food, as well as the protection of the entire system against environmental influences. As with the previous model, the new field kitchen will be suitable for preparing meals for up to 250 people.

■ Tactical Operation Center Shelter for GBAD

(ck) After successful acceptance of the Tactical Operation Center Shelter (TOC Shelter) at the manufacturer's site, Airbus Defence and Space in Immenstaad, Diehl took over the first serial TOC Shelter for an export customer of the IRIS-T SLM tactical air defence system. The completely equipped 20-foot shelter includes, among other things, several Diehl fire control computers and the Integrated Battle Management System (IBMS) software from Airbus. It was developed and constructed in accordance with Diehl's requirements in only two and a half years. The command centre for mobile 24/7 use does not require more than three people to operate it and, as an integral system part of IRIS-T SLM, it interconnects sensors such as the medium-range radar from HENSOLDT with the Diehl launchers thanks to the plug-and-flight technology. If required, it also provides data exchange and communication with higher-level command posts. Next steps include the necessary integration tests into the modular IRIS-T SLM overall system for medium-range, ground-based air defence whose delivery to the customer is still planned for this year.

Photo: Diehl



■ Leonardo AW159 WILDCATS Against COVID-19

(ck) Three British Army AW159 WILDCAT helicopters have been deployed to support the UK MoD's efforts in tackling the COVID-19 pandemic. The Army Air Corps' helicopters will be operating out of RNAS Yeovilton and will look to cover the South of England as required by the UK Government's response to COVID-19 alongside Royal Air Force helicopters from RAF Odiham and RAF Benson. The twin-engine multirole helicopter, which is built in Yeovil, Somerset, is a high-performance platform with state-of-the-art systems. "Leonardo is proud to support the UK Ministry of Defence's COVID-19 operations with its AW159 Wildcat helicopters as the country comes together to tackle this pandemic," said Norman Bone, Chairman and Managing Director of Leonardo UK.

Photo: Leonardo



■ Milrem Robotics to Deliver UGVs to the UK

(jh) Milrem Robotics will deliver two unmanned ground vehicles to the Defence Science and Technology Laboratory (DSTL) of the United Kingdom. DSTL, the purpose of which is to maximise the impact of science and technology for the defence and security of the UK, is procuring the unmanned vehicles to explore the capabilities and limitations of these autonomous systems in areas such as mobility, vulnerabilities and safety. Milrem Robotics supplies the vehicles to DSTL in partnership with QinetiQ who will integrate autonomous functions to the vehicles and arrange transfer to the end user. In cooperation with QinetiQ, Milrem Robotics is participating in two UK large-scale robotic programmes – JTARR (Joint Tactical Autonomous Resupply and Replenishment) and RPV (Robotic Platoon Vehicle), both worth over £50M per programme. Milrem Robotics' TheMIS unmanned vehicles have already been sold in the Netherlands, Norway, Germany, Indonesia, the UK and the United States.

■ RAM Block 2/2A Contract for Raytheon

(jh) Raytheon Missile Systems has won a \$146.1M contract for Rolling Airframe Missile Block 2/2A guided missile round pack and spare replacement components. This contract combines purchases for the US Navy and Germany as well as the governments of Saudi Arabia, United Arab Emirates, Egypt and Turkey. The RIM-116 Rolling Airframe Missile (RAM) is a small, lightweight, infrared homing surface-to-air missile. It was intended originally, and used primarily, as a point-defence weapon against anti-ship cruise missiles. Work is expected to be complete by June 2025.

■ United Kingdom Procures Rheinmetall MISSION MASTER

(jh) Her Majesty's Armed Forces have ordered four Rheinmetall MISSION MASTER robotic vehicles. Configured for transporting cargo, these unmanned ground vehicles will form part of the United Kingdom's Robotic Platoon Vehicle programme. This programme is designed to determine the extent to which unmanned vehicles can boost the combat effectiveness and capabilities of dismounted troops at platoon level. The four MISSION MASTER – Cargo vehicles will be delivered throughout the spring of 2020. In addition, the scope of supply comprises two stretcher systems that can be integrated

into the cargo vehicle in just 60 seconds. The order, which was placed at the end of 2019, also includes training and service support, as well as spare parts. The vehicles will be supplied by Rheinmetall Canada, with Rheinmetall BAE Land Systems providing on-location support services in its capacity as cooperation partner.

■ PCO and RAFAEL to Cooperate

(ck) PCO SA of Poland and Rafael Advanced Defense Systems of Israel have signed a Memorandum of Understanding for co-production of TOPLITE electro-optical systems (EOS) in Poland. The main purpose of this cooperation is the modernisation of Polish Mi-24 helicopters. The two companies



Photo: PCO

have been cooperating since 2007 for the supply of optoelectronic heads for Poland's GŁUSZEC helicopters. Under the MoU, PCO SA will be the only supplier of TOPLITE systems for recipients from Poland and will become part of the supplier chain under other Rafael programmes. The TOPLITE EOS family is a multi-sensor, highly stabilised EO/ISR solution for defence applications. It is used for intelligence/data collection, surveillance, reconnaissance and weapon direction. TOPLITE incorporates up to seven sensors for detection, tracking, identification, and targeting. TOPLITE EOS enables automatic or manual monitoring and investigation using its control unit, Situational Awareness (SAW) and Image processing package. TOPLITE EOS is derived from the LITENING targeting and navigation pod, of which Rafael has sold over 1,600 units. It is an integral part of Rafael's air defence systems and naval systems and is fully integrated with the SPIKE missile family on helicopters and other platforms.

■ Submarine for Egypt

(ck) In early April, thyssenkrupp Marine Systems officially handed over "S43" as the third of four HDW Class 209/1400mod submarines to the Navy of the Arab Republic of Egypt. Following the strict coronavirus prevention measures at the shipyard, the handover took place in Kiel without a ceremony, amongst only the inner circle of project managers. In a personal letter prior

to the handover, Vice Admiral Ahmed Khaled Hassan Said, Chief of the Egyptian Navy, praised the quality of the boat and the performance of the employees of tkMS. He expressed his gratitude for ensuring the delivery on schedule. The submarines of the HDW Class 209/1400 mod series can stay submerged for a long time, are fast, and are hard to locate thanks to their low signatures. The HDW Class 209/1400mod is the latest version of the HDW Type 209 "family" with over 60 boats built or under contract. The launch and naming of "S43" took place in May 2019. The first submarine, "S41", was delivered in December 2016 and the second, "S42", in August 2017. The programme is to be completed with the handover of the fourth boat in 2021.

Photo: tkMS



■ SPIKE Missiles for Slovakia

(ck) The Slovak MoD has signed a contract with Eurospike, a European Joint Venture between Rafael Advanced Defence Systems Ltd., Diehl Defence and Rheinmetall Electronics, for the supply of the 5th generation SPIKE LR2 ATGM and dismounted advanced ICLU launchers (Integrated Control Launch Units). The procurement was carried out through the NATO Support & Procurement Agency (NSPA). The company states that there are 34 SPIKE user nations and the Slovak army is the 6th armed force to choose the SPIKE LR2. In April 2018 the Slovak MOD published the results of the field testing phase of the Slovak TURRA 30mm Remote Control Weapon Stations (RCWS) mounted on PATRIA vehicles including multiple launch of vehicle-mounted SPIKE Missiles from the EVPU RCWS. The current contract includes dismounted launchers. SPIKE LR2 is a multi-platform, multi-mission and multi-range electro-optical missile, with standoff range of 5.5 km, fire & forget capabilities as well as man-in-the-loop features, such as retargeting mid-flight, attack of hidden targets beyond-line-of-sight, as well as the ability to launch to non-line-of-sight targets based solely on their geo-coordinates.



Photo: Rafael

It Does Not Always Have to be Gold Plated – Solutions for Future Fighter Aircraft Armament

The German Air Force is heading into the future. In addition to the long-term development of a new fighter aircraft within the framework of the Future Combat Air System (FCAS), replacement of the TORNADO weapon system is planned for the medium term. Although "old school", the TORNADO has successfully flown hundreds of thousands of flight hours and a wide range of missions. With the introduction of the ASSTA (Avionics System TORNADO in Ada) 3 upgrade programme and the GBU-54 precision laser-guided ammunition, a new approach was made, superseding the previous philosophy of anchoring weapon deployment parameters in avionics, and allowing improvements to the GBU-54 operational flight programme to be more quickly approved for use on the TORNADO. Building on this paradigm shift, the use of existing interfaces and data protocols provides the opportunity to integrate new weapons with an aircraft faster and therefore more cost-effectively in future. When the TORNADO is replaced, the EUROFIGHTER will be the Luftwaffe's main weapon system. The Air Force's EUROFIGHTERS are equipped with the GBU-48 for short-range air-to-ground operations only. A basic need for medium-range armament has been identified and an operational concept is being developed in accordance with the federal "CPM new" procurement process.

Diehl Defence, in cooperation with Rafael, offers the SPICE 250 standoff Precision Guided Munition (PGM) in Germany. SPICE 250 is a medium range glide bomb, which, thanks to innovative scene matching algorithms in the electro-optical seeker head, can be used for precise engagement of a broad target spectrum at ranges up to 100 km. With its general purpose warhead, this 125 kg category weapon can engage infrastructural targets, but its precision also makes it suitable for urban operations against small mobile targets. After weapon launch, video from the dual-band seeker head is displayed for the pilot of the launch platform, via an anti-jam broadband data link, meeting Human-In-The-Loop requirements for certain missions. Image recording and storage allow battle damage assessment after the mission. This means that during the free-flight phase, the target can be changed or a mission aborted, and image data can be acquired up to the last moment before the impact.

SPICE 250 shares an interface compatibility with the LITENING series as well as the RecceLite reconnaissance pods, both also from Rafael. Image and position data

Photos: Diehl Defence



Weapon mix for maximum flexibility in use – stand-off, reactive, safe

from both systems can be used directly as target data for the SPICE 250. Both the LITENING and the RecceLite are now integrated with the EUROFIGHTER: integration of the RecceLite was completed very quickly due to the high level of commonality between the systems, and on the basis of the previously completed LITENING integration.

The core of SPICE 250 is the intelligent quad rack (Smart Quad Rack - SQR). In addition to its function as a weapon rack, the SQR contains the data link module required for image transmission, including antennas, and a powerful computer unit. This computer unit enables in-flight weapon deployment planning in just a few steps. With the SQR, central components for weapon deployment are separated from the aircraft structure (data link, antenna) and its avionics (mission planning, control logic). Since a considerable part of the weapon system's performance is now provided by computer power and software, separation from the avionics in particular offers a decisive advantage: the integration effort can be reduced, and product improvements can be approved for use without major certification efforts, which saves a considerable amount of time and money.

The electrical and data interfaces on the

aircraft side at the SQR are largely identical with LITENING and RecceLite interfaces, which lays a further foundation for simplified aircraft integration.

A key feature of the SQR is that all the user interfaces required for operation, such as menu structures and buttons, can be generated by the SQR, internally. The user interface can be displayed on a Head Down Display (HDD) in the cockpit by simple video transmission via the video channel of the LITENING/RecceLite interface. For a platform such as the EUROFIGHTER, that already has LITENING/RecceLite integrated, this is an elegant option. LITENING/RecceLite are mainly operated via Hands-on-Throttle-and-Stick (HOTAS). By using the stick and throttle controls provided for controlling LITENING/RecceLite and the same underlying protocol, the operation of the SQR and thus that of SPICE 250 can be implemented via simple navigation through drop-down menus. These menus are displayed on the HDD, so a minimal delta is required to provide the functionality of the SPICE 250 weapon system with existing LITENING/RecceLite integration.

These are by no means purely theoretical considerations: in principle, the functionality of the SPICE 250 weapon system has already been verified in the EUROFIGHTER RIG via the procedure

described above. Execution of a pre-planned deployment of several SPICE 250s was simulated, including the video display of final approach. After a short explanation of the operating concept and the use of the existing display and control elements, the pilot successfully executed the mission without any further assistance.

Besides the electrical/logical integration, platform-specific mechanical and aerodynamic integration are, of course, necessary. Here, too, initial considerations point to good compatibility with the EUROFIGHTER. In principle, the SQR on the EUROFIGHTER would be carried on the inboard pylons and under the fuselage. This would result in different loading options for pre-planned missions in a high threat scenario or when used in conjunction with LITENING in the context of international crisis management with restrictive rules of engagement.

SPICE 250 could catapult the German Air Force into the future today. The capabilities of SPICE 250 serve the concept of remote carriers in many aspects of FCAS. Here, SPICE 250 can offer an introduction to new technologies that will be used and tested for the first time on the EUROFIGHTER, and subsequently transferred to the new FCAS fighter aircraft.



NATO and the Counter-Terrorism 'Roller Coaster'

Andreea Stoian Karadeli

Counter-terrorism is not an easy task, resembling a tall, fast and steep roller coaster ride. But embarking the CT roller coaster can actually provide NATO with the perfect opportunity to show that it has the ability to adapt and transform in line with the future needs of global security.

The global security context is continually evolving, driven by new threats, actors, variables and dynamics. Today, the complexity of elements that threaten national and international security represents a challenge to institutions in terms of adapting and reacting at the same pace. The counter-terrorism role of NATO has been debated on many occasions, while the organisation has developed its resources and responses according to evolving global threats.

NATO's Evolving Role in Counter-Terrorism

Many believe that the first time NATO acknowledged its role in counter terrorism was in the aftermath of the 9/11 events. It is true that throughout its 71-year history, NATO has invoked the collective defence clause of the North Atlantic Treaty - Article V – only once, in response to the 9/11 terrorist attacks. However, terrorism was identified as a threat long before 9/11. NATO has generally considered terrorism as an issue of marginal relevance to the Alliance and, for instance, in 1991, a review of the Strategic Concept mentioned terrorism as a valid threat although effectively placing it at the bottom of NATO's 'things-to-do' list. However, by the time of the next review in 1999, terrorism had become a higher-profile topic, and was at the top of the

Photo: NATO



Members of Bosnia and Herzegovina's Armed Forces and the Border Police and State Investigation and Protection Agency take part in a simulated anti-terrorism situation at Sarajevo International Airport. The drill was part of the five-day EU-led exercise 'Quick Response'.

list of non-military threats of relevance to NATO. Relevant enough to our current debate, the potential for terrorist use of non-conventional weapons was also noted back then. However, at that time, there was no clear plan to put in place any guidance as to what NATO's own role might be in the face of such a challenge and neither civilian nor military staffs were organised to focus on this topic.

Still, these previous steps helped in paving the way for the evolution of NATO's counter-terrorism role after 9/11. Pushed by the rapid unfolding of events, the organisation has subsequently taken serious steps on its 'roller coaster' journey. In 2002, at the NATO Summit in Prague, in order to help NATO to adapt to the challenge of terrorism, new measures were approved, including a Military Concept for Defence against Terrorism; a Partnership Action Plan against Terrorism; five nuclear, biological and chemical defence initiatives; protec-

tion of civilian populations, including a Civil Emergency Planning Action Plan; missile defence; cyber defence; cooperation with other international organisations; and improved intelligence-sharing. Although the Military Concept for Defence Against Terrorism has continued to be developed up to the present, it was the 2010 NATO Strategic Concept that, for the first time, explicitly described 'terrorism' as "a direct threat to the citizens of NATO countries and to international stability and prosperity". In other words, 'terrorism' was no longer a purely operational-tactical threat, but a strategic challenge, pushing the Allies to enhance their capacity to detect and defend against international terrorism, including through threat analysis, greater consultation with NATO's partners, and the development of appropriate military capabilities. Later on, the 2012 Policy Guidelines provided the strategic framework for NATO's counter-terrorism approach, focused on improved

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threat awareness, adequate capabilities and enhanced engagement with partner countries and other international actors. The Partnership Action Plan against Terrorism was also subsumed into the overall NATO approach. The next step was to apply the policy at the operational level, through the Action Plan published in May 2014, which identified specific tasks within three pillars – awareness, capabilities, and engagement. In 2017, NATO officially joined the Coalition against Daesh, while the Allies agreed on an action plan for further involvement in the international fight against terrorism, including: more AWACS flight time, more information-sharing and air-to-air refuelling; the establishment of a new terrorism intelligence cell at NATO Headquarters and the appointment of a coordinator to oversee NATO's fight against terrorism.

Photo: NATO



Current Assessment of NATO's Counter-Terrorism Journey

The terrorist threat has evolved, and is present worldwide in both connected and dispersed forms. While right-wing extremism is on the rise, the real fallout of the new Salafi-jihadi conquests will only be apparent in the medium and long-term. The recent wave of foreign terrorist fighters has emerged in two different contexts, Syria and Ukraine, driven by two different ideologies. With modern technology, terrorist groups have now more resources to plan attacks and make themselves heard and seen. There is also an increased interest in using weapons of mass destruction, as was revealed in various Daesh documents, including the possibility to weaponise the bubonic plague (according to material found on a laptop of a Tunisian Daesh operative in Syria). The terrorist

Improvised Explosive Devices (IEDs) are one of the main causes of casualties of troops and exact a heavy toll on local populations.

threat has, indeed, increased and diversified, leaving many to wonder how NATO can prove its efficiency and exercise its comparative advantage on the contemporary global security landscape. Currently, NATO's work on counter-terrorism focuses on improving awareness of the threat, developing capabilities to prepare and respond, and enhancing engagement with partner countries and other international actors. To begin by pointing at the "elephant in the room", we must all agree that the threat of terrorism is not perceived the same way by all member states. In the past year, as an expert invited to lecture in several courses at the NATO Centre of Excellence – Defence Against Terrorism in

Ankara, I witnessed how 'terrorism' can have a variety of definitions and perspectives based on the national experiences of each state. This fact only complicates the task of developing a comprehensive and unified strategy at a time when a common framework is much needed. For a long while now, various political divergences such as support for the increasing role played by NATO in the counter-terrorism field, the 'transatlantic divide' and the security priorities have been identified as strong obstacles in NATO's role on the security scene. Currently, the Southern flank has become a serious challenge, with two main risks: on one hand, violent non-state actors, power vacuums and consequently terrorist threats, on the other hand, state-led challenges emanating from Russia's rising military involvement in the Syrian crisis - and not only that...

NATO has counted mainly on its military power and, so far, history has shown that military intervention can help once-fragile nations restore stability and physically eliminate a terrorist threat. Unfortunately, they cannot address the main factors that caused such fragility and created a terrorist-friendly environment in the first place. While it is true that NATO's military capabilities have been successful in various contexts in the short-term, a broader counter-terrorism toolbox is needed in the long run, bearing in mind the non-military drivers such as limited economic development, demographic pressure, a lack of governance, and an accumulation

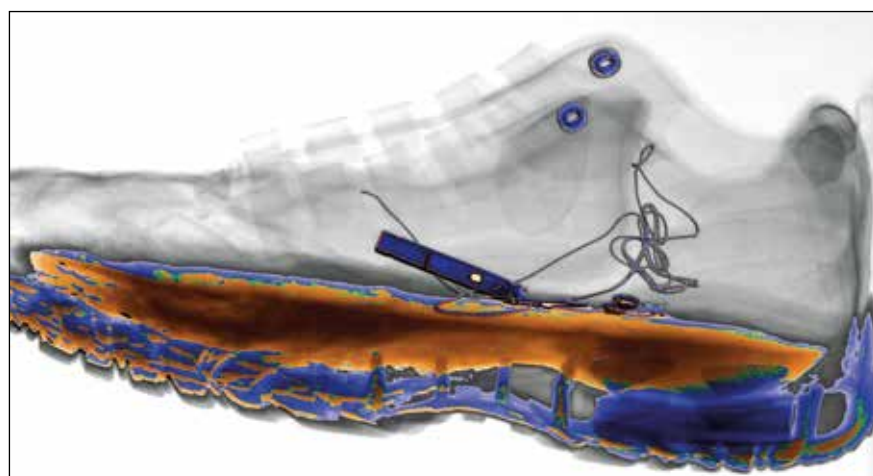


Photo: NATO

IEDs are easily hidden, for example in animal carcasses alongside roads or strapped to a person. They can be engaged via cell phones or trip wires.

Photo: US Army



Iraqi Counter Terrorism Service students watch as a Combined Joint Task Force – Operation Inherent Resolve trainer shows them how to search a person near Baghdad, Iraq, in September 2019.

of grievances, among many others that are found in crisis regions.

Recommendations

Although its military dimension has served as a protective and comfortable cocoon, NATO needs to understand the ongoing complex global dynamics, identify the needs and adapt its strategy to the new



Photo: NATO COE-DAT

security context, while developing the necessary means along the way. Bearing in mind the current world pandemic, the world we knew yesterday is no longer the same today and all of us have to adapt quickly in order to keep up with the domino effect. Terrorist groups might tomorrow prove rapid enough to take advantage of this situation and hit us when we are most vulnerable. Therefore, NATO and its partner organisations should be prepared to foresee, prevent and face the new threats rising from today's security landscape.

Secondly, bearing in mind the fact that the subject of counter-terrorism is perceived differently by each of its member states, NATO has the hard task of building together a common perspective towards 'terrorism' in all its forms. More than ever, western society needs to be united against a threat that is no longer physical, identifiable or singular. In this regard, bureaucratic processes should take less time, providing the chance for society to improve its counter-terrorism 'toolbox' so that it can adapt the strategy and measures in response to any kind of threat. With regard to the current risks on its Southern flank, NATO must also assess whether its current training and capacity-building mission in Iraq is fit for purpose, and should re-evaluate the impacts of Russia and Iran in Syria as well. In addition, no less importance should be given to the current status of Daesh, not only in the Syria-Iraq context, but also in Africa. Any change in the emphasis on counter-terrorism should be based on strong intelligence assessments from the hub for the South and other relevant sources. Moreover, the intelligence gathered and the analysis conducted must be comprehensive and include structural sources of terrorism and early warning patterns to give NATO and its members as much time as possible to respond.

My experience as a lecturer at COE-DAT has taught me that the only way to efficiently combat terrorism is through an extensively developed multidisciplinary, multicultural and perspective. While the

counter-terrorism practitioners' experience is extremely valuable, it sees only some facets of the whole, just as the reality on the ground and the perception of that reality in NATO's headquarters are, very often, very different. The contextual assessment of the threat is the key and it can only be done through an in-depth understanding of the local and regional cultural, social, economic and political realities. Given the fact that NATO lacks the proper instruments to deal with 'drivers of instability', it must choose between developing its own non-military instruments and cooperating with other international, regional, or sub-regional organisations in the targeted area.

Bearing in mind NATO's international legitimacy in terms of military campaigns, the organisation must help its members enhance their respective military capabilities to conduct direct military action against training camps or other infrastructure of terrorist groups. NATO planners must adapt new instruments of warfare – information, cyber and hybrid – to the fight against terrorism. In the East, the Alliance must combine its advanced presence with reinforced capabilities, while in the South, it must complement its permanent monitoring and surveillance of terrorist groups with the capability for collective direct action, if necessary.

Conclusion

Bearing in mind the evolving crisis worldwide and the development of further complex threats to international security, the key to ensuring the safety of our societies is adaptation. NATO has shown it has the ability to continuously adapt in order to face upcoming challenges and its counter-terrorism strategy is just one of several examples. However, the organisation has not yet reached its full potential and has been rather reticent in juggling both military and political assets in developing a broader counter-terrorism toolbox.

NATO's fight against terrorism remains a difficult task because terrorist groups change their behaviour frequently, forcing the Alliance to adapt its strategies and responses. NATO's ongoing process of adaptation and modernisation provides ways to transform crises into challenges and opportunities, ranging from adjustments to NATO's command structure to the integration of emerging operational plans.

The only way out of the complex crisis of today's world that can ensure NATO's success and survival remains its flexibility and acquiring the ability to identify and seize opportunities from the whole distorted picture. ■



Viewpoint from Tbilisi

The Impact of the Coronavirus on the Georgian Military

Eugene Kogan

On 26 February 2020 COVID-19 arrived in Georgia. Surprisingly, the Georgian health system proved to be well prepared for the emergency. Two important institutions - the National Center for Disease Control and the Richard Lugar Center for Health Research - with their medical staff working 24 hours a day, helped to prevent the spread of coronavirus throughout Georgia by monitoring and treating citizens. The Georgian defense forces brought their own medical department into the fight against COVID-19. Finally, the Georgian Government formed the Interagency Coordination Council under the Prime Minister to combat the virus and set up a website to inform its citizens about preventive measures and provide information on the steps taken by the Government to prevent the spread of the virus throughout the country.

On 4 March 2020, the Georgian MoD introduced preventive measures such as disinfection in all military units throughout Georgia to prevent the spread of the pandemic. These measures helped to stop the widespread infection. In addition, Defence Minister Irakli Garibashvili ordered that those Ministry staff who were in China, Iran, Italy or South Korea before the corona virus outbreak should be quarantined and isolated. All business visits abroad were cancelled or postponed, and Ministry employees were told to avoid public places. According to the Minister's decision, an unspecified number of employees have continued to work remotely since 12 March 2020. On 20 March 2020, Georgia imposed an entry ban on all foreign citizens and closed its borders. Georgia also stopped air traffic with other countries. This timely measure significantly reduced the risk of the virus spreading throughout the country.

One day later, the Georgian government introduced a state of emergency, which helped to contain the further spread of the pandemic. On the same day, Minister Garibashvili decided that Georgian defence forces should stay in their barracks to prevent the spread of the infection. Two days later, by decision of the Interagency Coordination Council of the Georgian

government under Prime Minister Giorgi Gakharia, the Georgian defense forces were deployed for the first time in the municipalities of Bolnisi and Marneuli to implement preventive measures against the spread of COVID-19. They coordinated their activities with the armed forces of the Ministry of the Interior (MIA) and guarded special checkpoints in the above-mentioned municipalities. In addition, military doctors work around the clock in the communities, while the Armed Forces Medical Service regularly supplies the checkpoints with medicines, disinfectants and individual medical protective equipment. In addition, an ambulance is available for emergencies involving military or civilian personnel.

As the next measure to prevent the spread of COVID-19, the Georgian government introduced a quarantine and a curfew on 31 March 2020. As a result, additional military forces were deployed in coordination with MIA forces to control checkpoints in Gori, Rustavi and Tbilisi in East Georgia and Batumi, Kutaisi, Poti and Zugdidi in West Georgia. On 1 April 2020, military doctors carried out the first medical tests in West Georgia. In addition, the military stationed in West Georgia took control of the Turkish-Georgian border crossing at Sarpi-Batumi. Militarily disinfected trucks enter the Sarpi customs area on their way to Georgia and back to Turkey.

These preventive measures resulted in not a single member of the armed forces testing positive for coronavirus. In addition, the number of COVID-19 infections has remained at the low level of 496 since 26 February 2020, with 6 deaths and 149 recoveries (as of 20 April 2020) in a population of 3.7 million.

The biggest challenge for society remains the uncertainty as to when the restrictions imposed could be lifted.

In conclusion, the US Ambassador to Georgia, Kelly Degnan, said on 10 April 2020 that "the government has done a very good job, not only in treating those infected, but also in raising public awareness" by staying at home and working from home and going outside only for important business and shopping.

Belarus Says Welcome to China, Iran and North Korea

Reuben F. Johnson

Belarus is a major player in the global arms business – and with their new partner China they want to expand their market share. This is not a positive development in a part of the world that has more than enough problems.

In 2017, at Belarus's international military exhibition MILEX, two of the PRC's major state-owned defence export firms, China Aero-Technology Import-Export Corporation (CATIC) and China Aerospace Long March International built two large pavilions. The exhibition space that those two firms occupied was considerably more acreage than they have traditionally paid for at much larger expos in South America or Asia. China, said one of the Belarus industry representatives at the event who was observing the size of the delegation from Beijing, is "making a

major move to establish a foothold in this part of the world."

The PRC's defence industrial presence in Belarus would appear to be planned for the long-term and potentially destabilising as well – both aspects which was telegraphed by both the size of the Chinese delegation in Minsk and the personnel leading it. The head of the Chinese contingent was none other General Zhang Youxia, who sits on the powerful Central Military Commission (CMC).

Zhang is close to Communist Party General Secretary and CMC Chairman, Xi Jinping. He is also one of the country's so-called "princelings" – these are the descendants of veteran Communist Party leaders. Specifically, Zhang is the son of General Zhang Zongxun, a senior Red Army commander who fought in the 1949 civil war for liberation and Sino-Japanese war. Zhang is one of only a handful of serving generals with battlefield experience, having served with distinction in the Sino-Vietnamese border wars in the 1970s and '80s.

In parallel with his CMC membership, Zhang runs the powerful Equipment and Development Department (EDD) of the People's Liberation Army (PLA). This entity is the successor agency to the General Armament Department (GAD), and the organisation that is the chief weapons buyer for the armed forces.

"People at his level do not usually visit such small states so far away from Asia like Belarus unless there is something significant happening," said a NATO intelligence officer specialising in Chinese military affairs. "That's like sighting Ivanka Trump riding the Washington Metro."

The reason that Zhang and his entourage were in Minsk was because the Belarus defence enterprise Polonez was showing the export version of China's DF-12 Intermediate Range Ballistic Missile (IRBM), designated the M20, which the Belarus firm will begin building under licence.

A virtual analogue of the Russian ISKANDER missile, this will mean another IRBM being in

inventory in this region. Like the ISKANDER, its "official" range is less than its actual performance parameters during its operational testing. That fact in itself is not only counter-intuitive, but runs against the historical reality that operational weapons always have a greater – rather than a shorter - range than testing prototypes. Which makes this missile another potential violation of the INF treaty signed between the US and the Soviet Union in 1987.

At present, Belarus is not an insignificant player in the world's arms business – and they now have the chance to expand their market share by having acquired a very powerful partner. In a part of the world that has more than its fair share of problems this is not a positive development. The fact that it is the PRC that is that partner makes it even more disturbing.

Current Tensions

Just how disturbing is seen today when most of Europe, the US, South America – and even regions in Asia where the pathogen originated – have spent months in lockdown due to what is increasingly being referred to as the "Chinese Communist Party" virus, officially known as COVID-19. The damage to the world economy is incalculable and the number of individuals whose livelihoods, businesses, stock portfolios and bank accounts will end up being decimated will far outnumber the number who perish due to the illness itself.

"The Communist Chinese have officially won the Third World War," said one political commentator as projections of the economic mayhem caused by quarantine period and stay-at-home orders being extended from April to May – and then into June – became progressively dire. "And they won it without firing a shot."

Now the PRC is well on its way, say the same commentators, to following up this victory by building a defence industrial alliance with



Photo: Kremlin

Belarusian President Alexander Lukashenko, Russian President Vladimir Putin and Russian Defence Minister Sergei Shoigu during the Zapad 2013 Russian-Belarusian strategic military exercises

Author

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Photo: via author

The HARBIN Z-20 helicopter is sometimes referred to as the “Copyhawk”, a reverse-engineered copy of the famous Sikorsky S-70C-2 BLACKHAWK.

Belarus. The question is how and why this relationship evolved as it did.

Three decades ago, when the Soviet Union imploded, the defence industry of the People's Republic of China (PRC) was a hodgepodge of disparate technological initiatives that were not producing much in the way of concrete results. The country's defence plants were living off decades-old Soviet technology that it had acquired and copied in the 1960s. They were supplemented by some US and European weaponry and sub-systems that had been purchased during the brief period of cooperation Beijing enjoyed prior to the 4 June 1989 Tiananmen Square massacre.

After Tiananmen, both the US and EU agreed to embargo all sales of all military hardware and defence technology to Beijing – a restriction that remains in place to this day. This even included barring the export of spare parts for platforms like the 24 Sikorsky S-70C-2 BLACKHAWK helicopter acquired from the US by the PRC in the early 1980s. (Almost thirty years later, in 2013, the PRC would roll out its analogous reverse-engineered copy of the famous Sikorsky aircraft, the Harbin Aircraft Industrial Group Z-20, sometimes referred to as the “Copyhawk.”)

From Russia with Technology

By 1991, Beijing's People's Liberation Army (PLA) had decided that its own defence industrial base was stagnating in its efforts to produce indigenous designs based on current-day technology. Beijing's arms makers needed an external source of weapons developmental innovation and know-how if they were to become capable of manufacturing products relevant to needs of the force.

The solution came in the form of a deal struck in the early 1990s. This was selling export versions of Russian platforms, like the Sukhoi Su-27SK, to the PLA. Numerous sales in the years after this were followed by the creation of licenced-production lines in the PRC that assembled some of these same Russian-design weapon systems. Foremost

among those was a contract to build the aforementioned Su-27SK at the Shenyang Aircraft Corporation (SAC).

Beijing originally signed up to an agreement to assemble (and pay the licence-production royalty fee for) 200 of these aircraft, which was designated J-11 in PLA Air Force (PLAAF) service. However, this is where the ultimate goal of the PRC's defence industrial planners became clear – a strategy that had three definitive streams of activity.

The first stream was to minimise the level to which the Russian OEMs would have access to and/or be aware of the activity taking place inside of the PRC production facilities that were now assembling their systems under licence.

Looking again at the history of the SAC cooperation with the OEM for the Su-27SK, the Komsomolsk-na-Amure Aviation Production Association (KNAAPO) in the Russian Far East, comments in the last decade from specialists assigned to SAC to support that production line about how they were treated by their Chinese customers are revealing to say the least.

One of the most common complaints from the KNAAPO representatives based at the SAC plant was that they were literally barred from the production floor where their own product was being assembled. A representative of the factory stated that back in 2007 a decision had even been made to close their liaison office at SAC because “the Chinese were not interfacing with our staff any longer. We are supposed to have staff there to support them, but they stopped asking for our support a long time ago.”

The reason, said the same KNAAPO official, is “they have bypassed us completely and have all of their own under-the-table lines of communication with the Russian plants that make engines, radars, etc. – all the important subsystems. This all violates the terms of the contract they signed with us, but they do not care because this is cheaper for them and they acquire more technology in the end.”

However, a larger issue that caused the Chinese to make sure that the OEMs had

no access to the production floor was that they were busily copying the Su-27SK/J-11 so that they could then build their own pirated copy of the aircraft. This is the fighter which we now know as J-11B, which the Chinese did their best to hide the existence of from the KNAAPO plant. Not surprisingly, the deal to licence-assemble 200 fighter aeroplanes was never fulfilled. By the time SAC had reached the halfway mark and had produced 100 Su-27SK/J-11 models, Beijing told the Russian plant at this point that they would not be assembling the second batch of 100 and would now truncate the series-production line.

“This was because once they got to the 100 aircraft point the Chinese knew enough about the Su-27 design to build their own reverse-engineered copy,” said the KNAAPO representative. “So they did not need or want to pay us the royalty fee per aircraft for the other 100 units.”

Parallel Acquisitions: Ukraine and Belarus

This process of copying Russian weapon systems took place in parallel with the second stream of activity, which was the acquisition of all of the subsystems know-how and technology that were installed inside Russian-made weapons platforms.

In a division of labour arrangement that was created in Soviet times, the Russian Federation was where almost all final-assembly plants for the weapon systems that the PRC wanted to buy were located. However, the expertise in numerous disciplines such as electronic warfare, radar production, jet engine propulsion and air defence system modernisation could be found in Ukraine and Belarus.

“We do not know for sure how many illegal [Chinese copies of the] Su-27 were built in the PRC and labelled ‘J-11B,’” said a Ukrainian defence enterprise director. “But I can tell you that it must have been at least 280 – because that is the number of [NIIP] N001 radar sets that were shipped to the PRC from the Novator plant in Khmelnytskyi here in Ukraine to support that programme. They may have built their own copy of the Su-27, but they still needed the original radar set.”

An analogous amount of assistance was provided by Belarus firms for other Chinese programmes. It is not an exaggeration to say that none of the major Chinese platforms that they have produced in the last 25 years could have ever happened without Ukrainian and Belarussian assistance.

The “Great Stone Industrial Park” is one of many Chinese large-scale infrastructure investments in Belarus.



Photo: via author



A Chinese J-11B fighter aircraft, a pirated copy of the Russian Su-27SK

Ukraine and Belarus also had another speciality that was largely not present in Russia. These two former Soviet republics were also home to a network of repair and overhaul plants that housed an enormous reservoir of expertise in maintaining and servicing weapon systems. Moreover, with their nations now being newly independent nations, these overhaul plants began to develop and market their own innovations and modernisation packages for Russian platforms.

One of the most well-known of these is the Baranovich Aircraft Repair Plant (BARP) No. 558 in Belarus. The facility is well-known for upgrading front-line fighter aircraft originally developed in the former USSR and has a depth of experience with the Mikoyan MiG-29 and Sukhoi Su-27 and Su-30, as well as the Su-25 attack and close-air support aircraft.

Into these facilities flowed a virtual army of Chinese technicians and engineers – all of whom closely studied insights gained from observing first-hand the process of tearing down and re-manufacturing an entire weapon system platform. This was a level of detail that they could not learn by just licence-assembling weapon systems sent to them by Russian OEM as knock-down kits to be simply mated together. (The Su-27SK kits sent to SAC to be assembled into a complete fighter required so little production expertise that they were often derisively referred as “screwdriver aeroplanes.”)

The Belarus Connection

In Russia the PRC had a partner that they needed as a source of complete, fully-assembled weapon systems. But Russia was never going to become a builder of Chinese-designed weapons.

Ukraine was a source of valuable technologies – to the point that it has generated controversy in the last year. The US and others have been concerned about the PLA achieving success in weapons development that it would not have achieved due to technological assistance acquired from Ukraine. A particular case in point was the opposition by the US to the planned Chinese acquisition of Ukraine's Motor Sich aeroengine production association in Zaporozhye. In

this arrangement the PRC would be building designs that came from Ukraine and not the other way around.

However, Belarus had an interest in cooperation to the level of initiating licenced production of Chinese systems that Russia and Ukraine did not. This is due to its smaller territory and population, its concern about its Russian neighbour and its anti-western stance. Perhaps equally important was that the political orientation of Belarus offered Beijing something that none of the other two former Soviet republics could.

Herein enters the third stream of China's plan for this region and where it overlaps with Belarus's interests.

For almost two decades, Belarus strategic policy has been that it wants to chart its own independent course with partners outside of the region as its chief interest. Witness that the country's President-for-Life, Aleksandr Lukashenko, has kept Russia at arm's length to avoid any scenario in which Moscow would attempt an Anschluss of sorts and acquire Belarus as a vassal state in a new, smaller version of the Soviet Union.

Ukraine is equally opposed to a union with Russia, but with its more functional democratic system, a history of popular revolts against dictatorial regimes, its increasing cooperation with NATO and a regular transfer of power from one president to another in the past 20 years has little attraction as a partner to Belarus with its one-man rule. Political dissent is always looked upon by dictatorships as an infestation that can rapidly spread out of control.

The nation in the world that is in more complete agreement with the ideology of Lukashenko's regime than any other is the PRC – and it has a history of suppressing dissent to prove it. For this and other reasons, Belarus adopted what was referred to as the “Third Way” as its principle in its foreign relations. What this meant, in the words of a leading businessman in Minsk, is that “America is the enemy, Europe can be a partner if it wants, but is not seen as a friend – but China and Iran and North Korea are welcome.”

The consequence has been a blossoming relationship between Minsk and Beijing – to the point where there are even regular commercial flights between the two capitals. This is another symbol of how the Chi-

nese presence in country is again one that is larger than would be expected. Another nation that Belarus has been friendly with, North Korea, announced the opening of a new embassy with official diplomatic status in Minsk in September 2016.

Belarus defence analysts state that the interest that the PRC has in setting up production of its weapon systems in their country is because Beijing see a potential market for its weapon systems in the region. US and European weapon systems are “unaffordable for these nations,” said one Belarus defence expert. “Romania, Bulgaria, Slovakia, etc. have purchased some small numbers of weapons from the West but these are not enough for their defence needs and in the event of a conflict they would have to be supplemented by some other, cheaper weapons.”

Other assessments by intelligence officers from NATO nations is that it is not just weaponry that the PRC seeks to establish a market for in the CEE region. “China takes a whole systems approach to expanding its influence and footprint in these nations,” said one intelligence analyst who has long specialised in assessments of the PLA.

“Beyond weapons platforms it is clear that Beijing has been trying to utilise firms like Huawei to penetrate the telecoms networks in these countries,” he says. “Then look at the other Chinese entities that are often an adjunct to the expansion of Beijing's influence – large Chinese banks, for example, that have opened up offices throughout the CEE region.” Another pointed out that Chinese influence with political parties in places like the Czech Republic “literally constitute some new, modern-day pro-Chinese version of the old Soviet-controlled Comintern. It is a programme to establish control in multiple nodes of the economy and government apparatus.”

The wildcard in the equation is the COVID-19 crisis and the many vulnerabilities it has exposed. In its aftermath, how many nations will be willing to build a closer relationship with the PRC when auto plants in Serbia have to shut down because they totally depend on piece parts imported from the PRC that are no longer arriving due to production disruptions in China proper. Nothing can threaten a government in this region like a spike in unemployment.

Additionally, how many will link their defence, high technology, communications and other strategic industries with Chinese firms. Belarus may always – due to its position – answer that question in the affirmative. But other CEE states that are seeing the unhappy consequences today of being too dependent on the Chinese may hesitate and consider other options. ■

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Dilemma between Strategic Migration and Coronavirus Pandemic – the Syrian Refugee Crisis

Korhan Özkilinc

The Syrian people were encouraged by the Arab Spring and has protested over decades of reprisals by the Assad clan. The majority of Syrians are Sunnis are part of the ruling upper class, whereas the family of President Bashar al-Assad are Alawites, so they belong to the Shiite spectrum and are thus close to Iran. In parallel with the beginning of the uprising in early March 2011, a group of young people in the city of Dara in southwestern Syria, on the border to Jordan, expressed anger by spraying slogans on the walls of their houses. The youngsters were then arrested by the local police. Although the families sent the oldest council member to the precinct so that the teenagers could be released, they were also mistreated and physically abused by the police.

Photo: ANF



Turkey has sealed its border with Syria.

Beginning of the Upheaval

This disrespectful behaviour of the local police director made the barrel overflow and spawned further protests extending to Damascus, with 15 March 2011 noted as the official start of the uprising in Syria. Iran provided military assistance in response to the call for help of Syrian President Assad. Up and until now, over 300.000 troops of the Iranian Revolutionary Guards are in Syria to represent Iran's interests in the country. Therefore, Sunni neighbours Turkey and Saudi Arabia decided to counteract the formation of a 'Shiite crescent' from Iran via Iraq to Lebanon. In addition, in 2014, the Daesh (Islamic State - IS) Jihadist terrorist organisation emerged like a 'phoenix from the ashes', rapidly conquering large areas in Syria and Iraq. This was another reason for the US to intervene militarily in the region with the US forces chose the Kurdish militia PYD (a long arm of the Kurdish terrorist organisation PKK), as a strategic partner. Thus, the US entered into a partnership with the mortal enemy of Turkey as their NATO partner.

Russia, on the other hand, took full advantage of the momentum, combining the advantages of its role as a mediator with its for-

ign policy intentions. Subsequently, Syrian President Assad has been provided military and economic support, and in return Russia received the right to use its several military bases, the most important being the naval base in Tartus and the Hmeimim Air Base in Latakia. Russia's intervention in 2015 was a 'last-minute' rescue for Bashar al-Assad, and Russian President Vladimir Putin thus 'reshuffled his cards' in the Middle East and repositioned Russia vis-à-vis the US. The US lost credibility with its important partners, such as Turkey and Saudi Arabia during that time. If the US had sought the proximity of NATO partner Turkey from the outset, instead of the Kurdish terrorist organisation, the situation in Syria would be very different today. As a result of the support of President Putin, Assad has been able to regain many lost territories and even the political situation in Syria has improved for him compared to before 2011 because many dissidents and opponents left Syria as refugees. The pressure of the Assad regime against the Sunni population has become even more brutal and millions of people have relocated to the Syrian-Turkish border. Turkey is a 'factor of hope' for many Syrians, but the desire for Europe remains unlimited. As in 2015, Turkish President Recep Tayyip Erdoğan opened the borders to Greece for refugees at the end of February 2020 as a way of forcing the EU to make concessions and to show

more commitment in the Syrian conflict. As a result, tens of thousands of people from Afghanistan, Syria and other countries attempted to move from Turkey to the neighbouring EU country of Greece. This time the EU border authorities were better prepared. This time, Turkey did not get the support it had hoped for from Brussels. Yet, as could be expected from previous experience in international politics, Turkey will receive moderate but not the desired support. When the Corona virus pandemic broke out, Turkey took the refugees back into the country by bus. Today's preliminary winner is Syrian President Assad, many of his opponents are out of the country, Iran and Russia are firmly supporting him and many Arab countries are considering reopening their embassies in Syria, which Bahrain and the UAE have already done. The most important one is yet to come, the Arab League has started to embrace Assad halfway again.

The question is whether Assad, will be convicted similar to those convicted in the Nuremberg Trials. Since 2012, the 'Commission for International Justice and Accountability' has been collecting documents about the atrocities committed by the president. 800,000 documents are said to have been seized to date, providing evidence of the Syrian president's atrocities. To date, over 400,000 people have died in the civil war, of which 100,000 were executed in prisons.

Flow of Refugees as a Strategic Migration Wave

The refugee crisis in Syria will be recorded in the history books both as a human tragedy in the 21st century and as a prime example of strategic migration. While its dimension is strategic and serves political and military objectives, it also involves significant exploitation of large groups of people. This form of inhumane warfare is not only an inexpensive political instrument compared to more conventional military forms of war, to a limited extent it can also be used as an operational 'tool of war' in peacetime. The strategy is simple, the refugee movements are deliberately manipulated through the use of force and/or psychological effect, thus transforming refugees to elements of mass expulsion, in the worst case to 'ethnic cleansing'. This kind of inhumane practice can be applied by conventional as well as irregular forces, including terrorist organisations. Particularly in times of pandemics, the streams of refugees can be misused as a catalyst for the destruction of peoples, i.e. the poor person as a refugee remains unnoticed as a weapon in the arsenals of the military and terror organisations. In our case, in Syria, the ones becoming refugees as a result from deliberate violence, are mostly motivated by the bombing of settlements by Syrian and Russian fighter planes, but there are also the terrorist organisations such as Daesh, Al Qaeda, PYD, generating mostly local refugee flows with little effort. It has become apparent that the bombing has caused a tsunami-like effect with masses of people heading towards the Turkish border. However, the terrorist organisations try to initiate local expulsions by force in order to obtain territories for their own ethnic groups, in this case for the Kurds. The Syrian refugees are not only a problem for Turkey, but also for Europe, because the flood of people has an influence on the host countries. This warfare is by its very nature economically worthwhile



Photo: ANF

In mid-March 2020, the invading troops attacked the village of Tewila in the town of Til Temir, which is mostly inhabited by Christians.

for the sending state because the expulsion of masses of people not only expropriates their assets but also makes the subsequent remittance of the refugees to their family members in their home country very profitable for the sending state.

The acts of violence by Syria, Russia and the terrorist organisations show clear signs of a strategic migration of peoples, along with some characteristics.

- The leading denomination in Syria is that of the Sunni population, thus influencing an ethno-religious and political balance contrary to the orientation of the Alawite denomination;
- The property and territory of the Sunni refugees were confiscated by the Alevist ethnic groups, and the Kurdish population has also benefited from this development, especially in Northern Syria;
- Through mass expulsion, Syrian President Assad has achieved the eviction of local dissidents and critical social classes that could later endanger his position. This means that he has no domestic political opponents in the country. Elections will soon be held in Syria and the outcome of the election results is already certain;
- Migration has affected economic resources in the host countries, mainly Turkey and Jordan, and subsequently Europe;

- Turkey has come into conflict with the EU because of the financing of the refugees, which is very much to the credit of Russian President Vladimir Putin, which means that Turkish President Erdoğan will have even closer foreign policy ties with Russia and can easily serve the interests of Putin, Assad and Ruhani;
- In Syria and Iraq, the US has established a strategic negotiating platform with the Kurdish population in support of its foreign policy in the eastern Mediterranean and Persian Gulf.

Coronavirus Epidemic and the Refugees

On 23 March 2020, the Syrian Health Minister confirmed the first case of a Corona virus infection in country. However, the infection progress and data are not regularly updated by the Government, with the figures reported probably incorrect. The fact is, Syria has suffered from a fragmented health system for decades, and corruption in the political environment does the rest. Yet, the real 'stab in the back' for the completely destroyed health system is the civil war in the country itself. More than half of the Syrian population has fled the civil war via Turkey and to the Middle East, and there are well over 6 million refugees. More than 3 million Syrians have been forced into the northern province of Idlib by the recent bombing of the Russian and Syrian air forces. There are also hardly any functioning hospitals left in the city of Idlib, because they were destroyed in the scope of the air attacks. According to the WHO, there were over 500 attacks on health facilities between 2016 and 2019, with over 70% of the attacks taking place in the northwest of the country. From a statistical point of view, there are 1,600 patients per hospital bed. The situation appears to be even more threatening, with regard to respirators: there only 50 respirators for 100,000 patients, many thereof defective. As far as the availability of physicians is concerned,



Photo: ANF

Refugee camp in Manbij in northern Syria for 300 families from Idlib

Photo: ANF



More than one million people, according to ANF, have fled the Syrian province of Idlib since December last year.

the situation is no different. Thousands of medical practitioners have already left the country in 2015 to seek their fortune in Europe, and the doctors that stayed in the region live safely in Turkey. When Turkey closed its borders due to the pandemic crisis, many doctors could no longer work in Syrian hospitals. Although Turkey brought many test kits and laboratories to Syria at the end of March, one should not forget that Turkey itself is also suffering from the pandemic. The refugee camps in Lebanon as well as in Jordan look even worse, especially the refugee children who are exposed to significant dangers, as many are travelling alone.

More than 250,000 Iranian national guardsmen who fight in Syria for the Syrian ruler Assad are a great concern of the Syrian population. They commute between Syria and Iran, with Iran itself being affected by the Corona virus. The Daesh/IS terrorist organisation has taken advantage of the current pandemic in Syria as an opportunity to continue the war in country. From their point of view, the virus pandemic is regarded as a 'divine punishment' of the Crusader countries but at the same time demands its fighters to protect themselves against the disease, which appears some-

what paradoxical. The advance of Daesh is also encouraged by the fact that NATO has suspended the training of Iraqi soldiers because of the pandemic and has sent US citizens back home to the US. The US forces and its allies Germany, France, Spain, UK, Italy, Portugal, Netherlands, Czech Republic and Canada have abandoned several bases and ceremonially handed them over to the Iraqi Army, although the training of the Iraqi Army has not been completed. US President Donald Trump, despite the withdrawal of US forces, has threatened Iran and its allies with military strikes if they attack US targets in the Middle East. However, Iran's response to Trump has been equally strong. Yet, the most interesting aspect about the development is that the US is stationing a PATRIOT and two short-range air defence systems in the Kurdish areas of Iraq at Al-Asad Air Base and Erbil. However, the main risk is that the 12,000 Daesh fighters, who are in Iraqi and Syrian prisons, could break out and return to their countries of origin, opening a huge security gap.

The heavily overcrowded refugee camps on the Greek islands constitute another problem. Several thousand young people are left on their own because they have set off on their own to Europe. In the camps there

are not only Syrians but also many refugees from Africa, Pakistan and Afghanistan. There is a lack of clean water and sanitary facilities. There are already several cases of Covid-19 cases. In other words, the Aegean has become a 'ticking bomb' threatening the health of Europe. Although the EU Commission has launched programmes but there is a lack of motivation among the local population, and this is compounded by imported racism. Recently, Germany and the EU more widely have taken over 1,600 Syrian children from the Greek islands. The refugees were flown out. German Development Minister Gerd Müller stated in a recent interview that the Corona pandemic in Africa would develop with a delay of two months, compared to Europe, and this could mean a new deluge of refugee movements in parallel with new civil wars, particularly in developing countries in Africa. At the end of March 2020, the EU Commission provided a new aid package for Syrian refugees in Iraq, Jordan and Lebanon. The package is worth €240M, plus more than €2Bn since 2015 through the Regional Trust Funds.

The great danger for humanity is that refugees can act as logistic carriers of pathogens in war zones, so that the impact would reach the dimensions of a pandemic. The Corona virus has taught us that if we are not careful, the cosine sequence will be very painful. The concern is that the terrorist organisations are seeing how biological weapons can be used to achieve great attention with little effort. Therefore, it is important that our 'security architects' consider how to avoid or combat asymmetric warfare in the future.

Demographic Order and the Suffering of Turkey

Turkey's geographical location makes it an important interface between Europe, Central Asia and the Middle East, and at the same time a rich hub with diverse population groups. However, this geopolitical wealth has an enormous potential for conflict. The ancestors of the Turks, the Ottomans had a simple but effective strategy to control the diversity of ethnic groups in the country. Dozens of ethnic groups with different religious backgrounds, spread over almost 6 million square kilometres, lived peacefully together. That resulted from the fact that trade was not restricted in the empire but simply that the settlement of people from different areas in the Anatolian steppes was not allowed. Unfortunately, the civil war in Syria, a former Ottoman territory, has not only had a great effect on the goodwill of the Turkish population but has also become an important burden for the Turkish Government. Over the last decade, more than 5 million Syrian

Photo: Kremlin



At the Orthodox Mariamite Cathedral of Damascus: President Putin with President of the Syrian Arab Republic Bashar al-Assad

refugees have settled in Turkey and, at the same time, several million refugees have arrived in Europe via Turkey. This has led to the development of discrepancies between Europe and Turkey in regard to refugee policies. However, the consequences of the waves of migration will, of course, have implications for a long time to come. The Syrian population in Turkey has the highest birth rate, a lot higher than the native population. In only in the last few years more than half a million Syrian children have been born. At the end of 2019, Turkish President Erdoğan said that Turkey had given almost 110 thousand Syrians Turkish citizenships so far. Of course, this is understood as a cultural enrichment, but how will the population structure in the whole of Turkey develop over the next two decades? According to the last statistical calculations made public in 2019, there are almost four million registered and 1.4 million unregistered Syrians living in Turkey as well as 1.5 million refugees from Afghanistan, Bangladesh, Eritrea, Iran, Iraq and Pakistan. In other words, there are almost eight million refugees living in Asia Minor today. According to statistical calculations, there will be 14-15 million people by 2040. This particular form of 'Arabisation' of Asia Minor could later become a source of political problems of many Arab countries. Besides, the Arab states would attract many Turkish Arabs for intelligence activities, because they have political problems among themselves. The economic consequences are not worth mentioning but we also know how much the health system of the respective country suffers from it. The 'arabisation' of Asia Minor would not only damage Turkey's well-developed geopolitical and geostrategic advantages through a demographic attack, but would also challenge the Turkish identity in Asia Minor. Turkey's strategy of 'Europeanisation of the country' will be pushed back towards the Central Asian region, and Kurdish and Arab nationalism would flourish in this region. As an example of these extraordinary events, especially in Germany, it can be observed how many Syrian and Kurdish clans have developed into 'mafia-like' organisations and commit crimes regularly. Turkish President Erdoğan has announced the establishment of a peace corridor in northern Syria with the help of the international community. It will have a length of 480 km and a depth of 30 km. This area will be developed as a resettlement for 2-4 million Syrian refugees, 140 villages for 5,000 people and 10 small towns for 30,000 people are scheduled to be built. However, after the pandemic crisis, this project is estimated to require an investment of US\$50 Bn.. The US would most likely not want to support this project as a return of 100 thousand Syrian Arabs to their home villages would lead

to conflict with the Kurdish ethnic groups. The problem is the property and belongings confiscated by the Kurdish terrorist organisation PYD, which had to be returned to Arab refugees. So a confrontation is inevitable. Arguably, the US is only pretending to sym-

ern mountains is being considered. With the Alawites in the mountainous regions of the northwest coast and the Daesh terrorist organisation believed dead awakened from its dust to establish the Caliphate State in the Arabian Peninsula, there is plenty of conflict



Photo: Kremlin

At the Great Mosque of Damascus, one of the world's largest and oldest places of worship: President Putin with President of the Syrian Arab Republic Bashar al-Assad.

pathise with Europe and Turkey, which has been badly hit by the wave of migration, but the tide can turn again quickly.

Conclusion

The refugee crises are not only the result of economic misery and climate change, but also the result of many wars. The long-lasting drama in the Middle East will inevitably initiate the 'Balkanisation' process. To be considered in this context is the large gap between the Shiite and Sunni faiths, which is widening. This conflict will further escalate as a result from the discrepancies between the different ethnic groups, the Arabs, Turkmen and Kurds. The civil war in Syria is multifaceted, the Shiite as well as the Sunni groups try to found their own states. As if that was not enough, Kurdish ethnic groups are trying to establish their own state in northern Syria called Kurdistan in the chaos with the support of the US. Yet, Kurdish nationalism is being fought at a broad level by Turkey with numerous military operations, especially in Syria, and Ankara is also trying to influence the efforts of the Kurdish terrorist organisations on its own Kurdish population in Turkey. Furthermore, Kurdish nationalism has the ideology of Marxism-Leninism and has a great explosive power in the region. But one thing is for sure: the establishment of a Kurdish state in northern Syria would skip the same civil war-like status to Iraq and Iran. The reason why Turkey seeks the proximity of Russia in Syria is that the US cooperates with Kurds. Against this background, the establishment of a Druze state in the south-

potential in the region. There are enough concerns that will keep us busy for the next few years. In other words, although the 'Balkanisation' process may serve as a 'geostrategic usability' for some world powers in the beginning, it will certainly drag the world powers into the next wars in the medium term. The consequences would be that Turkey and Europe would suffer under the enormous burden of the refugee flows, and especially in times of pandemics local wars would serve as 'accelerators of fire' on a global scale. The Corona virus crisis has taught us that nowadays pandemics spread very fast and the effects are spreading far beyond continental borders in a short time. The 'Balkanisation' of the Middle East will inevitably accelerate the strategic migration of peoples and the pandemic will, of course, do the rest. So it is imperative that Turkey works with the EU to develop a fundamental security policy for the upcoming and future refugee flows. The Corona virus crisis has taught us that it can become a notorious weapon in combination with the refugee crisis. It is, therefore, essential that our communities of value, such as the EU and NATO, develop a fundamental security architecture against such future threats. However, our attention should be focused on the current developments with China, because the pandemic crisis will redefine the global balance for itself. The EU, in particular, which is already under immense strain, is not under additional pressure from a lack of solidarity among its members, which would cause the EU to collapse. And this must be prevented! ■



Viewpoint from Tel Aviv

Four Scenarios for a Post-COVID-19 Middle East

Tamir Eshel



Photo: via author

In an article published by the Israeli Institute for National Security Studies (INSS), Brigadier General (Ret.) Itai Brun outlines four hypothetical scenarios for the post-COVID-19 world in 2021. "Analysts and commentators describe the crisis as a seminal

event of historic proportions that will materially change the world we live in", Brun writes. Because this crisis resembles other significant historic events, its effect could initiate a new reality or accelerate existing trends.

This coronavirus crisis began after a decade characterised by growing strategic competition between the powers, ongoing upheavals in the Middle East, globalisation, and an information revolution that has changed the world order. In the Middle East, the crisis comes after years of foreign intervention, Israeli-Arab wars, inter-Arab conflicts and Islamic uprisings. Therefore, the fragile structure of the existing order could be undermined, prompting disruptive developments and add further destruction to what people in the region have suffered for many years.

Brun outlines four scenarios and analyses how they could change the region.

1. "Continuation," following an interruption of a few months, there is a resumption of familiar global and regional trends from the pre-coronavirus era. According to this optimistic scenario, most countries will manage to control the spread of the virus by summer 2020, and the larger economies will return to a level of activity similar to the situation before the crisis. In the Middle East, the coronavirus will exacerbate fundamental problems, but regimes will manage to survive. Regional and global powers active in the region will seek to avoid escalation, but such escalation could occur inadvertently. Iran is not likely to cease its defiant attitude to seek regional dominance and nuclear power. China will strengthen its influence by providing investments, assistance and support to countries most affected by the coronavirus.
2. "Revolution," in which there is a fundamental change in the patterns that characterised life before the crisis and the world prepares for a new illiberal world order led by China. As time passes and the crisis continues until the end of 2020 and perhaps even longer, China's early recovery will position it as the world leader in mitigating this crisis. Practices common in China and Russia will become the norm for most countries.

In the Middle East, this scenario could be constructive for countries like Iran, Egypt, Jordan, Iraq, and the Gulf states, purchasing strong security systems for dealing with the pandemic. However, in war-afflicted regions such as Yemen, Libya, and Syria, it will exacerbate the humanitarian crisis. In this scenario, it will be easier for the international community to overlook Iran's defiance over its nuclear development.

3. "Breakdown," in which all global actors emerge wounded from the crisis, resulting in the international structure collapsing into chaos. In this scenario, outbreaks of the coronavirus will not be brought under control before the development of a vaccine in up to 18 months to two years. The US will abandon its global status, but China and Russia will also fail to recover. Global food crises and waves of nationalist violence would follow. Such a scenario will bring about upheavals in the Middle East, along with humanitarian crises that could lead to the collapse of governments in Lebanon, Syria and Iran.
4. "Reconstruction," in which the US regains the initiative and begins an international effort to repair the liberal world order and solve pressing problems.

Because preventive measures against virus outbreaks may continue until the end of 2020, the West discovers the true scale of the infections in China and is encourages Western liberal democracies to join forces and help the world cope with coronavirus outbreaks. In the Middle East, such a move could bring about more Western influence and assistance.

According to Brun the two main variables are the degree to which outbreaks of COVID-19 can be controlled, and the depth of the ongoing damage to economies. Merging the hypotheses into one central narrative creates a scenario in which all the international actors are engrossed in their own internal affairs in the near future. The trend of the East growing in influence will continue and perhaps even accelerate.

Events in the strategic environment can also have implications for the operational environment. Budgets will probably be diverted to rehabilitate national economies and health systems, which could be at the expense of defence spending. Such a diversion is unlikely to happen in countries that face internal instability, but could have an effect on regional conflicts and military force buildups, particularly those of non-governmental proxies that might try to exploit the situation in their favour. Finally, the dramatic effect of the pandemic could lead various elements to lend greater priority to the development and acquisition of biological weapons.

“We believe that privatising public services is fundamentally a mistake”



Photo: Wolfgang Hellmich

Wolfgang Hellmich, Member of Parliament, is Chairman of the Defence Committee of the German Bundestag. ESD had the opportunity to discuss with him the impact of the coronavirus pandemic on the German defence budget, on the successor to TORNADO and on VJTF 2023.

ESD: For the first time, many parts of the world have been affected by a pandemic, probably caused naturally by a

virus. The Berlin International Air Show (ILA) also fell victim to the corona virus. Which consequences do you think will the pandemic have for the projects of the German armed forces?

Hellmich: I am very much in favour of finding a time frame in which we can repeat the ILA as soon as possible. ILA is not only a place for communication and presentation, but it has always had great

significance for the political presentation of European integration and capability development in NATO and the EU. We should not forego this opportunity. Despite the unforeseeable financial consequences of the pandemic, the Bundeswehr must retain its capacity to act. Higher personnel and material requirements are placed on the troops when it comes to crisis prevention, and these



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Graphic: Airbus/Luftwaffe



An early impression of the Next Generation Weapon System

must be supported financially. It is also obvious, however, that the financial consequences of the crisis will make a lasting impact on the federal budget - for several years to come. As a result, major development and procurement projects may have to be planned over a longer period of time.

ESD: Which topics are currently of high priority for the Defence Committee?

Hellmich: The virus pandemic has caused a considerable time lag. For this reason, we are currently concerned with keeping the Defence Committee operational and competent to make decisions. We have been meeting in a somewhat reduced format with the necessary minimum distances between us in order to approve the many 25 million proposals together with the Committee on Budgets. The improvement of the Bundeswehr's material and personnel resources should not be delayed. We also have to maintain the supply of the Bundeswehr by small and medium-sized enterprises, which are getting into difficulties as a result of Corona.

Improving the personal equipment of the soldiers, implementing the reserve concept, accelerating the procurement processes - these and many other issues will have to be dealt with in autumn this year. And we must take the necessary decisions for the EU mission "Irinini" and EUTM-Mali. We will be challenged in equal measure by both the review of the Permanent European Cooperation on Security Policy (PESCO) and the preparation of the parliamentary part of the European Council Presidency.

The security policy consequences of the Corona crisis will be a new point on the agenda. According to Foreign Minister Maas, they will be a central issue for the German Council Presidency. It makes sense, for example, to develop and procure European capabilities in the area of medical care, such as medical transport. And maybe the unforeseeable consequences of the virus pandemic will increase the pressure to achieve greater European efficiency in European security and defence policy and defence industry.

ESD: The successor to the TORNADO weapon system will be a mix of EUROFIGHTER and the American F-18. Is procuring a US weapons system a good idea in view of the efforts of many Europeans to find a European solution?

Hellmich: I'm all for a pragmatic approach. First of all, a decision should be taken on replacing the first tranche EUROFIGHTER and procuring the third tranche. The development and integration of the Growler function in the EUROFIGHTER should also be commissioned - in view of the transfer of the EUROFIGHTER to the Future Combat Air Combat (FCAS). The only remaining issue would be the procurement of a small number of F18s, a type of aircraft that is also being phased out in the US, in order to maintain nuclear participation, for which the aircraft has not even been certified. I am quite critical of such a step but this issue will not be up for decision in this parliamentary term anyway.

The decision in favour of FCAS and against F35 was also based on an agreement to juxtapose the pros and cons, the costs over the entire life cycle of various aircraft, including the costs of the TORNADO, and to make these costs transparent. Therefore, a basis for decision-making which is comprehensible to the Members of Parliament must first be provided. To date, this has not been done by the MoD. And we are not going to buy the pig in a poke with taxpayers' money.

ESD: Despite considerable investment, the availability of equipment - especially of flying equipment - is still too low. Where do you see the challenges in increasing the operational readiness of the Air Force?

Photo: Bundeswehr



The pandemic has delayed the work of the Defence Committee of the German Parliament considerably.

Hellmich: We need to make a distinction between the different aircraft, for example between EUROFIGHTER, TORNADO, NH90 and others. In essence, it's a question of speeding up repairs by the industry. Our experience has shown that changes in work organization and prioritization in favor of the Bundeswehr result in acceleration. A systematic management of e.g. system or security updates can also increase operational availability. Furthermore, review the BSI security checks can increase the availability of flight hours.

In principle, however, I see a great need for action to increase the availability of systems for training and deployment, not only in the Air Force but also in other organisational areas. We believe that privatising public services is fundamentally a mistake. The investigation into the contracting of external consultants by the MoD illustrates what happens when private companies take control of government functions.

In 2019, a council of experts completed its analyses of the procurement organisation and recommended 58 individual measures. In September 2019, management reform began at the procurement

agency BAAINBw (Federal Office for Bundeswehr Equipment, Information Technology and Utilisation). I hope that implementing the proposed measures will improve the Bundeswehr's procurement process in the long term.

ESD: What is your opinion on the future of armed unmanned systems in the Bundeswehr?

Hellmich: I do not want to go into the discussion we still have to have according to the coalition agreement on arming unmanned airborne systems in the Bundeswehr. However, considering that the European MALE RPAS is being developed as an armed unmanned system, the Bundeswehr will probably operate such systems as well.

ESD: Does the corona crisis influence the timing of the €25M proposals?

Hellmich: We work hard to work off the impressive list of proposals, which for 2020 will consist of almost 30 items. The Defence Committee is operational and capable of taking decisions. However, the burden that the procurement agency BAAINBw currently has to bear might cause understandable delays.

ESD: The medical service and logistics of the Bundeswehr are already facing or will soon face particular challenges. Are there considerations for changing priorities, for example when planning procurement?

Hellmich: When talking to logisticians within the troops, I am always told that there is a great need for transport vehicles, handling equipment including swap loading systems and a lack of tool kits within the troops and that there is an urgent need to replenish stocks of spare parts. To date, however, the Committee on Defence has not seen any plans that could possibly be changed.

ESD: In your opinion, could a change in priorities lead to displacement effects - in terms of time or quantities - in major Bundeswehr projects, for example the second batch of the PUMA infantry fighting vehicle, the heavy transport helicopter or the main ground combat system?

Hellmich: That cannot be ruled out. However, it depends on the contracts concluded and the budgetary resources available.

ESD: Can you already anticipate effects on the training and equipment for the NATO Spearhead (VJTF) 2023?



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Photo: Boeing



To maintain its nuclear participation, Germany is considering the procurement of a small number of F-18 fighter aircraft.

Hellmich: Right now we have to fetch equipment for setting up the Spearhead within the Bundeswehr from other units. The aim, however, is to have Spearhead fully equipped by 2023. According to my assessment the VJTF 2023 will be much better equipped than 2019, but at the moment it seems impossible to fully supply the VJTF 2023 completely on its own.

ESD: Do you think future circumstances might make it attractive – or even necessary – to favour national suppliers of defence equipment over the consolidation and strengthening of the European defence industry?

Hellmich: I now hear from various European countries that, in view of the consequences of the Corona crisis, they are considering purely national tenders instead of European tenders, for example in the case of the procurement of submarines in the Netherlands. We should not, however, abandon the path towards an integrated European cooperation. Instead, we should talk about more cooperation now so that the European defence industry can survive in the long term. A German-Dutch arms conference or a German-Norwegian conference would be a format for discussion in order to make progress in this respect.

This, however, is by no means unconditional. In my opinion, in the armaments market, you cannot simply expose a medium-sized armaments company, as in Germany, to competition from corporations that receive strong state support or are even state-owned corporations. Three decisive changes in German policy are important in this respect: the - unfortunately belated - decision by the Federal Government on key technologies, the decision by Parliament on the subject of invitations to tender and the establishment of a round-table of state secretaries on armaments. Hopefully, this will help us to be on an equal footing with others. Only then will there be a European consolidation. Again, more state involvement is needed!

One more thing: I fully support the creation of a national player in shipbuilding. After all, it has taken a lot of discussion, but this is the prerequisite for building a consolidated European naval industry so that the best skills can prevail in the narrower markets of tomorrow. And if all capabilities do not match, different paths can be taken. In this respect I still see "Nordic cooperation" as the way forward.

The interview was conducted by Rolf Clement, the editor-in-chief of our sister magazine "Europäische Sicherheit & Technik" (ES&T).

It is reproduced here in a shortened form and with a focus on arms-related aspects. The full text was published in German in the May 2020 issue of ES&T.

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“I see submarines becoming even more relevant than today”



Photo: Guy Toremans

The Mediterranean plays a central role in the balance of power and is the frontline between politically different countries. For the Italian Navy, the underwater sector will become increasingly important in the coming years due to vital and strategic interests related to natural resources and underwater communication cables. To protect Italian interests, the Navy operates eight submarines from the Taranto Naval Base. ESD had the opportunity to speak with Rear-Admiral Andrea Petroni, Commander of the Italian Navy's Submarine Force (MARICOSOM).

ESD: Please give us an overview of the structure of the Submarine Flottilla.

RADM Petroni: Currently, the Submarine Flottilla's inventory comprises four SALVATORE TODARO class (Type 212A) and four Improved SAURO class submarines, and some 600 personnel of which more than half are crewing the boats. We are based at the Taranto Naval Base where we have all our training, logistic and maintenance facilities. And there are two secondary bases, one in La Spezia and one in Augusta (Sicily) where we can provide technical and logistic support to our submarines. The training centre provides the full spectrum of submarine training for both individual and for team training, ashore as well as onboard. We have simulators for combat team training and platform management, and a Command Team Trainer, all exact replicas of the systems we have onboard. We also have facilities to train personnel to manage safety procedures for 'Rush Escape' and 'Single Escape' from a distressed submarine. And our technical department is able to fully support our boats with high level maintenance capabilities at home, and when our submarines are abroad, we deploy our Support Groups.

ESD: What is particularly distinctive about the Italian Navy's submarines?

RADM Petroni: Although the Italian submarines have the most modern technology, that is not enough. The true strength of a submarine is the symbiosis between the boat and its crew, a symbiosis based on decades of tradition, training and experience gained from participating in real-world missions. If you take a look at where our submarines are operating, you will see that the submarines of the Italian Navy are the only non-nuclear force operating constantly throughout the Mediterranean Sea and beyond. Our submarines can contribute to maritime safety in a unique way, since they can assess the situation without changing the operational environment, helping to build maritime situational awareness and serving as a reliable source of information.

ESD: How do submarines meet the challenges in the region and in today's maritime environment?

RADM Petroni: The submarines are an essential part of the fleet. They are probably the most effective means of protecting Italy's national interests in relation to the sea. Submarines are one of the most flexible platforms because their endurance, camouflage and resistance allow them to perform a wide range of tasks. Traditionally, they have been one of the most powerful deterrents and, if this deterrent fails, in order to prevent escalation, they can help to control the sea and, above all, to refuse to sail. They play a crucial role in maritime surveillance and security measures in the Mediterranean.

Our main tasks include coastal defence, operations to combat surface warfare, sea control and sea refusal operations, protection of Sea Lines of Communication, participation in Special Forces operations, including surveillance, intelligence and reconnaissance operations, anti-drug operations, and combating other illegal activities.

ESD: Do you have any thoughts on the changing roles and missions of the submarines in the future?

RADM Petroni: I do not see any change in the role of our submarines, which will essentially remain linked to deterrence, information gathering and, if necessary, power projection. What I think will change is the way we operate our submarines and integrate new technologies – first of all, artificial intelligence and payloads like unmanned vehicles. I assume that submarines will no longer operate as 'lone wolves', but will increasingly be integrated into networks above and below the surface. At the same time, in view of the growing importance of the underwater area, which has always been controversial but will become increasingly congested, I expect submarines to become increasingly involved to ensure safe use of the sea. They can serve as a strategic deterrent, assist law enforcement, conduct EEZ patrols and act as 'advisors in joint operations'.

ESD: Will the improved SAURO-class submarines undergo further modernisation?



Photo: US Navy

Italian submarine SALVATORE TODARO pulls into US Naval Base New London

RADM Petroni: Our SAURO class boats are still effective but, as they are approaching the end of their life-cycle, we do not consider any further upgrades. For this reason, we are going to acquire four new submarines (Type U212 NFS) between 2026 and 2030, which will replace our four SAURO class submarines on a one-for-one basis.

ESD: Do you plan upgrades for the initial two TODARO (212A Type) class boats?

RADM Petroni: Yes, we plan a mid-life upgrade for the first two boats, the ITS SALVATORE TODARO and ITS SCIRÈ, in

the 2025 to 2026 timeframe. This MLU will focus on upgrades to the combat data system, sonar system and sonar in-board processing systems, as well as their communications and electronic warfare (EW) suite. We will try as far as possible to match the capabilities and performance of both submarines with the newly planned Near Future Submarines (U212 NFS).

ESD: Can you provide some preliminary details of these future submarines?

RADM Petroni: The new submarines will be an evolution of the four TORA-

DO class (Type 212A) boats. The new slightly longer boats are 1.2 m longer. They will feature a range of technology enhancements, all developed and manufactured in-country, including a brand new combat system, a redesigned fin to accommodate a set of electrically actuated mast-raising systems, a non-magnetic stainless amanox-steel hull, and new fluoropolymer foul release coating materials to reduce fuel consumption, a more powerful diesel generator set, an updated air-independent propulsion (AIP) system and new battery technology based on lithium-ion

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Photo: US Navy



The Italian TODARO-class submarine SCIRE makes its way up the Thames River to the Naval Submarine Base New London.

phosphate cells, updated sonar and communication suites and new ECM-ECCM electronic warfare capabilities, a propeller optimised cap combined with preswirled rudders, new ballast tanks and a new gas-generated emergency blowing system. The new boats will be capable of deploying UUVs, Leonardo's BLACK SHARK Advanced heavy weight torpedoes and feature a strike missile capability.

A contract is expected to become effective by 2020. A 'first-of-class' NFS 212 entry into service is foreseen for 2025.

ESD: How do you see the future of your submarine fleet? What are your main concerns?

RADM Petroni: As mentioned before, I see submarines becoming even more relevant than today. The changes in the strategic and geopolitical environment will require submarines to operate increasingly in co-operation with other assets. We see a shift towards joint operations where we become increasingly involved in surveillance tasks in support of the fight against illicit activities. My prime concern is to ensure that our submarines have the highest possible operational readiness and the capacity to carry out their assigned tasks. This is quite a challenge because to attain such a level it is imperative that my personnel have an optimal level of training and then we can stay abreast of the constantly evolving technological advances. And we will, of course, continue to develop the submarine service to adapt to ever-changing challenges and threats.

ESD: What new skills and technologies are you working on to ensure that your

submariners are equipped for the challenges of the future? What would be on your 'wish list'?

RADM Petroni: We have several ongoing Research & Development activities to improve effectiveness and stealthiness of our submarines. We are talking about weapon systems, unmanned vehicles integration, AI exploitation, underwater communications, power generation and storage, and target strength suppression. I believe that unmanned capabilities will allow NATO to ensure its required to gain and keep control of the operational environment, as I have mentioned – for longer periods and without interruptions, such as looking at sensors, sonar, weapons control, quieting technologies, undersea drones, and communications systems to help its submarines maintain their edge. Looking to sensors, sonar, weapons control, quieting technologies, undersea drones, and communications systems to help its submarines maintain their edge, dedicating more time to anti-submarine-warfare training and operations. New cloaking to make submarines invisible to new active sonar threats, an even more performing AIP system by using the best combination among Lithium batteries and new generation of Fuel Cell, underwater net-centric capabilities to gain a complete and reliable underwater situational awareness, and increased over the horizon weapon engagement capabilities.

ESD: What do you expect from DYNAMIC MANTA 2020 and in which aspects are you most interested?

RADM Petroni: NATO allies are aware of the rising threat coming from the underwater domain and, as such, are deter-

mined to improve their anti-submarine warfare capabilities. Within this context, Dynamic Manta is the most important ASW-exercise in the Mediterranean. Exercises such as the Dynamic Manta series allow us to practice joint anti-submarine warfare with coordination of air, surface, and subsurface assets. After analysis, the exercises provide us with areas that we can concentrate on to improve.

The participants can sharpen their skills, test new tactics and raise proficiency. In consideration of the exercises' realistic and complex training themes, I think the DYMA series is an invaluable training opportunity for all parties.

ESD: NATO is on the front line of the divide between Europe and Russia and with Africa. This makes the Italian Navy an important asset for NATO. What does the exercise show in relation to maritime security challenges in the Mediterranean or even beyond?

RADM Petroni: The Mediterranean Sea is a 'melting pot' of challenges, with sea migration, instability along the south coast, bottlenecks in access to the Atlantic and Indian Oceans, the conflict in Syria and Russia's intention to maintain a permanent maritime presence in the region. As a relatively small basin, the Mediterranean has always played and continues to play a central role in the balance of power and is the frontline between politically, economically and socially diverse countries. It has always been marked by pressure and friction. In the meantime, the underwater area has become an essential factor in the safe use of the sea. However, we are not yet fully aware of the threat. In the coming years, the underwater sector will become increasingly competitive due

to vital and strategic interests related to natural resources and underwater communication cables, as well as due to technological developments. Consequently, we must develop our awareness of how vital the underwater environment will become for our safety and well-being.

ESD: What must NATO do to revive its ASW capabilities?

RADM Petroni: I would say that the main thing is that we persevere and improve our ASW skills. Together with our allies, we can offer the best ASW solutions available. However, we must ensure that these capabilities can be used permanently in our area of responsibility, whenever necessary. Consequently, it is essential to maintain superiority underwater for long periods of time and without interruption, where both performance and quantity of capabilities are fundamental – numbers do matter.

ESD: Do you face problems in recruiting and retaining the right people for the submarine branch?

RADM Petroni: Recruitment is one of our most demanding tasks. Since society is developing rapidly, but the life of submariners on board is not, we face some problems in recruitment, partly because we do not want to lower our standards. However, as long as there are people who are interested in serving their country in a challenging and extreme environment and on board one of the most advanced ships developed by human endeavour, and I believe that will always be the case, we will find our way to recruit real submariners. On average, there are about 45 new submariners every year, while we lose about 20, mainly because of retirements.

ESD: Do you send officers, petty officers and/or ratings to foreign navies' training centres?

RADM Petroni: We regularly send officers for training with foreign navies and on board submarines, because we believe that we can only grow continuously by exchanging ideas with others. Some officers take part in Operation Senior Officer/Principal Warfare Officer courses in Norway and the Netherlands, and we also take the opportunity to send our officers on board Allied submarines whenever possible. We also train submariners of foreign navies, but I cannot say which navies. This year, in cooperation with ISMERLO, we will be organizing the first course for Coordinator of Rescue Forces, a course in which officers from many navies will participate.

ESD: Do you have an own submarine command course for the training of future commanding officers?

RADM Petroni: Yes. The six-week Submarine Command Course is structured in five weeks of classroom courses, exercises in the simulators, and information sharing with current and former Commanding Officers. Then follows one week at sea for their final evaluation. This intensive and dynamic training is aimed to see if candidates are able to manage the highly demanding task of being a submarine Commanding Officer. We evaluate the prospective officers' risk assessment, personal leadership ability to command a submarine independently and safely under difficult circumstances and across the entire spectrum of undersea operations. In 2020, we are running our fifth

Submarine Command Course and I look forward to personally seeing my Teachers and future Commanding Officers in action at sea.

ESD: How are the prospective Commanding Officers selected?

RADM Petroni: Our prospective commanding officers are selected after more than 10 years onboard of submarines where they have to achieve several qualifications and have successfully accomplished their qualification for surface ship command and one-year as commanding officer of a surface ship. Prospective candidates have to pass the rigorous Submarine Officer Command course before they are allowed to drive one of the boats. They must show a good understanding of the environment

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Photo: NATO



A crew member of the Italian Navy frigate ITS CARBINIERE, flagship of SNMG2, scans the horizon during Exercise Dynamic Manta 2020, an annual anti-submarine warfare exercise.

in which to operate a submarine, that they know how to take on internal and external situations and that they display leadership, concern for safety, positive reaction to adversity and mental agility. During the course, candidates practice their periscope skills in intensive tactical training designed to evaluate their risk assessment and leadership skills.

ESD: Do you send prospective commanding officers to the 'Perisher Course'?

RADM Petroni: We have sent officers as observers to the Submarine Command Course of the Royal Netherlands Navy.

ESD: How do you certify your boats and crews? What tests and certifications do they have to pass prior being declared 'fully operational capable'?

RADM Petroni: In a first phase, all crewmembers are individually trained and qualified for their duties onboard. This individual training can take more than one-year, depending on the crew member's speciality. Hereafter, we train and certify the entire crew with training sessions on our simulators as well as at sea training. This certification takes one to three months, depending on the starting level. We conduct these training cycles after a submarine's overhaul, after significant

crew changes as well as during regular periods in order to verify that every crewmember meets our high standards. In case a submarine has to deploy for 'real world' activities, we conduct additional extraordinary mission-oriented training sessions.

ESD: What are your thoughts on today's submarine training? Would you like to see improvements?

RADM Petroni: Today's training is surely effective, but I believe that we should look at resources to bring more realism into the training of submariners in order to enhance their performances even further. In the same way, I think we should play more of an emphasis on synthetic training opportunities, both nationally and among the allied navies, in order to save time at sea and capitalise on the preliminary training ashore. Within the Submarine community, one of the main topics of conversation is how to improve the human interface and interaction of new sensors, for example optronic periscopes. I believe that 'virtual reality' together with 'augmented reality' can help also in this fields where they can be a real 'game-changer'. Navies in general, and the submarine community in particular, recognise that virtual reality has great potential to impact the operators' effectiveness and mission readiness. As submarines are required to conduct more operations in concert with other manned and unmanned systems, I expect that the use virtual and augmented realities and other Situational Awareness tools will increase. Virtual reality can simulate physical tasks in an immersive environment full of risk where actual missteps do not result in real danger. Trainee individual instruction in the knowledge and skills necessary to successfully and safely pilot and maneuver a submarine. And as the security scenarios are rapidly changing, we also need to step up the 'lessons learned' cycle in order to shorten the delay between what happens operationally and what we teach and how we train our crews.

ESD: Admiral, what makes a good submariner and a good Commanding Officer?

RADM Petroni: First of all, he or she has not only to be a good sailor, be committed, competent and open-minded, but also needs to have good understanding of the environment in which they operate. In addition, a commanding officer must be able to 'see over the horizon', i.e. analyse and counter internal and external situations and warfare threats, display leadership and have a positive reaction to adversity.

The interview was conducted by Guy Toremans.



Viewpoint from Berlin



In Demand in the Crisis

Wolfgang Labuhn

Whatever is needed now, if we can help, we will do it", announced Minister of Defence Annegret Kramp-Karrenbauer (CDU) on 19 March in her "Order of the Day on the occasion of the Corona Pandemic". Since then, the German armed forces have made headlines when the Ministry of Defence's Air Force Operations Centre evacuated German citizens from Wuhan in China, when Airbus A 310 aircraft equipped with "Intensive Care Aeromedical Evacuation" as flying intensive care units brought Italian corona patients to Germany for treatment, and when the Bundeswehr helped the British National Health Service NHS with 60 ventilators. But much more impressive now is the daily help in all parts of the Federal Republic. On 14 April, the ZDF TV station showed 24-year-old Sergeant Maximilian Schreiter, otherwise a tank commander in Tank Battalion 104 in Pfreimd, playing a board game with old people in an old people's home in Scheßlitz in Upper Franconia (Bamberg district) - just one small example of the Bundeswehr's great contribution to overcoming the Corona crisis. Around 15,000 soldiers are currently on stand-by to provide personnel and material for authorities, hospitals and other institutions at the request of civilian agencies within the framework of administrative assistance, unspectacular but effective. Hundreds of such applications have already been received by the Bundeswehr's Territorial Tasks Command, which has to decide which units can help in what way. Once again, it has just become clear that the esteem in which the Bundeswehr is held by the Germans always increases enormously when civilian units reach their limits in coping with domestic crises. And the Corona mission of the troops currently renders any image campaign superfluous. Meanwhile, the Minister of Defence has retained the CDU chairmanship longer than expected. The Corona crisis forced the postponement of the special CDU party conference planned for 25 April, at which the succession should actually be settled. On 14 April, Kramp-Karrenbauer hinted that she might even remain CDU chairwoman until the next regular party conference in early

December 2020, which also means that she will be able to exert more influence on the budget negotiations in the autumn at the head of the largest governing party. This is because on 18 March the federal cabinet already placed its key figures resolution for the 2021 federal budget and the medium-term financial planning for the coming years under reservation. The Federal Ministry of Finance said that no one can seriously estimate the impact that the Coronavirus pandemic will have on economic development in Germany, which means that a decline in tax income will also have consequences for the defence budget. After all, it should rise to €45.6 billion in 2021, i.e. about half a billion euros more than in the current year and - contrary to the previously planned reduction - remain at this level until 2024. Until then, Germany actually wanted to spend 1.5 percent of its gross domestic product on defence, which so far seemed illusory. Paradoxically, an economic slump could now even make this target realistic. Hope is given by the explicit reference of the Ministry of Finance to an "agreement within the Federal Government that certain essential major projects to close capability gaps will be financed in accordance with the Bundeswehr's capability profile and thus to fulfil international commitments already entered into. Specifically mentioned in this context are the projects within the framework of the Franco-German and German-Norwegian armaments co-operation, the replacement of the 1st generation EUROFIGHTER aircraft, the new 2nd and 3rd generation EUROFIGHTER aircraft. These include the replacement of the Eurofighter aircraft from the first tranche with new models, the closing of the capability gap for airborne SIGINT (now with Bombardier GLOBAL 6000 aircraft instead of drones), the replacement of the obsolete TORNADO fighter aircraft, the procurement of naval on-board helicopters based on the NH90, new fleet service boats, the purchase of "anti-submarine warfare aircraft" and the procurement of a tactical air defence system. It will be interesting to see what other demands the Army will be making - and how long the timeline for the implementation of all these plans will be.

Turkish Air and Missile Defence Capabilities

Kubilai Han

Within the scope of the Turkish Armed Forces (TAF) Air and Missile Defence Operations Concept, which was publicised in 2001, the air and missile defence of Turkish sovereign airspace were conferred to the Turkish Air Force (TurAF) Command.

To accomplish this task, TurAF needs to know what is going in Turkish sovereign airspace from 300 ft and above and establish the capability to detect, identify, track and destroy potential threats ideally in 90 seconds to a maximum five minutes. The Turkish Land (established its Air Defence Branch in 1997) and Naval Forces Commands, on the other hand, are merely responsible for medium and low altitude air defence of their fixed bases, ports and facilities, as well as their troops.

Currently, the TurAF does not have a new generation long-range air and missile defence system capable of intercepting ballistic missiles. Turkey is one of the few countries in the world and the only NATO member meeting its air defence requirements via the F-16C/D FIGHTING FALCONS. In order to augment Turkey's air defence capabilities against missile threats from across the border to Syria, NATO missile batteries have been deployed in Turkey since 2013. Only Spain still provides one Patriot PAC-2 GEM-T missile battery deployed at the Incirlik Air Base, Adana, which is under NATO command and plugged into NATO's air defence system.

In December 2019, the Spanish government decided to extend the operation of this missile battery for a further six months until the end of May 2020. As part of NATO's Operation Active Fence, which started in January 2013 in response to Turkey's request to reinforce its border against Syrian missile threats, one ASTER-30 Block 1 SAMP/T battery with two Firing Units of the Italian 4th Air Defence Artillery Regiment have been stationed at Gazi Barracks in Kahramanmaraş since 6 June 2016. However, in December 2019, the

Photo: via author



A 51P6E TEL based on MZKT 7930 truck being unloaded from an AN-124 transport aircraft

Italian government decided to pull out the SAMP/T battery.

In order to augment Turkey's air and missile defence capabilities under a layered air and missile defence capability approach, the Turkish procurement authority Presidency of Defence Industries (SSB) is currently conducting a number of very short, short, medium and long-range air defence system projects. These include the S-400 TRIUMPH Long-Range Air and Missile Defence System Procurement Project, Long-Range Area Air and Missile Defence System Projects (GUMS/UMBHFS and SIPER/HISAR-U), HISAR-A Low-Altitude Air Defence Missile System Project, HISAR-O Medium-Altitude Air Defence Missile System Project, HISAR-RF Medium-Altitude Air Defence Missile System Project, and PORSAV National MANPADS, 35mm Oerlikon Towed Air Defence Gun Modernisation and KORKUT SPAAG.

The S-400 TRIUMPH

The contract for the sale of the S-400 TRIUMPH systems to Turkey was signed be-

tween Turkey and Russia on 11 April 2017. The US\$2.5Bn deal covers the purchase of two (one firm and one optional) four plus generation S-400 TRIUMPH systems totalling four batteries, with each battery consisting of eight Transporter Erector Launcher (TEL) vehicles. The value of the first S-400 System (Squadron) is estimated to be US\$1.3Bn and the value of the optional second S-400 System is estimated at US\$1.2Bn.

The delivery of TurAF's first S-400 battery to the 1st S-400 Squadron based at Murted Airfield Command (about 30 km to the northwest of Ankara) was completed in June 2019. The delivery of the components of the second S-400 battery, to be operated under the 2nd S-400 Squadron, were completed in September 2019. According to satellite images, TurAF's first S-400 system includes eight 5P85TE2 TELs, eight 51P6E TELs, three 40V6M Universal Mobile Masts with MAZ-79100 tractor (it elevates the 92N6E and 96L6E radar antennas to a height of 24 metres in order to increase the detection performance of the radar),

Author

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Photo: via author

The 96L6E surveillance and tracking radar of the S-400 System

one 91N6E BIG BIRD Target Acquisition and Combat Management Radar, one 55K6E Mobile Command Centre (based on 8x8 Ural 532301 tactical wheeled vehicle), one 92N6E GRAVE STONE Engagement and Fire Control Radar, one 96L6E Surveillance and Tracking Radar, 22T6-2/22T6E2 Transloaders (Missile Loaders) and the POLYANA D4M1 Mobile Command Control Systems. The 5P85TE2 TEL is usually used for the transport and launching of the 48N6E3, 48N6E2 and 48N6E missiles, each with a range of 250 km. The 40N6E missiles, with a range of 400 km, are generally carried on the 51P6E Launcher.

After the installation and training operations were completed with the first S-400 battery assigned to the 1st S-400 Squadron located at Murted Airfield Command, in November 2019 tests involving F-16 and F-4 2020 fighter jets as well as a helicopter were conducted. The missiles for the first S-400 system were delivered by sea in December 2019. The third party of over 120 missiles (a total of 64 missiles are required to load the 16 launchers of the 1st S-400 Squadron) were shipped from Russia by sea to Derince Port and then transported to Ankara. Meanwhile, the training of 100 TurAF staff at St. Petersburg began in May 2019 and was completed in December 2019. The Delivery and Acceptance Act for the first S-400 system was signed in Ankara in December 2019. Thus, the first S-400 system officially became Turkish property and the 20-month warranty maintenance period started. TurAF's 1st S-400 TRIUMPH Squadron will be operational in April 2020. Turkey is expected to sign a follow-on order in the first half of 2020 to exercise an option for the purchase of a 2nd S-400 TRIUMPH System. On 31 July 2019, the Presi-

dent of SSB Ismail Demir underlined that the shipment of a second S-400 system might start in late 2020. "When it comes to the second system, there is a series of steps including co-production, technology transfer and software integration, and the achievements of the first system should be integrated into the second system, too," he added. Demir stressed that Turkey will exercise sole control over the S-400 systems. Reportedly, the second S-400 Squadron will be placed in a strategically important location in the eastern and south-eastern region of Turkey.

Turkey's NATO allies, including the US, were critical of the S-400 deal between Russia and Turkey. In particular, on 12 December 2019, the US Senate Foreign Relations Committee adopted sanctions against Turkey because of the purchase of the Russian S-400 TRIUMPH Long-Range Air and Missile Defence System. As a result of the S-400 crisis with the US, Turkey's

partnership in the F-35 LIGHTNING II JSF programme – the largest ever defence programme in Turkish history – was suspended on 16 July 2019.

Development Projects

In order to fulfil the TurAF's requirements with national resources, SSB launched two separate Long-Range Air and Missile Defence System Development Projects.

The HISAR-U National Long Range Air Defence System Project was launched in 2016 to meet TurAF's long-range air and missile defence requirements with indigenous solutions. Aselsan, as prime contractor, has been tasked to cooperate with Roketsan and TUBITAK-SAGE as the main local sub-contractors. On 31 October 2018, President Erdoğan announced that the name of HISAR-U will be SIPER. On 15 January 2018, SSB, Aselsan, Roketsan and TUBITAK SAGE signed the contract regarding the SIPER Project. Aselsan will be responsible for the development of the Long-Range Search Radar, Multi-Functional Fire Control Radar and Radar (RF) Seeker. The system design specifications were completed in 2018 and the activities on the System and Sub-System Design are being implemented. In a first phase, with its range of over 100 km, the SIPER missile is planned to function against only air-breathing targets, including fighter jets, UAVs and cruise missiles. An Anti-Ballistic Missile capability is expected to be gained during the second phase of the project. It is anticipated that the SIPER National Long Range Air Defence System will be ready for serial production in 2022-2023.

In January 2018, Turkey also contracted Eurosam, Aselsan and Roketsan to undertake a definition study of the future Turkish Long-Range Air and Missile Defence System. Scheduled to last 18 months, the



Photo: Aselsan

A HISAR-O undergoing live firing tests in May 2019

Photo: Aselsan



In the foreground, a modernised 35mm towed Oerlikon gun and KORKUT-FCS

study aims at preparing a development and production contract for a future indigenous air and missile defence system (based on the characteristics of the SAMP/T system and with anti-ballistic capabilities) meeting the operational requirements of the TurAF. This study will pave the way for the launch of a three-country joint Long-Range Air and Missile Defence Programme.

Medium and Low Altitude Air Defence Missile Systems

With the transfer of eight US I-HAWK firing units to Turkey as part of the SRA assistance, TurAF gained the capability of the HAWK XXI Medium Altitude Air Defence Missile System. The US\$270M project, which included training and support costs, upgraded the systems to HAWK XXI levels and added eight MPQ-64 SENTINEL 3D Air Defence Radars to the system.

The Turkish HAWK XXI System is composed of two Battalion Operation Centres (BOC, one per fleet), two Ballistic Fire Distribution Centres (BFDC, one per Fleet), four batteries, eight firing units, eight MPQ-64 SENTINEL Search Radars, a modernised Continuous Wave Target Acquisition Radar (CWTAR), eight AN/MPQ-61 HPI (High Powered Illuminator) Lighting Radar with modernised LASHE antenna and eight Fire Distribution Centres (FDC) and a total of 24 launchers (12 launchers per fleet). Two HAWK XXI Batteries remain in every HAWK Fleet Command, and in every battery there are two firing units (three launchers per unit). A firing unit is composed of one AN/MPQ-61 HPIR Lighting Radar with LASHE antenna, one AN/MPQ-64 SENTINEL 3D radar, one AN/MPQ-62 CWTAR radar, one FDC and three M192 launchers.

Within the scope of the HISAR-A Low-Altitude Air Defence Missile System Project, which was initiated to meet the low altitude air defence missile system requirements of the TAF with indigenous solutions, the prototype missiles armed with live warheads similar to the tactical configuration were test-fired against high-speed targets in October 2019. On 3 October 2019, the first vertical launch from the HISAR-A Self-Propelled Autonomous Low Altitude Air Defence Missile System (KMOAIHSFS) was deemed successful. On 12 October 2019, the first firing test with a warhead from KMOAIHSFS was conducted. Once the final tests have been completed and the system has been declared available for series production, the first HISAR-A system is to be delivered in October 2020. According to the Turkish Ministry of Defence's 2017 Annual Report, the first HISAR-A System is expected to enter service in October 2020, the first HISAR-O System in May 2021 and the serial production phase is planned to be completed in 2025 (HISAR-A) and 2024 (HISAR-O). In February 2020, however, SSB announced that deliveries would begin in the first half of 2020 and a prototype unit would be deployed to the Turkish-Syrian border.

The HISAR-O Project covers the indigenous development of a Medium Altitude Air Defence Missile System that will be capable of neutralising air threats at medium altitude and medium range and with vertical launch characteristics. Within the scope of the HISAR-O Project in May 2019, a HISAR-O System Level Closed-Loop Live Firing Test was executed at the Aksaray HISAR Firing Range. During the test campaign, two BANSHEE JET 80 high-speed target aircraft were launched from catapults at

the Aksaray HISAR Test Range. The first HISAR-O complete round missile tests (with live warhead) are expected to be realised in 2020, and the HISAR-O System is planned to be inducted into TAF service in May 2021.

With a length of four metres and weight of 230 kg, the HISAR-A would be able to engage air-breathing targets up to an altitude of 10 km and at 16 km+ range, whereas HISAR-O, with a length of 4.5 metres and weight of 300 kg, can be used up to an altitude of 18 km and 25 km+ range. Featuring a solid propellant dual-pulse rocket motor and TVC capability, HISAR-A and HISAR-O missiles are equipped with an IIR seeker and a two-way encrypted RF data link.

A series of modifications (since the temperature will be different in surface-to-air utilisation, the radome/warhead will be specified to perform under high temperatures) is being conducted on Aselsan's Ku-Band, active RF Seeker Head deployed on TUBITAK-SAGE's Medium Range BOZDOGAN-BVR (Beyond Visual Range) Air-to-Air Missile. The modified RF seeker will be used on the new version of HISAR-O, named HISAR-RF, as part of the urgent demands of the TAF. The first ballistic tests with the new HISAR-RF missile will take place during the first half of 2020. The dual pulse propulsion system of the HISAR-A/O was retained in the HISAR-RF missile, while certain modifications in terms of aerodynamics have been made to the missile body.

VSHORAD and Low Altitude Air Defence Weapon Systems

Within the scope of the 35mm Oerlikon Towed Air Defence Guns Modernisation Project, the electronic subsystems on the 35mm GDF-001/003 Oerlikon Towed Air Defence Guns in the Turkish Land (118 units) and Air Force (42 units) inventories are being replaced with new systems that align with the current technology and required mechanical improvements. Within the scope of modernisation being carried out under Aselsan's responsibility, a Turkish designed and produced 35mm Air Burst Ammunition (Particulate Ammunition [ParM/ATOM]) firing capability is also being added to the modernised guns. The 35mm Air Burst Ammunition is 'smart' ammunition equipped with a programmable fuse.

Within the scope of the KORKUT-Fire Control System (FCS/AIC) Project, for which Aselsan was selected as the Prime Contractor, 57 Aselsan KORKUT-FCSs will be procured to replace the ageing D-IX SUPER FLEDERMAUS FCSs that fulfil the tar-

get acquisition and tracking requirements of the 35mm GDF-001/003 Oerlikon modernised towed air defence guns in the inventory of Turkish Land Forces. The KORKUT-FCS is designed for effective low altitude air defence of military bases and critical assets against modern threats in today's battlefield.

Within the scope of the KORKUT Self Propelled Anti-Aircraft Gun (SPAAG) System Serial Production Phase, deliveries of the production KORKUT SPAAGs began on 30 March 2019. As of November 2019, the number of delivered vehicles reached 17 – four Command and Control Systems and 13 Weapon System Vehicles. Two Weapon System Vehicles and one Command & Control Vehicle, manufactured during the prototype phase, were delivered to the Turkish Land Forces Command in 2016. The Project covers the supply of 42 Weapon System Vehicles and 14 Command and Control Vehicles from Aselsan through domestic development model. The 30-ton 6x6 ZMA-30 Tracked and Armoured Combat Vehicle (ZMA/ACV) manufactured by FNSS is the carrier platform.

Roketsan developed an indigenous Man-Portable Air Defence System (MANPADS) to replace the STINGER POST (FIM-92B) and STINGER RMP (FIM-92C) MANPADS in



Photo: via author

A MIM-23B I-HAWK launcher deployed at the Turkish-Syrian border

TAF's inventory. Dubbed PORSAV, the Turkish ManPADS are equipped with Aselsan's Imaging Infrared (IIR) type seeker head and is expected to be effective up to the altitude of four km and a range of six km+. As the lowest level unit of Turkey's layered air and missile defence capability, the PORSAV has been undergoing development since 2013 under the Eşek Arısı (HORNET) Project, and first firing tests with Ballistic Test Missiles,

Controlled Test Missiles and unarmed Seeker Guided Test Missiles took place in 2018 and 2019 at the Sinop test range. According to programme schedule, guided firing tests with armed Seeker Guided Test Missiles (with live warhead) against high-speed target drones will take place in 2020. The PORSAV National MANPADS are expected to enter service with the TAF in late 2020 or early 2021. ■

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“Any nation willing to participate in an OCCAR programme may do so”

Photos: OCCAR



OCCAR (Organisation Conjointe de Coopération en matière d'Armement / Organisation for Joint Armament Co-operation) is an international organisation whose core-business is the through life management of cooperative defence equipment programmes. The organisation was established by means of the OCCAR Convention which is equivalent to an international treaty. ESD had the opportunity to talk to its new director, VADM Matteo Bisceglia.

Armament Directors and Industry representatives. Challenging months also because we are dealing with this terrible coronavirus pandemic that as you can imagine complicates everything, but I trust that once we leave it behind we will surely be stronger. Having said that, I would like to point out that the OCCAR I have inherited is a high performing and effective organisation, very lean and with a very low overhead cost. In my view, OCCAR was already playing an important role in Europe before the launch of the European initiatives, a role that has been reinforced by them. In 2017, 25 EU Member States agreed to consider OCCAR as the preferred management organisation, as part of the Permanent Structure Cooperation (PESCO) commitments. Through PESCO and the European Defence Industrial Development Programme (EDIDP), I expect to see more European nations join the OCCAR community.



ESD: Now that OCCAR has been in operation for 22 years and you have been the organisation's Director for little more than half a year, how do you assess OCCAR's current role and status in the armament environment, and what are your personal objectives for the organisation?

VADM Bisceglia: Six months have elapsed since I began my tenure as Director of OCCAR – challenging months in which I have taken stock of the organisation's assets and discussed the strategic aims for the future with the members of my Board of Supervisors, the National

When OCCAR was established, the founding nations gave it a similar objective to that of the recent EDIDP initiative: to enable a strengthening of the competitiveness of the European Defence Technological and Industrial Base (EDTIB). Today, I am working with the European Commission to receive delegation for certain implementation tasks of the EDIDP, as two of the current OCCAR programmes are recognised by its Work Programme; this attests to the effectiveness of the organisation.

OCCAR's vision is to be a centre of European excellence for the management of complex armaments programmes. This is



The multirole FREMM frigate PROVENCE

therefore my first objective: to reinforce the reputation of the Organisation as a centre of excellence in the multinational defence systems life cycle management. For this, the organisation must remain as lean and flexible as possible, advantages that OCCAR offers over any other organisation, both national and international.

My second objective, linked to the first one, is that OCCAR is recognised as a trusted and reliable partner by the European Commission. I have outlined the scope of our current cooperation within the framework of the EDIDP. A good standing with the Commission is very important for our future involvement in the follow on programme, the European Defence Fund.

My third objective is to raise awareness of the advantages of OCCAR amongst the EU countries that are not OCCAR Member States. Not being an OCCAR Member State is not a barrier to the participation in any of our programmes. Quite the contrary, in the context of the management of these programmes, all nations have equal rights and privileges. The integration of Lithuania into the OCCAR BOXER armoured vehicle Programme in just eight months is a good example of that possibility and the efficiency of OCCAR in managing its integration.

We are ready to take on new challenges and I am looking forward to seeing quite a number of new complex programmes entrusted to OCCAR in the short term, even though the coronavirus pandemic could be an obstacle.

ESD: What is the relationship between EDA and OCCAR, and how do you share responsibilities?

VADM Bisceglia: The OCCAR Convention was signed in 1998, and at that time EDA was not yet established. In 2004, EDA was founded by a Council decision, and it was also the Council who tasked EDA to search for greater synergies with OCCAR, in light of our roles in the promotion and development of cooperative programmes. The Council specifically tasked EDA to avoid duplication. This is precisely what we have been doing ever since. EDA and OCCAR see each other as reliable and complementary partners with different roles in bringing forward new collaborative projects. EDA is focused on the upstream part of cooperation promotion, requirement harmonisation, preparation, research and technologies, whilst OCCAR focuses on the development, production, in service and disposal of those collaborative programmes downstream.

In 2012, we successfully concluded an Administrative Arrangement that defines the roles and involvement of both organisations and outlines how to transfer a programme from EDA to OCCAR. We have examples of this fruitful cooperation: MUSIS, ESSOR, the MMF and MMCM programmes were born within the EDA. However, the economic crisis significantly reduced defence budgets and although this should have seen more collaborative programmes, the reality was very different; more programmes were developed nationally. We expect that the European Initiatives will reinvigorate armaments cooperation and through the EDA-OCCAR Administrative Arrangement, new programmes will emerge to close the capability gaps identified by nations.

ESD: What effects did the establishment of the Permanent Structured Cooperation pattern (PESCO) have on OCCAR's structure and work? What developments are yet to be expected in this context?

VADM Bisceglia: The Permanent Structured Cooperation was launched in December 2017. Nations made pledges in favour of cooperation and in support of the European Defence Technological and Industrial Base. As part of the 18th more binding commitment, nations agreed to consider OCCAR as the preferred management organisation. As you can imagine, there is a certain expectation that some of the projects that have been launched in the PESCO framework will be at some point entrusted to OCCAR.

There are currently 47 PESCO projects, each with a different level of maturity. A number had already been launched before becoming PESCO, others require EDIDP funding to move forward, and many of



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them will require the launch of a procurement process. This is where OCCAR can play a significant role.

For the time being, PESCO has not entailed any change in the structure of OCCAR or its work. If a large number of PESCO small projects were to be entrusted to OCCAR, this might require a review of the OCCAR structure, as today it conceived to manage fundamentally

cal missile for the TIGER helicopter for France, apt for a potential integration in the MALE RPAS.

I like to think that all the OCCAR programmes are successful, and their final versions perform to the specifications of their customers. Take the A400M, for example. It is a fantastic and unique strategic and tactical transport aircraft, and all the crews that fly it are extremely



The strategic A400 Airbus airlifter is the result of one of thirteen OCCAR programmes.

large complex armaments programmes. However, for now, we are not there yet.

ESD: What does OCCAR's current portfolio of armament programmes look like, and which of these would you consider to be OCCAR's "lighthouse projects"?

VADM Bisceglia: OCCAR currently has thirteen programmes in its portfolio. These are the strategic A400M airlifter, BOXER armoured vehicle, the Counter Battery COBRA, the European Software Defined Radio ESSOR, the family of air defence missiles FSAF, the Multirole Frigates FREMM, the Medium Altitude Long Endurance RPAS, the Maritime Mine Countermeasures MMCM, the Multirole MRTT Fleet MMF (we manage the acquisition phase for NSPA), the Multinational Space Based Imaging System MUSIS, the Logistic Support Ship LSS, the Multipurpose Patrol Ship PPA, and the TIGER helicopter. We are currently integrating another two, one for the procurement of Night Vision equipment for Belgium and Germany, and another for a tacti-

pleased with the capabilities that the aircraft already provides. If we look into the land domain, in light of how well it is performing, its protection and versatility, paired with its modular built-up and given the interest raised in many nations, I think you will agree that BOXER is one of the best-armoured vehicles on the market. The MMF is another success story, proof of the fruitful collaboration of EDA, NSPA and OCCAR. This programme is based on existing Product/Programme, so little development was required and the configuration of all the planes is the same, which will ensure full interoperability of the fleet; the FREMM programme is another outstanding programme that delivers on time, to cost and to performance.

In addition, if we look into OCCAR's future, the MALE RPAS, a critical capability identified by the EU Council in 2013, will grow to be another "lighthouse project", once the contract for the development, production and initial in service support is signed, hopefully during the year.

ESD: What is the current status of the BOXER programme for the British Army? Can you elaborate on the contract structure?

VADM Bisceglia: On 4 November 2019, the ARTEC Chief Executive Officers and I signed a contract for the procurement of more than 500 BOXER vehicles on behalf of the UK. Upon the UK re-joining the BOXER programme in 2018 and the receipt of industries' proposal in early 2019, personnel from the OCCAR-EA BOXER Programme Division and specialists from the UK MoD's Defence Equipment & Support area, worked hard to evaluate, negotiate a best value for money contract and finalise the 11th amendment of the series production contract. This was accomplished in a very short timeframe of only 8 months. The contract for the UK amended the contract for Germany, the Netherlands and Lithuania, and includes the delivery of 5 prototypes in four specific Build Configurations (Infantry Carrier, Specialist Carrier, Command Post and Ambulance) and more than 500 series vehicles, initial In-Service Support Packages and Special Role Kits.

The production of the UK fleet will be shared between Germany and the UK. As a first step, the prototypes will be manufactured in Germany by the main-subcontractors of ARTEC, the companies Krauss-Maffei Wegmann and Rheinmetall. The first phase of series production will be conducted on the German production lines of both companies. Workers from the UK will be trained on how to assemble the vehicles and after the necessary knowledge transfer, the production will be transferred to new facilities in the UK. The plan foresees the first trials in June 2022 and the delivery of the first series vehicle to the British customer by November 2022.

The efforts are ongoing and are currently well on schedule. The first Critical Design review is scheduled for later this year.

ESD: What effects will BREXIT have on OCCAR's work?

VADM Bisceglia: The UK is one of the four OCCAR founding Nations and consequently, the fact that UK has left the European Union has no effect on OCCAR's construct. However, and depending on the arrangements reached on custom duties, we could see delays in the deliveries of parts for the programmes where UK manufacturers are involved.

ESD: With Germany having joined the ESSOR project, what are the next steps and what is the anticipated further time schedule of the project?

VADM Bisceglia: Germany has joined the ESSOR Programme as a Participating State with full rights. In the context of the current "ESSOR Operational Capability 1" programme stage, the former ESSOR nations retained the timelines for the already contracted outputs, including the final interoperability tests, whilst allowing Germany to catch up with the porting of the common product communication software (the so-called Wide Band Waveform), on their radio platforms. Thus, a second round of interoperability tests is planned, with all nations (including Germany) in early 2023. At the same time, Germany is participating in the ESSOR PESCO/EDIDP projects co-funded by the European Commission, which are branches of the ESSOR tree. These new projects are being integrated into OCCAR and the relevant contract signatures are planned in December 2020.

ESD: The flavour of the month is Cybersecurity and Hypersonic technology. Do these technology sectors open up new perspectives for OCCAR?

VADM Bisceglia: The OCCAR Convention Article 7 mandates the Executive Administration (that is to say the body who to control and implement those armament programmes that are assigned to it by Member States. In practice, this means that OCCAR-EA will manage the entrusted programmes, approved by the OCCAR highest decision-making body, the Board of Supervisors. It is not for the Executive Administration to decide what programmes to manage; this is a sovereign decision of the nations. However, I recognise that a lot has to be done in the cyber security domain and in hypersonic technologies. Cyberdefence is of course at the very top of future defence requirements, with hybrid warfare closely linked to it. OCCAR is ready and willing to also integrate such programmes, if nations decide so. Given the NATO-EU Joint Declarations, this could potentially be in collaboration with NATO, or through the EU, for instance, within the PESCO framework.

ESD: Are there plans for expansion? Are there any countries that one could expect to apply for OCCAR "membership", are there any new international armament requirements and programmes that you might expect to be assigned to OCCAR?

VADM Bisceglia: OCCAR was founded by its Convention (an International Treaty) with a clear European vocation. Through its very flexible set up, OCCAR can integrate new Programmes, new phases of programmes and new Members or Programme Participating States. I expect that in the near future some European Nations may consider applying for OCCAR membership. This may happen as a result of the EU initiatives and of the role that OCCAR plays within them. It is important for me to highlight that membership is not a requirement to having a programme managed by OCCAR. Any nation willing to participate in an OCCAR programme may do so, as long as it accepts the rules and regulations of OCCAR for the management of that programme, thereby acquiring the same rights and obligations as any Member State that also participates. OCCAR Membership also gives individual nations the possibility of influencing the organisation's corporate processes, but comes with an additional administrative burden, as it is mainly the Member States who defray the costs of the OCCAR Central Office.

I referred earlier to the PESCO framework and the programmes that have been created under its umbrella. With the pledge to consider OCCAR as the preferred management organisation and the European Defence Industrial Development Programme (EDIDP), nations have facilitated the conditions for the launch of even more collaborative programmes; those programmes may be entrusted to OCCAR. So certainly, I expect that we will see more European nations join the OCCAR community. Moreover, I very much look forward to it.

Masthead

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ESD: What major armament projects under the direction of OCCAR have already been completed?

VADM Bisceglia: When OCCAR was founded, a number of programmes that had already been launched and are still in its portfolio were entrusted to the organisation, namely the BOXER, COBRA, TIGER and FSAF. These programmes are now mainly in the In Service Support phase, but are going through new de-

ESD: Do the projects usually run smoothly? How strongly do national industrial interests play a role in your work?

VADM Bisceglia: How smoothly programmes run depends on how harmonised the technical and operational requirements are from the set-up and how innovative the programme is. The more development a programme requires, the greater the likelihood of encountering difficulties along the way.

OCCAR Director is to try to harmonise requirements as far as possible.

ESD: What influence does OCCAR have on the composition of the countries and companies running a project?

VADM Bisceglia: Article 7 of the OCCAR Convention mandates the Executive Administration to control and implement those armament programmes that are assigned to it by Member States. This means that OCCAR will manage those programmes that are entrusted to us, with the approval of OCCAR's highest decision-making body, namely the Board of Supervisors. The different Participating States come to an agreement amongst themselves before entrusting the programme to OCCAR, so the composition of the participants in the programme is not in the hands of the Executive Administration. With regards to industry, as you would expect, companies of the nations that participate in the programme are normally involved. The Procurement Strategy approved by the Programme Participating States sets the grounds for the selection of contractors. They can decide whether to launch an EU wide competition, such as is the case for the Belgian-German Night Vision Capability, where the company that offers best value for money will win the contract. The strategy can also be more restrictive. In some cases, it directly identifies a specific company, if for instance, we are talking about an ISS contract where only the original equipment manufacturer has recognised expertise or the ability to deliver.

ESD: Does the fact that German arms export regulations are more stringent than those of other countries play a role in the selection of the partners operating a project?

VADM Bisceglia: Indeed, the discrepancies between the export regulations in Germany and France for example, are well known and have made the first page of defence publications on numerous occasions. Especially for France, the reliability of its German partner in this regard has been questioned, given that France relies very much on export sales to maintain its defence industry. It is very difficult to achieve economies of scales based only on national demand, and given the wide variety of systems employed by the different EU Member States, export may become the only way to lower the unit price and maintain production lines. So absolutely, I think it is a strong argument to put in the balance when considering potential partners in a defence project.

The interview was conducted by Jürgen Hensel and Rolf Clement.



The BOXER, developed under an OCCAR initiative, is one of the best IFV on the market.

velopments for their Mid-Life Upgrades. All these programmes have delivered to their Programme Participating States highly capable weapons systems that have been used operationally.

Two other programmes were entrusted to OCCAR upon its establishment: the ground to air weapon system Roland and the anti-tank HOT MILAN programmes were integrated into OCCAR at the time of its inception. These programmes were more advanced in their life cycle: the first common development of the Roland was signed by France and Germany in October 1964, and the first production of the Franco-German HOT MILAN began in 1974. Thus, both programmes were already close to the disposal phase, and closure of the Roland programme took place in 2007 and HOT MILAN programme in 2003.

We could therefore say that Roland and HOT MILAN are the only programmes that have been completed, even though most of their phases were managed before their entrustment to OCCAR.

You ask how national industrial interests influence OCCAR's work. In my forty years' experience in the armaments field, I have seen multiple examples of defence programmes, where inefficiencies have been introduced by the Participating States' desire to have an equivalent industrial return on investment. The prime contractor should be allowed to allocate work to the most suitable subcontractor, regardless of national borders. Too often, I have also seen that when a system is developed cooperatively, each participating state continues to follow the "juste retour" approach and requests national variants that in practice are a limitation on cooperation. I think we all understand that politically it is not easy to offer work to a foreign industry because governments will have to justify to their citizens the reasons for potential job losses or the loss of industrial knowhow. I think this is one of the main reasons for the existing European fragmentation in this area.

My previous positions, either in the Italian navy or in OCCAR, as the FREMM Programme Manager has led me to experience these phenomena repeatedly. My aim as

FCAS – Europe's Most Ambitious Defence Programme

Giulia Tilenni

Franco-German efforts to develop a fully European-made 5th generation aircraft are finally advancing, albeit at a slow pace. The FCAS programme requires the overcoming political and industrial differences, something made more difficult by the new philosophical approach that such a system would bring to the battlefield.

At the ILA Berlin Air Show in April 2018, Dassault Aviation and Airbus signed an industrial contract on the Future Combat Air System (FCAS), an ambitious "system of systems", which is part of broader Franco-German cooperation in the defence sector announced a year earlier. The Next Generation Fighter (NGF), which is to be

developed by Dassault Aviation as prime contractor and Airbus as main partner, is powered by a turbofan engine jointly built by propulsion specialists Safran and MTU. The FCAS will also include Remote Carriers as unmanned systems (with Airbus as prime contractor and MBDA as main partner) and an Air Combat Cloud (with Airbus as prime contractor and Thales as main partner). The Paris Air Show 2019 was a milestone in the development of this comprehensive programme. Spain announced its official participation, a mock-up was presented and the selected engine specialists MTU and

Safran were awarded the contract for the NGF engine. Finally, on 20 February 2020, the contract for the fighter demonstrator was signed by the French Minister of the Armed Forces, Florence Parly, her German colleague Annegret Kramp-Karrenbauer, and the Secretary of State of the Spanish Minister of Defence, Ángel Olivares Ramírez. The 18-month contract study, worth €155M, will be financed equally by France and Germany, divided into Phase 1A (18 months) and Phase 1B (development of the demonstrator). It should be noted that Spain only commits its contribution in

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Phase 1B, France and Germany will determine the main characteristics of the fighter aircraft.

If the agreed timetable is met, the first demonstrator of the next-generation joint fighter aircraft will start testing in 2026, with first deliveries of production aircraft expected between 2035 and 2040.

As declared in official statements, the joint fighter is intended to “complement and eventually replace” the current generation of EUROFIGHTER and RAFALE fighter aircraft by 2035-2040. The High-Level Common Requirement Document (HLCORD) signed in 2018, which sets out the operational requirements to which the programme should respond, states that the NGF will be tailored to future operational challenges. It will likely be omnirole (like RAFALE) and flexible, thus being able to respond to a whole spectrum of air-to-air and air-to-surface missions. The

Photo: MBDA



An artist's impression of the FCAS in Luftwaffe colours

key capacities for future high-intensity battlefields, such as survivability and deployability in contested airspaces, will be ensured by innovative technical features, including a certain degree of stealth characteristics. The NGF will have to perform its missions alone or in cooperation with allied systems (interoperability) and the other FCAS systems. Thus, the fighter will likely have real-time data merging capabilities and high connectivity features.

The French might have expressly asked for a navalised version of the fighter, probably to minimise duplications during programme development, as is the case for F-35A (CTOL), B (STOVL), and C (CATOBAR). Conversely, the HLCORD does not mention any nuclear capability. Previously mounted exclusively on Dassault MIRAGE 2000N, the ASMP-A nuclear cruise missile (a component of the French nuclear deterrent) has been integrated on RAFALE F3. Albeit not specified, it is very likely that France will require FCAS to perform nuclear deterrence duties as well.

The F-35 as Benchmark

5th generation fighters do not ameliorate 4th generation fighters' capabilities linearly. Looking back at the history of fighter aircraft, it is possible to observe that 1st, 2nd and 3rd generation fighters were, respectively, evolutions of the preceding generation. The idea was to improve technology in order to make them able to fly higher, further, and faster. Instead, the 5th generation brings a revolution in the approach to air combat missions. This process involves outstanding technical features, but also important military and industrial developments that maximise their operational impact.

The Lockheed Martin F-35 is at the core of this revolution, and it is the point of reference for the Franco-German next generation fighter for at least two reasons. First, the F-35 is the 'state-of-the-art' and is expected to remain a cutting-edge technology (and philosophy) for the next decades as well. Second, should the Franco-German fighter be deployed within coalitions, it will operate along the F-35. The F-35 is an advanced multi-role fighter featuring some remarkable features – namely stealthiness and agility, avionics, and fully-fused sensor information, with the latter being the true revolution this fighter brings to pilots and to the battlefield. The pilot can focus on a number of limited, yet essential tasks (for example, deciding which kind of offensive or defensive action to take) rather than being in charge for the whole intelligence cycle. Due to sensor fusion, the F-35 provides pilots with a 360-degree real time situational awareness,

Photo: Georg Mader



The opening day of Le Bourget Paris Air Show 2019 was dominated by the unveiling of the FCAS mockup.

Photo: Georg Mader



At Le Bourget 2019, the French Minister of the Armed Forces, Florence Parly, her German colleague Ursula von der Leyen, and the Secretary of State from the Spanish Ministry of Defence, Ángel Olivares Ramírez, signed a first contract.

THEON SENSORS – a modern Greek wonder

Out of Athens, Greece, THEON SENSORS has stirred up the world market for night-vision and thermal imaging devices in the past few years, setting new standards and taking the global lead in its field. While the company started with a handful of people in 1997 serving the Greek market only, THEON SENSORS is today a dominant global force with more than 100,000 systems in operations or under contract in more than 50 countries around the world.

The early years

THEON SENSORS started early to adopt an extrovert business outlook with its first international contract award in 2004 for the supply of night driver viewers to the Australian Armed Forces. Additional export contracts followed while the breakthrough into the “premier league” of the international night vision market happened in 2010 when THEON SENSORS, unexpected by its global competitors, won the public tender for the supply of night vision monoculars to the Swedish Armed Forces. This contract was indeed a turning point for the company, where in recognition of the outstanding system quality and performance as well as the exceptional customer support, the Swedish Army placed orders of close to 15,000 systems over the five year contract period – much more than initially planned! While this was followed by major success in other European countries, such as the Netherlands and Denmark, THEON SENSORS expanded its

global reach through the establishment of two subsidiaries in Singapore and the UAE, while entering in co-production partnerships in various Asian countries.

The success story of the THEON SENSORS NYX night vision binocular

In 2013, THEON SENSORS launched the NYX night vision binocular in response to the apparent global trend of many end users to switch from monocular or bi-ocular to binocular systems. After a series of smaller contracts, THEON SENSORS continued its success with two breakthrough contracts for the NYX for the German Army and the German Special Forces KSK.

In cooperation with the KSK, the NYX binocular underwent an 18 month acceptance test period during which the system was tested in arctic, desert and jungle environments, which resulted in various upgrades and modifications of the goggle. The result of this “osmosis” between “Greek talent & entrepreneurship” and “German industrial DNA” was the all new upgraded NYX which provides outstanding optical performance at low weight but without compromising system robustness or ergonomics.

The “new NYX” continued its international success with contracts in Poland, Latvia, Portugal and Austria while THEON SENSORS’ partner SAFRAN-Vectronix received the contract award from the Swiss Army for the supply of 8,385 NYX night



Photos: Theon Sensors

THEON headquarters in Athens

vision binoculars, which will be locally assembled by SAFRAN-Vectronix starting in 2020. In support of its European activities, THEON SENSORS also established its German subsidiary “Theon Deutschland” in spring 2019, which was awarded its first contract for the supply of night vision clip on systems to the German Armed Forces in December of the same year!

Entering the US market

In parallel to its European campaigns for the NYX night vision binocular, THEON SENSORS signed a strategic partnership agreement in 2016 with the renowned night vision tube and system manufacturer HARRIS in the USA, which was recently acquired by Elbit Systems of America (ESA). This agreement provides HARRIS/ESA the rights to market and locally assemble the NYX night vision binocular for the US market under the designation F5032, using US 3rd Gen image intensifier tubes.

In summer 2019, Harris/ESA prevailed with the all new F5032 over all competitors, winning a 5 year IDIQ contract for a minimum of 14,000 goggles for the US Marine Corps. Interestingly enough, the F5032 (and thus indirectly the NYX) is expected to receive the US designation AN/PVS-31A, thus succeeding the L3 AN/PVS-31 as long term standard and presumed world’s best night-vision goggle of its class.

In March 2020, THEON SENSORS then opened its new US subsidiary further expanding its global reach.

The future in sight

The story of THEON SENSORS can indeed be described as a modern Greek wonder with a persistent vision of forging strong international partnerships. As such THEON SENSORS is on the road to become a true European Defense Industry Champion!



Photo: Georg Mader



A full-scale mockup of the Remote Carrier

allowing them to receive comprehensive intelligence from the battlefield, rather than rough information to be aggregated and analysed individually by pilots. All these features reshuffle the chain of command, putting the pilot at the base of it. Since the 5th generation fighter provides comprehensive threat identification and suggests potential actions to take for its neutralisation, pilots become unitary decision-makers in charge of choosing the best solution among different options autonomously proposed by the system. The more pilots are able to take autonomous decisions, the more the air force is able to fully exploit the F-35's peculiarities. Therefore, taking decisions on the

battlefield becomes less pyramidal, and it is split amongst a larger number of small decision makers, thus speeding up the whole decision-making process as well as increasing the resilience of the whole task force – which is now more difficult to decapitate. Furthermore, the F-35 has a revolutionary approach to interoperability. The Multifunction Advanced Data Link allows for sharing the data gathered by each platform with the others involved in the same missions – for example, modern and legacy strike aircrafts, as well as other aerial or ground-based platforms. This information sharing allows for reaching an unmatched degree of situational awareness.

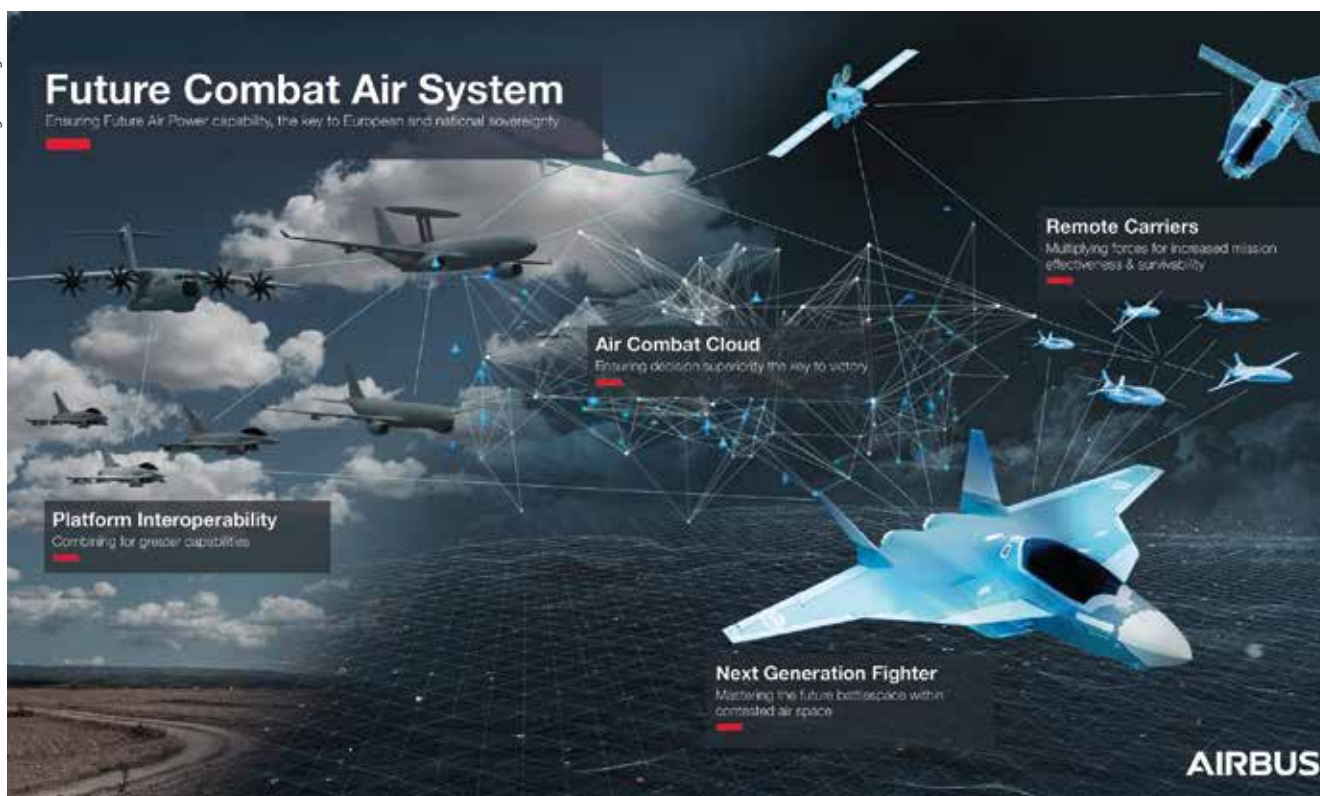
The Main Technical Challenges

The level of ambition for the FCAS is determined by the French and German agreement to develop dramatically towards 'state-of-the-art' air forces capable of making appropriate use of the disruptive technologies desired for the FCAS. As achieving strategic independence is one of the most important drivers for pursuing cooperation programmes, France and Germany must develop all the technologies required for the FCAS that are not yet deployed domestically. In order to maximise the limited resources for research and development of the programme, both countries will consider sharing as many components from other aviation programmes as possible.

The RAFALE F4 as Testbed

In the long term, the NGF will replace French RAFALE and German EUROFIGHTER. However, these models are expected to co-exist for a certain time, as currently is the case with MIRAGE 2000s and TORNADOs, respectively. Consequently, these aircraft will need to remain updated in order to remain relevant during high-intensity combat. This means that the companies involved in the FCAS programme will work on FCAS and on the upgrade of existing aircraft at the same time.

Image: Georg Mader



As a combat system of systems, FCAS will is to deliver increasing effects by leveraging the connected capabilities of pooled platforms.

In this context, French technical capacities and desiderata for the next version of RAFALE will be crucial for the FCAS programme as well, with the fighter to somehow serve as testbed for the NGF. The current F3R standard can be considered the final 'end-state' of the project as it was thought initially, as well as the final offer for the export market – which is substantially identical to the French version. As the French General Direction for Armament (DGA) defines it, the F3R is a "non-regression" intervention to keep the aircraft at the 'state-of-the-art'. Conversely, the F4 version, likely to be delivered from 2023, is intended to bring RAFALE's features typical of a 4th generation fighter as close as possible to those of a 5th generation fighter, at least in technological terms. Such a development will not only allow to maintain RAFALE's relevance on the battlefield in the next decades, but also to mutualise technologies developed for the integration on the NGF/FCAS. Such an evolution will not fully compensate for RAFALE's weaknesses, such as the limited autonomy without auxiliary tanks, but will be in line with the philosophy brought by 5th generation fighters, according to which software is more important than the airframe. The extensive work that has been carried out by

the DGA in the last years in terms of developing the next version of RAFALE can be an important starting point for preparing the French Armed Forces to the philosophical revolution brought by F-35 inspired systems. Cloud communications and a distributed approach to electronic warfare (EW), along with effective cyber security systems, are the main technologies to be integrated in the F4 version that will later be picked to substantiate FCAS. In these domains, the F-35 is considered as the model to follow.

In order to advance, as much as possible, the transition towards 5th generation fighters, RAFALE F4's communication systems will be enhanced to ameliorate the OODA loop (Observe, Orient, Decide, and Act). The 'Connect@aero' programme, already under development as part of an Air Force-wide innovation process launched some years ago, is the response to this requirement, and will likely be the basis for FCAS communications. This high-speed communication system and its additional connectivity ramifications will make the detection of enemy air defence systems more precise and collaboratively adapt the trajectories and manoeuvres of effectors and their munitions. The cloud will incrementally accomplish different operational functions, probably

starting with shared situational awareness, to then move towards predictive analytics allowing for a better and faster exploitation of large amounts of data. This system will be integrated into the RAFALE F4 due to the dedicated servers mounted on each aircraft, but it is thought of as a defence-wide one, allowing for the real-time collaboration of multiple assets to the information cycle. As the Chief of Staff of the French Air Force, Philippe Lavigne, said in an interview in 2018, "Connect@aéro will rely on major armament programmes such as the RAFALE (F4 standard), the A330 PHÉNIX as of its standard 2, the Contact and Syracuse communication programmes, the future European MALE UAV, the Light Joint Helicopter and many others, such as future munitions". With the FCAS system in place, the NGF will be in communication with a similar set of assets.

Concerning the distributed approach to electronic warfare, the French Armed Forces have abandoned the 'classic idea' of having EW-dedicated fighters or high-value assets based on civil aircraft. They rather opted to obtain a crowdsourced output from each fighter's individual EW capability. The aim is to minimise the impact of losses on the overall EW capability, which would be af-

Marketing-Report: Diehl Aviation

Europe's Defence Can Count on Diehl's Expertise

Together with France and Spain, Germany is developing the Future Combat Air System (FCAS) as a replacement for both EUROFIGHTER and RAFALE – to ensure Europe's sovereignty. From the very beginning, Diehl Aerospace has been involved in the development of new avionics and sensor technologies for aircraft systems. FCAS will be the largest defence programme in the decades to come. It will allow further expansion in the long run and thus strategically secure Europe's security and defence capabilities. The system is scheduled to be operational from 2040. Diehl Aerospace has been part of the core team since the very beginning of the programme. With more than 60 years of international experience in civil and military programmes, the German company has a recognised level of multifaceted expertise in the field of avionics and mission

equipment. It is part of the division Diehl Aviation, which combines the aviation expertise within the Diehl Group.

Together with other European partners in the military segment, Diehl Aerospace was instrumental in the development and manufacturing of all latest flying platforms, such as Airbus A400M, TORNADO, EUROFIGHTER, NH90 and TIGER. Furthermore, both Diehl Aerospace and Diehl Defence have maintained a reliable long-term partnership with the Bundeswehr.

Diehl Aviation is an established long-term first tier supplier for all major aircraft manufacturers in the international supply and aviation industry. Today, the German specialist is one of the world's leading development companies and suppliers for aircraft systems and cabin solutions. The company invests increasingly in research and development and has broad expe-

rience in the implementation of national research and development projects as well as international funding programmes. Thus, Diehl Aviation has become one of the innovation drivers in the industry. The business unit Diehl Aerospace has become the largest supplier of avionic systems in Germany and a leader in the areas of flight control, cockpit display systems, integrated modular avionics, mission and platform avionics.

During the current FCAS two-year joint concept phase (Joint Concept Study), Diehl Aerospace cooperates with the system leaders Dassault and Airbus Defence & Space. Furthermore, the company makes a substantial contribution in various national technology studies in order to further develop the EUROFIGHTER and in preparation of the Next Generation Weapon Systems (NGWS) as part of FCAS.

fects but never annihilated. The update of the existing RAFALE's SPECTRA suite in the F4 version will again allow for a technology transfer to FCAS' systems (solutions, libraries, doctrines, etc.).

Unknown Technologies

The NGF and its engine are the parts of the FCAS on which studies will likely advance faster than in other domains, namely stealthiness, manned-unmanned teaming and AI. In these domains, Rafale F4 cannot be used as

The French MoD is pursuing a comprehensive approach to the development of FCAS-related AI applications, encompassed within a Upstream Study Plan dedicated to Man-Machine-Teaming. The project is aimed at defining future cockpits and autonomous systems; identifying innovative technologies in the field of 'cognitive air systems', with a focus on decision-making autonomy and machine learning; developing concepts and technologies in the field of smart sensors. If the DGA assigned the studies on 'cogni-

schedule, and the limited funds allocated to defence expenditures, and in particular to R&D, are an additional challenge.

Unlike as was widely believed when Paris and Berlin announced the launch of the FCAS programme, the French industrial complex can identify technology challenges and practical obstacles of the programme due to the comprehensive experience gained with the development of RAFALE. Albeit the choice of producing a domestic multirole fighter has been more expensive than the procurement of 'off-the-shelf' foreign products, and has ended up with a less performing aircraft compared to others of the same segment this has empowered the French aerospace industry with outstanding skills. The fact that RAFALE F4 is expected to enter into service in 2023 will leave some room for improvements before the first flights scheduled for the NGF demonstrator. As has already pointed out, the possibility to transfer technologies already in use for three years on RAFALE to prototypes will allow to concentrate NGF's R&D efforts on 'new technologies', especially stealthiness and AI capabilities. Moreover, the fact that RAFALE F4 will be operational by 2025 will give French officers several years for evolving their mindset about the pilot's role and gradually integrate the new philosophical approach brought by 5th generation aircrafts in their daily work.

However, the success of the entire FCAS programme cannot be taken for granted, as various variables may still jeopardise its advancement. For example, the development of the F-35 cost at least US\$100Bn, while France and Germany struggled for two years before they had the motivation and scope to commit the first few million to the FCAS. Moreover, delays have been the norm when it came to European joint defence programmes. Airbus A400M Atlas and Eurofighter TYPHOON demonstrate well to what extent defence cooperation can prove difficult. As Dassault's Eric Trappier has recalled several times, the delay in the launch of the study phase for the NGF, that companies already expected in 2019, could finally end in a delay of final deliveries, or, worse still, in the need to revise capabilities downwards in order to deliver on time. Political and industrial divergences, and the need to effectively manage co-operation among countries having a different approach to defence issues are potential wildcards. Disagreements between France and Germany over arms exports, a crucial issue for the NGF, seems to finally be overcome due to a deal inked in October 2019. However, the imminent end of the 'Merkel era' and the German stance on NATO and overseas operations may still have a detrimental effect on the programme. ■



Photo: Dassault

A design proposal by Dassault for the NGWS

testbed due to its airframe and architecture (dating back to 1990s), but the nEUROn pan-European technological demonstrator can be of great help. Therefore, it is not surprising that, as Dassault's CEO Eric Trappier said at the company's 2020 annual conference, all data collected during the flight campaigns in the 2018-2021 period will directly serve for the FCAS development. As stealthiness is one of the demonstrators' main features, nEUROn serves as an important basis to better develop this characteristic, completely new for European defence companies – none of the existing European-made fighters has proper stealth features.

Some forms of manned-unmanned teaming have already been tested in February 2020 during the 5th flight campaign, due to a 'collaborative combat' exercise among nEUROn, five RAFALE and one E-3F AWACS. The DGA defined this test as "[...] rich in lessons learned in the field of low [radar] visibility and associated technologies", adding that the analysis of the data collected, ongoing in DGA's research centres, "[...] are expected to bring innovative elements to support our decisions over FCAS general architecture and technologies".

tive air systems' to Dassault Aviation and Thales, about 100 start-ups, SMEs, laboratories and research institutes specialised in AI, robotics and new human-machine interfaces will contribute to the Upstream Study Plan. In particular, they have been solicited for the development of cutting-edge algorithms and disruptive solutions. Here again, nEUROn should serve as an interface to test the best solutions among the ones available.

Final Remarks

As depicted, developing a 5th (or 5th and a half) generation aircraft is everything but an easy task, and there are many challenges still ahead. Fighters, along with submarines, are among the most ambitious and complex defence programmes that a country can pursue. The willingness to develop such a programme in co-operation with other partners and as a part of a broader aeronautical programme that totally revolutionises the functioning of the Armed forces are additional sources of complexity. Initial delays in the kicking-off of the programme compared to the first

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Image courtesy Nick Dawson

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Italy's Parliament in Support of Defence Programmes

Luca Peruzzi

During the last quarter of 2019, the Italian Parliament approved a significant number of the MoD's capabilities programmes some of which have already been contracted in 2019 with others to follow in 2020.

The turbulence of the last two years in the Italian Parliament and Government, characterised by various party coalitions, has disrupted the work of the Parliament and MoD, with negative consequences for the capabilities and efficiency of the armed forces, national industry, workforce, international com-

Land and Joint Programmes

The main defence programmes approved by Parliament and contracted at the end of 2019 mainly concerned equipment, vehicles and weapon systems for the Army. The Italian Army, which has suffered from budget cuts in recent years, needs a larger procure-

some 20,000 SICs out of a total requirement of over 65,500 SICs within a total budget of €1.6Bn. In addition to the bulletproof vest and helmet from Consortium Protezione Balistiche Italia with the companies Larimart and Ares Cosmo from Leonardo, the SIC focuses on the Beretta ARX-160 and ARX-200 assault rifles, APX pistol, PMX submachine gun, Victrix SCORPIO sniper rifle, grenade launcher and optics, C2 suite with the portable Leonardo SDR HH EVO software defined radio, Larimart portable computer with touchpad display unit, TC2 software, night vision goggles

and thermal imaging cameras. Another long-awaited contract concerns the procurement of additional 8x8 VBM FRECCIA wheeled armoured vehicles from the CIO consortium, which includes Iveco Defence Vehicles (CNH Industrial Group) and Leonardo as prime contractor. As a result of a new agreement between the MoD, MISE and Ministry of Finance (MoF), the original supplementary contract covers 30 AIFVs, including five in the combat version and 25 in the anti-tank version, as well as a ten-year support package and options for a further 11 units, with deliveries starting at the end of 2020 due to the consortium's efforts, after production had been suspended for an extended period due to a lack of funds. 249 FRECCIA VBM have been delivered to the Italian Army in the AIFV combat version with a two-man HITFIST Plus turret, able to accommodate eight fully equipped soldiers, an anti-tank version like the combat version with two anti-tank SPIKE missiles, and a command post and mortar carrier versions. The vehicle is equipped with the Thales TDA 2R2M 120mm mortar, which was put into service last year. The latest contract, signed in December, covers the remaining 381 vehicles to be acquired under a multi-year programme, including the development of a new Freccia VBM EVO Evolved version. However, the lack of funding has postponed the award of the contract, which has increased protection against mines and IEDs



Photo: Luca Peruzzi

After a protracted production stop, the MoD awarded the CIO consortium, including Iveco Defence Vehicles (CNH Industrial Group) and Leonardo, a new contract for additional 30 FRECCIA AIFVs.

mitments and market opportunities. The deteriorating situation has forced political parties and the current governing coalition to overcome this trend, although disagreements within the governing coalition over the allocation of resources may continue to interfere with their progress. The funds for the multi-year programmes came from the regular budget of the MoD, the Ministry of Economic Development (MISE) and the long-term extra-budgetary investments for the development of the country and the central administration (2019 to 2033). The actual allocation of funds, however, may be subject to fluctuation.

ment initiative. The Land Forces Directorate of the MoD has approved multi-year contracts for combat equipment for Soldato Sicuro, the FRECCIA infantry fighting vehicle (AIFV) and SPIKE anti-tank missiles. As an offshoot of the 'Soldato Futuro' development as part of Forza NEC's Concept Development and Experimentation phase, the 'Soldato Sicuro' programme delivers next-generation individual combat equipment package including clothing, protection, weapons, sensors and command and control. In addition to the 6,000 SICs already delivered, the new contract for the Soldato Sicuro consortium, which includes Leonardo and Fabbrica di Armi Pietro Beretta, includes

and advanced mobility, vehicle electronics architecture and firepower. The VBM EVO will feature a new unmanned turret, developed by Leonardo, which will be compatible with both the Mk44 and a new 30mm cannon, also from Leonardo. A launch contract for the new version is expected to be signed by the end of 2020.

The MoD also signed a contract for more than €100M with Rafael for the delivery of 126 launching system and 800 SPIKE LR long-range anti-tank missiles in addition to 14 in-door/14 outdoor simulators to be delivered from 2021. The SPIKE is replacing the outdated MILAN medium-range and TOW long-range anti-tank missiles. SPIKE will equip nine additional regiments and adds to the 96 launchers in service with seven regiment against an overall requirement for 24 regiments and additional launchers.

However, the Parliament has given the 'green light' for the acquisition of light multi-purpose vehicles (LMV) VTLM 2 LINCE, manufactured by Iveco Defence Vehicles and equipped with new generation C3, jammers and remote-controlled weapons systems from Leonardo. After the platform and mission equipment qualification in 2019, the initial batch of already contracted 34 vehicles is expected to be delivered by late 2020. The MoD submitted a request for additional 650 LINCERs in different configurations, including a light variant with simplified C3 and armament within an overall estimated €558 million budget, of which 398 vehicles under a €305.1 million first-tranche is expected to be contracted in batches from 2020, while the remaining will come with a follow-on tranche yet to be funded. The Army has already acquired 1,700 vehicles in the ear-



Photo: Italian Army

The Soldato Sicuro consortium including Leonardo (65%) and Beretta (35%) received a contract for 20,000 additional individual combat packages including C3 equipment, weapons and sensors.

lier VTLM 1 version while the new version overall procurement requirement stands at 3,600 vehicles.

The MoD also completed the Light Utility Helicopter (LUH) programme based on the Leonardo AW 169M, which received the 'green light' in November 2019. The aim of the programme is to replace the helicopters AB-412/212, AB-205/206 and A-109 with a single platform - the twin-engine 4.8-ton Leonardo AW-169M. Last December, the Army awarded Leonardo a €45M contract for the procurement of two AW-169M in a training configuration with two years' support and the initial development of an 'advanced multi-purpose' version. The latter is subject to a new contract under negotiation with Leonardo, together with the procurement of additional 15 AW-169M, as well as a comprehensive logistics and training package for both the first two helicopters as well as the follow-on batch with simulator training sessions held at Leonardo's Train-

ing Academy. The new version will serve a wide range of military and home/disaster relief missions. It is equipped with a 'state-of-the-art' all-weather avionics with EO/IR tower, self-protection and communication equipment for networking with other air, land and sea platforms within the NEC Forza programme. The AW-169M, which can be deployed and armed abroad, received military type certification last year. To date, 22 helicopters have already been delivered to the Guardia di Finanza. Procured for the Carabinieri Armed Forces in an initial series of seven helicopters, it has become the standard for the MoD and other state agencies.

After a long delay, the MoD awarded a €95M contract for the development, certification and integration of the Common Anti-Air Modular Missile-Extended Range (MBDA CAMM-ER). The CAMM-ER will replace the ASPIDE missile, which is the effector of the Army's SKYGUARD, the Air Force's SPADA and Navy's ALBATROS air defence systems (SHORAD) and will be phased out in 2021. The new CAMM-ER, developed as part of a joint initiative between Italy and the UK, features the same 'state-of-the-art' active search and soft-launch system as the CAMM version, with a new longer airframe, controls and a larger rocket motor to achieve a greater range of more than 40 km. MBDA has recently successfully completed initial trials. The programme also aims to develop and qualify a launch system based on the ISO 20 platform with its own up/downlink, to be integrated into the Army's new GRIFO SHORAD system. The focus will be on Forza NEC's new battle management module with the Oerlikon X-TAR 3D radar, the Air Force's Medium Advanced Air Defence System (MAADS) with the SIRIUS command post and the Leonardo KRONOS land radar, while the Navy will follow suit. The weapon production and support phase will be financed separately.

Within the framework of the 2019 to 2021 Multi-annual Planning for Defence, the MoD

Support for the Italian Red Cross

In order to survive the COVID 19 crisis, which has affected both Europe and the rest of the world, many people are coming together and supporting each other. Some regions of Europe are less affected by the crisis than others, but those with a larger number of COVID-19 cases need urgent support.

One of the companies that is helping those most in need is PELI Products, a manufacturer of protective cases and lighting systems. Peli has provided assistance in the form of a donation of a large set of its PELI 9600 linear lighting systems, a product that is particularly efficient in providing temporary mobile lighting, as required in the field hospitals and triage areas where Italian COVID-19 patients are treated. Further sets have been delivered to north-west Italy for other emergency first-aid centres.

Backed by the remarkable support of thousands of volunteers, the Italian Red Cross has been at the forefront of the fight against the pandemic from the start. As Francesco Rocca, President of the Italian Red Cross, recently stated, it is committed to transforming this extraordinary period of time into the 'Time of Friendliness'.

As a result of donations from companies such as PELI Products, the IRC will continue to participate and support health workers and help with the home delivery of food and medicines to the elderly, at-risk groups and anyone else in isolation.



Photo: Peli

awarded Leonardo a contract in March 2019 for the supply of the 'New Generation Identification Friend and Foe' (NGIFF) equipment, updated to the latest NATO standard Mode Five Baseline Three, and its integration on board the land and naval platforms of the armed forces. The contract for the six-year programme is worth €75M. Leonardo will supply several hundred NGIFF interrogators and cryptographic units to upgrade dozens of land and naval platforms. The NGIFF systems will enable the MoD to comply with NATO's mandate to use 'Model Five' capable systems as a minimum military requirement for air-to-air and ground-to-air identification. Further funding will be required to equip the airborne platforms of the armed forces with the same capabilities. Parliament also approved the acquisition of Iveco's new Lince 2 LMVs for €54M in order to improve the tactical mobility of Carabinieri forces, both in overseas operations and operations at home.

Naval Programmes

The Navy's submarine programmes were the focus of Parliament, which approved the acquisition of four new submarines with AIP equipment under the U212 Near Future Submarine (NCCR) programme, with funding from MISE. Based on the successful U-212A platform, developed with Italian and German cooperation and intended to replace the four ageing SAURO class

Photo: Italian Army



The Parliament gave the 'green light' for the procurement of 650 Lince 2 LMVs by Iveco Defence Vehicles and combat equipment from Leonardo.

awarded in 2020 and the first NCCR 212 is scheduled to enter service in 2025. As an evolution of the current U212A boats, they will feature important improvements developed by Italian industry, including a propulsion and energy storage system based on a new generation lithium-ion battery system, supported by an air independent propulsion (AIP) system using second generation fuel cells. The new platform will include a new generation combat and communication unit and control centre, new underwater and surface sensors, UUVs, Leonardo's Black Shark Advanced torpedoes and possibly an attack missile capability.

in 'dual-use' applications, ensure Special Forces projection in theatre and a deployable command platform for both amphibious and underwater operations. The SDO/SURS will be equipped with advanced diving equipment to rescue submarine personnel in distress with either a deployable resident or NATO-navies' provided Submarine Rescue System and a Submarine Rescue Diving Recompression System, in addition to deep-underwater operations, medical and extended SF C2 facilities. The €424M programme planned to be awarded in 2020 includes the platform, underwater operations equipment suite, a 10-year integrated support package, an advanced hyperbaric centre for military, civil personnel training and applied medicine research. The Navy also received funding for the development, production and support of the new EVO version of the MBDA TESEO Mk2A missile to ensure the service's ability in defending against against ship/strike missiles. In addition to the development of the new Mk2/E version of the Mk2/E missile to meet future operational requirements, the programme also includes support for the current stock of TESEO missiles, which will reach the end of their life in 2020 if no further support measures are taken. The Navy is working on a 'tailor-made' heavy anti-ship solution based on an advanced TESEO missile, which would have twice the range of the current version, greater effectiveness at the target and greater land attack capability. The improved guidance package will include an advanced radar seeker with an active electronically scanned antenna. The total programme to be financed by MISE, which amounts to €395.5M, now only covers the first phase of the development of the new missile version and the activities to extend the life of the current version. A contract award is planned for 2020, but not



Photo: Leonardo

The MoD awarded the contract for the first phase of the Army's LUH programme based on the Leonardo AW-169M platform.

submarines, the multi-year programme contract for €1.35Bn will cover the design, development, construction and delivery of the first two new generation submarines, as well as a ten-year logistics and training package. The contract will also include a €1Bn option to procure the remaining two boats plus support. The contract is expected to be

The MoD also approved the procurement of a new Special Forces and Diving Operations/Submarine Rescue Ship (SDO/SURS) to replace the ageing ANTEO platform, which has been in service since 1980. The SDO/SURS modular design will allow to accomplish the following main tasks: act as a 'support ship' for diving operations

for the new missile production and the ten-year support package.

The MoD also received the 'green light' for the procurement and 10-year support of two new 'underwater transporters' for a special unit in the COMSUBIN command of the Navy. The order is worth €90M. Although no further details have been given, it is likely that these are diver delivery vehicles.

Space and Air Programmes

As a first step towards the establishment of a Space Command, the recently established Special Office in the Italian General Staff will oversee the operations and assets of the new unit, including the new OPTSAT-3000 optical reconnaissance platform, the SICRAL family of communication satellites and dual-use radar-based COSMO-SkyMed Earth observation satellites. The first generation of four SkyMed satellites are equipped with high-resolution X-band synthetic aperture radar (SAR) systems for Earth observation by day and night and in all weather conditions. They were financed by the Italian Space Agency, , MoD, Ministry of Education, and University and Research, and were designed and built by Leonardo and its subsidiaries Thales Alenia Space and Telespazio. They are now to be replaced by a new generation of X-band radar satellites. Parliament has approved the procurement of the 3rd and 4th new second generation COSMO-SkyMed satellites. The first satellite was successfully launched in December 2019 and the second will be launched in 2020. The second-generation COSMO-SkyMed satellites will offer significant improvements in terms of performance, coverage, resolution, flexibility and response time compared to the first generation models, which are gradually being replaced. The multi-annual programme, with a budget of €212M, will be funded by MISE.

On the basis of the MoD's 2019 to 2021 DPP financing document, the OCCAR agency, on behalf of Italian and French MoDs, awarded a contract in November 2019 under the MULTinational Space-based Imaging System (MUSIS) Stage Two programme to the industrial consortium led by Thales Alenia Space, which includes Airbus Defence and Space, for the development and manufacture of the MUSIS Common Interface Layer (CIL). The primary objective of MUSIS is to provide France and Italy with easy, reliable and secure access to the individual capabilities of each country based on the French Composante Spatiale Optique and the Italian COSMO-SkyMed radar-based second-generation satellite constellations, e.g. satellite tasking and image production, thus enabling the mutual use of two complementary space systems. The CIL to be placed between the user ground segments of the two national space systems will enable users of one nation to task the space system of the other country and to receive, store and retrieve image products in a secure manner.

The Air Force will also benefit from the acquisition of 17 additional Leonardo AW-139 helicopters in the customized HH-139 variant to fulfil the SAR and and Slow Mover Interceptor missions in addition to civil protection tasks and to replace the ageing AB-212 (HH-212) platforms. The additional rotary wing aircraft will complete the current fleet size of 13 HH-139, which is not capable of fulfilling the assigned missions. The programme includes a ten-year support package. The procurement programme, which is scheduled to start in 2020, has a total budget of €760.7M financed in two tranches of €408M and €352.7 million respectively.

The parliamentary approval for the modernisation of the P-180 AVANTI fleet in service



Photo: MBDA

The Italian MoD finally signed the €95M contract for the development, certification and integration phase of the MBDA CAMM-ER programme.

with the Armed Forces enabled the MoD to award Piaggio Aerospace Industries a contract for the delivery of nine P-180 aircraft in the Evo Plus version, four of which will be used in a flight inspection configuration. Six aircraft in the VIP/Utility/Training configuration will replace the same number of older Air Force aircraft that cannot be retrofitted, while the remainder will complement the fleet to perform all assigned tasks. The remaining force fleet of 19 P-180s (of which 11 are operated by the Air Force, 3 by the Army, 3 by the Navy and 2 by the Carabinieri) will be converted to the new AVANTI II Plus. In addition, special consoles for flight inspection configuration will be purchased together with a ten-year fleet support package and a new flight simulator. The programme requires €143M. To partially offset the cancellation of the procurement programme for the new P-2HH Medium Altitude Long Endurance (MALE) systems with an estimated cost of €766M, Parliament also approved the completion of the development and certification of the P-1HH MALE system, which comprises two aircraft and a control station and is intended to serve as a 'test bed' for surveillance and reconnaissance technologies, including support for the EuroMALE programme, for an estimated €160M. The MoD has also awarded Piaggio contracts for engine/aircraft maintenance and overhaul.

The MoD also approved the programme to upgrade the self-protection capabilities of multi-engine aircraft in service with the Air Force. For €243M, these platforms will be equipped with a self-protection suite against the full range of threats including congested electromagnetic scenarios. ■



Photo: Luca Peruzzi

The Parliament gave approval for the procurement of four new AIP-equipped submarines under the Navy's Near Future Submarine U212 programme.

Armoured Vehicle Programmes in the Central and Eastern European Region

Michał Jarocki

Over the past several years, most of the countries in the Central and Eastern European region have invested a significant amount of time and financial resources in the modernisation of their armed forces, as a reaction to the sudden deterioration in relations between the West and Russia.

Very high priority was given to the procurement or upgrade of different types of heavy armoured vehicles, like main battle tanks, infantry fighting vehicles, or artillery systems. Modernisation of the fleet of 142 LEOPARD 2A4 main battle tanks to the 2PL standard remains one of the top priority programmes of the Polish Armed Forces.

However, according to information provided recently by the Armament Inspectorate, which acts on behalf of the Polish MoD, deadlines for delivery of upgraded MBTs won't be met. The current estimates predict that the full fleet of 142 modernised LEOPARD 2PL vehicles will be delivered to the Army by 31 July 2023 (with 43 vehicles in 2020).

However, until today the MoD of the Inspectorate hasn't confirmed successful finalisation of the testing phase. Therefore, it is possible that the whole process continued at a slower pace than expected and eventually had to be extended by additional weeks or months. It is even more probable, when taken into consideration the current crisis situation related to the COVID-19 pandemic.

"The tests of the LEOPARD 2PL prototype have not yet concluded due to a number of areas, which still need to be confirmed in terms of their compliance with several dozen requirements included in the Technical Specification," Major Platek informed in February.

He further added that despite continued trials of LEOPARD 2PL prototypes, the whole modernisation programme is well under way. Furthermore, several dozens of serial-production LEOPARD 2A4 MBTs were expected to be already stored at ZM Bumar-Labedy facilities and awaiting the upgrade. "The contractor verified the technical condition of the stored vehicles and is upgrading them in parallel to ongoing trials," said Platek. "Particular MBTs are in different stages of the modernisation process", he added.

In reference to Major Platek's statement, PGZ confirmed that "it is not a secret that the modernisation of LEOPARD 2A4 MBTs to the 2PL standard is delayed. At the moment, we are in the final stages of testing of the prototype vehicle, which was manufactured [and delivered - ESD] by our German partner Rheinmetall." "We can confirm that the agreement contains several amendments, which clarifies the terms and conditions it includes. It is a normal procedure in relations between a contractor and a contracting authority, especially in the case of such complicated and technically advanced programmes, as modernisation of Leopard 2A4 MBTs."

Photo: Rheinmetall



The modernisation of 142 Polish LEOPARD 2A4 main battle tanks to the 2PL standard is currently the most important programme of the Polish Land Forces.

It is run by a consortium of ZM Bumar-Labedy, a subsidiary of the Polish Armaments Group (PGZ, Polska Grupa Zbrojeniowa) and a number of other companies of the Group. German Rheinmetall Landsysteme is a strategic partner of the project.

Modernising Polish LEOPARD MBTs

The original contract, signed at the end of 2015, called for modernisation and delivery of 128 vehicles by late 2020, whereas the additional agreement, reached in 2018, added an optional batch of 14 upgraded MBTs, which were to be transferred to the Army in 2021.

On 24 December 2019, the Armament Inspectorate signed an amendment to the original agreement, covering additional works and services which need to be provided as part of LEOPARD 2PL modernisation. In result, €124M had to be added to the programme's budget, bringing the total cost of LEOPARD 2PL modernisation to €700M.

At the moment, the Polish Army awaits delivery of first LEOPARD 2PL prototype vehicles, which have undergone intensive tests and trials for over a year. According to Major Krzysztof Platek, a spokesperson for the Armament Inspectorate, testing period was expected to conclude by the end of March, which would allow for the prototypes to be handed over to the Army at the end of Q1 or in the beginning of Q2.

"The deadline for the conclusion of the contract is an important factor, but not the only determinant of its proper finalisation, which has to be taken into consideration by both sides of the agreement. (...) Our priority is to deliver a product, which complies with the requirements of the MoD. We work hand in hand with representatives of the department to assure that upgraded MBTs will reach the Army at the nearest possible date."

PGZ added that "irrespective of the ongoing trials of the LEOPARD 2PL prototype, ZM Bumar-Labedy is continuously engaged in the initial process of manufacturing and assembly of a number of LEOPARD 2A4 MBTs, which were delivered to the manufacturer for the awaited upgrade. These works will allow to step up deliveries of manufactured MBTs, once the final configuration of the LEOPARD 2PL vehicle is accepted by the Army."

Overall, the LEOPARD 2PL modernisation programme includes implementation of a number of new on-board systems and equipment to the platform, such as: new/upgraded observation and aiming sites for the commander and gunner, improved ballistic protection



Photo: Rheinmetall

The LEOPARD 2PL modernisation programme has noted a 2-3 year delay and significant cost overrun. Delivery of upgraded MBTs to the Polish Army should commence in 2020, to be completed by 2023.

of the turret, new electronic system for turret traverse and cannon elevation, installation of more effective fire/explosion prevention system, new command and control system, additional APU generator, additional cargo carrying equip-

ment and upgraded evacuation/towing system adjusted to the higher weight of the platform, new fire control system, new ammunition (DM63 antitank and DM11 multipurpose) and day/night reverse camera for the driver.

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Photo: Michał Jaroński



The upgraded LEOPARD 2PL MBTs are equipped with a host of new features.

Upgrade of Obsolete T-72M1s

The future fleet of 142 modernised LEOPARD 2PLs will constitute the core of Polish Army's main battle tank fleet, complemented by 105 relatively modern LEOPARD 2A5s. The country will also have to rely on 270 T-72M1 obsolete, Soviet-era MBTs and 233 PT-91 TWARDY vehicles, which are a locally designed modification of the former platform. However, these days MBTs of the Soviet/Russian origin present a minimal combat capability and are considered as not meeting the requirements of the modern battlefield in terms of firepower, speed, range, observation or survivability.

In a move to improve the combat capability of the most obsolete MBTs, the Polish

MoD launched in 2019 a programme for an overhaul and minimal upgrade of over 300 T-72M1 vehicles. The agreement was signed at the end of July 2019 between the MoD and a consortium composed of the PGZ, ZM Bumar-Labedy and Wojskowe Zakłady Motoryzacyjne (WZM). A number of other public and private defence companies, like PCO or OBRUM, were also involved in the project.

The first batch of upgraded T-72M1 MBTs was delivered to the Polish Army in late 2019. Shortly after the vehicles undergone first field trials. Further deliveries should run through to 2025. Overall contract's value is €382M.

The scope of works under the contract will be limited by the capabilities of the local defence industry. "We are modernising the equipment which is in the

inventory of the Polish Army. Thanks to this upgrade, main battle tanks will be equipped with modern targeting, navigation and observation systems, as well as new digital communications," said Mariusz Blaszczak, the Minister of Defence. In result of the overhaul, T-72s full operational capability will be resorted.

The programme calls for an overhaul and modification of up to 318 T-72M1 MBTs. It is an equivalent of five combat battalions, each equipped with 58 tanks plus two reserve companies with 28 vehicles. However, some representatives of the Polish MoD, like Wojciech Skurkiewicz, the Secretary of State, informed in the past that the Polish Army is currently in possession of only 257 T-72 MBTs. This means that for the programme to conclude as planned, the department would have to restore a number of vehicles which are kept in reserve or were even phased out and are currently stored by the Military Property Agency (Agencja Mienia Wojskowego, AMW).

Despite the fact that the upgrade of T-72-M1 MBTs was long awaited, the programme has fallen under wide criticism. Mostly due to its limited scope, due to which the vehicles will undergo only a minor modification, which won't significantly enhance their firepower or operational capability.

Furthermore, the programme has a limited budget, which is a result of a number of other, higher priority modernisation or procurement projects being followed by the MoD at the moment. In result, the upgrade plan does not include such essential modifications as replacement of engines and transmissions (and installation of a modern, highly efficient power-pack), stabilised cannon with a fire control system, new ballistic protection kits, like the explosive reactive armour which is mounted on the modernised PT-91s, or procurement of new, more modern ammunition.

The Army Needs Next-Gen MBTs

According to the Polish MoD, the programme to overhaul and upgrade of the fleet of T-72M1 MBTs is just an interim solution. Its goal is to allow the Army to maintain a significantly high number of main battle tank in active duty units, until the time comes to gradually phase out the most obsolete vehicles and replace them with newer ones. "We all await and work for the start of construction of new generation tanks by the Polish de-

Photo: Polish MoD



Around 300 T-72M1 MBTs will undergo an overhaul and limited upgrade in order to restore their minimal operational capability.



Photo: Polish MoD

Polish Armed Forces have a requirement for procurement of several hundred next generation main battle tanks in order to completely revolutionise the national MBT fleet, most of which is composed of obsolete vehicles. Poland would like to develop the new MBT independently, with the maximum possible involvement of the local defence industry.

fence industry," acknowledged Minister Blaszczak.

The Polish MoD has already announced its intention to launch in the undefined future the 'Wilk' programme, under which the country will procure several hundred of next generation MBTs. These new vehicles will allow the Army to phase out obsolete T-72M1s and PT-91s and will supplement the LEOPARD 2PLs and 2A5s in the line of service for the time being. Eventually, new MBT would also be intended to replace these two platforms as well.

At this moment it remains unclear, which path will Polish authorities choose in order to successfully launch and conclude the 'Wilk' programme. One plan calls for designing and developing of the new platform independently, with the use of the manufacturing capabilities of the local industry and scientific institutions and minimal support from foreign partners.

"We are restoring manufacturing capabilities in regards to armoured vehicle technology. (...) Restoring this capability (...) is another step towards establishing an industrial base for future works on the new main battle tank for the Polish Armed Forces," Witold Slowik, the President of the Management Board of the PGZ at that time, admitted in 2019.

Furthermore, in May 2019 PGZ confirmed its intention to work on the new Polish MBT platform. "PGZ is launching a research and development programme on

the new MBT for the Polish Army," declared Slowik during the European Economic Congress in Katowice. Later on he explained, that the Group has the capacity to independently design and develop particular, selected elements of the platform. This indicates that other parts of the vehicles, essential subsystem, would have to be procured from abroad or designed in partnership with foreign entities. The alternative is that Poland would develop a next generation MBT in cooperation with foreign partners. The country could apply to become a member of one of pan-European projects, such as Franco-German Main Ground Combat System (MGCS), which Poland shows a considerable level of interest in.

Over the past several months, Polish authorities have signalled their interest in the project and expressed intention to become a part of it. In a common view, becoming a partner in the MGCS project would could significantly benefit the local defence industry and in the long term would allow Poland to modernise its obsolete MBT fleet by the introduction into service of a next generation, European-designed platform.

'We will discuss the project of the European main battle tank. We would like to participate in it and in the future, if such a platform was developed with our help, we would equip [our armed forces - ESD] with it', said the President of Poland, Andrzej Duda, at a press conference held in early February during an official visit of his French counterpart, Emmanuel Macron in Poland. The Polish leader added that he would like to see extensive participation of the local defence industry in the project.

Regardless which path would Polish authorities follow on the way to the procurement of next generation MBTs, it seems obvious that the country would have to become open for cooperation with foreign entities and political partners. Developing the new combat platform either independently or in partner-

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Photo: Michał Jaroński



Under the BORSUK programme, the Polish Army intends to procure several hundred modern tracked infantry fighting vehicles, which will replace the current Soviet-era BWP-1s.

ship with Germany and France under the MGCS project, Poland will also seek to allow its own defence manufacturers to benefit from the programme.

New IFV will Change the Posture of the Polish Army

Under the BORSUK programme, the Polish Army intends to procure several hundreds of modern, tracked infantry fighting vehicles (IFV). According to some estimates, the country has a requirement for over 2000 such vehicles. They will replace the currently operated, Soviet-era

BWP-1s, which are obsolete and no longer meet the requirements of the modern battlefield.

The new IFV platform is designed and developed by the local defence industry. Huta Stalowa Wola, a subsidiary of PGZ, is the leader of the project. During the International Defence Industry Exhibition (MSPO) 2019 in Kielce, the manufacturer presented a prototype of the next generation swimming IFV (Nowy Bojowy Pływający Wóz Piechoty, NBPWP). The prototype of BORSUK/NBPWP has already undergone a series of intense static and dynamic field trials, during

which a number of its functionalities, such as speed, manoeuvrability, survivability, and firepower were tested. The manufacturer had also to confirm that the platform complies with high technical and tactical requirements of the Polish Army.

The future Polish IFV will be equipped with a locally designed 30mm turreted, remote-controlled weapon system (Zdalnie Sterowany System Wieżowy, ZSSW-30), which will also become a standard equipment of the currently operated Rosomak/Patria AMV 8x8 armoured personnel carriers. The ZSSW-30 turret was designed to fight, destroy, and suppress enemy light and heavy armoured targets and other objects – including the enemy's infrastructure – in different climate conditions, and to provide fire support for units during combat operations, at any time.

According to the manufacturer, the new Polish IFV platform will have a swimming capability, making it able to cross wide water obstacles, as well as to operate in diversified terrain and various weather conditions. Furthermore, the NBPWP vehicle will be characterised by its high manoeuvrability and ability to be easily transported by air or land.

The next generation Polish IFV will provide a high level of ballistic protection for the crews and dismounted soldiers, withstanding direct shot from firearms and rocket-propelled grenades, as well as the explosion of IEDs or mines. The manufacturer intends to develop several variants of the NBPWP, from a light, swimming vehicle to a heavily armed combat platform.

Photo: Michał Jaroński



The OTTOKAR-BRZOZA programme calls for the procurement of a series of modern tank-destroyers to be stationed primarily in the northeast of the country, near the so-called Suwalki gap.

Modern Tank Destroyers

Under the OTTOKAR-BRZOZA Poland intends to procure a number of modern tank destroyers. Lately, the Armaments Inspectorate has confirmed that five local and international companies submitted their applications to take part in the technical dialogue procedure. This process precedes all future MoD tenders in Poland.

The Polish Army wishes to arm its future tank destroyers with anti-tank missiles and advanced sensors. They will replace the currently operated, Soviet-era BRDM-2 vehicles, armed with obsolete 9P133 MALUTKA-P effectors. These obsolete land systems no longer meet the requirements of the modern battlefield and do not provide enough protection for the crew.

The current technical dialogue is actually a second iteration of the project. Its goal

is to allow the Armament Inspectorate to determine and better define a number of technical requirements for the future tank destroyer platform. The initial procedure allowed only tracked vehicles to be included in the consideration, while the current one admits also wheel-based platforms.

The list of companies participating in the technical dialogue includes: AMZ Kutno, MBDA UK, Lockheed Martin Global, Rheinmetall Defence Polska – a subsidiary of Rheinmetall Landsysteme GmbH and state-owned PGZ – which acts on behalf a number of its subsidiary companies, such as Rosomak, OBRUM, HSWola, Jelcz, WZM or Wojskowe Zakłady Uzbromienia.

Lockheed Martin and MBDA-UK are expected to offer their renowned anti-tank missile systems, HELLFIRE and BRIMSTONE 2, as the main armament of the new tank destroyer. Both companies are ready to integrate their missile systems with any kind of tracked or wheeled vehicles, which will be selected by the Polish Army.

Which platform could it be, will depend on submitted offers. Rheinmetall and AMZ Kutno could present a number of platforms ready for integration with anti-tank weapon systems. However, it's the PGZ which seems to be the frontrunner in the terms of providing the drive base for the future tank-destroyers, as its subsidiaries have already delivered a number of tracked and wheeled armoured vehicles to the Polish Armed Forces, like the KRAB/K9 or Rosomak/Patria AMV 8x8. Therefore, selection of one of these chassis for the OTTOKAR-BRZOZA programme would be less risky in terms of operability of the new platform and could allow to generate extra savings to programme's budget.

New IFVs for Czech Army

In early 2020, the Czech MoD announced its intention to significantly increase defence spending. The department has a wish for around a quarter of its budget to be invested in the procurement of new or modernisation of currently operated military equipment.

The MoD has a particular goal of strengthening the Czech Army, by enhancing its operational capabilities and combat strength of field units. Therefore, the department decided to allocate €2.7Bn for the country's defence expenditure, which represents around a 13% increase on the previous year.

The department intends to spend around €653M on the procurement of new mili-

tary equipment or the modernisation of currently operated weapon systems. "The goal is to modernise and strengthen our army," said Lubomír Metnar, the Minister of Defence of the Czech Republic in early 2020. "Modernisation of the army is my absolute priority. We are doing our utmost to ensure that our troops have the best equipment available."

the Czech programme, Projekt System & Management GmbH, a JV between Krauss-Maffei Wegmann and Rheinmetall Landsysteme GmbH, eventually decided not to make a bid.

The IFV procurement is described as the biggest modernisation programme in the recent history of the Czech Armed Forces. Therefore, the country awaits significant

Photo: Michal Jarocki



A number of local and foreign manufacturers have shown interest in the OTTOKAR-BRZOZA programme. The future tank-destroyer will most likely be based on one of the tracked/wheeled platforms offered and manufactured by the local defence industry.

The main goal of Czech MoD's modernisation efforts in 2020 will be the finalisation of the highly anticipated procurement of 210 tracked IFVs, which the country has been following for the past several years. The project has an estimated value of about €1.8 billion.

New IFVs will replace currently operated, obsolete BVP-2s, which are of the Soviet-origin and therefore no longer are capable of operating on the modern battlefield. Furthermore, by not providing sufficient level of protection capabilities, either active or passive, they constitute a threat to the security of their crews.

However, not only the Czech Army is awaiting a final decision on the new IFV. The same anticipation accompanies for three manufactures, which in late 2019 submitted their bids in the tender. These are: General Dynamics European Land Systems (ASCOD 2), BAE Systems (CV90) and Rheinmetall Landsysteme (LYNX). The fourth company, which had shown its interest in

benefits for the local defence industry, which would be involved in the project as subcontractors or manufacturers. All three bidders have already presented their plans for involving the local defence companies in the production and delivery of new Czech IFVs. Furthermore, all three confirmed that the production of new vehicles could be moved to the Czech Republic with the maximum possible level of transfer of technology.

The IFV procurement is a cornerstone of the plan for modernisation of the Czech Armed Forces. New vehicles will be fielded by the Czech Army's 7th Mechanised Brigade. Currently, the unit is equipped with obsolete BVP-2s and modernised T-72M4CZ MBTs.

GDELS as One of the Frontrunners

One of the manufacturers, which decided to make a bid in the Czech tender, is GDELS. One of major armoured vehicle

manufacturers in Europe offered its ASCOD 2 platform, which has already been selected by the armies of Austria, Great Britain, and Spain in the ULAN, AJAX, and PIZARRO programmes respectively. The offer was customised in accordance with the Czech Army's requirements. Therefore, the ASCOD vehicle will feature a number of improvements to its design, which will enhance its operational capabilities. The platform will be coupled with a selected turret system. During the IDET 2019 exhibition held in Brno, the company showcased its vehicles integrated with the unmanned UT-30MK2 turret from Israeli Elbit Systems. The manufacturer stated that the platform could also be fitted with a manned MT30 system, if the Czech Army had such requirements. GDELS confirmed that it is ready to integrate any kind of manned or unmanned

to involve local defence companies in the IFV programme. Therefore, its intention to set up a local production of new vehicles based on the ASCOD design, and involve Czech defence companies in the process.

The company also states that its Czech partners would be added to its global chain of suppliers and subcontractors. This would allow them to offer their products globally, strengthening their market position and improving sales opportunities.

Delayed or Cancelled?

In recent days, the Czech Prime Minister, Andrej Babiš, has announced that his government considers putting a hold on the IFV programme, either by postponing or even cancelling it. The head of the Czech government noted that due

ing forward to commissioning new IFVs, which would allow to phase out obsolete, Soviet-era vehicles, and therefore enhance its operation capabilities, especially at a time of heightened tensions between the West and Russia.

The same level of uncertainty might accompany the bidding companies. They invested their time and funds in promoting their designs and partnering with local defence companies, which were expected to play a significant role in the manufacture and introduction of new IFV to the Czech Army. However, at least at this moment, some of the companies don't seem to be worried by the latest announcements of the Czech authorities.

"Rheinmetall views the Czech Republic as a key market and will continue to invest and partner with Czech companies for the foreseeable future. We will fully respect the decisions of the Czech MoD and comply accordingly," said Oliver Mittelsdorf, a senior VP in Rheinmetall's Vehicle Systems Division.

He continued by saying that "Rheinmetall is working closely with the Czech MoD and will do their utmost to meet their requirements of today and tomorrow. Rheinmetall will always remain open, transparent and flexible to the Czech government's future defence, technology and automotive needs".

"Our strategy has always been one of a long-term investment in the Czech Republic with local defence partners. We do not foresee any changes in our commitment to working with the Czech defence industry and our plans have not altered one bit," Mittelsdorf said.

New Mortar Systems for the Czech Army

The planned procurement of future IFVs is not the only modernisation programme of the Czech Army, which might be subject to change of investment priorities of the country's authorities. The same problem might relate to the acquisition of new, self-propelled 120mm self-propelled mortar systems, which the Czech Armed Forces desperately require. New mortars are expected to replace the currently operated self-propelled SPM-85 PRAM-S and towed M1982 PRAM-L artillery systems.

One of the companies, which expressed its intention to participate in the programme is Finnish Patria. The manufacturer already presented a turreted, remote-controlled NEMO mortar system. During the presentation, which took



The Czech MoD intends to procure 210 modern IFVs under the programme, which has brought attention of a number of European manufacturers

turret with the ASCOD platform, depending on Czech Army's final selection. The fact that the vehicles was presented in Brno with the Israeli UT30MK2 was simply a result of company's previous integration tests and did not relate directly to the requirements of the Czech Republic. The manufacturer made also a strong point about the industrial part of its offer presented to the Czech MoD. GDELS is well aware of the Czech requirements,

to the current COVID-19 pandemic, his country might have to transfer budget resources to other, more important projects.

"The army can wait. We probably do not need infantry fighting vehicles immediately, but we need other things for this coronavirus war", Babiš said. The perspective of delay or even cancellation of the tender puts Czech Armed Forces in difficult position. The service was look-

place at the IDET 2019 exhibition, the system was set on the AMV 8x8 chassis. However, according to its representative, Risto Paloposki, who is business development manager at Patria, the company does not plan to make the AMV 8x8 chassis a part of its offer, as it is aware that the Czech Army would prefer to integrate the future mortar system with one of the vehicles, which it already operates, such as the PANDUR II 8x8. The country's MoD might also decide to integrate the future mortar system with a number of vehicle types, which the manufacturer is also ready to comply with.

The Czech Army has a requirement of 62 new self-propelled mortar systems, which the country's authorities would like to manufacture locally, with the help of the local defence industry. It might seem that the modest number of mortar systems planned for procurement would be enough for foreign industry partners, like Patria, to set up their local production under the transfer of technology agreement.

The other company which might show interest in the Czech mortar programme is the Polish Huta Stalowa Wola. The manufacturer could offer its M120 turreted mortar systems, which can be integrated with wheeled and tracked vehicles.

Hard Decisions for Slovak MoD

The procurement of 81 VYDRA 8x8 wheeled armoured vehicles is one of the most important and highly anticipated programmes of the Armed Forces of Slovakia. The programme has a planned budget of approx. €417M.

However, the country's MoD has so far failed to secure the contract. The planned acquisition of a vehicle, which was designed by the local defence industry and Finnish Patria, stalled due to a number of difficulties, resulting in harsh criticism of the programme coming from the country's political opposition.

It was expected that the final decision on the procurement of 81 VYDRA 8x8 wheeled armoured vehicles will be taken by the Slovak MoD in the first half of 2019, shortly after the conclusion of all tests and trials of the vehicle's prototype. The test, which were to evaluate the platform's operational capabilities in different terrain and climate conditions in Slovakia and Finland, concluded according to plan and provided the expected positive outcome. However, despite positive results of field trials, the procurement programme was suddenly delayed due to harsh criticism it

Photo: Michal Jaroš



Due to the ongoing COVID-19 pandemic, the Czech procurement programme might be delayed or even cancelled.

faced from the country's political opposition, including the parties, which formed the central government after February general elections. The opposition argued that the cost of the acquisition was too high. It also questioned the legality of the decision taken by the Slovak MoD, to select the Patria AMV platform for the future wheeled, armoured vehicles of the Slovak Army.

Furthermore, the project became the subject of investigation of the country's Office for Public Procurement (UVO), an institution which controls the execution of public tenders in Slovakia. Its goal was to verify, if that particular procurement programme

was carried out in accordance with the country's law.

In late 2019, the Slovak authorities stated that the production of VYDRA 8x8 vehicles won't commence prior to country's general election, leaving the final decision of acquisition of the new APCs to the new government, which was sworn in March 2020.

At this moment it remains unsure, how will the new Slovak Government deal with the VYDRA 8x8 programme. Especially, that the country will have to face far more disturbing problems related to the COVID-19 crisis and the economic crisis, which might be the outcome of the pandemic. ■

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German Heavy Transport Helicopter Approaching

Current Status of the Procurement Programme

Andre Forkert

The Bundeswehr is looking for a successor to the ageing CH-53 transport helicopter fleet. The Heavy Transport Helicopter (HTH) competition will also have a decisive impact on the German Armed Forces' future capacities.

The two bidders submitted their first offer in mid-January. The Bundeswehr intends to make a type decision in early 2021. 2020 began with an important development in the STH competition. On 13 January, the two competitors – Sikorsky (a Lockheed Martin company) and Boeing – submitted their initial bids to the German procurement authority BAABw in Koblenz. Sikorsky is proposing the CH-53K KING STALLION, supported by German technology companies such as Rheinmetall and MTU Aero Engines. Boeing is pitching the CH-47 CHINOOK, in partnership with various German industrial partners.

Significance of the STH Programme

The STH programme is of great significance for the Bundeswehr. It is about the question of whether the German armed forces can meet the increasing demands on the alliance and national defences and the role they will play in international conflicts in the future. The STH is to replace the outdated medium-weight CH-53G/GS/GA/GE transport helicopters in the German Air Force. Not even one third of a total of 69 CH-53 (3 x CH-53G, 40 x GA, 20 x GS as well as 6 x GE) aging aircraft of the Air Force is currently operational. The Bundeswehr started fielding the CH-53G weapon system as early as in 1972. Modernisation is, therefore, an urgent requirement. According to the BAABw, the retiring of selected CH-53s, currently

Photo: Lockheed Martin/Sikorsky



31 CH-53K aircraft in different manufacturing stages are in currently in production at the Sikorsky site in Stratford, Connecticut.

in service, will take place in parallel to the STH introduction.

The bids submitted in January – the offer documents numbering several thousand pages – are so-called 'indicative offers'. On the basis of these documents and requirements of the Bundeswehr, the BAABw and its contenders will work out the relevant milestones for a binding offer. Negotiations are scheduled to begin in spring 2020. At present, a decision on the contract award is expected at the start of 2021, with the first aircraft to be delivered at the beginning of 2024. The offers envisage first deliveries three years after the contract is awarded.

It is still undecided as to what kind of contract will be awarded. For example, Sikorsky or Boeing could become the prime contractor with several subcontractors, or there could be a large number of subcontracts

with the respective suppliers. On the basis of the indicative offers, BAABw can, in principle, select the best pieces as if from a 'shopping cart' and in the end demand the best and final offer from both contenders. Another interesting aspect of the tender is that probably different quantities – depending on the model that emerges as the winner – will be subject to the proposals as different numbers of the two helicopters would be required in response to the operational requirements of the armed forces. According to usually well-informed circles, the requirement will come down to 60 CH-47 or 44 CH-53K.

For the BAABw, however, the programmer brings some innovations. For the first time in over 50 years, a helicopter will be procured from abroad.

The reorientation of the maintenance concept is also noteworthy. For example, in

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contrast to the CH-53G, the Bundeswehr requires that maintenance be carried out at Bundeswehr sites. Maintenance personnel from the Air Force and industry are to work there side by side. In the first 36 months after the introduction of the aircraft, the industry will be responsible for 100 per cent of the performance. This gives the Air Force time to build up its own capacities. Maintenance personnel for the 'theatres of operation' must be recruited from the pool of trained soldiers, and the industry can also be called upon to provide support in safe operational areas.

It is the dedicated objective of the Bundeswehr to procure a product built to military specifications according to the 'Military off-the-shelf' principle (MOTS), i.e. a product available on the market, and to certify it according to the military certification criteria of the so-called DEMAR regulations, which are based on the civil EASA EU Aviation Safety Agency. The approval is carried out in close cooperation with the German Federal Armed Forces Aviation Office. The offers from both contenders also have to include detailed information how the certification is to be carried out.

As a result, a new development was ruled out right from the start and challenges such

as those encountered in past procurement programmes (A400M, EUROFIGHTER, NH-90, TIGER, etc.) are to be avoided. However, due to the individual requirements of the German Armed Forces, the helicopter can only partly be called a MOTS product. The current plans, for example, envisage an aircraft that will differ significantly from those of the US Army or the US Marine Corps (USMC). An example for this 'Germanisation' is the installation of radio equipment or demand for a weather radar. The cockpit will have to accommodate considerably more equipment than, for example, the helicopters in the US Army. These and other additional equipment items required will significantly increase the take-off weight, take up additional space and, therefore, inevitably increase the complexity of the system.

The US Army uses the CH-47 CHINOOK in different versions: purely as a support and logistics helicopter and in a special forces version. The USMC uses the CH-53K exclusively as a support and logistics helicopter. In contrast, the Bundeswehr plans to combine a variety of capacities in one model. The new STH is to be a support and logistics helicopter that is suitable both for armed Combat Search and Rescue (CSAR) missions and special forces opera-

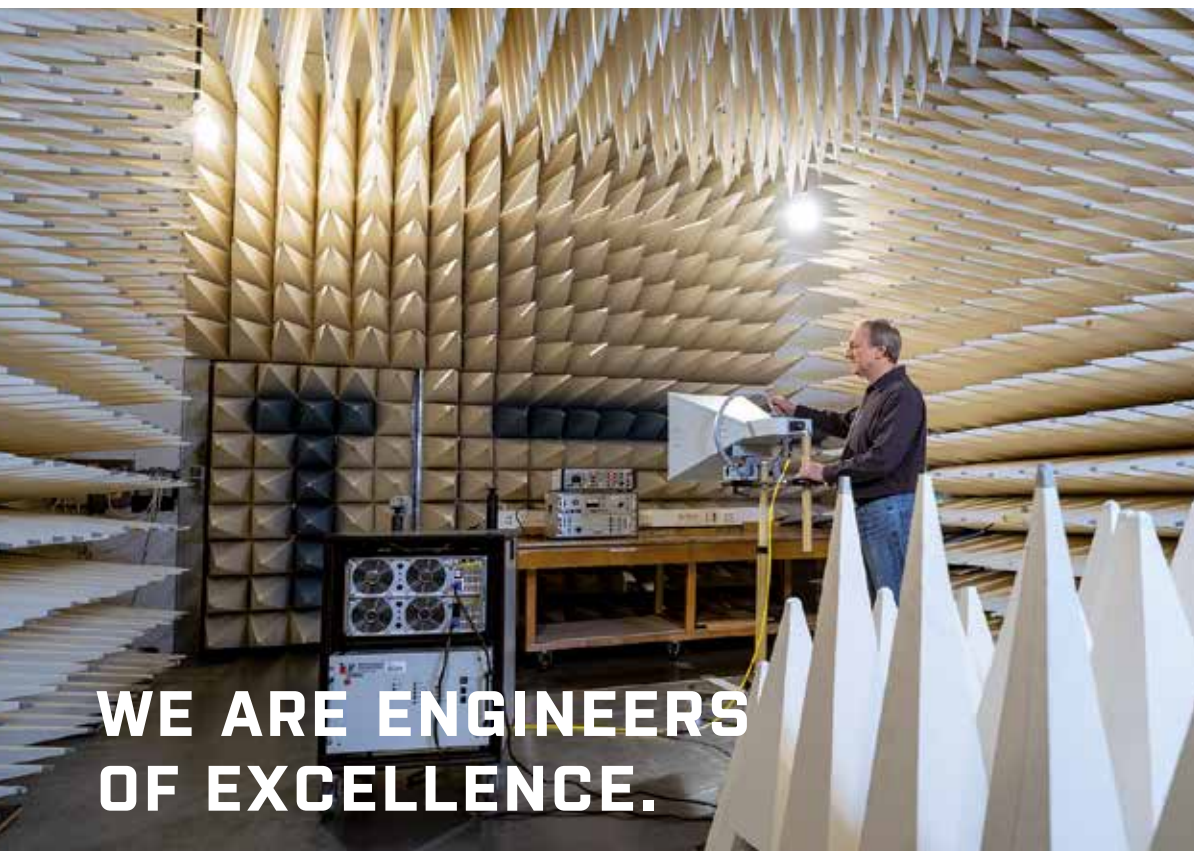
tions. The STH will also be used for disaster relief, medical evacuation and humanitarian missions.

However, which of the two helicopters best meets the demanding requirements of the BAABW? Let us now compare the two contenders.

Sikorsky CH-53 KING STALLION

"The CH-53K is the most modern, most intelligent and most powerful heavy-duty helicopter," Frank Crisafulli, Director of Business Development at Sikorsky, said when submitting the bid for the helicopter. With a transport capacity of 16 tonnes, the aircraft would fully meet the requirements and would, therefore, be the right decision for the Bundeswehr.

The Sikorsky helicopter has been developed for military requirements. The newly developed CH-53K can be upgraded with little effort. It can be expanded with future technologies and comes with an autonomous flight capability based on fly-by-wire flight control, which supports the pilots, freeing them from routine tasks. An integrated sensor and diagnostic system helps to detect problems at an early stage, which



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Technical Comparison		
	H-47 CHINOOK – Extended Range (ER)	CH-53K
Length	30,20 m	30,20 m
Rotor Diameter	18,30 m	24,00 m
Overall Height	5,69 m	8,60 m
Width	4,80 m	5,30 m
Max. Take-off Weight	24.494 kg	39.900 kg
Payload	12.284 kg	15.900 kg
Max. Payload underslung	11.793 kg	16.300 kg
Cruising Speed	291 km/h	315 km/h
Service Ceiling	6.096 m	4.880 m
Range	998 km	752 km
Engines	2x Honeywell T55 with 3.529 kW each	3x T408 with 5.600 kW each

CH-47F CHINOOK Team	
Company	Task / Technology
Boeing	Team leader, production of the frame in the US
Aero Bildung	Type-specific training for technical personnel
CAE	Simulation (mainly flight simulators)
Aircraft Philipp	Components
Cotesa Composites	Composite components
Honeywell	Auxiliary turbines, hydraulic and pneumatic components
Rolls-Royce	Engines
Diehl Defence	Electronic warfare systems, especially DIRCM
Liebherr Aerospace	Components
Reiser Simulation und Training	Simulation
ESG Elektroniksystem- und Logistik	In-service support and lifecycle services
Rockwell Collins Deutschland	Cockpit Avionik
Rohde & Schwarz	Radios

CH-53K KING STALLION Team	
Company	Task / Technology
Lockheed Martin/Sikorsky	Team leader, production of the frame in the US
Rheinmetall	Management, MRO, simulation, training technical documentation
ZF Luftfahrttechnik	Transmission, dynamic components
Autoflug	Interior equipment, seats, MedEvac-equipment
Hydro Systems	Landing gear, ground maintenance equipment
MTU Aero Engines	Engines
Vincorion Aerospace	Winch
Liebherr	Landing gear, hydraulic components
HENSOLDT	Radar, sensors, EW systems
Collins Aerospace	Cockpit avionics
Rohde & Schwarz	Communications

simplifies maintenance and ensures the efficient operation of the entire fleet.

Its mid-air refuelling capability, extensive communication systems and a wide range of electronic countermeasures make the transport helicopter particularly suitable for CSAR missions, disaster relief and fire fighting from the air as the CH-53K can transport up to 12,000 litres of water. Compared to its predecessor, the CH-53G, it can deliver more than four times the amount of water. In addition, it can simultaneously transport firefighters and material to the scene of the fire. Alternatively, the aircraft can be equipped with medical equipment as a heavy rescue helicopter.

The CH-53K is characterised by a high degree of interoperability. On the one hand, it enables fast cargo handling. It uses the same pallets as the two transport aircraft of the German armed forces, the Airbus A-400M and Lockheed Martin C-130J SUPER HERCULES. This is also advantageous for NATO, as these aircraft are in use in France, Spain and UK. Thanks to the compatibility of the pallets, cargo can be transshipped quickly and easily between the aircraft. The CH-53K can, therefore, bridge the last mile of transport, as it can reach remote areas where larger transport aircraft cannot land. Secondly, attention needs to be drawn to the fact that a US Lockheed KC-130 tanker aircraft has successfully mid-air-refuelled the CH-53K. The US Air Force is also introducing this type with the C-130J.

One way or another, the German armed forces will have to source their heavy transport helicopter from abroad. Nonetheless, Germany will benefit in the long-term from the added value created by the programme. "More than 70% of the services required to operate the CH-53K are provided in Germany by German companies," said Mike Schmidt, Managing Director of Rheinmetall Aviation Services. The project will create more than 500 high-tech jobs in Germany and will secure 'knowledge transfer' to German industry for at least the next 40 years. Sikorsky and Rheinmetall are also planning to build a logistics centre and a fleet management centre at Leipzig/Halle Airport. According to Rheinmetall, up to 370 jobs are to be created over the next 15 years. This would mean that maintenance and support of the Bundeswehr's new transport helicopter would be carried out centrally in Leipzig. In addition, the CH-53K programme relies on a partnership with German industry. "Our strong team consisting of leading German technology companies ensures the success of the STH programme," explained Tim Paul, Head of Sales at Rheinmetall Aviation Services. "Sikorsky entered into an early partnership with more than 10 key players in



Photo: Lockheed Martin/Sikorsky

A CH-53K overflight

German industry, including industry leaders like Rheinmetall, MTU, Autoflug and Hydro. The STH programme is managed by an integrated project team, which is stationed with the troops in Holzdorf. In addition to the maintenance, training and logistics infrastructure, a permanent project team will be established to coordinate the work between both partners and with suppliers during the helicopter's service life, in order to ensure successful integration of the CH-53K, high availability, reliable support and maintenance," Paul continued.

The programme is lead by Sikorsky (the helicopter frame itself will be built in the US) and Rheinmetall (as operator and responsible for maintenance, technical modifications, logistics, training, simulation, technical documentation and the cyber and IT security concept). MTU Aero Engines participates in the production and maintenance of the engines, Autoflug is responsible for the safety systems, seats and the MedEvac system, ZFL for the dynamic components, Vincorion for the rescue winch and Hensoldt for self-protection. Hydro is responsible for ground support equipment, which includes maintenance equipment and the development and maintenance of the manufacturer's tools. This includes triple jacks, tie rods and tools for rotors and engines. Thomas Elsner, a member of Hydro's Executive Board and CFO, stated, "A decision for the CH-53K would be a forward-looking decision for our company for a period of more than 40 years. Our largest German site in Biberach would benefit considerably from a contract award". For HYDRO, the programme would offer the opportunity to increase its 'footprint' in military aviation as a business area. Hydro is a medium-sized company with around 750 employees, which has supplied the German Army with tools for the maintenance of the current CH-53G for many years, among other things.

Liebherr (responsible for landing gear), Rockwell Collins (avionics) and Rohde & Schwarz (communications) are involved in both the CH-53K and CH-47 teams and have, therefore, already been confirmed as winning the competition. With the SOVERON AR (Airborne), Rohde & Schwarz offers a software-defined aircraft radio, which is already

integrated with the EUROFIGHTER, NH90 and A400M. It has a frequency range of 30 MHz to 512 MHz, meets civil and military avionics standards, is controlled via MIL-STD-1553B data bus or serial RS-485 interface and is suitable for jet and propeller aircraft, helicopters and drones.

The CH-53K is currently in use with the USMC. Sikorsky guarantees the USMC an availability rate of at least 89%, which, according to Sikorsky, was exceeded in the test and introduction phases. The USMC plans to purchase a total of 200 aircraft. First deliveries will take place in 2023/24 with the aircraft being relocated to the ships. This means that the introduction into service will not be affected by delays.

Boeing CH-47 CHINOOK

Boeing is offering the CH-47 CHINOOK, or more precisely, a version similar to the Canadian armed forces' CH-147F based on the CH-47 Extended Range (ER) version. The main difference is the installation of the air-to-air refuelling probe, which is otherwise only available on the MH-47G aircraft in the US Army. The German aircraft will have the air-to-air refueling capability, but the refueling probe will not always have to be on board. Should air-to-air refueling be necessary, it will be installed easily and quickly. With the MH-47G, the US use a second variant for special forces. The ER version has a

range of 1,000 km and a service ceiling of 6,100 m. Equipped with Common Avionics Architecture System from Rockwell Collins and Digital Automatic Flight Control System, the aircraft was specially designed for conventional transport tasks, SAR missions and missions in support of special forces. It also complies with German requirements.

Boeing has always stressed that the CH-47 is the only helicopter of this size that is 'ready-to-go', immediately available and 'combat proven'. This statement is 100% true, as the risk associated with the Boeing offer is certainly lowest, if at all. Another advantage is that many NATO allies and neighbours already use this type of aircraft, including the US, Canada, UK, the Netherlands, Spain, Italy, Greece and Turkey. France is planning to lease some helicopters to gain experience of them and then make a purchase decision, if necessary. France has just received CH-47 support from the UK in Mali. The type is used by 20 countries. The strengths of the CH-47F are primarily its technical maturity (low development risk), its market availability (ongoing production of high numbers), its wide distribution (great potential for multinational cooperation), a long service horizon (the US Army wants to use the aircraft until at least 2060) and its range without air-to-air refuelling (only the ER). Boeing currently produces three to four aircraft a month in Philadelphia, and will continue to do so for some years to come. According to Boeing, the CH-47 is also a cost-effective aircraft, the flight hour is said to cost about US\$8,000 to 9,000.

"The CHINOOK provides the German armed forces with a state-of-the-art, high-performance, multi-role helicopter. It is not an aircraft under development and therefore there is no risk associated with the CHINOOK procurement. We have an active production line and more than 950 aircraft in use or on order from 20 countries, includ-



Photo: Boeing

A CH-47 CHINOOK supporting US Special Forces

ing eight NATO customers. The Chinook offers immediate interoperability at the lowest operational and acquisition cost," said Michael Hostetter, Vice President Boeing Defence. "When we deliver the aircraft to Germany, we want Germany to be able to train in country and maintain and service the CHINOOK. That's why we are fully committed to ensuring that parts of the production, maintenance and training are carried out in Germany with our German partners," Hostetter emphasised.

torque. Block II also includes a single-segment fuel tank on each side (previously three tanks), electrical system improvements and other improvements, as yet not specified. Officially not part of Block II, but nevertheless closely related to it, is the replacement of the two engines. Reportedly, there have already been initial tests with the existing General Electric (GE) T408 engine on a CHINOOK. These engines also power the Sikorsky CH-53K KING STALLION.

Boeing also says that all the capabilities required by Germany are already in use by other countries, but not in an all-encompassing version. If the CH-47 were to be selected, the Bundeswehr would procure 60 aircraft. More aircraft with more crews is certainly an advantage regardless of the payload because not all missions fly with the maximum load. However, this advantage will only be valid until the Bundeswehr comes up with the idea of reducing the number of aircraft by limiting the number of flight hours. According to Boeing, it is also possible to deliver the aircraft faster than desired by Germany. However, a faster growth would be helpful to quickly close the gap of the current CH-53 fleet.

The CH-47 is also said to be so cost-effective because inspections and maintenance can be carried out in the open air and do not require a hangar. Moreover, the CHINOOK is operated and maintained on an 'inspection base', engines need to undergo overhaul only after 3,000 flight hours. The glass cockpit is made by Rockwell Collins Deutschland GmbH from Heidelberg, so maintenance can also be carried out here. While the topic of self-protection systems is still open, discussions with Hensoldt are already taking place. German CAE Elektronik GmbH is responsible for aircrew training systems and services.

Photo: Boeing



A CH-47 CHINOOK hauling heavy loads

Arguably, a drawback of the CH-47 is that it is said to have a low growth potential given the age of the design. However, since the US armed forces want to use the helicopters until at least 2060, continued development is inevitable and has already commenced in the scope of the 'Block II' programme, which includes new rotor blades, improved transmission systems, non-segmented tanks and an increase in payload (approx. 1.8 t) and range. According to a Boeing spokesperson, Germany will receive a 'German' variant with several Block II elements, which will include the improvements available then.

On 16 January 2020, Boeing announced that the maiden flight of the CH-47 CHINOOK Block II with the new Advanced CHINOOK Rotor Blade (ACRB) had taken place. In March 2019, the maiden flight took place of the CH-47 Block II – at that time still with the standard rotor blades. Boeing has not yet announced any further details about the current test, only that the new ACRBs will give the helicopter an additional lift of 771 kg. The original plan was to provide a lift capability of 680 kg (at 4,000 feet and 35°C when hovering).

In addition to the new rotor blades with advanced geometry and a new asymmetric airfoil, Block II includes a new propulsion system to cope with the higher

torque. For the new, more powerful and heavier engines, a new engine mounting on the rear pylon is necessary. Since the T55 rotates in the opposite direction, a new transmission is also necessary, Boeing explain. The engine replacement is part of the Future Affordable Turbine Engine programme and will certainly not be available shortly. The US Army has announced that Boeing has been awarded a contract for MH-47G Block II helicopters, with 15 aircraft to be delivered between 2020 and 2022. Starting in 2023, the new CH-47 Block II helicopters will be procured while the Block I helicopters will be converted. The final US Army Block II fleet will consist of 473 CH-47F Block II aircraft. In addition, the 69 MH-47G helicopters of the US Special Operations Command will receive similar product upgrades. This would be in parallel with the Bundeswehr's procurement planning. Although Block III is not a programme yet, and no decisions have been made, it has already been suggested that Block II be followed by another product improvement. A possible Block III programme will then probably begin at the end of the 2030's or start of the 2040's. According to current plans, the product improvements will be developed between 2027 and 2040. One topic, in particular, will be to turn the CH-47 into an Optionally Piloted Vehicle.

Conclusion

The bids have been submitted. Now it is important to make the right decision in order to stay on schedule as the new helicopter is urgently needed. For a number of reasons, the CH-53 fleet has reached the end of its service life and the planned modernisation and overhaul measures are proceeding at a 'snails pace'. With the CHINOOK, the Bundeswehr would not take any risks and introduce an aircraft that performed reliably for many years. The CH-53K is certainly a more modern helicopter, although Boeing still has Block II and III in the pipeline. These plans must also be taken into account when considering the total costs.

Regardless of which type is selected, the Bundeswehr capacity profile will see a quantum leap. There must not be any delays due to shortcomings in the procurement process or because of political interference. The force urgently needs the capacity, and as soon as possible.

Moreover, it is difficult to compare the two systems on offer. It is a bit like comparing 'apples and oranges', as both have their advantages and disadvantages, which is why it is difficult to evaluate the price difference. ■

Shorter Waves, Better Performance

Thomas Withington

There is growing military interest in extremely high frequency communications which offer promise in outflanking electronic attack while carrying wideband traffic.

The history of tactical communications has been a story of electromagnetic migration. Almost twenty years before the Second World War radio pioneer Guglielmo Marconi demonstrated shortwave radio transmissions, today referred to as High Frequency (HF: three megahertz/MHz to 30MHz) communications. The crucible of war prompted further innovation: Very High Frequency (VHF) telecommunications, using frequencies of 30MHz to 300MHz were pioneered before the conflict, along with Ultra High Frequency (UHF) radios transmitting on wavebands of 300MHz to three gigahertz/GHz. All the belligerents involved in the war used HF and V/UHF radios, and militaries continue to depend on tactical communications employing these wavebands. Conventional military radio communications have remained in these wavebands since that conflict 75 years ago. In one sense there is an 'if it ain't broke don't fix it' argument to be made regarding these bandwidths. Quite simply, HF and V/UHF frequencies work and are dependable. HF provides global ranges using the ionosphere; an upper layer of the atmosphere between 60 km and 1,000 km in altitude. High Frequency signals cannot penetrate this and are bounced back to earth; the ionosphere working like a satellite dish which provides the intercontinental range, albeit at reductions in data capacity compared to V/UHF.

V/UHF on the other hand can carry exponentially more data but is restricted to a Line-of-Sight (LOS) range. For air-to-air, and air-to-ground/ground-to-air communications this does not present too much of a problem. A radio in an aircraft is for all intents and purposes atop of a very high transmitter: An aircraft flying at 30,000 feet (9144 metres) will have a line-of-sight range of 213 nautical miles (394 km) and will be capable of reaching any other V/UHF radio



Photo: Library of Congress

V/UHF radio communications were pioneered during the Second World War. These wavebands have remained standard for military voice and data traffic, and look set to remain so in the future.

within this range. Yet such distances begin to diminish the closer one gets to the Earth's surface as the curvature of the planet creates progressively more of an obstruction to the LOS range of V/UHF transmissions: An antenna six feet (1.8 metres) above the ground will have a LOS range of just 5.6 km. This explains the tall antennas seen on armoured vehicles work to extend the LOS range of V/UHF transmissions as much as possible, but contemporary tactical communications continue to rely on V/UHF transceivers, which both act as radios and radio relays to allow communications traffic to reach beyond LOS ranges by 'skipping' across each transceiver until reaching the traffic's intended destination.

There are some important differences between VHF and UHF which are relevant to this discussion. VHF signals travel (propagate) well through the air, and can penetrate an array of non-metallic surfaces, although their disadvantage is that large antennas can be required to equip VHF radios. This is not only because high antennas are needed to overcome LOS restrictions, but because as a general rule-of-thumb antennas have to be a quarter of the wavelength that they

will handle. This can make VHF antennas between 70 cm and 150 cm long. An added encumbrance is that VHF is highly congested with commercial and broadcast radio, television and cellphone traffic being just three of the waveband's occupants. Antenna sizes are smaller for UHF radios on account of the shorter wavelengths and can be typically between 7.62 cm and 15.2 cm in length. Yet UHF transmissions cannot penetrate solid objects and propagate slightly less well with a higher risk of interference although with the benefit of this band being less congested.

EHF

As far as tactical communications are concerned, barring Satellite Communications (SATCOM) which can overcome these LOS and bandwidth restrictions, but which require an expensive, accompanying constellation of spacecraft, ground stations and infrastructure to work, not to mention dedicated SATCOM equipment, the frequencies used by the world's armies to communicate have remained largely unchanged. Yet change could be in the offing.

Author

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Photo: US Navy



While V/UHF antennas are still more manageable than their HF counterparts, they add height to a vehicle, as can be seen here with the antennas atop of these AM General HMMWV vehicles.

There is the potential that tactical communications could migrate into Extremely High Frequency (EHF) wavebands of 30GHz to 300GHz in the coming years. Dr. Timothy Hancock, programme manager for the microsystems technology office at the US Defence Advanced Research Projects Agency says that EHF communications can provide “a level of inherent physical security against eavesdropping and jamming,” adding that “at higher frequencies, there tends to be more absolute bandwidth in the spectrum available for use. This can be leveraged for higher data rate communications.” For Dr. Peter Barker, a lecturer in communications and electronic warfare at Cranfield University’s Centre for Electronic Warfare, Information and Cyber the higher frequencies used by EHF “provide greater bandwidth, and hence data rate, capacity” compared to the V/UHF frequencies more routinely used for tactical communications.

Characteristics

Like all radio wavebands EHF has advantages and disadvantages: EHF wavebands generate very narrow beam widths measuring millimetres, hence such frequencies also being known as Millimetre Wave (MMW). Basic physics explains what this means and why it is significant. The frequency of 35GHz has a wavelength of 8.56 mm. The narrower the beamwidth, the harder the transmission can be to detect using an electronic support measure. These narrow beam widths give EHF transmissions very low sidelobes. Sidelobes are residual beams of radiation which fan out either side of the main beam when a radio or radar is transmitting. A

way of visualising sidelobes is to place an illuminated torch on a glass table. In the reflection, one can see that the main beam is flanked either side by other light beams which fan out and gradually lose intensity the further they are from the main beam. Sidelobes can be used to detect a radar or radio without being within the Field-of-View (FOV) of the main beam. Once the emitter is detected via its sidelobes electronic attack can be directed into the radar or radio using these sidelobes; allowing the one performing electronic attack to be outside the FOV of the main beam. The low sidelobes and highly directional nature of EHF transmissions can make them very hard to detect using an electronic support measure: Radio transmissions which are hard to detect are hard to jam.

Photo: US DOD



EHF communications could be useful for providing a wide band link for unattended ground sensors allowing the carriage of real time video traffic, for example, across line-of-sight ranges.

Moreover, the antennas required for radios transmitting in these frequencies are small. A general rule of thumb says that a radio antenna should be one quarter of its wavelength. Sticking with our 35GHz frequency this means that an antenna equipping a radio transmitting at these frequencies could be as small as two millimetres in length. Dr. Barker says that this would enable compact antenna arrays requiring a lot less real estate on a vehicle or on a soldier’s person. Another benefit is that this part of the electromagnetic spectrum is notably less congested than the V/UHF wavebands, thus EHF communications have a relatively unobstructed electromagnetic highway to zoom across with sparse traffic. The wide waveband of EHF gives the user several wavebands across which transmissions can hop. This can frustrate attempts by signals intelligence operatives to locate and jam EHF transmissions given that they will have to monitor very wide band widths, or several wavebands simultaneously, therein.

Interference

As always with radio communications there are trade-offs. One of the major ones is attenuation. Attenuation is the phenomena by which RF transmissions can be disturbed by contaminants in the atmosphere like rain or snow. The reason why EHF transmissions suffer more attenuation than V/UHF communications is a result of their narrow wavelength. Such narrow wavelengths risk the transmissions having a portion of their energy absorbed by precipitation like snow or heavy rain. Alternatively, deliberate interference in the form of chaff could be degrade the efficiency of EHF transmissions. Radar is commonly jammed by chaff; metal

strips cut to precisely half the wavelength they are intended to jam. There is a challenge in accurately cutting chaff to 50% of the wavelengths used for EHF communications. Nevertheless, chaff of this size would be relatively easy to disperse over an area where EHF communications are active possibly using artillery shells to disperse the chaff in the atmosphere. Such lightweight metal strips would also be capable of loitering in the atmosphere for some time, potentially causing prolonged disruption.

To an extent, these problems of attenuation could be mitigated using a high gain directional antenna which will ensure transmission are concentrated into a narrow beam to help reduce the effects of attenuation. Even with the attenuation challenge, EHF transmissions could reach distances of up to six kilometres. This will make EHF particularly appropriate for high data-rate transmissions, and Dr. Barker sees a useful application for such technology being fixed battlefield local area networks which can carry point-to-point voice and data information. This could be useful if unattended sensors are surrounding a Forward Operating Base (FOB). These sensors could have EHF transceivers which would allow high data rate communications across line-of-sight ranges back to the FOB. This would allow 'data heavy' traffic such as real time video to be handled with relative ease.

While the narrow beam width of EHF transmissions can create challenges regarding signal detection, similar challenges may be experienced regarding jamming. To electronically attack EHF communications the attacker will need to ensure that they can transmit enough RF (RF) energy into the radio to sufficiently lower the signal-to-noise ratio to such an extent that the transceiver can no longer extract the signal from the prevailing electromagnetic noise. The net effect of this is that the EW practitioner needs to have a high power amplifier and a high gain transmitter, the latter of which must efficiently concentrate its beam as much as possible to ensure that the jamming can flow into such the narrow apertures used by EHF radios. An analogy would be trying to thread a needle which is several metres away rather than held in your fingers.

The question of antenna size is something of a double-edged sword for EHF communications as it will require antennas to have highly precise alignments to ensure that traffic can flow between EHF radios: "The electronics technology for operating at 30GHz and over it still in relative infancy, and can be expensive" warns Dr. Barker. As such, there is a need for the "development and demonstration of suitable antenna technology that will allow for high gain and directionality"

to overcome range limitations, he continues. Antenna tracking technology continues to evolve which could ensure that EHF can be used practically by troops and vehicles on the move. Some of the advances made in mobile satellite communications could hold promise.

Phased Arrays

Dr. Hancock says that phased arrays, where the beam of energy is electronically, as opposed to physically steered may help to solve the directional conundrum. Yet using such technology has a cost as phased arrays "require electronic components behind each radiating antenna element, which can be cost prohibitive." Advances in phased array technology may offer hope particularly given recent technological strides and the increased adoption of Active Electronically Phased Arrays (AESA) in radar and electronic warfare technology. AESAs have individual T/R modules mounted on the face of an antenna which generate the transmission beam and waveform, point these transmissions in the desired directions and process the RF energy coming into the system. Dr. Hancock says that the silicon technology now routinely used in SATCOM, space technology and forthcoming fifth-generation wireless networks has helped to "revolutionise the cost model for the phased array," and he "expects this to continue as directional communications systems at MMW frequencies see more use in the commercial and military sectors" in the future.

Work is ongoing in developing EHF as a practical proposition for tactical communications. Dr. Hancock and his colleagues are engaged in the MIDAS (MMW Digital Array) programme. MIDAS is developing beam forming technology that "allows the array to form many digital beams simultaneously to alleviate the pointing problems of using narrow antenna beams." Put simply if you increase the number of individual beams pointing in a specific direction then you increase the chances that at least one of these beams will reach the intended antenna. An added benefit of this technology is that a single antenna could transmit a multitude of beams to different users on the same EHF network, effectively allowing a radio to perform many tasks at once like sending imagery data to one user, while handling voice communications with another. At the core of the MIDAS effort is Complementary Metal Oxide Semiconductor (CMOS) technology. CMOS components use electrical power very efficiently and produce minimal heat.

There is still some way to go before EHF is routinely adopted for tactical communica-



Photo: Northrop Grumman

AESA technology has been in use with military radars for the past three decades. It could hold promise as far as EHF communications are concerned in helping overcome some of the challenges inherent in this technology.

tions with Dr. Barker predicting that such technology could begin to proliferate in the coming decade. There are still some major technological hurdles to overcome, not least the question of antenna design and performance. It is perhaps a little unfair to say that the military is conservative when it comes to communications technology. HF and V/UHF continues in widespread use because despite the advantages and disadvantages inherent in each waveband they get the job done. Even with the advent of EHF it is perhaps unlikely that this will herald a wholesale migration towards these new frequencies away from these traditional wavebands.

Nonetheless, EHF could offer promise for specific niche applications. As mentioned above, linking unattended ground sensors to a FOB so as to provide a wideband, real-time sensor feed of the surrounding environment is one possible application. There may be others which will become clear as the technology begins to proliferate on the battlefield. Interestingly a number of tactical radio manufacturers were contacted during the preparation of this article to ascertain their views on EHF technology and to hear about their efforts to this end. Some failed to respond, while others stated that they were interested in the technology but declined from providing further details. This seemingly suggests that some firms are taking an interest in the technology and may be pursuing with their own research and development efforts but keeping these under wraps for now for commercial reasons. ■

Eastern European Tactical UAS Programmes

Alex Horobets

The market for unmanned aerial vehicles (UAVs) has expanded considerably over the last ten years. Nowadays, many more countries are able to procure medium-class drones or tactical drones.

While the United States had the largest share of the market for military-grade UAVs by 2016, European companies are rapidly catching up and many players in Europe are planning to develop or acquire unmanned aerial systems (UAS) in the near future.

with medium and small drones dominating these plans. The main suppliers of military drones continue to be the US-based companies General Atomics Aeronautical Systems Inc, AeroVironment, Northrop Grumman Corporation, Insitu, and the Israeli companies IAI and

In 2015 Poland announced a planned contract for the supply of UAS. The Polish military plans to procure tactical systems and mini-UAVs such as ORLIK and WIZJER. ORLIKs with a range of up to 100 km are to be used for reconnaissance and surveillance. Delivery is expected to



Photo: US Navy

The ScanEagle UAV by Insitu is used by armed forces all over Eastern Europe.

Almost a dozen European countries, including the United Kingdom, Germany, France, Italy and Greece, operate or plan to purchase MALE (Medium-Altitude Long Endurance) UAVs. In the future, Poland, Belgium, the Netherlands, Spain and Switzerland will be added to the list of countries operating this class of UAS. The market for small and medium tactical drones in Europe is both more diverse and more massive. However, the degree to which they are used in different armies varies: in most cases, they are reconnaissance drones and not combat drones. Most European powers either have different classes of UAVs in service or plan their future production or acquisition,

Aeronautics. Aerospace Industries and Aeronautics. Among the European companies are BAE Systems, Leonardo, Airbus Defence and Space, Dassault Aviation, Thales, Schiebel, WB Electronics. The Eastern European countries clearly lead the way in the deployment and procurement plans for UAVs, while other regional states lag far behind.

Poland

Poland, which has participated in joint operations under NATO auspices, intends to acquire both mini-UAVs and tactical UAVs as well as a small number of MALE UAVs in the future.

be completed by 2022, with possible additional purchases being considered. The Polish army intends to procure a total of 25 WIZJER drones with a range of up to 30 km before the end of 2022. The first batch is to be delivered as early as 2020. At a meeting of the Polish Parliamentary Committee on National Defence in 2018, Wojciech Skurkiewicz, the Defence Ministry's State Secretary, announced that MALE ZEFIR UAVs, tactical GRYF UAVs, and tactical short range ORLIK UAVs should be delivered to Poland between 2020 and 2022.

The ORLIK programme is about acquiring Brigade-level UAVs. The system will be supplied by a consortium led by PGZ.

Twelve systems are to be delivered, including four from 2020 to 2022. Each system includes a control post and four UAVs.

It is expected that medium-range tactical GRYF UAVs will operate non-stop for up to 20 hours and can be used as combat drones if required. The Polish Ministry of Defence plans to acquire six such systems between 2020 and 2022, including four drones, a control set and a data analysis system.

The heaviest, MALE-class, ZEFIR UAV will carry bombs and guided missiles. Such systems could be purchased either from the US or Israel. For example, this could be a variation of the MQ-9 REAPER by General Atomics (USA). Four packages are planned to be purchased, each including a ground station and three drones. The first pair of such systems is expected to have been acquired by 2022.

If such purchases are successful, UAVs will be deployed at all organisational levels of the Polish Army. However, it should be borne in mind that the acquisition of so many platforms in such a short period of time represents a disproportionate burden on the country's defence budget.

The Czech Republic

Until 2011, the Czech Republic used domestically produced SOJKA III UAVs. Later, it decided to purchase existing platforms from abroad.


In 2017, the Czech army revealed its plans to procure reconnaissance and surveillance drones and tactical UAVs by 2025. By 2021, the Czechs want to procure unmanned combat aircraft (UCAVs) capable of transporting air-to-ground guided missiles as part of the strategy "Modernization of Air Combat Capabilities". Currently, the Czech Army has ScanEagle UAVs from Insitu and Boeing as well as RQ-11B RAVENS, PUMA and WASP-III drones from AeroVironment in service. The country's UAV procurement project aims to acquire Class II unmanned multipurpose systems capable of carrying optoelectronic reconnaissance systems, radar sensors, electronic warfare systems, communication systems and weapons systems. In addition, the Czech military is still planning to acquire light reconnaissance drones, which will improve its operational capabilities to support ground forces.

Romania

Romania operates a limited number of UAVs, and does not share much information about their actual number in service. According to the local ROEC Analytical Center, the country operates UAVs such as SHADOW 600 (RQ-7B SHADOW) by AAI Corporation, RQ-11B RAVEN by AeroVironment, ScanEagle (Q-27) by Insitu and Boeing, and PHOENIX 30 by UAV Solutions. Romania has also joined NATO's Alliance Ground Surveillance Programme.

In 2016, the Romanian MoD announced a tender for the procurement of six tactical UAVs for an estimated €55M. In 2017, however, the tender was cancelled after Ymens Teamnet and Israel Aerospace Industries filed complaints with the Romanian Public Procurement Authority. The procurement process has never been resumed since then.

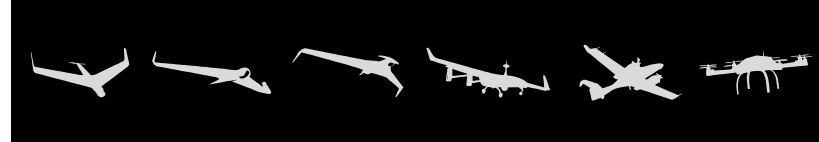
Back in 2011 the Romanian defence ministry launched a tactical UAV project called BOREAL. The drone is planned to come into service at the level of army's small units, but the ministry is reported to still be in search of local companies



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Photo: Bayraktar



The BAYRAKTAR TB2 drone has been co-produced by Turkey and the Ukraine.

capable of manufacturing BOREAL. To date, Romania has neither acquired nor developed any strike UAVs.

Ukraine

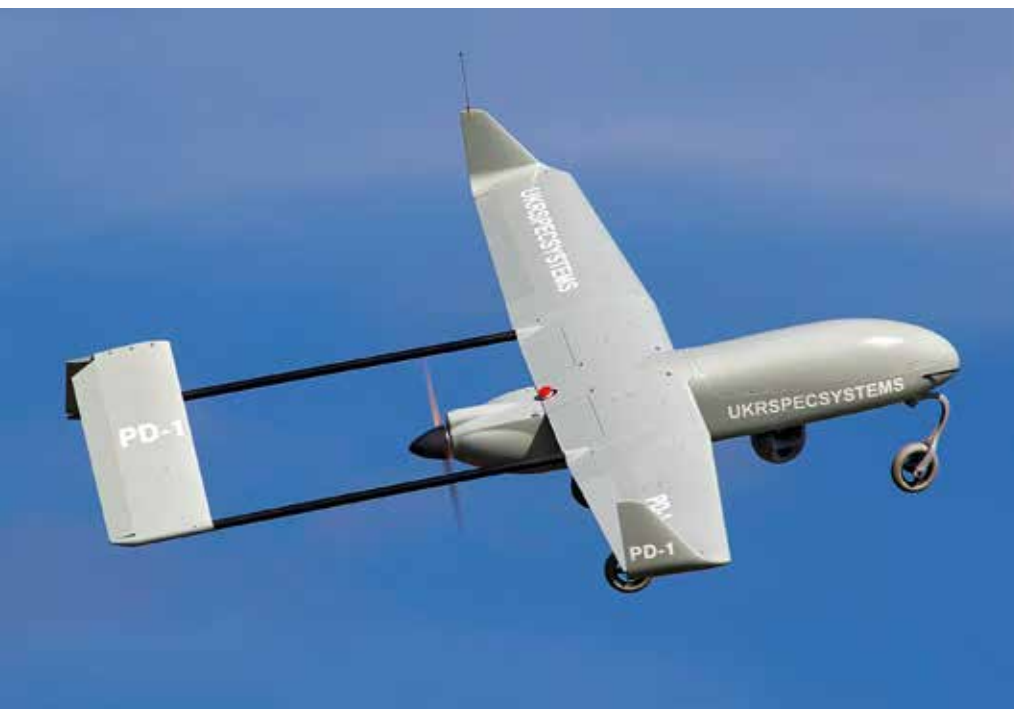
Turkey and Ukraine, which are both creating unmanned systems of different classes, should also remain in focus. One common feature is that the two states have recently combined their efforts to create a modern, heavy-duty attack drone.

Ukraine boasted a boom in UAV production in 2014, when the urgent need for such systems in the armed forces arose. Initially, volunteers pushed for the purchase of UAVs for civilian use, which were then adapted for military missions. In 2019, the Ukrainian Army commissioned the modernised SPECTATOR-M1 UAV complex, which was manufactured by Korolev Meridian JSC of Ukroboronprom Holding Company. The UAV is capable of reaching an altitude of 3.5 km, a speed of 120 kmh and can operate for up to

two hours at a range of up to 150 km. It is designed to perform aerial reconnaissance by day and night.

Among the private Ukrainian manufacturers, the company Ukrspesystems, which produces the PD-1 drone, should be mentioned. This UAV can stay in the air for five hours at an altitude of up to 2 km, even in a hostile electronic environment. The company is currently testing a vertical take-off/landing system (VTOL), which it plans to use in the next generation of UAVs, the PD-2. The country's army will probably also put the new UAV into service. The main feature of this and a number of other Ukrainian companies that design and manufacture military-grade UAVs is that the Ukrainian Army will deploy them under actual combat conditions, so that all drones will be completed in accordance with the latest military requirements. For this reason, other nations have expressed great interest in Ukrainian products. For example, the state foreign trade company SpetsTechnoExport presented Ukrainian UAV projects at the exhibition and conference for unmanned systems in Abu Dhabi in 2018. On display were Ukrspesystems' PD-1AF drone for vertical takeoff, the RAM Kamikaze drone from Defense & Electronics Technology Company and SPECTATOR from Korolev Meridian JSC.

Photo: Doroshenko



The Ukrainian-made PD-1 can stay in the air for five hours at an altitude of up to 2 km, even in a hostile electronic environment.

Ukrainian-Turkish Defence Cooperation

Turkey has been known, since 2014, for the successful production by Baykar

Makina of the BAYRAKTAR TB2 MALE UAV, boasting full autonomy for up to 24 hours. In 2015, the drone was upgraded to carry weapons. BAYRAKTAR TB2 is believed to be one of the best UAVs in its class, being successfully used by Turkey in its military operations. This unmanned system is also operated by Ukraine and Qatar.

The next stage in the development of Turkish and Ukrainian UAVs was the heavy strike drone AKINCI joint project, manufactured by Turkey-based Baykar Defence. The drone is equipped with a turboprop 750-horsepower AI-450C engines built by the Ukrainian company Ivchenko-Progress. Also, as part of this collaboration, Baykar Defence and Ukrainian Ukrspetsexport (member of the Ukroboronprom Concern) created a Black Sea Shield joint venture, developing precision weapons and aerospace technologies. With a working altitude of 12 km, operating time of 24 hours, and a load capacity of 1,350 kg, AKINCI will be produced mainly for the armed forces of Turkey and Ukraine, while export options also remain on the table.

The first AKINCI drone is expected to be delivered to the military by the end of 2020.

Bulgaria

Bulgaria is in the process of modernising its armed forces to meet NATO standards. Since 2015, the Bulgarian military have had plans to introduce UAVs into the ground forces. It is expected that the main focus in the UAV sector will be primarily put on investments in mini UAVs before shifting to tactical ones. Discussions are ongoing regarding the need to purchase middle class drones.

In 2018, Bulgarian company VMZ Sopot sealed a deal with Israel's Aeronautics Group for the production of UAVs based on Israeli technology.

Bulgaria's defence ministry has turned to 24 companies both at home and abroad for the supply of 22 military-grade tactical reconnaissance drones. The expected cost of the deal stands at nearly EUR12.7M. The first batch is 12 mini drone systems, the first four of which are expected to be delivered in 2020 and the

rest before 2024. The defence ministry will consider suppliers from Bulgaria, Israel, the United States, and a number of other countries.

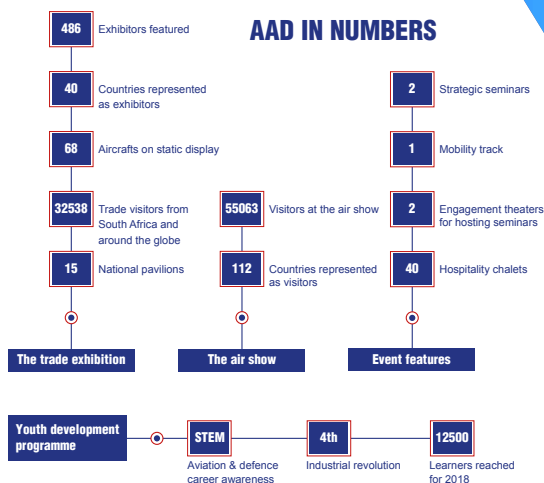
Concluding Remarks

Throughout Eastern Europe, unmanned systems are being developed at an uneven pace, while regional leaders are deploying middle-class UAVs, including combat drones. However, most countries mainly deploy small drones, such as RAVEN (USA), PUMA (USA), ScanEagle (USA) in the Czech Republic and ScanEagle (USA), BlackJack and ORBITER (Israel) in Poland. However, such platforms are not capable of carrying heavy loads and weapons. They therefore cover a niche for reconnaissance operations and leave the options open for combat drones. With the development of UAV technology based on increasing autonomy and the combination of drones to form swarms, a future UAV/UAS race can be expected on the world defence markets, also involving Eastern European manufacturers. ■

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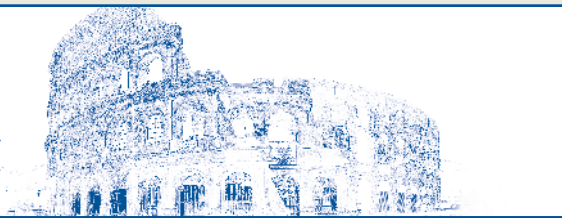
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Viewpoint from Rome



Italy's Armed Forces Fighting the Coronavirus

Luca Peruzzi

From the very beginning of the fight against coronavirus by the Italian health authorities, the Italian Armed Forces have played a key role, from the surveillance of the territory and the control of movement restrictions to medical assistance and transport of biologically high-risk patients and the support of the Carabinieri. According to the MoD, more than 45,000 men and women from the four service branches (Army, Air Force, Navy and Carabinieri) assisted the National Civil Defence, which manages all activities against the pandemic, and the Ministry of Health to handle the emergency situation.



Photo: Italian Navy

Italian Navy personnel embarking an isolator transporter unit on an SH101

Thanks to coordinated efforts between the Civil Protection Department, the ministries of Foreign Affairs and National Health and the Joint Operations Command of the Armed Forces of the Ministry of Defence (COI, Comando Operativo di Vertice Interforze), which has set up a 24-hour situation room to direct all operations on coronavirus emergency requests, the latter evacuated Italian and European citizens from China and Japan

by using the Air Force's long-range tanker/transport aircraft KC-767A. The evacuation involved medical teams of the Italian Armed Forces and the Italian Red Cross (CRI), as well as the Spallanzani National Institute for Infectious Diseases in Rome. The first emergency infrastructure set up by the Italian MoD was at the Cecchignola military base in Rome, where Italian citizens returning from Wuhan in China and Japan were quarantined from February onwards. Since then, the MoD has not ceased to support the Civil Protection Department and, as the situation has worsened, a number of other infrastructures have been made available, bringing the total to 6,600 beds in military facilities throughout the country.

Since the introduction of movement restrictions and the establishment of red zones in northern Italy, the police and the armed forces have played a key role in maintaining public order and ensuring curfews. With the exception of the Carabinieri, who perform both police and military duties, 7,050 men and women were immediately available to assist the authorities and the population thanks to the MoD's "Strade Sicure" operation, set up in August 2008 to deploy personnel and surveillance systems in sensitive locations throughout the country. Since the beginning of March, military personnel has increased by 367 staff and, for the pandemic, were supported by the San Marco Amphibious Brigade of the Italian Navy and the protection commandos of the Air Force Fucilieri dell'Aria and the police (Polizia di Stato). The border and law enforcement agency of the Guardia di Finanza and the Italian Coast Guard worked around the clock to ensure compliance with movement restrictions as well as life-saving and day-to-day operations, from the rapid transport and distribution of medical and personal protective equipment (PPE) to community assistance.

The MoD provided both medical staff and facilities. The doctors, nurses and attendants of the medical service, coordinated by the General Inspectorate for Military Medical Services, are mainly deployed in the affected civilian hospitals in northern Italy, reinforcing the local medical service and the staff of nursing homes for the elderly decimated by the coronavirus. In order

to deal with the pandemic and to increase the number of medical staff on duty in the Italian Armed Forces, which in the past received limited funding, the MoD has quickly put 120 doctors and 200 nurses on duty, to be available from April. Since 24 April, 109 doctors and 153 nurses have been working alongside civilian staff in medical facilities. Within 48 hours, the MoD has also dispatched two field hospitals with military medical personnel in Piacenza and Crema near Lodi, while a naval field hospital with military personnel is operational in Jesi near Ancona in the Marche region. The Army's mountain troops activated a hospital near Bergamo with Russian medical personnel. The humanitarian organisation US Samaritan's Purse established a field hospital with the support of the MoD, and the Qatari Government donated another large hospital. The Celio Hospital in Rome, the main military medical infrastructure in Italy and part of the Army Logistics Command, began to treat coronavirus patients in mid-March in collaboration with the Spallanzani National Institute for Infectious Diseases, followed by the Army and Navy Military Medical Centres in Milan and Taranto respectively. The Celio Hospital became the centre for treating pandemic patients in central Italy. The technical units of the Army and Air Force immediately started infrastructure works to expand the medical facilities and initially accommodate up to 120 beds, 30 of them in the intensive or sub-intensive care unit. Another accelerated programme concerns the tender for a new field hospital (Role 2 Basic, with an option for another 3) by the NATO Support and Procurement Agency. The field hospital is to be delivered urgently by the end of 2020, in addition to emergency funding for medical equipment for hospitals, transport equipment for at-risk patients, two new Role 2 Enhanced field hospitals and additional medical staff.

Thanks to the versatile platforms, equipment and trained personnel of the Italian Armed Forces, the latter play a key role when transporting patients, materials and logistics. The Italian Air Force is one of the few air forces in the world with transport capacities for patients at risk. The Air Force provides special teams and carries out missions with C-130J, KC-767A aircraft and HH-101 helicopters, while the Italian Army uses a UH-90 and the Navy three SH-101/SH-90 for these missions with CRI personnel and medical evacuations. Thirty-eight military helicopters are used for medical missions and surveillance. Leonardo is also contributing to the project with company-owned aircraft and helicopters. Another task is the rehabilitation of buildings and outdoor areas, where teams from the Italian Army, including CBRN special units supported by Russian personnel, are deployed. The logistic troops of the Army play a role in the movement of materials and the management of PSA depots, together with the Air Force logistics and airport terminals, which also manage three airport freight hubs for international and national relief and medical flights. The Armed

Forces' Special Technical Support Unit supported the conversion of snorkel and hyperbaric masks into ventilators.

The Agenzia Industrie Difesa (AID) of the MoD, which manages the industrial defence facilities, was also involved in the fight against coronavirus. The MoD's chemical-pharmaceutical production plant for defence purposes, located in Florence, was activated for medical care, while an agreement was signed with a commercial company for the production of PPEs. Military personnel has been dispatched to ramp up production of lung ventilators.

Photo: Italian Army



An Italian Army sanitation team at work

Support for civilian facilities, the national health service and the population is provided in parallel with international defence commitments. In addition to the protection of national borders, such as the Air Force with its 24/7 fighter scramble service and the control of national and nearby waters by the Italian Navy together with the Coast Guard and the Guardia di Finanza, the Italian Armed Forces have been and continue to be involved in international missions, including in Kosovo, Afghanistan, Lebanon, Libya, Iraq and, more recently, Niger. The Italian Navy is involved in anti-piracy operations with a frigate in the Gulf of Guinea (returned home) and in Aden, a small group of ships in the Mediterranean (Operation Mare Sicuro) to secure commercial traffic and national interest, a ship and command of NATO's SNMG2 naval group, and an MH-90 helicopter and personnel deployed on the Mistral LHD with the French "Joan of Arc" group. All the above activities are supported by a logistical chain that must work according to certain procedures to protect personnel from the coronavirus.

Countering Drone Weapons

Proliferating Drone Attacks Move Militaries to Seek Quick Solutions

Tamir Eshel

The growing activity of drones, particularly those carried out by military forces and nation-sponsored insurgencies, in Yemen, Syria and Libya mark an alarming proliferation of weaponised drones and loitering munitions employed as 'drone weapons'.

When associated with precision attacks against armed forces and strategic infrastructure, such attacks demonstrated the disruptive potential that drones and cruise missiles have on military affairs. The new capabilities are driving military forces to seek countermeasures and capabilities in order to mitigate the threat.

Counter-drone solutions operating in a civilian environment are bound by restrictions and safety regulations limiting the use of almost all methods, except nets,

Both civil and military drone countermeasures address the threat at different levels - situational awareness, identification and defeat. Situational awareness aims to detect and classify targets to warn the user of the presence of objects that may be hostile, triggering protective measures by troops facilities that may be at risk. It also provides a 'tripwire' triggering additional sensors required during a heightened state of alert. While homeland security defenders may settle for drone detection and protection

Radar Sentinels

Counter-UAS systems detect targets based on different sensors – radar, communications intelligence (COMINT), acoustics and electro-optics. C-UAS systems often employ multiple methods to improve the probability of detection and reduce false alarm. Radar is likely the most common sensors for such systems, but conventional radar systems usually have problems detecting and tracking small UAS operating at slow speeds. Even if detected, distinguishing them from birds and other elements in the surrounding environment is hard. Radars cover a broad area with high sensitivity but lack the persistence and agility required for tracking those illusive targets, which often use erratic flight path and frequent obstructed by terrain, buildings or trees.

To overcome this issue, Saab has developed the Enhanced Low, Slow and Small (ELSS) function for its GIRAFFE radar, to better cope with the challenges of UAS threats. With ELSS, the GIRAFFE detects and tracks even small/mini-UAVs, with a low false alarm rate. The ELSS works in parallel with the main air surveillance mode and the Rocket, Artillery and Mortar shells (RAM) detection, enabling simultaneous air surveillance, and UAS detection.

Elta also enables detection of low, slow and small targets with its ELM-2026B X-band radar, which has drone-detection capability on top of its traditional VSHORAD point-defence functions. In addition, ELM-2026B has a unique mode tracking of hovering drones. Elta offers the ELM-2026B as part of the DroneGuard counter-UAS system. DroneGuard comprises three detection layers and effectors, managed by a unified control unit. The radar, passive communications-electronic intelligence (COMINT-ELINT) and an integrated Electro-Optics sensor provide three detection and classification layers. The combination of passive and active sensing systems ena-

Photo: DroneKill



By choosing standard compressed air ammunition, operators can choose to engage their targets with lethal force.

drone chasers and streamers. As the risk of potential damage of drone strike is much more significant, the military requires Counter-Unmanned Aerial Systems (C-UAS) to defeat such attacks as quickly as possible. With an absence of limiting regulations, the military user is more liberal in employing lethal force, if the operation is coordinated with other forces and do not pose excessive risks to friendly forces or interference to electronic systems.

at the lower altitude, military capabilities should address drone threats across the airspace and spectrum. The proliferation of drones in the modern battlefield makes them the most common objects present at the lowest tier (500 ft. above ground level). However, drones and loitering weapons also pose risks to military forces when operating at higher elevations. For example, small tactical drones operating up to 7,000 ft or medium altitude long endurance drones, operating at altitudes above 20,000 ft.



Photo: Liteye Systems

The Anti-UAS Defence System (AUDS) is a layered counter-drone defence providing multiple capabilities to detect, track, identify and defeat malicious drone threats.

bles the detection of drone activity, including drone swarm.

DroneGuard was recently tested by the Portuguese Navy as part of the NATO-wide naval REP(MUS)19 exercise. For this exercise, Elta deployed the DroneGuard system to set up 360° coverage, detecting and simultaneously tracking high and low flying airborne threats flying over the port and coming from the sea. Portuguese special forces launched a raid against the port, using single drones and a drone swarm. DroneGuard effectively detected and tracked those targets at a long-range, automatically classifying the threats and providing the defenders a situational picture in real-time. The system successfully intercepted and neutralized the drones through jamming.

With LSS functions, modern radars may be effective on fixed sites but are not effective on the move. When such a capability is required, a staring array of active electronically steered antennae are used. Typical radars of this class are Elta's Green Rock, KFRS from Raytheon, RADA's MHR and BLIGHTER A400 series, all of which are E-scan radars. Some of these radars were recently integrated in C-UAS systems that have recently deployed in tension zones around the world by the US Army and Marine Corps.

Raytheon's Ku-band Radio Frequency System (KRFS) currently operational with US Army units is a multi-mission radar providing sense and warn for RAM and C-UAS tasks. The KRFS radar can track small and large drones, and cue different effectors in response. Its accuracy enables significant C-

UAS mission performance, including precision fire control and engagement of UAS swarms employing soft or hard kill measures at tactically significant distances.

Liteye Systems, Inc. has teamed with Numerica and Citadel Defence to deliver a layered counter-drone defence based on the AUDS providing multiple capabilities to detect, track, identify and defeat malicious drone threats. The system uses the BLIGHTER A400 radar offering on-the-move 360-degree defensive capability, while multiple layers of detection, classification and positive identification provide situational awareness and protection. Citadel's Electronic Attack solution features sophisticated machine learning high fidelity frequency defeat and a robust directional broad-band defeat to ensure protection from a variety of threats. The USMC was first to deploy the Light Mobile Air Defence Integrated System (LMAD-IS), which combines Rada's RPS-42 tactical air surveillance radar, along with Ascent Vision Technologies' EO/IR stabilized gimbaled system as well as an RF emitter to cover 360 degrees, and provide 'soft-kill' defeat of drones. In 2019, the system was successfully deployed with a US naval force in the Arabian Sea and is believed to have taken down an Iranian drone that approached a US Navy ship at the Strait of Hormuz.

SIGINT On the Watch

Electronic sensing provides another tier of defence, employing electronic signal intelligence (SIGINT) to detect the characteristic electronic activity of drones and their control links. While ordinary SIGINT often requires an extensive operator involvement for signal analysis, the C-UAS application relies on automatic signal processing, using artificial intelligence and machine learning to spot specific drone's electronic signa-

ture and recognize new threats. With this knowledge, the C-UAS? can apply specific protocols to defeat these drones.

Wearable Drone Warning

Some solutions include an 'Electronic Early Warning' concept to protect an individual soldier or a small unit. One example is the RfPatrol from the Australian company DroneShield. This wearable drone detection device provides drone-related situational awareness without distracting the user from the mission. The 'DroneShield Link' allows operators to keep their device database up to date with the changing threat environment.

The WINGMAN 103 system from the Danish company MyDefence also provides drone detection in a wearable form. Produced as a handheld radio, the device operates autonomously, with an internal or omni-directional external antenna. As WINGMAN continuously scans and searches for UAS control and video signals, it acts as an early-warning detector of commercial drones. The continuous scanning function makes it capable of detecting the drone control signal or video downlink signal, often before the drone takes off from the ground.

When early warning is not enough, troops need countermeasures to engage hostile drones. Citadel's TITAN 3 is a compact C-UAS drone protection system, which autonomously detects, identifies and defeats drones. Using an artificial intelligence and machine learning to address and adapt to changing threats, the system operation requires no signal expertise calibration or training. It can detect drones of up to 3 km away, at heights up to 1,500 ft. above ground. At that altitude and 1,500 meters away, TITAN 3 defeats consumer and hobbyist drone's by denying control and video



Photo: Rafael

Rafael's DRONE DOME-L is a vehicular mounted 10 kW drone-defeating laser weapon.

signals, forcing such common drones to hover and safely land. The system does all of that without interfering nearby communications and electronic activity. The system was recently used by US Special Operations Forces and the US Navy to prevent drone attacks and reconnaissance. At the request of SOF operators, the system underwent several iterations optimised for manoeuvre operations.



Photo: ELTA

DroneGuard comprises three detection layers and effectors, managed by a unified control unit.

Arming RWS Against the Drones

With military forces rushing to deploy tactical C-UAS capabilities, Remote Weapon Stations (RWS) stand out as a most useful platform. With these applications in mind, DroneShield has positioned an RWS tailored solution – the 'DroneCannon RW' – that packages a C-UAS applique for RWS, enhancing the capabilities of existing systems tackling any new threat. This lightweight add-on provides a soft kill, drone jamming solution, which engages drones from 500 metres, forcing drones in single or swarm attack into a fail-safe mode where they will either hover or slowly descend. This function allows the operator to utilise a kinetic weapon or other mounted equipment to more easily neutralize the target.

Employing an escalating use of force strategy users may opt to use a non-lethal hard kill first. This can be achieved by using Singapore Technologies' Engineering 40mm C-UAS munitions, designed to take down multirotor class-I UAS. These munitions use a programmable time fuse to deploy a pack of streamers that entangle the hostile drone's rotors causing it to fall.

Both low and high velocity (HV) variants are available. Using HV grenades with an Automatic Grenade Launcher (AGL), multiple grenades can be fired to create a large curtain of streamers that completely engulf a large multirotor drone. Researchers at the US Army have developed a non-lethal 40mm projectile for a low-velocity weapons. These patented grenades pack an arresting net into the grenade, enabling the use of standard rifle mounted low-velocity grenade launchers, such as the M-203 and M320 as anti-drone weapons.

By choosing standard airburst munitions, operators can engage their targets with lethal force. One of the most popular lethal weapons against drones is the 40x53mm airburst grenade, produced by several companies, including the German Rheinmetall company, Nammo from Norway and Turkish Aselsan. Several armies have already adopted this solution. The most recent was Germany, that opted to deploy a mobile C-UAS solution, integrating the Spexer 3rd generation radar from Hensoldt, and the Protector remote weapon station from Kongsberg mounting 40mm automatic

grenade launcher firing airburst ammunition. As depicted by the Aselsan ATOM-40 munition, the typical airburst effect from the 255 grams 40mm high explosive fragmentation munition has a lethal radius of five metres. Fired from a high velocity AGL at a speed of 240 meters per second, its range exceeds 1,500 metres.

Guns can also be used to escalate anti-drone response. A most effective airburst munition offered by Northrop Grumman is the 30x113 round developed for the XM914 chain gun, which can be mounted on remotely operated turrets such as the Reconfigurable Integrated Weapon Platform from Moog. This turret was selected by Leonardo to integrate with a Stryker 8x8 combat vehicle configured for the US Army Initial Mobile Short-DroneRange Air Defence (IM-SHORAD) Vehicle. It will be able to fire programmable projectiles that explode at close proximity to the targeted drone, based on range data provided by the vehicle's radars.

Expanding VSHORAD Capabilities

Other guns equipped to defeat drones include Rheinmetall's SKYRANGER, part of the company's SKYSHIELD air defence system designed for the air defence of strategic sites. In tests conducted in Switzerland in 2018, the system demonstrated the effectiveness of the AHEAD pelleted munitions against both small and fast flying drones. Rheinmetall's SKYNEX air defence system is complementing the SKYSHIELD, providing command and control over the entire system. Its core element is the Oerlikon SKYMASTER command and control system, managing all sensors and effectors over the network. These may include assets such as SKYSHIELD or SKYGUARD fire units, guided missile launchers, interceptor drones, jammers or even high-energy laser effectors.

Optimising this solution to countering drones, Rheinmetall teamed up with the X-TAR3D search radar, the Oerlikon Revolver Gun Mk3 and a SENTINEL interceptor drone, the system also provides a scal-

Photo: CITADEL



Citadel's TITAN 3 is a compact C-UAS drone protection system that autonomously detects, identifies and defeats drones.



Photo: MyDefence

The WINGMAN 103 system provides drone detection in a wearable form.

able counter-UAS solution, addressing UAS threat scenarios below the war threshold. The SENTINEL interceptors may be used in situations where an engagement of a suspected drone is imminent but where lethal force or electronic effects cannot be used. The Oerlikon Revolver Gun Mk3 is designed, first and foremost, for short- and very short-range ground-based air defence. Remotely operated and network-capable, the system can receive and process target data from both 2D and 3D search radars and is equipped with tracking sensors, such as a Ku-Band tracking radar as well as electro-optical sensors and electronic warfare components. Firing 35mm x 228 ammunition, the revolver gun delivers massive firepower with high precision, neutralising incoming rockets, mortar rounds and unmanned aerial systems, low-flying aircraft and aerial munitions.

A different weapon optimised against drones is the COYOTE drone, developed by Raytheon to address an urgent US Armyop-

erational requirement for a C-UAS capability. It packs a small warhead, RF seeker and proximity sensor, which enables COYOTE to close in on a target drone, based on target information obtained from the KFRS fire control radar. A new variant, known as COYOTE Block 1B, is equipped with a more advanced sensor and warhead. The more advanced COYOTE Block 2 variant fly has a different shape enabling the drone to fly faster and farther and manoeuvre harder, thus being able to take down larger enemy drones. The COYOTE's are able to operate individually or in teams, taking on enemy drone swarms. These drones employ communications and collaboration software, enabling the pack to select targets and change game plans when engaging threats.

Lasers Against the Drones

The ultimate drone killer may not be a gun or missile but instead the laser beam. Many industries are already working on high en-

ergy laser weapons, but only few have systems ready to deploy in the field. It is likely that C-UAS could be the first application of this new weapon class.

Raytheon was the first to introduce a light weaponized C-UAS laser with its drone-killing HELWS. Mounted on a Polaris MRZR all-terrain vehicle, HELWS is paired with Raytheon's Multi-spectral Targeting MTS for target acquisition and beam direction. The US Marine Corps and Air Force were the first to utilise the system on two laser weapon projects. The Marine Corps' Compact Laser Weapons System was the first ground-based laser approved by the Department of Defence in 2019 for use by warfighters on the ground, in response to a need for counter unmanned aerial systems to take down drones. The US Air Force has also ordered two HELWS systems for experimental use, planned to for deployment outside of the US.

Another laser-based C-UAS system that recently completed testing is Rafael's Drone Dome-L, a vehicular mounted 10 kW drone-defeating laser weapon integrated with the company's Drone-Dome C-UAS assembly. Rafael's Drone-Dome-L is capable of destroying moving drone targets from several kilometres, in a few seconds. Multirotor drones represent a challenging target for lasers, due to their erratic flight-path and as their sharp manoeuvres make them unpredictable. Employing a smart and fast autotracker with the laser, as part of a unified system, makes DroneDome-L effective against multiple drone attacks. In recent tests, the system has repeatedly demonstrated the capability to yield maximum power on small target area of few square centimetres from several kilometres away, burning through the drone in a few seconds.

The system relies on radar and SIGINT to detect the target. Then, the EO module takes over to verify and selects the aiming point for the laser. The laser is activated only after the system confirms the fine tracking point is on the mark.

Since the laser requires only few seconds to deal with each target, the adversary may try to overwhelm laser defences by adding targets or decoys. Drone Dome's algorithms prepare for such cases considering different target priorities, and harnessing multiple lasers, enabling it to deal with swarms.

Rafael is also developing a higher power laser weapon under a different programme, designed for broader capabilities including C-RAM, active protection and C-UAS. This programme is part of a broader, tactical directed energy weapon development pursued by Israel's Ministry of Defence. ■



Photo: USMC

The LMADIS 'soft-kill' system, here shown in the Oshkosh vehicle-mounted version, is believed to have taken down an Iranian drone that approached a US Navy ship at the Straits of Hormuz in the Arabian Sea in 2019.

European Artillery Locating Radar Capabilities

Tim Guest

Sophisticated artillery locating capabilities will make the difference between success and failure on tomorrow's battlefield. The importance of this asset cannot be stressed enough, and European players have been getting their houses in order with upgrade agreements, tenders and contract decisions.

Weapon locating radar (WLR) will play a critical part in neutralising the increasing threat from enemy artillery, missile and rocket systems in any future large-scale warfare scenario, and these threats must be detected rapidly and counteraction taken swiftly and effectively if our own artillery assets are to stand any chance of survival.

This brief article looks at some of the WLR systems currently in use and being procured in the European theatre, together with agreements to upgrade some, and developments to seek entirely new systems.

WLR Around Europe

In Denmark, new fire support systems are among improvements to Danish brigade-level artillery that are expected to include new MMR to deliver weapon-locating capabilities, to be sourced during the 2024-2031 timeframe. That is, unless the urgency and importance of such a capability does not move further up the Danes' priority list before that time. Meanwhile, in the Czech Republic, the military's Strategic Development Project 2019-2022, includes latest artillery modernisation plans such as sustaining and further developing its Saab Artillery Hunting Radar - ARTHUR system to improve its counter-battery capability. The Saab radar system has been in service with the Czech Army for over 10 years and improvements will include integrating its WLR capabilities with a new fire direction system, which is also part of the strategic project. In Finland, the choice of a new counter-battery

Photo: Bundeswehr/Maximilian Schulz



Soldiers from the Bundeswehr's 325 Artillery Battalion deploy on exercise with COBRA

radar was finally made by the Finnish Defence Force (FDF) last January, when it chose IAI ELTA's ELM-2084 ground-based mobile 3D AESA multi-mission radar (MMR) over the last remaining contender, Saab's ARTHUR system. This followed earlier 2018 trials involving some six or seven companies. The ELM-2084 ground-based MMR is a mobile S-Band radar family using advanced 3D Active Electronically Steered Array (AESA) technology and provides artillery weapon location and AD capabilities against short, medium and long-range threats. Its artillery WLR capacity, amongst many capabilities, detect rocket, artillery and mortar (RAM) fires – at time of firing and along the projectiles' trajectories - enabling it to locate enemy gun positions, as well as extrapolating and predicting impact points, so friendly battery positions can take defensive/evasive actions. The Finnish contract includes training and spares and has options for additional systems in the future.

ARTHUR (more on this later) is now a combat-proven weapon locating system in use in other European countries including Sweden, Norway, Greece, Italy, Spain and the UK. Along with the COBRA – Counter Battery Radar – it emerged from European R&D in the 1980s and 90s to incorporate improvements into new WLR systems, including: improved sensor and computer technologies; improved ballistic calculation capabilities; improved command & control. Since then, European systems have increased their range and become more accurate.

For its part, COBRA was developed by the EURO-ART consortium for the German, French and the British Armies. It seems only 29 systems were rolled out. While superseded by ARTHUR in the UK, it is still in use with the Bundeswehr and the French Artillery. This 3D system consists of a C-band active phased-array, high-performance radar with advanced processing capabilities and integrated, flexible command, control and communi-

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cations. With an integrated Inertial Navigation Unit (INU), the fully solid-state system covers at least 180 degrees, with tilt adjustment of -5 degrees to +25 degrees. Carried on a wheeled chassis, the radar is typically crewed by four and can detect enemy artillery fire in two minutes for at least 40 separate firing positions. Indeed, some 20,000 GaAs integrated circuits in each antenna enable it to extrapolate the locations of multiple targets at extremely long ranges. COBRA networks into the ADLER artillery C3 system in Germany and with the ATLAS system in France.

In use with Polish Artillery is the LIWIEC Artillery Reconnaissance Radar System (RZRA - Radiolokacyjny Zestaw Rozpoznania Artyleryjskiego) from Polish defence company, PIT-RADWAR, which enables the detection and identification of RAM targets and active enemy gun positions and calculates firing solutions to enable accurate counter-battery fire missions. As part of an overall automated fire control system, the RZRA counter-battery radar scans an area in excess of 1,000 square kilometres, 24/7, in any weather. One LIWIEC radar was used by Polish forces in Afghanistan between 2010 and 2012 at the Polish base in



Photo: Saab

Saab's ARTHUR artillery hunting radar

Ghanzi province, to detect and provide early warning about potential enemy shelling, and to support the operations of friendly artillery assets. LIWIEC has gone through several dynamic development phases in recent years to adapt it to the changing operational demands of the modern battlefield. The system uses

an electronically-steered, narrow microwave beam in C-band (NATO-G) to scan the horizon over a 90-degree arc for each antenna position; data is refreshed every 0.5 seconds. Mechanical antenna setting within a 180-degree sector combines with the 90-degree electronic steering, resulting in full coverage over 270 de-

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grees. Recent changes to the LIWIEC's hardware and software have expanded the radar's operational envelope and improved operator comfort and ergonomics. One of the most important of these has been replacement of analogue transmitting-receiving elements with digital counterparts, enhancing such things as the radar's resistance to jamming. At least nine modern domestically manufactured radars have been delivered into service with the Polish Army over the past three years. Ongoing development of the system being considered by the company to meet changing operational needs include the introduction of an active AESA-class antenna and digital and software-based technologies related to the radar's transmission and reception, as well as equipping future RZRA LIWIEC systems with active Gallium Nitride-based antenna arrays. The new capabilities offered by the multi-channel analysis

and signal processing methods of such antennas would expand the operational capabilities of the radar including using them for deep reconnaissance behind the enemy lines. Networking the radar with other battlefield radar and sensors as part of an integrated C4ISR system is also being considered.

However, with the emergence over the past 20 years of MMR technology, this has increased its application relevance of these systems for such uses as static target force protection, (against multiple target types), of forward operating bases in theatres such as Afghanistan and Iraq. An MMR effectively combines the functions of a WLR with those of an AD radar and, using similar techniques, provides a 360-degree, target-tracking capability. SAAB's GIRAFFE AMB was the first such MMR effectively deployed, with ELTA's ELM-2084 one of the latest and most sophisticated MMR's yet deployed.

Photo: Saab



GIRAFFE 4A can act simultaneously in weapon locating, air surveillance, ground-based air defence, sense and warn and other modes.

Latest UK WLR Activity

While it already released an RfI in Q3 last year for a new WLR to be introduced in 2026 under the Project SERPENS programme, (more of that in a moment), the UK's MoD subsequently awarded Saab a contract for the mid-life extension and support for its existing ARTHUR WLR valued in excess of £38M. The mid-life extension represents a major programme of obsolescence management by the insertion of modern technology, to ensure ARTHUR's critical operational counter-fire capability can be sustained on a cost-effective basis through to its extended out-of-service date. Anders Carp, Senior Vice President and Head of Saab's business area Surveillance said that the systems had already contributed to protecting UK forces for more than 15 years. Deliveries of the mid-life extension will take place between 2022 and 2023 and Saab will carry out the work in Gothenburg, Sweden, with support also taking place at 5th Regiment Royal Artillery's Marne Barracks in Catterick, UK. ARTHUR is known in the UK as the Mobile Artillery Monitoring Battlefield (MAMBA) radar. Jeremy Quin MP, the UK's Minister for Defence Procurement said that MAMBA had proven itself as a battle-winning capability, protecting civilians and troops on operations for many years and that the artillery in Catterick will work alongside Saab to ensure the equipment remains in service for the next six years. The UK received its first ARTHUR systems from Saab in 2003, and the systems have supported operations in Iraq and Afghanistan.

Graphic: Saab



The GIRAFFE 4A mounted on a Hägglunds vehicle

Photo: Saab



GIRAFFE 4A combines the battle-proven designs from the ARTHUR and GIRAFFE AMB product families with an all-new radar sensor.

UK's Project SERPENS

With ESD having sight of the Project SERPENS RfP, it's worth detailing what the new UK MoD project is looking for from any future UK WLR solution. The RfP states that under contract to the MoD's Land Equipment, Armoured Vehicles Programmes - Artillery Systems Programme, the Army HQ Single Statement of User Need (SSUN), which SERPENS will deliver against, is: 'The user requires and organic, responsive, persistent, protected and mobile suite of networked systems optimised to detect, acquire, track and assess adversary indirect fire threats at ranges available to peer opponents. These systems must be survivable on the modern battlefield, deployable with all land forces and linked autonomously to both future ISTAR architectures and effectors, in order to support effectively the counter fires battle within the warfighting division and the Light, Strike and Armoured Infantry Brigades.'

The main users will be 1 Arty Brigade and 1 ISR Brigade and the in-service date for SERPENS is 2026 with an anticipated out of service date of 2057. SERPENS is a Category A equipment procurement project taking into account through-life costs.

The tender also states: SERPENS will deliver a digitally networked suite of sensor systems to detect hostile mortars, artillery and rockets within the land environment. It will comprise part of the wider Land Environment Tactical ISTAR (LE Tac ISTAR) capability (an Army programme in its own right) and from the outset will be conceived with clearly defined architectures to allow seamless operation within

Photo: Saab



Saab's GIRAFFE AMB, the first MMR deployed in Europe

land, joint and NATO ISTAR constructs. It has key dependencies and interactions with: Land Environment Tactical CIS (LE Tac CIS), the primary voice and data bearer. ZODIAC, the future Land ISTAR architecture. Divisional Deep Fires Programme, the ability to strike deep targets with precision. Close Support Fires Programme, the provision of close fires to the Land Environment.

The existing weapon locating capabilities: Mobile Artillery Monitoring Battle-

field Radar (MAMBA), Advanced Sound-ranging Post (ASP) and the Lightweight Counter Mortar Radar (LCMR) reach their OSD in 2026. Should they not be replaced, this will result in the loss of a significant target acquisition capability at a time when Land Forces require enhanced weapon locating sensors as part of the divisional counter fires battle.'

Long-Necked Footnote

With what it terms multi-mission flexibility, Saab has now introduced the GIRAFFE 4A, which it says combines the battle-proven designs from the ARTHUR and GIRAFFE AMB product families with an all-new radar sensor, based on AESA (Active Electronically Scanned Array) technology. This new radar offers exceptional range, performance and multi-function operational flexibility in a single solution and can scan a full 360 degrees. GIRAFFE 4A can act simultaneously in weapon locating, air surveillance, ground-based air defence, sense and warn and other modes without performance degradation. Its weapon locating mode enables it to track ballistic projectiles and calculate their points of origin and expected points of impact so either defensive action can be taken against incoming counter-battery fire, or fire mission coordinates can be sent to friendly forces artillery for rapid adjustment of own fire in response. The system includes a sophisticated ECCM capability. ■

Photo: author



PIT-RADWAR's LIWIEC WLR is designed to co-operate with integrated artillery command and control systems as well as directly with batteries and individual guns.

Azerbaijan's Defence and Security Industry

Korhan Özkilinc

Over the last 10 years, Azerbaijan has undertaken considerable efforts to reform and modernise its military industry. This is because of the interdependence of security policy and defence industry in Azerbaijan, which has been in conflict with neighbouring Armenia for almost 30 years.

After the collapse of the Soviet Union, a power vacuum arose in the Caucasian region, which inevitably led to wars and ethnic conflicts in the region, especially in the Nagorno-Karabakh crisis region between Armenia and Azerbaijan. The permanent Nagorno-Karabakh conflict holds great potential for war because the sporadic fighting between the two countries could quickly turn into a major conflict. In addition, neighbouring Russia, Turkey and Iran, with their differentiated geopolitical strategic interests, play an important role in the region.

me index. However, with regard to Armenia, Azerbaijan has made massive investments in defence industries and military infrastructure over the past 15 years.

The data analysis in the 2014 Military Expenditure Database produced by the Stockholm International Peace Research Institute shows that between 2010 and 2014 Azerbaijan invested four to eight times more annually in its military than neighbouring Armenia, mainly due to high oil and gas prices on world markets, which amounts to more than US\$3Bn annually. In 2015, Baku invested nearly US\$5Bn in its defence industry. Despite

The Beginnings of Baku's Defence Policy

Under the first president of the country Ayaz Mutallibov between 1991 and 1992, Azerbaijan began to build up the armed forces. Yet, there were political discrepancies between foreign and domestic policy. He did not even take the trouble to establish an independent army, but relied entirely on Russia, meant that the resolution of the conflict with Armenia, including the country's domestic security, was entirely in Moscow's hands.

The unstable leadership led in a short time to disaster and the result was the dismissal of Mutallibov and his ministers. The second president of Azerbaijan, Abulfaz Elchibey, made progress with his pro-Western and anti-Russian foreign policy during his short term of office from June 1992 to June 1993, expelling Russian troops from the country and replacing the Cyrillic alphabet with the Latin alphabet. Unfortunately, Elchibey was unable to achieve its far-reaching goals for two reasons: the continuing instability in the west and south of the country, and the revolt of the paramilitary units of Colonel Surat Huseynov in Ganja. Elchibey wisely resigned his post in Azerbaijan in response to civil war-like conditions. Shortly before his resignation, he entrusted the state leadership to the former communist leader of Soviet Azerbaijan, Heyder Aliyev.

Initially President Aliyev secured his power and then appointed Colonel Huseynov Prime Minister. However, only two years later Huseynov was sentenced to life imprisonment for treason, only to be pardoned by current President Ilham Aliyev in 2005. In terms of foreign policy, Heyder Aliyev normalised relations with Russia and, at the same time, opened the horizon to the West, i.e. on the one hand bringing the country closer to NATO and the EU and, on the other hand, keeping good relations with neighbouring Russia, which is of crucial importance for the government.

Photo: Paramount



The TUFAN 4x4 MRAP, developed by a joint venture between the South African Paramount Group and Azerbaijan's MODIAR

The permanent state of war between the two countries influences the arms policies of both the Baku and Yerevan governments. The most recent study of the 2017 Global Militarisation Index shows that Armenia ranks third worldwide in supporting its armed forces with state resources. In contrast, Azerbaijan was primarily economically dependent on oil and gas exports. Due to the decline in oil and gas prices, Azerbaijan has fallen from fifth place to sixth place in the sa-

falling oil revenues in recent years, Azerbaijan has continued to invest heavily in its defence industry. In general, Azerbaijan has set itself ambitious goals and is in talks with many global players to develop new weapons systems. The Azerbaijan MoD is cooperating with the military authorities of nearly 50 countries. Recently, the MoD announced that the country will develop a long-term BMD and Railgun by 2020, most likely in cooperation.



Photo: ShinePhantom

In 2009, Azerbaijan purchased 12 Soviet-era 2S7 PION 203mm self-propelled howitzers from Belarus.

The country's 'multisectoral foreign policy' also determines its defence policy: Moscow dominates 65% of the defence market with countries such as Israel, South Africa, Czech Republic, Turkey, Ukraine and Belarus sharing the rest.

A New Military Doctrine

Until the reign of President Ilham Aliyev, the country's security forces served more to maintain government power than to defend the country. Only later was the military doctrine redefined and heavily invested in the defence industry.

On 16 December 2005, President Ilham Aliyev founded the Ministry of Defence Industry by merging several Soviet-era military-industrial complexes. Of importance were RPE IGLIM, PEYK, TELEMKHANIKA, ALOV, ECM, RADOGURASHDIRMA, ARAZ, AVIA AGREGAT, AZON, RPE DALGA, RPE DALGA, RPE NEFTGAZAVTOMAT, NATIONAL AEROCOSMIC AGENCY among others. Azerbaijan currently has at least 65 such companies and is expected

to have more than 70 such companies over the next few years.

Azerbaijan's arms strategy serves primarily to defend the country, but is also of great importance for the country's foreign policy. In 2007, Azerbaijan, in cooperation with several NATO experts, developed a concept for the 'defence and security of the country' to modernise security structures. The defence concept sees Armenia as a 'threat' and demands 'the restoration of territorial integrity' by means permitted under international law. In principle, Azerbaijan demands the return of the occupied territories of Nagorno-Karabakh through peaceful measures.

Three years later, on 8 June 2010, Parliament adopted a new military doctrine according to which Azerbaijan will not carry out military operations against a country if it is not attacked by it. In addition to the 'right to self-defence', the liberation of the occupied territories is clearly emphasised, which inevitably leads to Armenia being classified as the Number One 'enemy of the state'.

The doctrine also sees extremist religious movements as a threat, but Azerbaijan as a whole sees no need to enter into a military alliance, even if it has close relations with NATO, because "integration into European and Euro-Atlantic structures" is as important for the country as "strategic partnership" with Russia.

Modernisation of the Armed Forces

Azerbaijan wants to modernise its armed forces, which have been heavily dependent on obsolete Soviet equipment. Developments over the two decades show four strategic directions and their impact on the defence industry:

- 1) Outdated Soviet stocks were modernised by cooperation partners such as Israel, South Africa and Turkey. These upgrades improved competitiveness and allowed new production processes to be learned.
- 2) Procurement of new military equipment on world markets while integrating domestic industry into the production of new military equipment.
- 3) Setting up joint ventures in Azerbaijan with 'friendly' countries such as Turkey, Israel and South Africa.
- 4) Manufacturing new military equipment according to NATO standards and exporting it to world markets.

Azerbaijan is dependent on foreign defence equipment and attaches great importance to protecting its defence industry from future uncertainties, which means that security of origin is immensely important. Azerbaijan does not want to violate the Countering America's Adversaries Through Sanctions Act. Some of the most important international cooperation partners of the arms industry are:

Belarus

In the past, Azerbaijan pursued a similar strategy as Belarus and Ukraine. The acquired military equipment was second-hand. For example, 60 T-72M1 tanks were purchased between 2005 and 2006 and 93 more between 2011 and 2013. In 2009, Azerbaijan purchased 12 2S7 PION 203mm self-propelled howitzers and 11 Su-25 ground attack aircraft for the Air Force.

Czech Republic

In September 2015, Azerbaijan contracted the Czech company Aero Vodochody Aerospace to supply L-39 C aircraft. Azerbaijan owns 24 older L-39 aircraft. In 2017, Azerbaijan received 10 second-hand RM-70 122mm self-propelled multiple launch rockets, which had been modernised in Israel.



Photo: Mangust

An Otokar COBRA APV of the Azeri armed forces at a military parade in Baku

Israel

Israel is Azerbaijan's most important defence industry partner with relations dating back to the foundation of Azerbaijan. The foundation stone for the defence partnership was laid by the visit of Israeli President Shimon PERES to Baku in 2009. Today, Israeli defence equipment can be found in all segments of the defence industry.

Between 2014-2015, Israel delivered six SHALDAG Fast Patrol Boats (partly produced in Azerbaijan) and between 2016 and 2017 four OPV-62 SA'AR 62 Offshore Patrol Ships to the Azerbaijani Coast Guard, with an additional 250 SPIKE-NLOS rockets for the SHALDAG and OPV-62. Azerbai-

ti-tank missiles, five ATMOS-2000 155mm self-propelled howitzers and ten CARDOM 120mm self-propelled mortars. Moreover, in 2016, Israel delivered 50 SAND CAT armoured vehicles with ten Spike-LR launchers, 250 SPIKE MR/LR anti-tank missiles and 100 LAHAT Laser Homing anti-tank missiles, and, not to forget, the Israeli company ELBIT also modernised most of the Azerbaijani T-72 MBTs.

In 2016, Israel delivered a BARAK launcher with 75 BARAK-8 SAM missiles, six IRON DOME CAS systems with an unknown number of TAMIR missiles as air defence system as well as two EL/M-2288 AD-STAR radars.

Pakistan and Azerbaijan are cooperating intensively, including in military training and in the defence industry. In 2017, the purchase of 10 MFI-17 SUPER MUSHAK trainer aircraft was completed and delivery of the first aircraft is expected shortly. Azerbaijan is also interested in the JF-17 THUNDER, which was jointly developed by China and Pakistan, but here we will have to 'wait and see'.

Russia

Russia dominates 65% of the Azerbaijani defence market (compared to 95% of the Armenian defence market) and exerts influence on the country's military structures, creating a strong framework for future reforms and thus securing Moscow influence throughout the Caucasus.

Baku has purchased a lot of military equipment from Russia for quite a lot of money. In 2007, Azerbaijan purchased 62 T-72M1 MBT and, in 2010, 70 BTR-80 APC. In September 2009, Azerbaijan contracted the Russian company ROSVERTOL to deliver 24 Mi-35M combat helicopters only to add 66 Mi-8MT/Mi-17 transport helicopters by 2014.

In 2011, two S-300 PMU units with 200 48N6E2 missiles were purchased for Azerbaijan's air defence system, in addition to several hundred IGLA-S, SA-17 GRIZZLY and SA-11 air defence systems between 2012 and 2014. From 2012 to 2014, Azerbaijan received 18 2S19 MSTA-S 152mm self-propelled howitzers, 18 2S31 VENA self-propelled mortar systems and 18 BM-30 SMERCH 300mm self-propelled multiple rocket launchers. From 2013 to 2015, Russia delivered 100 T-90S MBTs and 118 BMP-3M IFVs with 1000 9M117 BASTION anti-tank rockets. In addition, Azerbaijan contracted ROSBORONEXPORT in September 2014 to modernise its T-72 tanks. 2017 was an exceptionally active year, with the Azerbaijani Army receiving 36 TOS-1A self-propelled multiple rocket launchers, 70 APC type BTR-82A, 24 KHTIZANTEMA tracked vehicles with 800 anti-tank missiles. Recently, negotiations have been conducted with Moscow for the joint production of the latest generation missiles.

Slovakia

In 2017, Slovakia delivered 18 DANA 152mm wheeled self-propelled howitzers to Azerbaijan with a second lot of another 18 pieces will follow.

South Africa

In 2014, the Azerbaijani company Air-Tech Services Corporation founded a joint venture with the South African company

Photo: Mangust



Members of the Azerbaijani Special Forces during a military parade in Baku 2011

jan is one of the few countries to equip its coastal vessels with rocket systems.

From 2006 to 2009 6 pcs LYNX self-propelled multiple rocket launcher and 50 EXTRA EXTENDED Range Artillery rocket systems were delivered for the Azerbaijani Army. In 2010, ten-piece Suva APVs with more than 100 Spike MR/LR Anti tank missile were delivered. Thereafter, from 2010 to 2011, a five-piece pcs ATMOS-2000 155mm self-propelled gun and 10 CARDOM 120mm self-propelled mortar (Elbit) were delivered. Finally, in 2016, 50-piece Sand CAT Armoured Vehicles with ten Spike-LR launcher systems, 250 Spike-MR/LR anti-tank missiles and 100-piece LAHAT Laser Homing anti-tank missiles were delivered. The Israeli company ELBIT has updated most of the Azerbaijani T-72 MBT.

Between 2006 and 2009, Israel delivered six LYNX self-propelled multiple rocket launchers and 50 EXTRA EXTENDED Range artillery rocket systems to the Azerbaijani Army. In 2010, they delivered ten SUFA APVs with more than 100 SPIKE MR/LR an-

The two countries are also working closely together in the UAV sector. Between 2011 and 2013, 10 HERMES-450 and five HERON UAVs were delivered. Previously, Azerbaijan purchased 14 UAS from the Israeli company AEROSTAR. Some of the components were manufactured in Azerbaijan, and in 2015-2016 Azerbaijan received 50 HAROP drones with more than 20 kg of explosives from IAI. The Israeli company AERONAUTICS and the Azerbaijani company AZAD Systems have agreed to produce the ORBITER series in 2011. So far, 100 ORBITER-1K, ORBITER-2 and ORBITER-3 have been produced. Recently, Azerbaijan also signed an agreement with a NATO country to supply 100 ORBITER 2M units. Azerbaijan intends not only to use the produced FHs itself, but also to export them to other countries and, therefore, gain a reputation on the international defence market.

Pakistan

Relations between the two countries date back to the establishment of Azerbaijan.

Paramount Group. Paramount Aerospace Azerbaijan modernised the outdated aircraft MI-24, MI-25 and MIG-29.

Previously, Paramount Group Azerbaijan had established a joint venture with MO-DIAR, which produced 85 MARAUDER APCs and 60 MATADOR APCs between 2009 and 2015, equipping both APCs with Cummins engines. The 'know-how' gained was used to develop the TUFAN 4x4 MRAP in Azerbaijan, which was launched in 2017 with preparations for series production currently in full swing.

Turkey

Turkey and Azerbaijan are traditional allies and both governments are in close contact. Turkey has helped rebuild the Azerbaijani Army and integrate it into NATO structures. Between 2011-2016, Roketsan supplied 30 self-propelled multiple rocket launchers T-107 107mm, 40 self-propelled multiple rocket launchers T-122 122mm and 20 self-propelled multiple rocket launchers T-300. In 2010, OTOCAR sold 35 COBRA APV and 37 SHORTLAND Land Rovers to Azerbaijan. Turkish pistols are also license-produced in Azerbaijan, such as the ZAFAR-P 9x19mm pistol from Turkish TISAS Zigana. It is an open secret that many development pro-

jects and joint ventures between Turkish and Azerbaijani companies are at an advanced stage of development. In 2012, the Azerbaijani Army wanted to buy 36 T-155 FIRITNA self-propelled artillery systems. However, due to the German trade embargo against Azerbaijan, it could not import the systems. That being said, the intention to do so nevertheless remains. Baku is also very interested in the new Turkish attack helicopter T-129 and the MBT ALTAY in order to compensate for positions lost in the past.

Ukraine

Ever since the Soviet era, Ukraine has had important defence companies. After the collapse of the Soviet Union, these companies successfully established themselves on the world markets. Azerbaijan is one of the most important customers and has purchased from Ukraine many second-hand products such as tanks, armoured vehicles and missile systems.

Between 2006 and 2011, Azerbaijan purchased 12 L-39 C trainer aircraft, 16 Mig-29 fighter aircraft and 12 Mi-24P/Mi-35P combat helicopters for the Air Force. From 2004 to 2013, the Azerbaijani Army received 45 T-72M1 MBTs, 150 BTR-70 APCs, 12 BM-9A52 SMERCH self-propelled multiple

rocket launchers, two BMP-1 IFVs, three BTR-3U GUARDIAN IFVs, 18 BTR-80 APCs, four BTS ARVs, 54 2S1 122mm self-propelled howitzers, three 2S7 PION 203mm self-propelled howitzers, 16 2S3 152mm self-propelled howitzers, 19 BTS ARVs and several hundred R2 anti-tank missiles and R27 BVRAAM air-to-air missiles.

Conclusion

Azerbaijan has built a strong army to recapture occupied Nagorno-Karabakh and the seven bordering districts of Armenia. Despite the sharp increase in the military budget, the Army's capabilities have not improved as hoped, as the Soviet legacy in the Azerbaijani army remains a major obstacle to reform. This has a significant impact on the country's weapons systems as they are based on two norms, NATO and Russian. The coexistence of different norms also leads to ineffectiveness in the Army. Inevitably, military personnel would have to be trained in two different weapon systems. Young Azerbaijani officers tend to be more reform-minded than their older colleagues, which will have a decisive impact on Azerbaijani foreign and security policy in the future. ■

Exhibition Update – May 2020

As at 30 April 2020, of those that are relevant to the ESD 2020 schedule, to the best of our knowledge, the following exhibitions have been affected by the COVID-19 coronavirus:

FIDAE	Cancelled
AFCEA Bad Godesberg	Next event 24-25 Feb 2021
DSA	Postponed to 24-27 Aug 2020
Quad A	Cancelled
EuroAsia	Postponed to 24-28 Jun 2020
IT2EC	Postponed to 1-3 Sep 2020
Security Birmingham	Postponed to 22-23 Sep 2020
Xponential	Postponed to 10-12 Aug 2020 (TBC)
SOFIC	Cancelled
IDEB	Postponed to 28-30 Oct 2020
ILA Berlin	Cancelled
CTX	Postponed to 8-10 Sep 2020
BSDA	Postponed to 14-16 Oct 2020
NITEC	Postponed to Spring 2021
UDT	Postponed to 8-10 December
CANSEC	Postponed to 2-3 June 2020

HEMUS	Postponed to 30 Sep-3 Oct 2020
KADEX	Postponed to 10-13 Jun 2021
SEDEC	Postponed to 15-17 Sep 2020
EUROSATORY	Cancelled
EW Europe	Postponed to 16-18 Nov 2020
ADM Seville	Postponed to 9-11 Sep 2020
DEFEA	Postponed to 11-13 May 2021
Balt Military Expo	Postponed to 20-22 April 2021
Close Combat Shrinvenham	Postponed to 20-22 Oct 2020
Farnborough International Air Show	Cancelled
SMDC	NO CHANGE (as at 29 April 2020)
Enforcetac/U.T. Sec	Moved to Sep 2020, now 10-11 Mar 2021

Notes:

This list covers relevant events originally scheduled before 15 August 2020.

ExCeL London is, for the foreseeable future, the Florence Nightingale Hospital

“We are now working on an 'ILA goes digital'...”

Photo: Airbus



**Interview with Dirk Hoke,
President of the German Aerospace Industries Association
(Bundesverband der Deutschen Luft-und
Raumfahrtindustrie e.V. - BDLI)**

Dirk Hoke was appointed Chief Executive Officer (CEO) of Airbus Defence and Space in April 2016. In January 2019 he replaced Dr. Klaus Richter as the President of the German Aerospace Industries Association (BDLI).

ESD: The International Aerospace Exhibition/Berlin Air Show is cancelled this year. What does this mean for the German aerospace industry?

Hoke: It is a severe blow for the BDLI and Messe Berlin as the organiser of the International Aerospace Exhibition (ILA 2020) and for the aerospace industry. But health and safety come first, of course. For us it was clear that we would take responsibility for the exhibitors, partners and visitors at ILA 2020. We would like to thank all those who were involved in the preparations for the exhibition for their dedicated work over the past few months. We are proud that we have been able to move ILA forward on its course as an industry trade show for innovation, new technologies and sustainability. We are now working on an 'ILA goes digital' - but are already looking forward to the next 'real' ILA in 2022! It is important to look ahead and, above all, to overcome the coronavirus crisis and its effects.

ESD: The coronavirus pandemic is forcing us to change our behaviour in many respects - at least temporarily. Many nego-

tiations and meetings, for example, take place digitally. Do you expect these behaviours to continue after the pandemic? How is the aerospace industry preparing for this?

Hoke: It is particularly true that this digitisation is based on space technology. Not everyone is probably aware of this: home office, telemedicine, but also on-demand streaming are only made possible by our space technology. The achievements of space travel allow a minimum of everyday life in the current crisis and show how much they create connections: proximity at a physical distance and quarantine without loss of contact. Space travel enables companies to be kept running now, far away from the presence at company headquarters.

Certain changes in behaviour, particularly with regard to the flexibility of new working methods, will certainly continue. But: we all also see how important air transport is for the globalised economy and for German exports in particular. This is why I am also confident that the industry will recover after the crisis, even if the challenges are enormous and will last for a considerable period of time.

ESD: In which areas - short, medium or long haul - are you most likely to see changes?

Hoke: I am convinced that we will see significant changes in all areas of civil aviation. Above all, the path to climate-

neutral flying will fundamentally change aviation. Our goal is ambitious: We want to fly climate-neutral by 2050. Of course, this will change all sectors.

ESD: What measures are required to avert damage to the aerospace industry caused by the coronavirus crisis?

Hoke: The coronavirus crisis has been the most serious crisis in our society and therefore in our industry since the end of the Second World War. Never before has the state had to intervene more strongly in personal and corporate life. This pandemic brought air traffic almost to a complete standstill within a few days. An end to the slump is not in sight. All airlines have either completely or largely decommissioned their fleets. The crisis and its effects are far-reaching and it will take several years before we return to some degree of normality.

Let me briefly outline the most pressing problems for our industry: The lack of liquidity is causing existential problems for some airlines. A break in our deep-seated supply chains has either already occurred or is imminent. Our supply industry, which is dominated by medium-sized companies, has invested heavily in the expected further ramp-up of civil aircraft programmes and has significantly expanded its capacities. These companies, which are located throughout Germany, have made large investments which are now no longer needed, but the financing

of which is of course still ongoing. This leads to enormous distortions between income and expenditures. Conclusion: the situation is highly critical. Many of our suppliers are acutely threatened by insolvency.

The priority for the BDLI is therefore to secure liquidity without delay with the aim of safeguarding the supply chain: it is now absolutely essential to maintain supply chains and thus the technical and economic performance of our German aviation industry as a key strategic industry, also with regard to the role in the European network. Indispensable is the 100 percent guarantee provided by the national Reconstruction Credit Institute (Kreditanstalt für Wiederaufbau (KfW), similar to the Swiss model, which gives companies easy and inexpensive access to liquidity bridges.

It is important that these measures to stabilise or rescue our industry are applied quickly and without bureaucracy.

At the same time, the coronavirus crisis is also affecting the companies in our space industry, the production rate of which has already plummeted in some cases. The partners – our clients, the state space agencies – the European Space Agency, and German Aerospace Centre (Deutsches Zentrum für Luft- und Raumfahrt – DLR), and the space industry – are currently working together at full speed to avoid the worst effects, adjust processes and move projects forward under difficult conditions. The aim is to maintain the



Photo: German Armed Forces

In 2018 the crowds were packed during ILA in Berlin. ILA was cancelled in 2020 due to the coronavirus pandemic.

entire aerospace supply chain, from medium-sized suppliers to system houses. In this exceptional situation, close and immediate cooperation between politicians and our systems and equipment industry is essential - for the benefit of our country. Because, as this crisis impressively demonstrates, our aerospace industry is of strategic importance and systemic relevance: it enables the flow of goods as well as rescue, supply and aid missions and contributes to the operational readiness of our armed forces. It is essential for critical infrastructure, internet connectivity, digitisation, navigation and earth observation, and crisis prevention.

ESD: With regard to climate change, air transport had already come under criticism before the pandemic. What efforts is German industry making to reduce CO2 emissions from aviation?

Hoke: Our goal is clear: climate-neutral flying by 2050. Let me be clear: flying brings numerous and indispensable advantages. Aviation connects people around the globe and has underscored its essential importance for Germany and Europe, especially during the coronavirus crisis. For example, Airbus has flown millions of face masks to Europe, and the German Air Force has used Airbus aircraft for emergency care of patients.

So the problem is not flying, but emissions. And we are already reducing them today. The aircraft of the latest generation are already up to 20 percent more efficient than their predecessors. The use of alternative and synthetic fuels is also of particular importance. We are also researching new drive concepts and are already using technologies to further reduce emissions.

During the current coronavirus crisis, our goal at the federal and EU level is to work on solutions that will enable airlines to accept ordered aircraft within the framework of the EU's Green Deal and economic stimulus programmes. In concrete terms, this means: we are creating "green incentives" for airlines and aircraft manufacturers to replace older, less environmentally friendly aircraft with eco-efficient, modern aircraft in the short term, thereby significantly reducing CO2 and noise emissions. In this way, we are already making a significant contribution to green flying in a timely manner.



Photo: Boeing

In response to the German Air Force's requirement to replace its aging TORNADO fleet, both the EUROFIGHTER and a limited number of F-18F (pictured), to preserve the nuclear participation capability are the most likely contenders, in which case the modernisation and adaptation requirements for both aircraft constitute a solid opportunity for industrial participation, even at subcontractor levels.

Photo: Airbus



Supply chain management for platforms like the H145M helicopters...

Photo: Airbus



... or the NH90 has proven to be time-saving and extremely efficient.

ESD: Where do you see the strengths of the German aerospace industry - in the supply of high-quality parts or components, or in system leadership?

Hoke: Both - the strengths lie in their synergistic interaction. It is clear to me that the success of our industry, which is at home throughout Germany, from large cities to small towns, is based on the close

intermeshing of small and medium-sized companies with major world market leaders. Today, aircraft manufacturers are no longer aircraft manufacturers in the classical sense, but rather system architects and integrators within the value chain. Cooperation with universities and non-university research institutions such as the German Aerospace Centre or the Fraunhofer Insti-

tutes is also of fundamental importance. This combination is the driver for innovation and thus technological leadership in the highly competitive global market - and our recipe for success.

In addition to its economic and technological strength, aerospace is a European success story par excellence. The components of success are interdependent: without the European orientation, technological and economic success would not have been possible. Ground breaking development projects such as the A350, the Future Combat Air System (FCAS) or the ARIANE rocket can only function in a European alliance. The times of small states are finally over.

ESD: The German Government's strategy paper for strengthening the security and defence industry does not classify the production of fixed-wing and rotary-wing spacecraft as a national key technology. The German Government sees this as an area in which technologies developed in a European or global framework can be applied. What is your position on this?

Hoke: The past has shown that we can only enter into profitable collaboration in areas at European or global level where we can demonstrate and contribute strong national key technologies.

With regard to the other technologies or capabilities that we want to map nationally with our industry, the question of platform integration also arises: systems competence is indispensable for integrating national key technologies and at the same time being able to maintain sovereign access to them.

The goal of building and maintaining key capabilities in the areas of cyber, IT and crypto can only be achieved with systems capability. The same applies to sensor technology, electronic combat, networked operations management and, in the long term, artificial intelligence. Capabilities like these cannot be developed in isolation and incorporated into a preconfigured system without disclosing essential elements. At the same time, our products are becoming increasingly digital. Interfaces and integration points are particularly exposed to security risks in this area. This national system capability is becoming increasingly important, particularly in view of the System of Systems approach, which we now intend to implement prominently in the Future Combat Air System (FCAS) project.

Nonetheless, close cooperation with our partners and friends will continue to be a high priority in our industry. In order for this to remain so, we must remain capable of making industrial and techno-

logical contributions. To do so, we need strong capabilities in the field of key technology and the basic ability to integrate systems. At the same time, it must be clear that the ability to provide national support and further develop systems is essential for our country's sovereignty and ability to act – regardless of where certain platforms or delivery dimensions are placed in the matrix. In my opinion, this should also be reflected in the Federal Government's definition.

ESD: The current 'state of fiscal emergency' will not remain without effects on the long-term spending behaviour of the Federal Government. Do you see dangers for essential armament projects such as the Tactical Air Defence System (TLVS), FCAS or the TORNADO replacement?

Hoke: The Federal Government's efforts to cope with the coronavirus crisis and to contain and cushion the economic consequences are enormous. It is putting a lot of money into the hands of companies as well as their employees to help them overcome this extraordinary situation.

It would be counterproductive to reduce the funds for defence programmes to finance these measures. Why? Firstly, we are talking about the procurement of products and services that the Bundeswehr urgently needs in order to be able to cope with the demands placed on it. The Bundeswehr has been waiting a long time for projects such as the replacement of Tranche 1 EUROFIGHTER and the TORNADO replacement as well as the Tactical Air Defence System.

Particularly in areas where new procurements are to replace ageing models, there is a serious risk of serious capability shortfalls because the systems currently in use are already very old. For this very reason, it is important that the Ministry of Defence now implements the planned projects – despite all adversities. The QUADRIGA programme to replace EUROFIGHTER Tranche 1 would be a step in the right direction.

On the other hand, the timely implementation of such programmes helps companies in our industry to generate liquidity, maintain development capacities and secure jobs in the high-tech sector. Here I am looking in particular towards particularly technology-intensive projects like EuroMALE.

In this context, it is important for me to stress that behind such contracts there is always a large number of companies involved in such programmes along the supply chain. It is precisely because our products are so complex that the value chain behind them

Photo: Airbus



The A400M airlifter programme is another solid source of income and potential for the German aerospace industry. Shown here is the aircraft during a test flight dropping airborne troops.

is so important. This is where highly specific know-how is located, which we simply cannot afford to lose or even reduce.

For these reasons it is important to ensure that we employ these companies and their highly qualified staff now and in the future. Projects that are in the pipeline should be brought forward now. Projects such as the replacement of the first tranche of EUROFIGHTER or the development of the CAPTOR-E radar (ESCAN), which is equipped with electronic beam steering, are a good way of supporting our industry. The supply chain for platforms such as the EUROFIGHTER, the H145M helicopters and the NH90 is in place and well established. Accordingly, orders for the Light Support Helicopter (LUH SK) or the MRFH Multi-Role Frigate Helicopter, for example, would not only mean quick and uncomplicated liquidity for many companies, but would also help to maintain our supply landscape.

In addition, we must also be able to plan reliably with a view to the actual implementation of such projects. Only in this way will our industry succeed not only in maintaining but also in expanding capabilities so that we can continue to cooperate with our partners on an equal footing and remain competitive in the future.

In recent years, the Ministry of Defence has contributed to improving planning security by increasing the volume of Section 14 of the federal budget. If the Federal Government were now to turn the defence budget into a financial quarry for coping with the coronavirus crisis and not to launch projects as planned, it would

not only counteract its declared intention to strengthen the German defence industry but would also deviate from its previous course of improving the material equipment of our armed forces.

ESD: The global market for spacecraft is highly competitive. Will the Europeans and thus also the contributing German industry be able to hold their own here?

Hoke: Yes, because we must preserve Europe's independent access to space. Space technology is more important than ever before. And only those at the top have a say at the bottom. With ARIANE 6 we have the ideal launch vehicle for this. What's more, the launch costs per Kg of payload are only half as high as for ARIANE 5. We are competitive in this strategic industry of the future and can thus secure Europe's sovereignty.

ESD: Will German industry be able to maintain or even expand its current considerable share in the development and construction of high-quality satellites?

Hoke: Definitely! We have a highly specialised industry in Germany that produces the most important and most operational satellites of the present. And the current crisis shows we need space travel more than ever before. Satellites from Germany are in use worldwide. I assume that this will also be the case in the future.

The interview was conducted by Rolf Clement, Editor-in-Chief of our sister magazine "Europäische Sicherheit & Technik"

GA-ASI Completes First Production-Representative MQ-9B

(jr) General Atomics Aeronautical Systems, Inc (GA-ASI) has completed the first production-representative MQ-9B SKYGUARDIAN Remotely Piloted Aircraft (RPA). First flight of this aircraft took place on 30 March 2020 at GA-ASI's Flight Operations Facility in El Mirage, California. The new SKYGUARDIAN, known within GA-ASI as BC03, is a company aircraft that is being utilised for ground and flight testing to collect airworthiness certification data starting with flight loads and aircraft performance testing. The results from the tests will form the type certification exposition needed to achieve the military type certificate for the PROTECTOR platform. The multi-mission MQ-9B is built for all-weather performance with lightning protection, damage tolerance, and a de-icing system. SKYGUARDIAN, as well as the maritime SEAGUARDIAN®, features a GA-ASI-developed Detect and Avoid System (DAAS). According to GA-ASI President David R. Alexander, BC03 will be followed by BC04 (also known as UK1), which will be the first PROTECTOR aircraft to be delivered to the RAF. "Production has already begun on BC04 and, prior to delivery, it will be used for combined system test and weapons testing" said Alexander. In addition to the RAF, MQ-9B has been selected by the Australian Government for the Australian Defence Force (ADF) under Project Air 7003. The Government of Belgium has also approved Belgian Defence to negotiate the acquisition of GA-ASI's MQ-9B.

Sale of Hydroid Completed

(jh) Kongsberg Maritime AS, a wholly-owned subsidiary of Kongsberg Gruppen ASA, has completed the sale of Hydroid, its US based underwater technology company, to Huntington Ingalls Industries. In a recent press release, Kongsberg Gruppen announced that Kongsberg Maritime had entered into an agreement with Huntington Ingalls on the sale of Hydroid, Inc for US\$350M on a debt-free and cash-free basis and as adjusted off an agreed upon working capital. The transaction has now been completed. Huntington Ingalls Industries is the largest supplier of vessels to the US Navy. In connection with the transaction, Kongsberg and Huntington have entered into a strategic alliance agreement. The agreement relates to underwater technology from Kongsberg Maritime's underwater environment in Horten, as well as a wider range of Kongsberg's maritime solutions.



Photo: Kongsberg Maritime

New VP Marketing at Aeronautics



Photo: Aeronautics

(ck) Aeronautics Group, a provider of integrated solutions for unmanned platforms, payloads and communications for defence, has appointed Matan Perry to be its new VP Marketing and Business Development. Perry has been with Aeronautics since 2006, his last position being Marketing & Business Development Director for mainly APAC and Europe. During his years in Aeronautics, Perry has been engaged with strategic planning, appointment of local representatives and negotiation with both industry and government customers worldwide. He has also been involved in the company's main projects and has been responsible for the build-up of clients' first UAV squadrons in their own territory. As a Lieutenant Col. (Reserve), Perry has operational and commanding experience and is acquainted with a variety of UAV platforms. Matan holds an LLB & BA - Honours Law degree as well as an Accounting and Business Administration BA degree.

New VP for Marketing and Sales at CONTROP



Photo: CONTROP

(ck) CONTROP Precision Technologies Ltd, a company specialising in Electro-Optics and InfraRed (EO/IR) solutions, has appointed its VP Business Operations – North America, Mr Guy Oren, to be the company's new Vice President for International Marketing & Sales. Oren has experience in business and strategy development, in marketing and sales and in programme management and operations. He served in the Israel Defense Forces (IDF) in the Special Forces, where he held various operational and commanding roles. He has a Bachelor of Business Administration degree and has graduated from a special programme at the Israeli Technion.

Airbus Operations in Spain Closed

(ck) Airbus has temporarily closed its operations in Spain in line with a royal decree limiting movement and industrial activity in the country. The company announced this on 30 March. The move will see all non-essential work at its Spanish facilities cease until 9 April as the country's government battles the coro-

navirus. In terms of Airbus' industrial footprint in Spain, this will most dramatically affect the Airbus Defence and Space (DS) CN235, C295 and A400M assembly lines in Seville in the south of the country, and the A300 MultiRole Tanker Transport (MRTT) conversion facility in Getafe, near Madrid. In addition, Airbus Helicopters' NH90 and TIGER facilities will be similarly affected.

New CEO at Naval Group



Photo: Naval Group

(ck) Naval Group's Board of Directors has appointed Pierre-Éric Pommel as Chairman of the Board with a delegation of authority as Chief Executive Officer. His top priority is to protect the health and safety of the group's employees and to enable customers to safeguard their core activities in the service of defence.

Record Sales for RAFAEL

(ck) In FY 2019, Rafael Advanced Defense Systems Ltd recorded sales of US\$2.7Bn, an increase of 3.9% compared to 2018. The company's orders totalled US\$2.8Bn, with record high export orders, and an order backlog of US\$7.2Bn, equivalent to 2.5 sales years. In addition, in 2019, the company handed over a dividend of US\$130M to the Israeli government. In 2019, Rafael continued to press ahead with extensive marketing and business activities in Israel and around the world, including the acquisition of UAV manufacturer Aeronautics and other companies, as well as numerous other activities. In 2019, Rafael sold two IRON DOME batteries to the US Army and also delivered the first TROPHY Active Protection Systems to the US Army. Rafael received an order from India for the supply of SPIKE missile systems, and a major order for SPIKE from Germany, while expanding its SPIKE user-base to 34 nations. The company also increased the number of users of its LITENING pod. Domestically, Rafael won a contract for a multi-domain project with the Israeli MoD and was awarded the Israel Defense Prize for its SPICE 1000 air-to-surface system. Rafael's investment in its manpower continued in 2019, recruiting over 800 new employees, primarily in technological fields, with 9% of its sales channelled to R&D of defence and civilian technologies, which also entailed vast cooperation with academic bodies in Israel and around the world.



Photo: RAFAEL

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