

European Security & Defence

3/2017

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The EU Is not in a Good Shape



On 26 March the EU celebrated its sixtieth birthday in Rome, which should have been a joyous occasion, and reason to celebrate. But the present state of the EU is unfortunately hardly a cause of celebration. The EU is in one of its greatest ever crises. The foundation for what is today the European Union (EU) was laid on 25 March 1957 with the signing of the Treaties of Rome. From what was then the European Coal and Steel Community (ECSC), Germany, France, Italy, Belgium, The Netherlands, and Luxemburg created the European Economic Community (EEC), with the aim of improving the common foreign trade policy of the countries involved. The aims of the European Union, among others, are common foreign and security policies, a common currency policy, and common policies regarding culture, the environment, and education and training. It is difficult for all the member states to implement common laws. The introduction of the Euro in 2002 revealed the lack of unity among the members; countries such as Great Britain and Sweden rejected the adoption of the euro, and clung on to their old currencies. The EU countries are likewise not unified when it comes to environmental and energy policies, with an increasing number of arguments about the best way to tackle climate change. The member states are equally at loggerheads about the issue of whether electricity should in future continue to be generated with aid of nuclear power stations. Further proof of disunity among the EU countries came in 2004 with the failure of the efforts to create a common constitution. Since then, a whole range of problems have arisen which the EU has for years negligently failed to resolve. These include saving the euro, which in Greece has still not been achieved, and the allocation of refugees, where the EU has not come a single step further. The latest issue, since the Brexit vote, has been the very existence of the EU. It is high time for the birthday boy to be made fit for the decades to come. "United we stand, divided we fall", said Donald Tusk in the run-up to the summit conference in Malta on 31 January 2017. In his letter to 27 state and government leaders regarding the future of Europe, the President of the European Council cited three major threats to the stability of Europe. These include a new geopolitical landscape: China acting

with increasing self-awareness, the aggressive policy adopted by Russia towards the Ukraine and their neighbours; war, terror, and anarchy in the Middle East and Africa (where radical Islam is playing an important part); and the "worrying utterances" of the new American Government. All this is making our future hard to foresee; the internal situation; the rise in a sense of nationalism and increasing xenophobia in the EU itself; the moral stance adopted by the pro-European elites; the dwindling trust placed in political integration; subjugation under populist arguments; and doubts regarding the fundamental values of liberal democracy. In his letter, President Donald Tusk appealed to the state and government leaders to remain united. "It must be made clear beyond any misunderstanding that the dissolution of the European Union will not lead to the re-establishment of some kind of mythical states with recourse to full sovereignty, but rather that these states will de facto fall into reliance on the great superpowers, the USA, Russia, and China. Only together can we be fully independent", as Donald Tusk put it. Commission President Jean-Claude Juncker, in a recent white paper, has broached the debate about the future development of the European Union with 27 member states. The document was published by the European Commission in the run-up to the sixtieth birthday of the Treaties of Rome. Five scenarios are described, each of which holds out a prospect as to where the Union could be by 2025, depending on which course Europe takes. In the scenarios, the issue is pursued as to how Europe will change in the next ten years, from the effects of new technologies on society and employment, to concerns regarding globalisation, and on to matters of security and increasing populism. Interestingly, surveys show that matters of security are today among the areas in which Europeans still see great potential for international cooperation. It is therefore entirely right to press ahead with the European defence union as one of the most important future projects of the EU, and to strengthen still further the EU Common Security and Defence Policy, especially against the background of the attitude adopted by the US President towards NATO.

Henning Bartels

Between Politics and Necessity



Photo: Roketsan

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From Policy to Action



Photo: EDA

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■ Australian OPV Tender

(df) Damen Shipyards Group has submitted a tender for the SEA 1180 Phase 1 Project to deliver twelve Offshore Patrol Vessels (OPV) to the Royal Australian Navy. For this offer Damen has teamed with ASC For-

Photo: Forgacs



gacs Shipbuilding in a joint venture to build the initial two ships in South Australia and further ten in Western Australia. This joint venture is already investing in infrastructure at the Henderson Shipbuilding Precinct in Western Australia in preparation for the OPV construction to move to WA. "We are fully committed to maximising Australian industry participation and supporting the development of a sustainable, national shipbuilding industry in Australia," said

Roland Briene, Damen Sales Director Asia Pacific. "This is fully in line with our standard practices where we partner with local organisations to help transform local shipbuilding industries into globally competitive shipyards."

■ Estonia Signs CV90 Support Contract

(df) Estonia has awarded contracts to BAE Systems to maintain and sustain the country's fleet of 44 CV9035 Infantry Fighting Vehicles (IFVs), which were acquired from

Photo: BAE Systems



the Netherlands in 2014. The long-term agreements covers configuration management for new IFV capabilities as well as maintenance, repairs, and spare parts. "The armoured manoeuvring capability

programme is one of the most important capability development projects of the last decade in Estonia, which will increase the combat capability of the Estonian Defence Forces remarkably," said Margus Padjus, Project Manager of the procurement department at the Estonian Centre for Defence Investment (ECDI). "The CV9035 Infantry Fighting Vehicles that the Estonian Ministry of Defence bought from the Netherlands were the first step in this project. To ensure that utilisation of the vehicles would be as efficient as possible, ECDI entered into the long-lasting life-cycle support contract with BAE Systems Hägglunds. I am convinced that our CV90s will be professionally and reliably supported by BAE Systems Hägglunds."

■ Surveillance Capabilities from Diamond Aircraft

(jh) Diamond Aircraft, based in Wiener Neustadt (Austria) was among the exhibitors of this year's HOMSEC exhibition in Madrid, Spain. The company drew atten-

Photo: Diamond Aircraft



tion to their portfolio of special mission and trainer aircraft. According to Alexander Maierhofer, the company's Technical Sales Manager for Special Mission Aircraft, Spain has a requirement for an airborne surveillance and reconnaissance capability on the country's southern border that Diamond Aircraft could respond to with its DA 42 MPP (Multi-Mission Platform). The DA 42 MPP is a twin-engine aircraft capable of operating up to twelve hours without refuelling. The aircraft is offered as an ISR (Intelligence, Surveillance and Reconnaissance) platform, for geo surveys or TV broadcasting with a flexibly configurable sensor fit. Beside the DA 42 the company has identified market potential in Spain for between 20 and 30 of its DART-450 reconnaissance trainers for varying applications. In Spain, Diamond Aircraft is represented by Rosique Aircraft based in Reus near Tarragona.

■ EDA Research Project on 3D-Printing

Photo: John Abella



(df) The European Defence Agency (EDA) has named 3D-printing as one of the key enabling technologies to improve European industrial competitiveness. These so called Additive Manufacturing (AM) technologies might enhance defence capabilities significantly due to improved mobility, sustainability, effect and protection through e.g. field repair & maintenance and therefore reducing logistic burden and improving sustainability in warfighting and peacekeeping missions. According to EDA, substantial economic benefits

are also expected. To identify and explore areas where additive manufacturing can have a wider impact EDA has commissioned Fundación Prointec and MBDA France to conduct a project designated "Additive Manufacturing Feasibility Study & Technology Demonstration" with expected completion in December 2017. The study targets the entire spectrum of European defence and AM stakeholders, at all levels of defence and AM supply chains.

The project is composed of three work strands:

A desktop study to place AM and its potential in a defence context. The main outcome of this work strand will be the identification of opportunities for AM in the European defence sector. At the same time, it will aim to highlight factors preventing European defence forces from reaping the benefits of this breakthrough technology.

The second work strand is a technology demonstration of AM in a simulated deployment scenario. Its purpose is to demonstrate the feasibility and operational utility of deploying these technologies in support of a military operation.

Following the desktop study and the technology demonstration, the conclusions of this feasibility study, including the equipment used and typical objects and materials produced, will be presented in an exhibition. The objective is to raise the military awareness of AM technology and to exemplify how it could improve the way operations, logistic support or maintenance of platforms are conducted.

■ UK Engagement in the F-35 LIGHTNING II Programme

(df) The UK has taken further steps in the F-35 LIGHTNING II programme. The US Department of Defense's F-35 Joint Program Office has awarded a contract worth more than €96 million to Lockheed Martin to de-



Photo: BAE Systems

liver the initial training, engineering, maintenance and logistic support for the UK's F-35 LIGHTNING II fleet over a three year period. Lockheed Martin has subcontracted work worth €48 million to BAE Systems. "Nothing demonstrates the strength of our relationship better than our joint work on the most advanced combat aircraft in the world – the F-35 LIGHTNING II and the UK is proud to be the future hub for all the European jets," said UK Defence Secretary Sir Michael Fallon. "The additional investment at RAF Marham will ensure that we have a formidable fighting force that, at a time of growing danger, in the most momentous of weeks, will help us work with our US partners to promote international peace and security." The second step was the beginning of training the pilots in the new F-35 LIGHTNING II simulator in preparation for flight trials on the UK's new QUEEN ELIZABETH class aircraft carrier next year. The refurbished simulator will test pilots' skills to the limits as they practise landing on the deck of the new aircraft carrier in a range of difficult sea and weather conditions.

■ Turkish Armoured Amphibious Assault Vehicle Project

(df) The Turkish Undersecretariat for Defence Industries (SSM) has awarded the contract for the Armoured Amphibious Assault Vehicle (ZAHA) project to FNSS.



Graphic: FNSS

This programme was initiated by SSM to meet the amphibious armoured vehicle requirement of the Turkish Naval Forces Command. Under the terms of the contract the vehicles will be developed and produced by FNSS based on an indigenous development model. FNSS will deliver 27 vehicles: 23 personnel carriers, two command and control vehicles and two recovery vehicles. The technical characteristics of the Armoured Amphibious Assault

Vehicles were determined by taking into consideration the operational concept and mission requirements defined by the Turkish Naval Forces Command. "Following the Anti-Tank Vehicles Project, the ZAHA contract is the second contract we have signed with SSM in the past year. Then there is also the KORKUT contract we have signed with ASELSAN", said Nail Kurt, General Manager and CEO of FNSS. "FNSS vehicles currently in the inventory of the Turkish Armed Forces, which include the Armoured Combat Vehicles (ACVs), the SAMUR Armoured Amphibious Assault Bridge and the KUNDUZ Amphibious Armoured Combat Earthmover, are performing their duties admirably. Vehicles that will enter the inventory in the coming period include the ACV-30, which will be used in the KORKUT project; the KAPLAN-15 and PARS 4x4, which will be used in the Anti-Tank Vehicles project; and the Armoured Amphibious Assault Vehicle."

■ Seventh FREMM with GE Gas Turbines Launched

(df) The seventh Italian FREMM multi-purpose frigate FEDERICO MARTINENGO was recently launched. All of the Italian Navy's new CARLOS BERGAMINI class FREMM



Photo: GE

frigates - 10-ships in total – will feature the same power dense GE LM2500+G4 gas turbine in a Combined Diesel eElectric And Gas turbine (CODLAG) propulsion configuration. The GE LM2500+G4 marine gas turbines will soon also power the Italian Navy's new PATTUGLIATORI POLIVALENTI D'ALTURA (PPA) multipurpose offshore patrol ships. GE's contract includes an order for seven LM2500+G4 gas turbines, the company announced. The ship's flexible hybrid propulsion plant will feature small gearbox mounted-motors for low speed

operations, two propulsion diesels for mid-speed service and the LM2500+G4 gas turbine to reach 32+ knots. GE also will be responsible for the electrical system integration. Worldwide, more than 1,300 GE gas turbines log over 14 million hours serving 35 navies on 500 naval ships for 100 military ship programmes.

■ GOWIND Corvette Makes First Sea Trials

(df) According to DCNS the first sea trials of the very first GOWIND 2500 corvette have been successful. "It is a very important moment for DCNS: the GOWIND corvette designed especially for the international market is now sea proven," said Eric Chap-



Photo: DCNS

let, DCNS' Vice-President Marketing. "We are very proud to announce that, with the GOWIND 2500 corvette, DCNS now has the latest generation vessel to strengthen its product line geared to the international naval defence market." The GOWIND corvettes have a total length of 102 metres, a width of 16 metres, a displacement of 2,600 tons, a max. speed of 25 knots, and a range of 3,700 nautical miles at 15 knots. They have been laid out for a complement of 80 with helicopter detachment included. Special capabilities include the SETIS combat system that has been developed by DCNS for the FREMM frigates and GOWIND corvettes. The first GOWIND 2500 corvette was built at the DCNS site in Lorient, France. Nine other corvettes are to be built in Egypt and Malaysia in the scope of a co-production arrangement.

■ Contract Awarded for GRIFFON and JAGUAR

The French Procurement Agency DGA has awarded the first production contract for 319 GRIFFON and 20 JAGUAR (shown here)



Graphic: GME

vehicles as part of the Multi-role Armoured Vehicle contract. As a crucial stage of the SCORPION programme, the early award of this conditional tranche will therefore provide for the production of these new vehicles to commence only 27 months after development. The contract includes logistic support and associated training and was awarded to a team consisting of Nexter, Renault Trucks Defense and Thales. The GRIFFON Multi-role Armoured Vehicle and the JAGUAR Armoured Reconnaissance and Combat Vehicle, both of which benefit from a high level of protection, will respectively replace the VAB and the AMX10RC, the SAGAIE ERC and the VAB Hot, used intensively in all kinds of terrain for over thirty years. They will enable the French Army to have a state-of-the-art combat tool with the best protection technologies and the best possible use to be made of digitised data on the battlefield. First deliveries of the GRIFFON are expected in 2018 and of the JAGUAR in 2020. The SCORPION programme calls for the delivery of 1,668 GRIFFON vehicles and 248 JAGUAR engines to the French Army, as well as associated logistic support facilities.

■ Pakistan Orders AW139 for SAR and EMS

(df) Leonardo announced that the Government of Pakistan signed a new order for an undisclosed number of additional Agusta Westland AW139 intermediate twin engine helicopters. The aircraft will be



Photo: Leonardo

used to perform utility, SAR (Search and Rescue) and EMS (Emergency Medical Services) operations across the country. Deliveries are expected to start in early 2018. The contract is a further step towards the completion of fleet renewal programmes spread over several batches plus logistic support and training. This event is a major achievement for Leonardo expanding the already successful presence of the AW139 model in the country. A fast growing fleet of AW139s is already in service in Pakistan, with several units operated by the Pakistan Government for relief and transport duties. According to Leonardo, the AW139

is the perfect fit to Pakistan's operational environment, delivering outstanding capabilities and hot and high performance unmatched by any other existing helicopter type in the same class.

■ SEA VENOM Tests from a Royal Navy LYNX

(df) Working together through the Defence Growth Partnership (DGP) initiative, MBDA, in collaboration with the UK Defence So-



Photo: MBDA

lutions Centre (DSC), the Royal Navy and QinetiQ, has successfully conducted air carriage and jettison trials of its SEA VENOM/ANL anti-ship missile. During the trials a Royal Navy LYNX Mk8 helicopter successfully conducted a series of air carriage trials prior to jettisoning two SEA VENOM missiles fitted with telemetry kits. The outcome of the trials has been a de-risking of the integration process of SEA VENOM on both the LYNX and SUPER LYNX helicopters for the export market. SEA VENOM is a modern anti-ship missile primarily designed to destroy vessels ranging from

FIAC (Fast Inshore Attack Craft), through medium sized FAC (Fast Attack Craft) up to large vessels such as Corvettes from safe stand-off ranges. The 100 kg-class missile is one of the products of France's and the United Kingdom's collaboration on missile technologies. In UK service the missile is planned to be used from the AW159 WILDCAT helicopter, while in France the DGA (Direction Générale de l'Armement – the French defence procurement agency) is currently conducting the development flight campaign for the missile on a PANTHER helicopter test bed.

■ Germany Procures MELLs

(df) In the scope of the MELLs programme Germany will procure 1,000 SPIKE missiles and 97 launchers with deliveries starting



Photo: Eurospike

in 2018. MELLs is the German acronym for "multiple role lightweight guided missile system" denoting the SPIKE LR (long

■ Jammer in an Attaché Case



Photo: Rostec

(df) United "Ruselectronics", part of the Rostec State Corporation, upgraded a compact jammer to become the "SOLARIS CASE", a suitcase featuring jammer technology and therefore ensuring protection from explosive and tapping devices. In comparison with previous versions, the scale of suppressed frequencies is extended twice in the updated one. Besides, the radio-interference device allows to "block" Bluetooth channels, Wi-Fi and 4G. The Solaris case was presented at LAAD 2017 in Brazil. In the follow-up of the exhibition, a number of Latin American countries applied for the purchase of a device integrated in a small "attaché case". The development was carried out by the company Sozvezdie, part of United Ruselectronics.

According to the developers, the updated SOLARIS is provided with a function for the smart suppression of cell communication which provides for the analysis of a lot of frequencies, to pick up the potentially dangerous channels and block them. The hardware is integrated in a small attaché case which can be easily transported without attracting third-party attention. The case can be used to ensure the safe movement of VIPs as well as during mass public events in order to prevent terrorist attacks. The system blocks radio signals which can trigger the detonation of an explosive device. Moreover, the transmitter is designed for blocking illegal access to confidential information. During closed-door negotiations the case equipment can be used to cover the office by blocking tapping.

range) product. Above all, the SPIKE guided missile will supplement and expand the weapon system of the PUMA armoured infantry fighting vehicle as a high precision, stand-off-capable component enabling highly effective engagement of armoured and infrastructure targets.

■ Rocket Motors for the AIM-9P Missile

(df) The US Air Force has awarded a contract for the production of rocket motors for the AIM-9P missile to Orbital ATK. The award is an indefinite-delivery/indefinite-quantity contract estimated at a volume of US\$67 million when fully optioned adding to the more than 30,000 SIDEWINDER motors the company has produced to date.



Photo: Orbital ATK

The AIM-9P SIDEWINDER missile has received significant upgrades since its first development in 1978, with the latest version featuring Orbital ATK's SR116-HP-1 reduced-smoke rocket motor. Work for the current FMS order is expected to run through February 2022. "The SIDEWINDER missile system has a proven record for effectiveness and reliability at home and around the world, and this award will help our allies defend shared interests for years to come," said Pat Nolan, Vice President and General Manager of Orbital ATK's Missile Products Division. "I am confident we will deliver this FMS version to our allies overseas with the same outstanding record with which we deliver thousands of other tactical air-to-air rocket motors."

■ Polish Navy Orders RBS15 Mk3

(df) The Polish Navy has placed an order for the maintenance and logistic support of the Polish Navy's RBS15 Mk3 surface-to-surface missile system with deliveries taking place between 2017 and 2018. The RBS15 Mk3 is a long-range missile system, it excels as the main anti-surface armament for any type of naval vessel. It is designed to operate in a diverse range of scenarios, from anti-ship engagement in blue to littoral waters as well as land attack missions. The RBS15 Mk3 allows for true fire-and-forget operability in all weather conditions, thanks to its advanced pre-launch programmable active radar seeker. The missile is jointly produced and marketed by Saab, Sweden and Diehl Defence, Germany. "The RBS15 Mk3



Photo: Saab

is a world leading surface-to-surface missile system providing excellent performance in all weathers," says Michael Höglund, head of marketing and sales at business unit Missile Systems within Saab's business area Dynamics. "It is a vital part of the shipborne Polish Navy offensive capability and we are happy to assist the Naval Port Gdynia in their professional work ensuring the readiness and availability of this versatile and powerful missile system."

■ Next Generation Combat Helmet

(df) The US Army has awarded the contract for the Advanced Combat Helmet Generation II (ACH GEN II) to Revision Military. In the scope of the last contract from the US Army in 2012 a total of 180,000 ACH helmets had been successfully delivered. In this next generation combat helmets Revision



Photo: Revision

said their scientists were able to exceed the weight reduction requirements stipulated in the Army's solicitation by a sizeable margin: the solicitation required a minimum 15% weight reduction, with Revision's solutions for ACH-GEN II providing up to 24% weight reduction over the legacy ACH design, pushing the envelope of attainable weight reduction while maintaining very good ballistic protection. In total Revision has delivered

1.1 million helmets to the US military, and an additional 300,000 helmets internationally. Across all of these programme deliveries, according to the company, Revision has never received a single warranty claim for product malfunction or defect, has never had to recall a single faulty product, and has never failed a single Lot Acceptance or First Article test.

■ Thales SOTAS Chosen for Danish Vehicles

(df) The Danish Defence Acquisition and Logistics Organisation (DALO) signed a framework agreement with Thales for the acquisition of the SOTAS vehicle communication system including logistic support. The contract covers the next seven years with first deliveries in 2018. Maintenance technologies will be transferred to Denmark to reinforce a



Photo: Thales

closer local relationship with DALO. SOTAS systems are based on a high performance open architecture that is modular, scalable and future-proof. The modular components can be assembled and scaled to provide optimal system configurations for all vehicle types and missions. Upgrades are performed with minimal impact on the existing installation. This provides for great flexibility and logistic advantages that support the broad range of wheeled and tracked military tactical vehicles. Denmark will install the new communication system in both wheeled and tracked vehicles. SOTAS systems are already fielded in more than 30 countries supporting a broad range of wheeled and tracked military tactical vehicles.

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The Geostrategic Challenge in the Baltic Sea

Giulia Tilenni

The Baltic Sea is an area of key strategic interest for all its littoral states and for their respective regional security bodies. Its geography makes it a potential scenario of confrontation between Russia and NATO and/or the EU.

The Baltic area is vitally important for at least eight countries – Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Russia, Sweden, and, to a lesser extent, Norway.

Recently, the area has received considerable attention due to rising political and military tensions between Russia and the West. Geo-economy has been driving the strategic posture of these stakeholders. The big picture at the political-military level is therefore complex and multifaceted.

Because of its morphology and as most littoral states are EU members, the area is considered by some as some sort of “EU

Russia’s landlocked territory grants limited access to the sea. In fact, westward it can access the sea mainly through Murmansk in the Barents Sea, St. Petersburg, in the Baltic Sea and Sevastopol in the Black Sea. As the Barents Sea is usually frozen, and Turkey can easily block Russia’s access to the Black Sea in case of tensions, St. Petersburg port remains Russia’s key commercial port/choke point. Furthermore, despite a decade of investment and slight improvements, Russia’s east coast does not represent a valid strategic alternative, yet.

The Baltic Sea is an important commercial and energy route for EU countries as well:

Firstly, three states have asymmetric allegiance to multiple regional bodies. Norway is a non-EU NATO member. Conversely, Sweden and Finland are non-NATO EU members.

Secondly, Russia has special relations with Finland and somehow with Sweden. But nowadays, Sweden and Finland are allied with Russia’s rivals, although these alignments are still not encapsulated within binding defence arrangements. A strategic confrontation between Russia and the West would put them in the cross-fire. Once again, geography matters. The Russian annexation of Crimea has advanced Russia’s physical presence in Europe, and it has created a worrying precedent for the Baltic States which host significant Russian minorities.

Finally, as the Baltic Sea partially constitutes the EU/NATO–Russian border, respective military postures contribute to the Baltic geostrategic challenge for the near future. All of the stakeholders are well aware of the strategic importance of the area, still their posture is not always adamant, thus feeding misperceptions and misunderstandings.

Multiple Alliances, Multiple Concerns

In the years before the Ukraine crisis, the littoral states had been reducing their defence budgets and the number of servicemen. Most of them abolished conscription in favour of professionalism. Furthermore, core capabilities for the Baltic theatre, such as ASW, SAM, and armoured assets have been shrinking due to inconsistent evidence of threat. As a result, concerned states are nowadays experiencing severe capability gaps, which are hard to fill in the short term. In the meantime, they are no longer credible and effective in performing some of the needed core missions autonomously. In light of rising tensions with Russia, northern countries seek better military assets, but it will take years to rebuild potent capabilities. As of today, they are



Photo: NATO

NATO training with amphibious assaults in Poland

lake”. However, the Baltic Sea is a relevant route for both the EU and Russia. The Danish Straits, Kattegat and Skagerrak, rank among the world’s ten most important oil choke points with about 3 million barrels of oil transit per day.

Russia is the major recipient of the economic flows across the straits as roughly 40% of the oil in transit departs from Russia to its trade partners. It is worth recalling that

the North Stream gas pipeline connects Vyborg (Russia) to Lubmin (near Greifswald, Germany), and in the near future North Stream 2 will connect Ust-Luga (Russia) to Greifswald (Germany).

Contested Area for EU/NATO–Russia Relations

This area being monitored by big powers should make it one of the world’s most secure commercial routes. This notwithstanding, the region is likely to become a contested area for EU/NATO–Russia relations because of the peculiar, intricate cauldron of political and military relations amongst stakeholders.

Author

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Photo: NATO Allied Air Command

Russian MIG and British TYPHOON over the Baltic

dependent on and bridled into complicated alliances.

In fact, Finland and Sweden are not fully integrated into NATO, despite strong ties. NATO members intervening in case of aggression is just an unlikely policy option. Given Finland's and Sweden's status, NATO support is not granted.

At least in theory, EU membership should compensate for it. The legal framework introduced by the Lisbon Treaty includes a mutual defence clause (art. 42.7) comparable to the collective defence clause reaffirmed by NATO article 5. To this day this clause has been invoked only once, after the French request of collaboration following the 2015 terrorist attacks which were then understood as a direct menace to France. In reality, however, each EU state responded differently to President Hollande's support request, and only some contributions were proper military ones. However, as the EU has no autonomous HQ, major operations should be carried out through NATO, and non-EU members might not agree on intervening. Besides, without US tankers, ISR, strategic airlift and other assets, European projection capabilities are rather limited. Finally, several analysts have repeatedly highlighted that EU members' combat forces are too few and far between and often already overstretched abroad. Structural problems, such as inefficient funds allocation in defence spending, is another issue per se. Consequently, Finland and Sweden need to add credibility to their defence posture. Sweden will likely reintroduce conscription, and both coun-

tries are building up their military doctrine and forces structures (i.e. the reestablishment of a permanent military presence in Gotland).

Situation of the Baltic States

Latvia, Lithuania and Estonia, although NATO members, share the same fear. Tallin, Riga and Vilnius are uncertain whether NATO's article 5 would work promptly in case of aggression. On the one hand, they plan to raise military budgets up to 2% GDP by 2018 (Estonia has already made it) in order to meet NATO demands and to acquire new systems, especially radars. On the other hand, their defence still relies heavily on allied military assets, such as the Baltic Air Policing, which compensates for their gaps in air force and air defence capabilities.

Scandinavian and Baltic countries are also strengthening defence ties in an attempt to put together a regional sub-block of countries with significant defence capabilities. The Nordic battlegroup – Sweden, Finland, Norway, Ireland, Estonia, Latvia and Lithuania – represents a notable example.

To fill regional capability gaps and to reassure the Baltic allies and Poland, NATO has recently launched its Force Integration Units (NFIU) programme. It consists of a strengthened NATO presence to ease an eventual intervention – by NATO Response Force and/or NATO VJTF – under article 5. Meanwhile, the US is reinforcing its presence through the European Reassurance Initiative: 4,000 US soldiers have been re-

deployed to the Baltics, Poland, Romania and Bulgaria to underline Washington's commitment to Europe in case of major conflict. However, more US soldiers on the ground do not automatically untangle troubling overlapping alliances and foggy foreign policies in the region.

Russia has always had a different approach to strategic planning. Moscow has tried to keep up capabilities, or at least to compensate for their shortfall. Military planning has always been a top priority on the Russian agenda. Moscow is better prepared than the other stakeholders for strategic confrontation. It is worth noticing that Russian economic and military capabilities remain poor, yet their strategic thinking put the country in a relatively advantaged position when it comes to political-military action – such as in the Middle East and in Ukraine, where it achieved its objectives by force.

The Importance of A2/AD

As a consequence of this scenario, Anti-Access/Area Denial (A2/AD) is becoming a mantra between lights and shadows. Both Russia and NATO are working on raising the number of A2/AD assets in order to preclude military access to the region and restrict the opponent's potential manoeuvres. The geography of the Baltic Sea makes it difficult to dominate the entire sea or major aero-naval operations but each actor, although incapable of dominating the sea in case of war, is able to interdict or counter-interdict the enemy's operations.

Russian A2/AD capabilities are developing comprehensively, with a stress on missile air defence and missile ground-to-ground retaliations. In addition to air defence based on Su-27/33 and Mig-29, Russia is boosting missile defence. The OSK West deploys two air defence brigades (1st and 2nd) on nine regiments. Each regiment includes two battalions/batteries of S-300 (F, P, or V) or S-400 (range of action 150-400 km, depending on missiles). Batteries can operate from predetermined protected locations, but they can also move easily within the same theatre. The 2nd brigade, in particular, deploys its assets along the Russian Baltic border: 500° Rgt. (Gostilitsy), 1488° Rgt. (Zelenogorsk), 1489° Rgt. (Vaganovo), 1490° Rgt. (Sablino), 1544° Rgt. (Vladimirskiy Lager), 22° Rgt. (Kaliningrad). Moreover, long-range air surveillance radars are operated by 333° Rgt. in Khvoynyy and 334° Rgt. in Petrozavodsk.

Ballistic missile capabilities include the 26th Ballistic Missile Brigade (Luga) and the 152nd Missile Brigade (Kaliningrad). Each of them deploys twelve Iskander-M SRBM double launchers.

Furthermore, Russia deploys three out of four airborne divisions close to the Western border: 76th Air Assault Division (Pskov), 98th Airborne Division (Ivanovo) and 106th Airborne Division (Tula). Russia considers them strategic rapid deployment forces. Many other units in the area are being fleshed out and slightly modernised. The Baltic Sea Fleet and the Northern Fleet contribute to reinforce Russian posture, notably through additional air defence capabilities and cruise missiles, especially the SS-N-27 SIZZLER (anti-ship) and the SS-N-30 KALIBR (land attack).

Deterrence by Denial versus Deterrence by Punishment

While Russia pivots on “deterrence by denial”, NATO has traditionally embraced a “deterrence by punishment” approach. Over there, NATO’s air policing and ballistic missile defence are guaranteed through collaborative work by all members. The US ERI initiative and the EFP (Enhanced Forward Presence) should further deter Russia. Besides, NATO considers its Response Force the main means of strategic projection – and the “stick to punish”. Recently, several HQs in East Europe have been upgraded to manage major operations promptly (e.g. Brunssum). Nevertheless, it seems NATO felt the need to mirror the Russian A2/AD posture.

It is developing a strategic “six-pack” aimed at strengthening adaptation to the Baltic challenge, including A2/AD capabilities, with a focus on anti-missile assets. In par-

ticular, the core of the Baltic Sea (about 430 km) can be covered by sea-based, endo-atmospheric interceptors SM-6 (Standard Missile-6, AEGIS system), while the protection of the Danish Straits would be assured by Patriot batteries located in Germany and operated by the Air Defence Missile Wing 1 – Air defence missiles groups 21 (Sanitz), 24 (Bad Sülze), 26 (Husum) and 61 (Toden-dorf). Furthermore, both NATO and non-NATO members in the region are investing in surveillance systems, fast attack craft, SSK, and coastal missile batteries, thus bolstering a more traditional anti-access approach to territorial defence.

Potential Escalation/De-Escalation

Geographical and political features undoubtedly contribute to the instability in the Baltic Sea, and misperceptions fuel uncertainty.

When it comes to the Baltic Sea, each side reads the other side’s posture in terms of potential aggression. Russia perceives NATO redeployments to the area as an act of aggression, and conversely NATO denounces Russian flyovers over the Baltics as an act of aggression. Moreover, both NATO and Russia are used to conducting military exercises in the Baltic area, the typical scenario being the aggression of the other part on its territory (e.g. BALTOPS, Anakonda, Zapad). However, actual military capabilities on both sides, although relevant, are overall limited in comparison to Cold War orders of battles and tones. A local conflict is

more likely to erupt than a full scale confrontation, and all the stakeholders are unwilling to escalate, especially if non-NATO countries are involved. Russia has demonstrated its capability to carry out rapid dominance operations to grab a strategic object of interest. Yet Russia is unlikely to be able to sustain prolonged large operations. Although NATO has a significant military and technological edge over Russian forces, political difficulties among its members can create a political-military stalemate in case of real action. In this context, the case of Ukraine raised worries amongst several members. To sum up, even if the situation were to heat up, both the US and Russia believe it would be a local conflict. However, the political implications of a direct confrontation could be much bigger and the situation might be difficult to manage because of the large number of stakeholders involved. Militarization of the Baltic Sea and political muscle flexing are fuelling a powder keg. All of the stakeholders might find themselves dragged into a crisis all of them wanted to prevent – and that no one could really afford, regardless of official statements. Strained EU–Russia relations and uncertainty fed by the first weeks of the Trump presidency do not help. It is imperative for Europe to find a different balance of power to change the course of the current defence trends in the Baltic region. Europe might not be able to afford raising voices and US disengagement at the same time.



Commander of the Polish tank company during NATO exercise “Noble Jump” in Poland

Photo: NATO



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The Role and Place of Georgia in the Russian Military Calculus

Eugene Kogan

Back on 22 February 1993, Pavel Grachev, then Russian Minister of Defence, said: “With regard to our units in Georgia, Batumi, Gudauta and other locations, these locations are of strategic importance to Russia. Otherwise, we will lose the Black Sea (region)”. Apparently, for President Vladimir Putin and his administration, the importance of Georgia in particular and of the Black Sea region in general has not diminished even 24 years later, despite Russian retention of the military bases in Abkhazia (a breakaway region of Georgia) after the August 2008 war and annexation of the Crimean Peninsula in March 2014.

There is a saying that appetite comes with eating. In other words, Georgia is indeed a “sweet cake” that Putin and his administration are interested to take care of. As a result, they pay utmost attention to Georgia and are not ready to let others take care of the country. How Georgian political and military elites see the Russian encirclement of Georgia is of no importance to the Russian military, since the latter know full well that Georgian politicians can only complain about the Russian encirclement, but they will do nothing to hinder it. Furthermore, the Russian military see the encirclement of Georgia as a one-way road, in that steadily encroaching upon Georgian territory will reduce the country’s independence and sovereignty and will slowly move it back into Russia’s fold.

In order to understand the role and place of Georgia in the Russian military calculus we need to look at the bigger picture. For instance, the Russian military continues to view Georgia as a pivotal transit country for oil and gas pipelines and a newly-built rail link from Azerbaijan to Turkey (Baku-Tbilisi-Kars). Furthermore, Georgia is primarily responsible for the missing rail link between Abkhazia, the breakaway region of Georgia, and Armenia, still the staunch ally of Russia. Georgia is also a major transport route and an energy transit country from Russia to Armenia. As a result, the Russian military views Georgia as part of the Russian sphere of influence where all the necessary links come together, a kind of regional strategic hub. In addition, they see in Georgia a potential Russian pressure point on Turkey, a NATO member state.

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Freedom Square and the city hall in Tbilisi

Putin and his administration view Turkey with friendly suspicion, despite President Erdogan’s repeated reassurances that Russia is a friendly country and an important economic partner of Turkey. They say that: “For too long Turkey was and still remains a NATO member state and, as a result, cannot be fully trusted, assurances or not.” Furthermore, the Russian military bases in and joint task forces with Abkhazia and South Ossetia, the breakaway regions of Georgia, as well as the Russian military bases in Armenia and soon-to-be-established Russian-Armenian Military Joint Task Force (MJTF) encircle Georgia. Finally, since Georgia lacks serious air and naval capabilities, Russia maintains its air and naval dominance over Georgia in the Black Sea and thus puts Georgia in a tight spot.

Russia’s Military Claims

It is currently hard to say whether or not Russia is interested in revitalising the de-

funct Transcaucasian Military District (TMD) that existed during Soviet era by including Azerbaijan and in it. However, such a possibility cannot be dismissed out of hand, although the author has no evidence to support his assumption. If such evidence exists, it would remain highly classified by the Russian military and is unlikely to be disclosed. Nevertheless, the aforementioned Russian actions highlight the very important place and role of Georgia in the Russian military calculus. The author’s point is further reinforced by the Nezavisimaya Gazeta military expert Lieutenant-General Yuri Netkachev. According to Netkachev “Georgia strives for joining NATO poses a threat to the Russian friendly countries (Abkhazia and South Ossetia). This is an important factor in Russia strengthening its positions in the region”.

Netkachev’s claim that Georgia’s aim to join NATO poses a threat to Abkhazia and South Ossetia, the breakaway regions of Georgia, is indeed ridiculous. However,

(Photo: George Kvishinadze)

at the same time, it shows that Georgia is viewed by the Russian military as an important link to what is happening in the South Caucasus and justification for Russian strengthening its presence in the region. Keeping Georgian political and military elites guessing what may happen in the future remains the Russian mid-to-long-term policy for the South Caucasus region in general and for Georgia in particular. Furthermore, the Russian guessing game versus Georgia also targets Georgia's partners, such as the EU, NATO and the US who are currently distracted from the region by their domestic challenges. That the rhetoric of Georgia's partners has only partly manifested in deeds encourages Russia in its pursuit of keeping Georgia in its sphere of influence.

To reinforce the author's point of view about the Russian medium-term policy and Russian pursuit of Georgia, Stephen Blank writes that, coupled with the integrated air-defence system (IADS) and anti-access/area-denial (A2/AD) networks that Russia is building in and around Syria and the Black Sea, Russia is constructing an elaborate network of air and naval defences. As a result, the constructed network places the entire Caucasus beyond the easy reach of NATO and Western air or military power.

As Blank continues, in other words, as Moscow moves to manoeuvre Turkey, as well as Georgia and Azerbaijan, into its orbit through combined economic, ethnic, military and political pressures, it is also ensuring that these countries will be placed behind an air-defence umbrella. This could allow the Russian Army and/or Navy to advance into them if necessary and to do so with impunity, since Western forces would be deterred by the likely high rate of casualties they would incur. Indeed, when this network is completed, Moscow need not invade but only threaten to undermine the sovereignty or integrity of these countries, or their pro-Western affiliations and economic-political ties.

Propaganda and Disinformation Campaigns

A variety of soft security tools available to Russia, such as propaganda and/or disinformation campaigns combined with cyber security attacks plus imposed economic sanctions, would be ruthlessly used by Moscow to bring Georgia under Russia's heel, even before Moscow decides to move in and finish the business called independent Georgia. The Russian military option towards Georgia cannot and should not be ruled out. Such a warmongering scenario may sound too cold-blooded and sober-

minded to the liberal-minded political elites in the West, but that is how Russia's political elites and military think and operate in the 21st century, author's comment. The author's assertion will be dismissed outright by the Russian officials, but this should be expected.

Furthermore, Blank states that the consequences of this Russian strategic operation are quite clear. If NATO cannot effectively defend the Caucasus or connect to it, Georgia's NATO option becomes meaningless. Since NATO remains unwilling to accept Georgia as a member, the [Georgian] application [for membership] will become an empty ritual, a cheque that cannot and will not be cashed. The result of Georgia not becoming a NATO member state but rather remaining a NATO partner turns Georgia into easy prey for belligerent Russia, a point reiterated below.

the famous quote "expect the unexpected" or be prepared for any [Russian] eventuality that Russian officials would deny strenuously, since they live in their own created world: the world of denial.

Georgia's Important Role in Russia's Strategic Goals

In conclusion, Georgia continues to play an important role in the overall Russian strategic goals in and around the South Caucasus and the Black Sea region. Georgia is a link to Armenia and Azerbaijan as well as a pressure point on Turkey, whom Russia is interested in keeping at bay, decoupling from the NATO Alliance and exerting a degree of control over. Georgia is also a rail link between Abkhazia, the breakaway region of Georgia, and Armenia that Russia is very much interested in re-establishing.

Photo: US Marine Corps



Georgian soldiers practice marksmanship skills with US Marines.

Despite NATO's presence in Georgia, which Russia tends to exaggerate intentionally, Russia does not consider this presence as a threat that would jeopardise its plans to keep Georgia in its sphere of influence. Putin and his administration know full well that NATO is not in a position to assist NATO partner Georgia if Russia decides one day in the future to bring recalcitrant Georgia back into its fold. Let us remember that Putin's plans to invade Georgia in August 2008 were prepared in 2006 and put into motion two years later. Even if Putin and his administration will dismiss the author's assertion outright, such plans exist and are likely to be carried out if and when Putin and his administration see the right moment to execute them. Let us remember

On the point of re-establishing a rail link, Russian officials very often expressed their view. However, Georgia has thus far refused to give the green light to the project, since Georgian officials see a clear Russian stratagem that it can be foreseen that the Russian pressure on re-establishing a rail link is to continue.

By reasserting their control over Georgia, Putin and his administration sent a clear message to the West: "Your investment in new democracies failed to pay off and we do not consider you a competitor in the post-Soviet space in general and in and around the South Caucasus and the Black Sea region in particular. Back off and leave Georgia alone. Thus, basically and back to us what was and still is ours." ■



Viewpoint from Washington



Chet Nagle

Readiness, Readiness, and Readiness

During Chancellor Merkel's recent visit to Washington, President Trump reportedly handed her a \$330Bn invoice for Germany's share of NATO dues. It was marked as overdue for twelve years. The invoice caused concern and merriment on the left and right and then the United States and the Federal Republic denied it had ever happened. Bogus or not, the invoice caused some head scratching.

It is no secret that Germany, France and other NATO nations do not meet minimal defence budget targets as agreed by NATO, something candidate Trump pointed out by saying members should "pay their fair share." He also said, more worrisome in many nervous European capitals, "NATO is obsolete." President Trump has since reevaluated threats facing Europe and no longer thinks NATO is obsolete, but members might remember that "pay your fair share" is still very much on his mind.

As if to remind NATO members of that, a week after his meeting with Chancellor Merkel, President Trump debunked press reports that their meeting was not cordial by tweeting that he had a GREAT meeting with the Chancellor. But he then added that "Germany owes...vast sums of money to NATO and the United States must be paid more for the powerful, and very expensive, defence it provides to Germany!"

In any event, European and American defence contractors probably enjoyed the report of Trump's phantom invoice too, and then realised that if NATO members actually started paying their fair share – 2% of GDP – there would be a surge of new defence contracts. And when it was announced the American president's defence budget will ask for a \$54Bn increase, they further reckoned that a buying bonanza of new weapon systems was on the near horizon. But is it?

There are, of course, constraining factors on defence spending by NATO members, not the least being Brexit and the hobbling financial difficulties of Greece, France, Italy, and others. There are also factors constraining the U.S. defence budget. First, there is the difference between what the services want and what they need and second, there is the 2011 Budget Control Act (BCA) that places arbitrary caps on domestic and defence spending. Lifting the BCA cap on defence spending will be very difficult at best, because the political appetite for more defence dollars at the expense of social security and medicare simply does not exist.

And with regard to the kind of American defence spending that is coming, the three most important words are readiness, readiness, and readiness. Military services carefully guard details of how ready they are for combat, but the situation is now so dire that they have become quite vocal. Carrier aircraft, the tip of the spear of power projection, are at such a low readiness level that their crews must cannibalise spare parts from aircraft in storage boneyards. The Air Force says that less than 50% of its combat units are ready for "full spectrum" (high threat, high intensity) combat. The Army, Marines and Coast Guard are in similar straits.

This makes it obvious that the first bulldog to be fed by the US defence budget will be readiness, and procurement of new or even existing systems will be minimal. Advanced weapons research will get some scraps so the military will not fall behind in warfighting technology.

So unless your defence company is heavily into maintenance, training, spare parts or advanced research, expect to face lean times. That is, unless the winds of war increase to gale force.

Kazakhstan and Russia: On the Brink of New Challenges

Stephen Blank

Arguably the crucial Russo-Kazakhstani relationship will soon face serious new challenges stemming from both internal transformations in both countries and the accelerating changes in world politics that will encompass Central Asia in their impact.

Russia's internal changes arise from factors that the Kremlin cannot admit – but that are increasingly evident – namely its decreasing ability to sustain its claim of primacy in Central Asia, even as it sees the US disengaging from Central Asia and Afghanistan. That disengage-

its long-cherished dream of dominating a continental trade and investment bloc in the form of the Eurasian Economic Union (EEU) to cooperating with China's Belt and Road Initiative (BRI).

Beyond that, its ability to sustain military force throughout Central Asia is also un-

in Afghanistan. All these actions inevitably reverberate upon Moscow's ties to Astana (and other Central Asian capitals).

Grand Leader's Multi-Vector Foreign Policy

Meanwhile, Kazakhstan's President Nursultan Nazarbayev has launched a major domestic reform that deconcentrates his powers and devolves many of his powers regarding domestic and economic policy to parliament, which would also now choose government ministers. Nazarbayev would retain his powers in foreign and security policies and remain Kazakhstan's "Supreme Arbiter". Given Kazakhstan's visible socio-economic successes and real economic problems, partly stemming from its dependence on commodity prices and the example of Uzbekistan, Tajikistan, and Turkmenistan who all face daunting economic problems and, as the recent Uzbek transition showed, excessively rigid governing structures, these reforms are prudent.

As regards relations with Russia, the major potential danger from this reform is that squabbling politicians during or after Nazarbayev's lifetime (he is 76) will fail to resolve economic challenges, allow politics to fall into clan and ethnic rivalries that target the very large Russian minority, or provide a pretext for Moscow to claim that their rights are being abused and then intervene. Given Moscow's very strong media position across Kazakhstan, it retains a significant, if as yet unmeasured, influence on elite and mass perceptions there and could easily exploit or even incite domestic unrest.

Concurrently, Nazarbayev's long-standing support for key Russian initiatives like economic integration and services like mediating the Syrian civil war show potential domestic challengers that he enjoys Russian support. He will undoubtedly endeavor to ensure that his successor also



Photo: kremlin.ru

Russia's President Vladimir Putin and Kazakhstan's President Nursultan Nazarbayev

ment obliges Russia to shoulder more responsibilities in Central Asia despite the rising burden of those obligations.

China's commercial and economic ascendancy are already long-established facts and Russia has had to subordinate

der pressure. On Vladimir Putin's recent tour of the region, he had to admit that if Kyrgyzstan wanted Russia to leave the base at Kant it would do so, even as he secured pledges of support from Kyrgyzstan and Tajikistan for Russian forces' continued presence there.

Moscow's increasingly visible support of the Taliban also indicates its apparent readiness to consort with terrorists to retain its military primacy in Central Asia, if only to prevent ISIS from seizing power

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does so. And Moscow undoubtedly will prefer to see a stable Kazakhstan under that successor to ensure regional stability.

Policy of Toleration

Thus internal pressures are always potentially aligned to external ones. Since Russia has never fully accepted any post-Soviet state's claims to sovereignty and territorial integrity as ironclad, Kazakhstan lives under the perpetual shadow of an intervention. Indeed, Russian officials and analysts have repeatedly asserted that it is a natural or objective process for the smaller states around it to be absorbed into a Russian sphere of influence, based, *inter alia*, on their supposedly common history. And they frequently remind Kazakhstan of its large Russian minority as a potential vulnerability. Russia's growing perception of a US disengagement from Central Asia also obligates it to assume still more responsibility as a regional security manager. This danger of Russian *de facto* or *de jure* truncation of Kazakhstan's sovereignty and/or territorial integrity has always focused Nazarbayev's attention on pursuing a "multi-vector" foreign policy whose watchword is balance among Russia, Chi-



Photo: Arken

The physical transformation of Kazakhstan's capital, Astana, symbolises the country's move into modernity.

if Kazakhstan did nothing on its own to engender that outcome.

Threats to the Balance

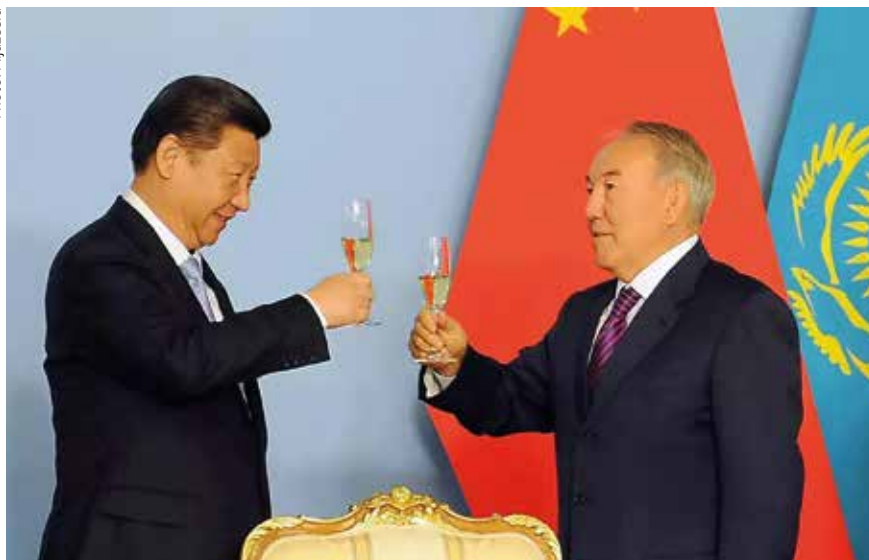
Indeed, we can easily postulate three possible alternative scenarios that could undermine this carefully crafted balance. If terrorism prevails in Afghanistan or in another Central Asian state, Kazakhstan, as a relatively lucrative target will immediately

that pressure. And if the Taliban remained allied to Russia, Moscow's willingness to support or sponsor terrorism in pursuit of its interests can hardly assuage Kazakhstan's need for security.

A second danger could come about even if the next regime does not fail to meet domestic challenges, and that stems from potential Sino-Russian rivalry in Central Asia. But if Kazakhstan did fail foreign governments would likely establish ties with disgruntled cliques or else, so that the populace rises up against a ruling clique it sees as excessively connected to either Russia or China.

These contingencies should highlight the importance of Sino-Russian relations to Kazakhstan. There are multiplying signs now that, for whatever reason, China is seriously considering deploying its troops to Central Asia, at least in the areas around Afghanistan. China may be suspicious about Russia's intimacy with the Taliban and its Pakistani backers or fears that Russia can no longer be fully counted on to defend Beijing's huge investments in Central Asia. Kazakhstan, in particular, has come to depend on Chinese investments. Indeed, Chinese state-owned enterprises (SOE's) protect those investments by "making key members of the Kazakh government stakeholders in the success of the investments. In addition, -- Chinese government strategy has evolved from one of simply buying off key members of the Kazakh government in order to gain approval for investments to one of making institutions in the Kazakh state, such as KazMunaiGas, stakeholders in the long-term success of the investment in order to secure protection for investments in a climate of political uncertainty," Daniel C. O'Neill wrote in his article "Risky Business: The Political Economy of Chinese Investment in Kazakhstan."

Photo: Aljazeera



China's President Xi Jinping and his Kazakh counterpart Nursultan Nazarbayev during Xi's state visit to Astana

na, and the US. Indeed, he has masterfully pursued and achieved that balance by his initiatives on proliferation, welcoming of Chinese foreign investment, strong support of Eurasian integration, and by leading a domestic policy of toleration. Nevertheless, as he and presumably any successor well know, this policy requires constant balance. And trends in Central Asia could overthrow that balance even

be at risk. The Taliban might promise Russia to respect Central Asian borders and the status quo. But if they or, worse yet, ISIS, come to power they will probably not adhere to that bargain. Moreover, there are now thousands of battle hardened terrorists from Russia or Central Asia who would welcome a chance to destabilize what they regard as immoral, corrupt regimes in their homelands. Kazakhstan would soon feel

Indeed, Kazakhstan is the biggest recipient among all post-Soviet states of Chinese foreign direct investment (FDI). Should Russia and China fall out over Central Asia, this Chinese investment becomes a target for nationalist agitation and resentment among Russians in Kazakhstan, Kazakhs who resent China's presence and behaviour in Kazakhstan, and potentially in Moscow.

Dealing with World Powers

Alternatively, the previous speculation that US President Donald Trump wanted to make a deal with Moscow directly injures Kazakhstan and its neighbours for it would express a visible diminution of US interest in and support for the Central Asian states' independence, even though it is clear they all want to maintain contact with Washington and are especially concerned to see the US stay in Afghanistan and also increase investment into their countries. Indeed, as Russia's ability to assert its primacy in Central Asia continues to decline, it may feel even more impelled to intervene in Central Asia, especially where its co-ethnics are deemed to be at risk.

Therefore, if the great powers cannot maintain coordination or balance among themselves the repercussions could be felt

in Central Asia. Russian scholars have recently written a paper on contemporary international relations that asserts the possibility that, "at the same time, the growing instability in peripheral regions lends legitimacy to the sharply increased foreign policy focus on security and justifies the subsequent mobilization of resources to meet those challenges. Meanwhile the military buildup by the major powers coupled with turmoil in the periphery could lead to untold disaster – a series of severe conflicts afflicting every member of the global order, from the major powers to unstable quasi-states." This passage is taken from "Global Revolt and Global Order: The Revolutionary Situation in Condition of the World and What To Do About It" by Oleg Barabanov et al.

Similarly, many Chinese thinkers view China's periphery, which surely includes Kazakhstan and Central Asia, as the most likely area for potential military clashes. To the extent that Sino-Russian interests diverge or internal factors originating in an individual country or the overall Central Asian region ensue that periphery, including Kazakhstan, could become the object of great power rivalries. Indeed, if we extrapolate from Russia's behaviour towards other post-Soviet states and China's encroach-

ments not only on the South China Sea but also on Central Asian neighbours like Tajikistan, it becomes clear that Kazakhstan cannot for a moment relax its vigilance about defending its sovereignty or territorial integrity. Therefore, it must consistently work to sustain a balance among the great powers.

Yet balance may not ultimately suffice to ensure its security. When we also take into account that, for the Russian government and many Russian analysts, great power status, that is to say, an imperial or quasi-imperial status that reduces its neighbours to protectorates at best, is the precondition for the survival of the regime, the extent of the structural danger to Kazakhstan that is inherent in its ties to Russia becomes apparent.

Kazakhstan must therefore keep Russia, China, and even the US in a balance while augmenting its own resilience and domestic capabilities. Even if it succeeds in achieving the latter, forces beyond its control, as may be developing now, could jeopardize that balance along with Central Asian, not just Kazakh, security. Consequently, the Russo-Kazakh relationship not only faces major future challenges but could become a much more important barometer of the direction of future international affairs. ■

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Viewpoint from Ankara



Cengizhan Çatal

Turkey and the EU Need to Act Together and Rely on Each Other

The failed coup d'état attempt on 15 July 2016 marks one of the most significant waypoints for Turkey's security and defence policy. In a nutshell, more than 300 people, including 104 pro-coup soldiers, lost their lives and 1,491 were injured. Tens of thousands of soldiers were degraded from their military ranks. Besides, thousands of people were removed from their positions in military, administrative and judicial institutions.

As a result of the coup attempt, Turkey's domestic and security policy, the structure of the military and foreign policy have and will become subject to major change. The weak and unclear reactions of Europe in response to the coup attempt were perceived as disturbing by Turkish politicians. The Turkish Government, which failed to receive sufficient support from the European countries following the unsuccessful coup attempt, turned its alignment to new alliances that it believed could establish permanent partnerships with – like Russia, above all.

Part of the first reactions by Turkish decision makers was the start of negotiations with Russia for the S-400 missile defence system independently from NATO's joint air defence system considerations and based on the assumption that the Adana-Incirlik military air base would be closed for use by western countries such as the United States and Germany.

Notably, the tension between the Turkish Government and Europe brings along the risk to turn into a crisis that can be very difficult to resolve and covering the entire political, economic and security spectrum. Therefore, if Turkey is totally excluded from Europe, it can be envisioned that the European Union (EU) will also be threatened by significant security risks. The crisis in Turkey-EU relations is surfacing at a time when Turkey and the EU need to act together and rely on each other. The tension between the EU and Turkey will not contribute to the long-term interests of both sides in defence and security policy. Considering the current state of EU-Turkey relations, they are not sustainable for the security of both parties. However, regional security is an indispensable issue for both sides. In this respect, the big

debate in Ankara is about how the relations with the western countries will develop.

Turkey's most important of recent military deployments was the Operation Euphrates Shield, which started on 4 August 2016 and ended on 29 March 2017. The Turkish Armed Forces succeeded in pushing the ISIS back from Turkey's southern border to the south of the Syrian town of al-Bab in the Aleppo Governorate. At the end of the operation, the presence of ISIS in the Cerablus-Cobanbey-al-Bab triangle was terminated. It is important to say that the Operation Euphrates Shield was also of symbolic importance. According to Turkey's political leaders Operation Euphrates Shield contributed to the deterrence factor of the Turkish Armed Forces in the international environment. Also, the operation created awareness in the public opinion about the military power of the Turkish Armed Forces after the failed coup attempt.

The Turkish Army has accomplished Operation Euphrates Shield. However, uncertainties and potential security risks in Syria remain to be at the top of the agendas in Ankara.

Taking all these aspects into consideration, we can say that 2017 will be a very challenging year for Turkey's security. Turkey is fighting against different terrorist organisations which have completely different ideologies, strategies and methods. Moreover, these terrorist organisations operate both domestically and abroad. Turkey fights against four different shapes of violence, constituted by ISIS, PKK, armed extremist left terrorist organisations and the Gülen movement FETÖ. Turkey will have to cope with these threats for at least three more years, which is probably a very optimistic prediction. Moreover, the conflict in Syria is continuing. The chaos in the Middle East, which creates new terrorist groups, has not come to an end.

At this point, Turkey is looking for reliable allies to support the country in political and military terms in the fight against this "cocktail" of security threats. 2017 and 2018 will be a period in which Turkey will reshape its internal and external security policy and relationship with its allies.

Hybrid Warfare in Asia: Potential not yet Unleashed

Jan Blinka

“Hybrid warfare” is currently one of the most “trendy” terms in the security-strategic dictionary. Although the concept was used for the first time in the beginning of the 21st century, it gained its prominent position after the Russian annexation of Crimea and Moscow’s involvement in the military conflict in eastern Ukraine. Subsequently, it has become part of the strategic documents of the European Union and NATO, as well as of their member states.

Hybrid escalation follows roughly three stages: first, the attacker engages in internal and external political subversion to undermine the credibility of local government and create unrest among the population. Subversive action would include the support of anti-government and anti-“system” forces, propaganda tools and media campaigns, and the creation of “pockets of influence”. In the second stage, the attacker would take steps to ensure that any such opposition movement would topple the government, preferably by peaceful and legal or semi-legal means, promoting change in the political status quo. In the third stage, the attacker would overtly intervene with kinetic means to ensure “new realities on the ground”, which would be presented as “fait accompli”.

So what is “hybrid warfare” and can we trace its presence beyond the European continent – to Asia for example?

Hybrid Warfare, Nothing New under the Sun

From the buzz around the concept of hybrid warfare, it may seem that the world has experienced in recent years an entirely new type of armed conflict, for which the community of security experts and military strategists had to devise a name. However, the very essence of hybrid warfare is as old as war itself – it is a combination of military and civilian resources, which, thanks to their synergistic effect, force the opponent to take steps that he would not take voluntarily.

Author

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(Photo: Tomer Gabel)

Haifa, Israel, after a rocket launched by Hezbollah hit the city near Bnei-Zion hospital

Although armed conflicts traditionally combine several dimensions (except for the use of regular military forces, it is often the involvement of secret and diverse operations and of propaganda and disinformation activities), hybrid warfare is different from them in placing emphasis on the achievement of strategic goals by non-military means of a subversive nature. These include primarily, but not exclusively, deployment of special forces, sabotage, support of local resistance units and separatism, propaganda and disinformation campaigns, economic pressure, and terrorist activities. As Valery Gerasimov pointed out in his famous article “The Value of Science in Prediction” in 2013, “the role of non-military means in achieving political and strategic goals has grown, and, in many cases, they have exceeded the power of weapons in their effectiveness.”

When military force is used, it is used in a limited manner and in denial mode, when its presence is officially disavowed, or labelled as “peacekeeping”. To quote Gerasimov once again, “the open use of

forces – often under the guise of peace-keeping and crisis regulation – is resorted to only at a certain stage, primarily for the achievement of final success in the conflict”.

Mark Galeotti describes hybrid warfare in even clearer terms: it is a stage of political destabilisation, which precedes and sometimes even replaces the phase of proper kinetic warfare operations.

What is new, therefore, in hybrid warfare is not the inclusion of non-military means in the service of war itself, but the level of their interconnection with conventional warfare, the emphasis on the non-military component, and the extent of damage that can be done with such a synergy due to the technological and social cohesion of the contemporary world.

Practical Application of the Concept

Destabilising activities conducted by Russia against the territorial integrity of Ukraine in 2014 are a prime example of hybrid warfare. During the annexation of Crimea



(Photo: Kurdistanstruggle)

Kurdish fighters of the YPG, a Kurdish militia in Syria

and the first phase of military operations in eastern Ukraine, which ended with an open intervention of Russian regular forces in the summer of 2014, Moscow used almost a full arsenal of hybrid warfare tools, especially in political, economic, social, and military domains. Non-military means included support for local separatist troops, economic pressure on Ukraine, and propaganda and disinformation campaigns directed at the Ukrainian and global populations. From the military component, both special and regular forces were deployed in so-called incognito or denial mode, but the military element was not crucial to achieving Moscow's strategic goals – it secured the desired outcome through its supportive and supplementary role.

If a similar analysis is carried out in Asia, we can conclude that none of the ongoing conflicts satisfies the definition to be considered hybrid.

China's Activities in the South China Sea

Consider China's activities in the South China Sea. Although some scholars and practitioners consider them as examples of hybrid warfare, these activities fall short of fulfilling the above-mentioned definition, mainly because they are not armed conflicts (so far). Although two battles were fought between the PLA Navy and Vietnamese Navy in 1974 and 1988 for ownership of the Paracel and Spratly Islands in the South China Sea, they were "ad hoc" military clashes, which resulted in shifts of their management from Vietnam to China and which did not escalate further. Since that time, there has not been any military armed conflict between the claimants in the South China Sea dispute.

The uses of non-military means of warfare are further limited by the fact that the disputed features are uninhabited rock formations, whose first ever "residents" are the incoming Chinese soldiers, anglers, and workers. Thus, there was never any population against which China could employ its tools of political destabilisation as a prepar-

atory stage for a further military campaign. Rather than hybrid warfare, China's actions and behaviour in the South China Sea are more reminiscent of the great powers in their redistribution of "newly discovered" territories and can be described as the tactics of "take as much as you can".

First, conventional forces were deployed in order to secure the ownership of the disputed features, several of which have become artificial islands through land reclamation. On more than 3,200 acres of reclaimed soil, Beijing builds airports, radars, missile storage, and other military equipment and assets, thereby confirming its de facto authority over the territory and creating a new status quo on the ground (and water)

(Photo: US Department of State)



Aerial view of the Zaatari refugee camp in Jordan

regardless of the legitimacy of such actions under international law. Subsequently, China uses means of non-military nature, such as media campaigns and historical and legal justification, to legitimise its actions before the world's public, and maritime militias to project its control over claimed waters.

East Asian Frozen Conflicts

There are two long-standing armed conflicts in East Asia – the dispute between South and North Korea for dominance over

the peninsula and the conflict between mainland China and Taiwan. Both are currently frozen in military terms, and both have experienced in the course of their duration repeated use of non-military tools such as propaganda and disinformation operations, support for civil unrest and opposition, and cyber and terrorist operations. The most recent examples of such methods include, among others, China's restrictions on tourism to Taiwan following Taiwan's general elections in January 2016, and the hacking of South Korea's military cyber command by North Korea in December 2016.

However, none of the actors has fully explored the potential for hybrid warfare significantly to change the status quo. So far, non-military tools of warfare have been used subordinate to the military dimension, even though they might play a prominent role in destabilising an opponent's society and thus preparing the stage for "final success in the conflict."

Considering the capabilities of players in these two East Asian conflicts, the most likely scenario would include the application of hybrid warfare by China against Taiwan; other combinations would not have as much chance of success in this case. Even though China possesses huge

military, economic, influential, and cyber capabilities, which it could use in order to destabilise Taiwanese society, there are two main limitations to the successful application of hybrid warfare. First, the island's residents are mostly unsympathetic to the government of mainland China and 60% of them identify themselves as exclusively Taiwanese. Second, Taiwan has strong security ties with the United States, which would object to any serious attempt by Beijing to destabilise the island.

India: Between Pakistan's Markhor and China's Dragon

The armed conflict between India and Pakistan in areas such as Jammu and Kashmir dates back to 1947 and is predominantly a "traditional" territorial dispute in which the emphasis lies on military means and the non-military dimension plays only a complementary role. Even though Pakistan is accused of being involved in undercover operations and in supporting terrorism and local separatist groups in Indian-controlled territory, these non-military activities are subordinate to the use of regular forces in achieving the desired end state. The hybrid potential of the Indo-Pakistani territorial dispute has not been fully explored by either side.

On the Sino-Indian border, there is currently, primarily, only verbal conflict in the Indian-controlled Aranuchal Pradesh and other smaller regions, which China claims. As even Indian military officials are aware, the hybrid potential of this conflict is based primarily on the economic underdevelopment of India's remote regions, which contrast with the prosperity of neighbouring Chinese provinces. Beijing can use such inequality to foment separatist sentiment within the local population, which is culturally and ethnically close to the population of China's Tibet.

Due to ethnic and cultural separation from India's population and the pre-existing separatist sentiment, these two conflicts are more likely to develop into hybrid war than any of the above-mentioned disputes. In a possible scenario, China and/or Pakistan would try to exploit those dividing lines, triggering a political and social crisis in the disputed territories that would prepare the stage for military intervention and final annexation. If not developing according to plan, China and/or Pakistan could send in their "peace" troops, which by their presence would help to ensure the desired outcome. The main weight of the warfare would, however, rest on the support of local opposition movements; manipulation of public opinion, cyber attacks, special operations and

disinformation campaigns – namely, on non-military power ingredients.

Future Hybrid Conflicts

Sound familiar? It should: a similar scenario was followed when Russia destabilised Ukraine and is likely to be repeated against neighbouring states whose status quo it wishes to change without military aggression. However, since this hybrid method of warfare was successfully used in Crimea, other countries have become more cautious towards the possible employment of such a combination of military and non-military activities against them.

Although the element of surprise was lost, some disputes, as shown above, certainly have the potential to escalate into a hybrid war. Since the key goal is to avoid becoming the target of a hybrid attack, the attention devoted to this phenomenon by security experts as well as the civilian population in the given country is essential. It is necessary to popularize the topic itself and follow the activities of any "hybrid" attackers even before any actual attack occurs. As Miroslav Mares writes, "the most important weapon against these hybrid threats is a confident democratic society that is willing to defend democratic values and national identity." ■

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Viewpoint from Jerusalem



Tamir Eshel

Walking a Tightrope over Syria

The Arab spring is not limited to the Arab world, in fact – it is a global spring big groups are frustrated, angry, communicate and driving change.

Russia and Iran are the most dominant powers in Syria. Both plan to stay. Syria is a mirror that reflects the complex relationships between the two strongest Muslim factions and other minorities in the Middle East. Iran's direct influence is not limited to Syria or Iraq, where Iranian proxies are assisting the Syrian and Iraqi regimes. The increasing influence of Iran is reflected beyond the Shi'ite-dominated nations in the region.

In Lebanon they turned the oppressed minority into the most powerful force, and in Yemen they are fighting the Yemeni Government to gain control over Bab el-Mandeb, the second most important maritime route connecting Europe with the East. This is a strategic development that is happening right now, but the world is concerned with other, seemingly more urgent issues - ISIS and the flood of refugees caused by the Syrian and Iraqi conflicts.

While Israel is directly threatened, this trend has regional and global ripple effects. Besides Iran's nuclear ambitions Jerusalem is concerned about a future "Shi'ite Crescent" led by Iran, - a continuous land-link connecting Iran to the Mediterranean, over Iraq, Syria and Lebanon, which will have strategic implications - first and foremost to Israel, that is constantly threatened by Iran, but also to other regional powers, including Turkey and Saudi Arabia.

The Middle East is not sitting idly by and accepting Iranian settlement in the region. Beneath the surface, new alliances are formed between past rivals that have become allies facing a common threat. This is a trend the Middle East has seen through the centuries.

Syria is likely to remain fragile for a long time. Although many say they fight ISIS, in fact they fight each other, and the Iranians are also in Syria for a reason. Seeking to become Assad's patron, the Iranians have a broader goal, to defeat Sunni groups and the Kurds, both being helped by the Americans and Saudis. They fight the same elements in neighbouring Iraq.

For the US-led coalition, their allies in Syria are foes in Iraq - where the US is assisting the Shi'ite government forces in their fight against the Sunni extremists of ISIS. The neighbouring Saudis, who cooperate with the Turkish and US forces in Syria, are sitting on the fence regarding Iraq, but are heavily involved in fighting the Iranian proxies south of the border – in Yemen.

Although Israel is not directly involved in these conflicts, Jerusalem has quietly aligned with the moderate Sunni nations against Iran. After eight years of strategic disagreement with Washington, Israel seems to have regained some influence and the support of the Trump administration. Israel's Prime Minister Benjamin Netanyahu also maintains open links to Moscow. Juggling between the two superpowers, Netanyahu reinforces their awareness and concern regarding the Iranian threat to the region.

"Victory over the terrorism of ISIS cannot lead to an upsurge in terrorism by Iran and its proxies. We will not exchange terrorism for terrorism," Netanyahu said after his recent meeting with Russian President Vladimir Putin. "Israel is not opposed that there should be an agreement there. We strongly oppose the possibility that Iran and its proxies will be left with a military presence in Syria under such an agreement," the Israeli Prime Minister added.

For six years Israel has avoided the conflict in Syria but struck whenever Iranian proxies - Hezbollah - tried to transfer military hardware Israel considered to be "destabilising".

Ever since Russia entered Syrian territory in 2015, Israel has repeatedly emphasised to Putin its "red lines" regarding Iran and the groups it supports. Netanyahu has visited Moscow four times over the past 18 months. The defence communities of the two countries have also established open lines of communication to coordinate and avoid potential confrontation in Syrian airspace.

But the main goal is to keep the Iranians out of Syria in the long run. To achieve that, Israel would prefer Russia to stay, and act as Syria's guardian, helping President Assad and his Shia-aligned Alawite minority remain in power.



Transforming while Operating

The Italian Defence Approach to Current and Future Security Challenges

General Claudio Graziano

“Transforming while operating” has been a mantra for the Italian Armed forces for some years, thanks to the two-pronged approach the Italian Defence has been using.

On the one hand, we are preserving, consolidating and strengthening the available capabilities, in order to ensure the current level of military commitment.

by strong joint, multinational and inter-agency integration. I cannot but seize this opportunity offered by European Security and Defence



been reviewed every decade based on the new threats of the time: this was the case of intra-state conflicts in the former Soviet area in the 1990s, of international terrorism in the aftermath of September 11 attacks and of the current, clearly hybrid threat posed by international terrorism, with its global and geographical dimensions, organisational effectiveness and evocative appeal. Being aware of this trend means being ready to foresee the evolution of future crises to the extent possible and making all instruments available for response, when needed.

The current international landscape is characterised by widespread instability. This leads to conflicts that may not be limited in scope and that feed on political, social, economic, environmental or religious factors, especially in areas subject to economic and social tensions. In particular, we have to tackle security challenges emerging from within two arcs of crises and instability surrounding NATO and European borders. The first and Southern arc spans from the Middle East across Northern Africa to the Sub-Saharan Region. The second and Eastern arc runs from the Baltic Region across the Black Sea to the Western Mediterranean. Eastwards, NATO has to deal with the security situation that follows the annexation of Crimea by Russia in 2014.



Italian 8x8 wheeled infantry fighting vehicle FRECCIA in Afghanistan

About 6,500 personnel are currently deployed on operations abroad, to whom 8,000 personnel dedicated to homeland security, disaster relief and support to civil authorities at home should be added. On the other hand, a process to rationalise and modernise our organisation and decision-making models is under way with a view to tackling the current and future threats that emerge from the new and evolving strategic landscape. Through this, we will create an agile and adaptable military force, characterised

to share some thoughts about the strategic vision of Italian Defence. I am specifically referring to the definition of security challenges to our country and the international system we actively contribute to, but also to the guidelines that drive the evolution of the Italian military.

Unstable Southern and Eastern Flank

Nowadays, we tend to associate the very idea of threat to the devious actions of transnational terrorist organisations. The type of terrorism we are facing today is a component of a cyclical pattern of crises that led the international community to recurrently face new threats in the strategic and military domains. As a matter of fact, the role of the armed forces has

Author

General Claudio Graziano is the Italian Chief of Defence.



As a result, the range of the Atlantic intervention has been reviewed to include the territory of European countries and the neighbouring areas. Being an active member of NATO and of the international community, Italy does not relinquish its responsibilities in Eastern Europe and takes part in initiatives aimed at showing Allied solidarity, resolve and capacity to respond to the threats on the Eastern flank.

Likewise, Italy – whose strategy focusses on the Mediterranean for historical and geographical reasons – promotes the development of strategies in all international fora to address the threats to security that come from what is known as the “Southern Flank” of NATO and Europe. The Southern Flank evokes a multi-shaped threat which is not limited to the countries facing the Mediterranean, but includes other areas, namely the Arabic Peninsula, Middle East, Sub-Saharan Africa and the Horn of Africa. All of these have direct and indirect influences on the security of the Mediterranean basin. More specifically, this wider area is where multiple phenomena converge, such as institutional fragility, uncontrolled migration, faith-inspired terrorism and the proliferation of transnational criminal organisations that thrive on illegal trafficking, first and foremost of human beings.

Global Response to Security Threats

With this picture in mind, the relationship among these phenomena calls upon national governments and international organisations to tackle security challenges using a multidimensional approach that takes into account all the variables affected. As a consequence, no measures to limit migration can be adopted unless accompanied by other initiatives in the affected countries, for instance fighting terrorism, supporting stability, and capacity building. In order to face the threats that originate along this flank, Italy supports the idea that an integrated and international answer is required and should be developed to prevent and address crises in multiple fields. From a military point of view, this translates into the NATO project known as “Hub for the South”, an organisation that will be located at the NATO HQ – Naples to coordinate and implement all security-related courses of action in that area.

The complexity and the scale of challenges and threats requires an ability to respond globally and synergistically, which Italy has been demanding for a

long time, implying the need to increase multinational collaborations in the field of defence and security. We are definitely starting off along the path of a shared understanding of the common challenges within the European Union and NATO, with the identification of tangible measures such the creation of the first unified EU military structure in Brussels (the Military Planning and Conduct Capability – MPCC). This will enable the EU to react flexibly, quickly and effectively, better exploiting the already existing national headquarters made available to the EU, among which is the double-hatted (European/national) Operational Headquarters of Centocelle, in Rome.

Italy's Exposed Position

Among the Western countries, Italy is one of the most severely affected by the above-mentioned changing and unpredictable geo-strategic framework. Being firmly bond to the Euro-Atlantic area for cultural, political, and economic reasons, Italy lies bare to the effects of the crises that have the Mediterranean as pivot. Therefore, both the Euro-Atlantic and Euro-Mediterranean regions are Italy's main areas of strategic interest and intervention. The first is characterised by a core of shared values with security as a top priority. As a result, Italy joined NATO and started supporting the gradual integration of EU countries' defence organisations. As for the latter region, projecting stability is a crucial effort to

terms of force deployment, but also of participation in all initiatives that improve global security.

Starting from the Balkans, Italy has always attached great importance to the stabilisation of the region, given our political tradition, geographical position, and cultural similarities. The main commitment in the area is our participation in NATO operation JOINT ENTERPRISE in Kosovo, under Italian leadership for the fourth consecutive year with 550 personnel.

Italy's Worldwide Military Engagement

Because of the geo-strategic position of the country, the Italian defence is also deeply engaged in the Middle East, where security is critical due to many concurrent factors. We actively contribute to the stabilisation of Southern Lebanon with an articulate contribution of 1,100 personnel deployed within the United Nation Interim Force in Lebanon (UNIFIL). Italy is also part of the counter-DAESH operation INHERENT RESOLVE, with slightly more than 1,400 personnel, which today represents our major quantitative effort. In this context, let me mention the contribution of our Carabinieri, strongly requested by our partners, for their effectiveness in developing capable local security forces; they are 100 men and women currently deployed in Baghdad and Kurdistan in support of Iraqi and Kurdish police forces.




Italian FREMM (European Multipurpose Frigate) “Carlo Bergamini”

contain most threats to our communities. Against this backdrop, Italy has a pivotal role that translates into a major tangible and resolute contribution not only in

In Afghanistan, we are still supporting the stabilisation of the country with 950 personnel deployed on NATO's Resolute Support Mission, where Italy fills the posi-

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Italian Eurofighters (EFA) ready to take off to ensure air policing over Iceland (2017)

tion of Deputy Commander and serves as Framework Nation of the Training Advisory Assistance Command West (TAAC-W) in Herat.

In Africa, Sahel's current security conditions are giving cause for concern. This region, which can be considered the "Southern border of Europe", is where many phenomena are emerging that directly affect European security. For this reason, Italy is supporting a large number of capacity-building initiatives of the International Community, primarily EU's, to create the conditions for long-term security and development in the region. Also in the Horn of Africa, Italian defence plays a very active role as leader of the European Union Training Mission in Somalia and as a member of the EU air-naval operation ATALANTA.

We are among the main promoters and actors in a number of multilateral and bilateral initiatives aimed at stabilising the Mediterranean, in accordance with our national strategic priorities. This includes our overarching commitment to Libya with a view to pursuing an effective "whole-of-government approach" to solve the crisis in the country. In September 2016, we deployed 300 personnel on operation HIPPOCRATES on Libyan request to provide medical support to the local forces that fight DAESH as well as administer advisory and capacity building activities in the healthcare sector in Misrata. A very first lesson learned is the need to ensure greater responsiveness to the real needs and a greater joint integration of health facilities. That is the reason why we are moving towards a Joint Medical Corps under the direct authority of the Chief of Defence.

The Italian presence in the Mediterranean is also relevant. We are deployed on operation MARE SICURO to fulfil protection and security tasks at sea, and protect sea lines of communication, naval transports

Readiness Action Plan, being part of the enhanced NATO Response Force, which is designed to guarantee a 360-degree ready response capability of the Alliance. Air policing, currently provided to Iceland, is ingrained in this domain as a practical assurance measure for Member Countries. Italy is also committed to the latest deterrence and defence-oriented stance of the Alliance in the Baltic countries (Enhanced Forward Presence) as well as on the South-Eastern Flank (Tailored Forward Presence). In this area, Italy is contributing significantly by means of an army air defence asset (SAMP/T) deployed in Turkey.

Transformation to Meet the Needs of Ongoing Deployment

In order to continue to pursue such complex efforts in the international scenario, carrying out the transformation process that has been outlined in the "White Paper for International Security and Defence" of 2015 will be crucial. It constitutes a momentous instrument to



Carabinieri trainers in Iraq, Operation INHERENT RESOLVE

and Italian oil platforms. In the EU, we are part of the EUNAVFORMED SOPHIA to disrupt the criminal networks associated with human trafficking and train the Libyan Navy and Coast Guard. Within NATO, Italy is contributing to the highly flexible maritime operation SEA GUARDIAN to fulfil a wide range of operational tasks related to maritime security. Finally, we concretely support the initiatives stemming from the approved NATO

consistently integrate the different variables at play in the security and defence domain.

Reviewing governance is one of the preliminary aspects of initiatives underway. This will be done by rationalising headquarters and top-level organisations in a joint perspective and by favouring the more markedly operational component. Intended actions will allow us to design a flexible organisational model to guaran-



tee joint, cross-sectoral and interagency response through the creation of a single “control room”. This structure will pivot around the Chief of Defence, who – in his role of Commander in Chief (CINC) – will be able to develop maximum operational synergy across the various domains, including the cybernetic one. Such a process will be developed thanks to the Deputy Commander, Operations – also Commander of Joint Operations HQ – in charge of designing, organising and conducting all of our Armed Forces’ operations.

Top Priorities for the Armed Forces

Yet, in the near future, the Armed Forces will be characterised in particular by their operational capabilities. Amongst other relevant aspects, increased effectiveness of Special Forces is a top priority. They are a joint asset of extremely high strategic calibre. In addition to traditional elite units, over time we have been developing new capabilities for conducting and supporting special operations and we intend to create new ones. The Joint Special Operations Headquarters will ensure that this sector is managed more effectively,

precisely thanks to a redesigned joint organization for commanding, coordinating, controlling, and planning operations as well as joint training activities.

Considering the importance of the Mediterranean for our country, the joint amphibious capability will be further developed in order to create a Brigade-level Amphibious Force endowed with a complete range of naval, land and air assets in the near future.

Furthermore, Italian Defence is strenuously working to develop practical cyber capabilities. The cyber threat has completely changed the traditional conflict paradigms. Strategies and measures to deal with this domain must be integrated at the joint and inter-agency level to be effective and, as a consequence, a joint headquarters for cyber operation has been recently established and will achieve its full operational capability in 2018.

Finally, such context does not only require our defence system to rely on a military instrument with the necessary operational capabilities, but also demands adequate industrial and technological independence to meet national needs. Accordingly, the White Paper enhances and widens the role of the Director of National Armaments to include the ad-

ditional role of Joint Logistic Commander in order to guarantee consistent strategic and military guidance in the procurement sector, along with increased effectiveness in supporting the national military instrument as a whole.

Competent and Deeply Motivated Soldiers

In conclusion, considering the unpredictability of current international scenarios, Italian Defence – and Italy as a whole – as an active and careful player in the context of global security has no intention of shunning its own responsibilities. Therefore, in order to be always up to the task, Italy will continue to adjust and develop multidimensional response capabilities to meet any security requirement.

In order for this to happen, Italian Defence should rely on our most valuable asset, namely our servicemen and servicewomen. They are competent and deeply motivated professionals, our most precious resource. They can make the difference, much more than any technological or organisational innovation, albeit significant. These are men and women we are proud of. Of these men and women I am the proud Commander. ■

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Defence Procurement in Italy

Luca Peruzzi

The Italian MoD's procurement organisation contributes to developing and maintaining a solid technological and industrial base, ensuring the preservation of national interests. The 2015 White Paper and the law bill recently presented to Parliament are expected to create a more efficient defence procurement and logistics organisation.

Current SGD/NAD Structure

According to the current legislation the Segretariato Generale della Difesa e Direzione Nazionale degli Armamenti or Secretariat General of Defence/National Armament Directorate (SGD/NAD) constitutes the superior level of the administrative-technical chain and is responsible for the management and control of all the national and international activities related to industrial policy and cooperation in the sector of

sector. The SGD/NAD organisation today headed by LtGen Carlo Magrassi is directly subordinate to the Minister of Defence and receives operational technical directives from the Chief of Defence. SGD/NAD comprises six departments including those for Industrial Policy and International Relations (3rd), the Coordination of Armament Programmes and Development (4th) and Technological Innovation (5th), the tasks of which are more specifically aligned to procurement. Among the SGD/NAD directorates, procurement efforts involve the technical directorates of Land Armament (TERRARM), Naval Armament (NAVARM), Air Armament and Airworthiness (ARMAEREO) and Communication, Information, IT and Advanced Technologies (TELEDIFE). The overall budget for Italy's defence procurement stands at around €4,5 billion, integrating both the allocated funding from the Ministry of Defence's (MoD) ordinary

tirely comparable with other European defence procurement organisations in terms of manpower and management structures, can, however, be compared if it comes to procurement activities, capabilities and activity sectors. According to the Italian MoD, the Italian defence procurement organisation will be more effective when the reform defined by the 2015 White Paper and the law bill recently presented to Italian Parliament will be approved and implemented.

Organisational Considerations

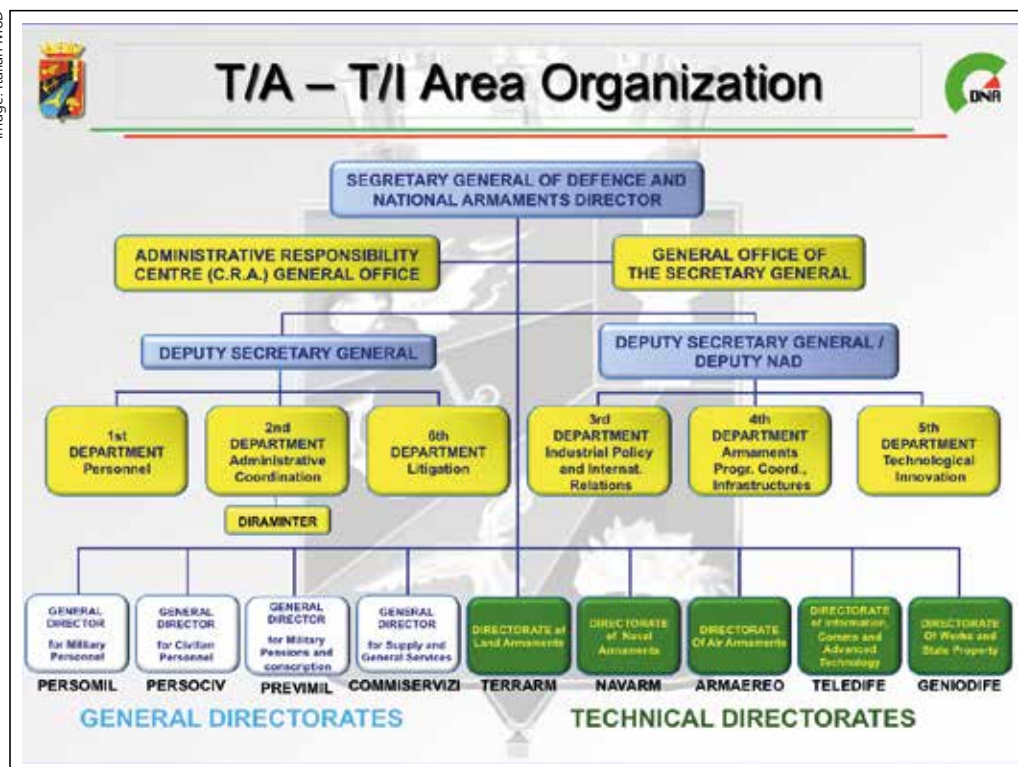
According to the 2015 White Paper the future National Armaments and Logistics Director (DNAL), will centralise the acquisition of weapon systems, infrastructure and logistics, except for direct support to operational units. This will result in an organisation based on two major conceptual

pillars, the first of which will perform the functions now assigned to some departments and technical management offices (directorates) in the SGD/NAD. It will be responsible for the technical and administrative activities to ensure the acquisition of weapon systems and the disposal of weapons at the end of their life cycle.

The second pillar, structured as the Defence Logistics Command (Comando Logistico della Difesa, CLD), will ensure the professional management of funding and the "logistics of consumption" that can be jointly managed regarding supply activities, efficient maintenance, transport, infrastructure, health, administrative and technical services.

In virtue of the strategic role based on economic and technological planning - both at an industrial and international level - policies affecting the aerospace industry, defence and security, and the public and private interests of the defence sector will strictly be part of the competence of the political

Image: Italian MoD



Organisational chart of the Italian MoD's Armament Division (SGD/NAD)

defence materiel. The latter includes activities related to the modernisation and replacement of defence systems, vehicles and equipment, as well as for the determination of policies related to the innovation and technological research in the defence

budget and the available resources coming from the Ministry of Economic Development (MiSE, Ministero dello Sviluppo Economico) to sustain the defence development programmes with high-tech content. The current organisation, though not en-



head of the MoD. For the implementation of political directives the DNAL will depend on the Ministry of Defence.

In the meantime, the SGD/NAD headquarters was transferred from the centre of Rome to the military compound at Centocelle (Rome suburbs), which already accommodates the Italian Armed Forces' Joint Operational Command, Special Forces JOC and the Italian Joint Force HQs, to enhance efficiency and ensure cost reductions.

Research and Development

SGD/NAD is, however, a key supporter and enabler of Research and Development (R&D), providing planning and programming of research and using the technical directorates to draft and manage the resulting contracts for research activities co-financed with large companies, small and medium enterprises, universities and research entities. The 4th Department deals with the finalisation and management of the respective weapon system development programme while the 5th Department, dedicated to technological innovation and research, deals with applied research up to technology demonstrators (TRL = 6) implementation. These



Photo: author

Upon completion of the programme, the Italian Air Force's TYPHOON fleet will comprise 96 aircraft. Shown here is an Italian Eurofighter during the International Air Tattoo in 2014.

amounts to around €48 million. With some exceptions, the Italian Armed Forces do not have personnel dedicated to research and hence utilise outside resources. On the oth-

not evolve without a certain level of industrial and technological autonomy, which could satisfy at least a part of these requirements at national level or throughout the participation in multinational initiatives in development and procurement. Even in an anticipated environment of multinational cooperation the need to develop and maintain a solid technological and industrial base is a guaranteeing factor for the national interest's tutelage. Advanced technologies and adequate industrial capabilities are also necessary for the collaborative development of new products at a parity level, reinforcing the integration with European partners and the ties with other friendly countries.

Current Programmes

The Italian defence is therefore involved in a continuing process of renewal of the military instrument to integrate it increasingly with European and coalition environments and to respond to the challenges which the actual and future strategic scenarios bring about. Listed hereunder are the main programmes executed by SGD/DNA.

The land forces' requirements include:

- New CENTAURO II (8x8) mobile gun system (MGS): in the scope of the programme the cavalry units are to be equipped with a new 120 mm armoured gun capable to match the new operational needs in terms of mobility, survivability, protection and interoperability. The procurement requirement for the new 120 mm armoured gun



Photo: Leonardo

The first of 10 NH90 helicopters in the TTH configuration for the Italian Navy

activities are performed at a national level by means of the National Military Research Plan (Piano Nazionale della Ricerca Militare, PNRM) and within the international collaborative frame through international organisations, including EDA, NATO STO and bilateral or multilateral agreements. For these activities, the dedicated budget

er hand, test and evaluation activities are carried out independently thanks to a vast and diffuse network of military test centres throughout the country.

In this context the 2015 White Paper highlights a 'Military Instrument' able to generate the necessary operational capabilities. The national defence system by itself could



programme covers 150 vehicles and logistic support. A first batch of 50 vehicles including pre-series and series-production units has been authorised. The programme has been awarded to the CIO consortium consisting of Iveco Defence Vehicles and Leonardo.

- **8x8 FRECCIA AIFV:** the programme is to provide the Italian Army's 'Medium Forces' with the CENTAURO wheeled armoured infantry fighting vehicle FRECCIA ("Arrow") in different versions (combat, anti-tank, mortar, command post, reconnaissance and recovery), 630 vehicles total. In 2016, the second phase of the programme was launched covering the procurement of the first 30 combat-configured vehicles for the second 'Medium Brigade'. The same phase also includes the development and acquisition of the FRECCIA EXPLORER's two versions for the cavalry units, with the prototype production in 2017. The programme was awarded to the CIO industrial consortium.
- **Forza NEC:** The programme is to digitise the land component, including the landing (amphibious) forces, to ensure full interoperability at joint and international levels (NATO, EU, Coalition). According to the Italian Army Report 2016, the programme's concept development and experimentation phase activities continued in 2016 with field testing of first prototypes and pre-series systems. This phase is planned to continue until 2021. Lead by Leonardo, the industrial team includes the CIO consortium, Elettronica, Iveco and MBDA.

Main programmes for the Navy include:

- The development and procurement of the new ships under the 'Naval Law' or the Italian Navy's fleet renewal programme. Except for the two high-speed special operations support vessels, an industrial team lead by Fincantieri as prime and including Leonardo as combat system integrator and main supplier (CMS, sensors and weapon systems) is to deliver the three-following types of vessels with a 10-years in-service support:

a) The Pattugliatori Polivalenti d'Altura (PPA) or Multirole Patrol Vessel programme managed by OCCAR covers the delivery of seven ships (with option for additional three) in three different configurations (Light, Light Plus and Full), with the combat system, sensors and weapons as distinguishing elements. All featuring a common platform with two modular areas for either military or HADR equipment, the PPA are equipped with new generation equipment including in the "Full" configuration a du-

127mm VULCANO long-range ammunition with sabot

al-band multifunction AESA radar, variable depth sonar and MBDA Italia SAAM-ESD air defence missile system. The armament package is centred around a 127/64 mm main gun with VULCANO long-range guided ammunition and a 76/62 mm single deck gun mount. Deliveries are planned between 2021 and 2026.

b) The Landing Helicopter Dock (LHD), for which steel cut is expected in summer 2017 followed by a platform-launch in July 2019 and delivery in June 2022. With a length

in February 2019. With a displacement of 23,000 tons and 181 metres in length the LSS can carry and replenish both at sea and ashore with marine and jet fuels, water, oil, ammunition, electrical power and food. Managed by OCCAR, the project has attracted the interest of the French MoD, which - according to the Italian MoD - wants to join the programme to satisfy a requirement for three similar ships; in addition there is the Brazilian MoD with an observer status.

- Two high-speed special forces support vessels in composite material to be delivered in 2019/2020 are under construction at Intermarine.

- The FREgata Multi-Missione (FREMM) joint French-Italian programme for a total of 18 units (10 for Italy and 8 for France) is in the shipbuilding and in-service support phase for both nations. Managed by OCCAR, the Italian programme awarded to Orizzonte Sistemi Navali (a Fincantieri-lead joint venture with Leonardo) saw the delivery of the sixth frigates in April 2017, while the remaining four are in different stages of construction and outfitting.



Picture: Leonardo

Photo: author



The CENTAURO II 8x8 Mobile Gun System (MGS) during a presentation in 2016

of 240 metres the LHD will feature a full-length deck with a two-islands configuration, a well-deck for 4 LCM, a dual-role hangar and extensive hospital facilities (NATO Role 2-E). The combat system will be fitted-for SAAM ESD air defence system, in addition to self-defence systems.

c) The construction of the Logistic Support Ship (LSS) is well underway with the launch scheduled for November 2017 and delivery

- The U-212A joint submarine programme is in the final stage (four boats for Italy and six for Germany) with the fourth Italian boat to be delivered by Fincantieri in good time, while in-service support continues. An MoU signed in March 2017 extends the co-operation between the two nations in the submarine sector addressing shipbuilding, R&D and in-service support, with potential expansion to other customers.

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SGD/DNA advanced programmes for the Air Force:

- The F-35 Joint Strike Fighter (JSF) programme for the development and production of a fifth-generation combat aircraft in cooperation with the US, UK, Canada, The Netherlands, Turkey, Australia, Denmark and Norway. With the objective to replace all older-generation combat aircraft (AMXs, Tornados and AV-8Bs) in service with the Italian Air Force and Navy the programme calls for 90 F-

payloads. In the frame of the four nations programme managed by the Eurofighter consortium (including the Italian Leonardo group), the Italian Air Force is to receive 96 aircraft (82 combat single-seaters and 14 double-seat trainers), of which the 87th (and 74th single-seater) aircraft was delivered in April 2017 as the 500th series-produced TYPHOON. The Italian industry, including Elettronica and Avio, takes advantage of a strong participation in the programme.



Picture: Thales Alenia Space

The COSMO-SkyMed satellite programme is carried out in cooperation with Italy's national ASI space agency and the French MoD.

35s, thereof 60 in CTOL and 30 in STOVL version; in the scope of the programme the Italian MoD will also establish a Final Assembly and Check Out/Maintenance, Repair, Overhaul and Upgrade (FACO/MRO&U) facility in Italy, managed by Lockheed Martin and Leonardo to build and sustain Italian and foreign F-35s. Due to military budget reductions, the programme is affected by procurement limitations in the 2015-2020 period with an initial operational capability for the Italian fleet today estimated for 2022.

- The F-2000 or TYPHOON procurement programme for a fourth-generation combat aircraft, primarily in the air defence role and specialising in both beyond visual and short-range air-to-air engagements but capable to carry out diversified missions and

- The M-345 programme for the development and acquisition of a new basic trainer and its ground based training system (GBTS) to meet the requirements of the new Italian Air Force integrated training system together with the M-346 and initial basic flight screener. The M-345 will progressively replace the 137 MB-339 aircraft in service with around 45 aircraft including 15 dedicated to the Frecce Tricolori national aerobatic team. The M-345 has been designed and manufactured according to the design-to-cost concept (for both unit cost and flight hour cost) which allows savings throughout its entire life-cycle. Another innovative element is the certification approach for the entire system, based on the European EMAR 2 directive, that SGD/DNA Air Armaments and Airworthiness Direc-

torate (DAAA) applies to all new-development systems. In addition to the aircraft, of which the first five have been contracted in January 2017, Leonardo will provide the GBTS and the integrated logistic support package.

- The M-346 programme for the development and acquisition of an advanced integrated training system and comprising an extended GBTS for the advanced training of pilots to fly on fourth (F-2000) and fifth (F-35) generation combat aircraft is well advanced and includes the acquisition of 18 aircraft. Leonardo's M-346-based integrated training system has already been selected and is operating with the most demanding customers, such as the Israeli and the Republic of Singapore air forces. The M-346 is also at the centre of an evolution roadmap towards a Light Combat Aircraft (LCA), which could offer advanced front-line capabilities.

- The new reconnaissance and escort helicopter (Nuovo Elicottero da Esplorazione e Scorta, NESS) programme for the Italian Army is to provide a replacement for the combat-proven Leonardo AH-129C/D MANGUSTA attack helicopter to be retired from 2025. The newly developed platform based on the latest additions to Leonardo's family of advanced helicopters will be equipped with sensors, a communication system and armament better suited for the evolving and future theatres of operation and threats. With a requirement for 48 helicopters to be acquired in several batches, the current contract covers the study, development, industrialisation, production and testing of a prototype and three initial production helicopters.

Space Activities

In the space domain, the Italian MoD made significant investments in the past and continues to invest substantial resources in cooperation with national organisations and in the scope of international programmes. After the successful completion of two major programmes in satellite communication (SICRAL 2 and ATHENA FIDUS, in cooperation with the French MoD and involving the two nations' space agencies – ASI and CNES – for the latter) in the recent past, the Italian MoD is currently involved in the COSMO-SkyMed Second Generation dual-use earth-observation satellite constellation programme. The satellites will have an SAR (Synthetic Aperture radar) sensor, and the programme is carried out in cooperation with the national ASI space agency and – in the long-term – with the French MoD with the objective to exchange services between the HELIOS I and II (already operational) and the future Composante Spatiale Optique



ASTER 30 SAMPIT in firing preparation at Italy's PISQ joint firing range facility on Sardinia

capability development, research & technology, certification/airworthiness, pooling & sharing initiatives in addition to cooperation in general. Within the capability development area, the national interests are mainly focused on the European MALE RPAS (Medium Altitude Long Endurance Remotely Piloted Aircraft System) programme managed by the multinational OCCAR procurement agency (Organisation Conjointe de Coopération en matière d'Armement).

Photo: MBDA

(CSO), and the national COSMO SkyMed (1st and 2nd generation) satellite constellations under the MUSIS programme. In the meantime, the Italian MoD has required an independent 'optical' capability, complementary to the joint objectives with the French MoD, and has launched the OPT-SAT3000 programme with Israel. These new assets, in addition to providing an autonomous ISR capability, will allow to share their capabilities with allied countries through international cooperation agreements.

C4ISTAR

In the C4ISTAR sector, SGD/NAD is managing the European Secure Software defined Radio (ESSOR) programme, which aims at developing the European Software Defined Radio technology in order to improve the capabilities for cooperation in coalition operations. In addition to the European High Data Rate Waveform as the wireless pillar to a net-centric battlefield, the six participating nations (France, Finland, Italy, Poland, Spain and Sweden) and industry (Thales, Bittium, Radmor, Leonardo, Indra and Saab), generated and validated the definition of the European Software Defined Radio Architecture in the first programme phase, while more is expected for the second phase.

Joint Programmes

As far as other joint programmes with national or multinational procurement organisations are concerned, the Italian MoD is active in all European Defence Agency work strands including

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Photo: Leonardo

The M-345 trainer aircraft in the colours of Italy's Frecce Tricolori aerobatic team

With the objective to develop a new generation RPAS for ISTAR missions with capabilities superior to current systems and able to operate in air spaces without limitations, the programme launched by France, Germany, Spain and Italy and involving Airbus Defence and Space, Dassault Aviation and Leonardo, has currently received funding for the definition phase to be concluded with a preliminary design review (PDR)

the SAMP/T modernisation programme, but also the joint participation of all three nations in the Mid-Life Update and extension programme for the existing Aster 15 and 30 munitions.

SGA/NAD is also involved in the METEOR next generation, Beyond Visual Range Air-to-Air Missile (BVRAAM) system in co-operation with France, Germany, Spain, Sweden and the UK. Initially developed for

10 TTH helicopters in naval configuration for the Italian Army and Navy, as well as the Leonardo-developed VULCANO long-range guided and unguided munition, which is being qualified in cooperation with the German MoD and industry.

Perspectives

With the participation in these bi-national or multinational cooperation programmes and based on the assumption that the budget can be provided, Italy manifests its will to support EU Smart Defence initiatives as well as the Alliance's common, cooperative and comprehensive approach to develop common defence advanced capabilities. SGD/NAD not only sustains the national industry at an international level but also supports the consolidation of the European defence industry through transnational cooperation in the development of products which a competitive edge on the worldwide market. In the process of the Defence Strategic Review, the stagnation of financial resources represents an impediment to the renovation and rationalisation of the 'Military Instrument'. However, according to both military representatives and analysts, the real challenge for the procurement and research sector is to maintain financial support, although minimal but essential and guaranteed over time, to ensure a continuity in the modernisation and renovation of the military in line with the standards desired by NATO and EU. This is the challenge which the new White Paper 2015 with the indicated multi-years investment law extended to a six-years-period and the associated new 15-years long-term programmatic plan wants to address, ensuring stability and continuity in defence modernisation. ■



Photo: Italian Navy

The Italian Navy's future PPA patrol vessel in full combat configuration

presentation in October 2018. The subsequent phases are open for other countries to join the programme. In the missile domain, the FSAF-PAAMS multinational programme within France, the UK and Italy, has passed a milestone in December 2016 with both the entry of Italy into the development of the Aster 30 Block 1NT (New Technology) ammunition and

Europe's new generation of combat aircraft including the Saab GRIPEM, Eurofighter TYPHOON and Dassault Aviation RAFALE, METEOR is also being integrated with the Lockheed Martin F-35 Lightning II. Among other international programmes, the Italian MoD is participating in the NHIndustries NH90 programme with the procurement of 60 TTH and 46 NFH and

NATO and Cyber Defence: The Turning Point of 2016

Jamie Shea

Last year, 2016, was very much a year of decisions for NATO in the field of cyber defence. In many ways, 2016 was also a watershed year, when cyber defence was no longer purely a question of protecting networks against a growing and more sophisticated spectrum of cyber attacks but instead became an issue of the integrity of democratic institutions in NATO countries.

The abuse of cyber space became a means not just to acquire or manipulate data, or interfere with the running of a network but to influence political outcomes and even exert outright political coercion and intimidation.

sea and space), NATO's defence ministers' meeting last February approved a roadmap outlining the steps that need to be taken so that the Alliance can fully implement the domain concept by 2019. This roadmap provides for a closer relationship

can unfold, leading to the requirement for much better and earlier situational awareness and responsive decision-taking. Operating "at the speed of relevance" has become the new buzz phrase.

Moving towards the Cyber Domain

As NATO moves towards cyber as a domain, it needs to practice better for these scenarios in its Crisis Management exercises and also in its Trident series of military exercises, so that we can cope effectively with this new reality. This also means a better coordination of effort across the NATO Command structure. Already SACEUR has set up a Cyber Division at Allied Command Operations, in order to better identify requirements and ensure that NATO's capability packages to common fund its acquisitions reflect the cyber dimension.

In this respect, NATO will need to meet the challenge of speeding up its upgrades to its information technology and to the NATO Cyber Incident Response Capability, which is responsible for the daily defence of NATO's networks. We must move from a culture where capabilities are acquired in big chunks or platforms and at intervals of every ten or fifteen years to one in which information technology can be constantly upgraded in an evolutionary way and with smaller amounts of investment but on a more frequent basis.

Finally, another issue associated with making cyber an operational domain is that NATO will need to learn more from its Allies who have already moved in this direction, such as the US, the UK, France and the Netherlands, how their models are working and how they are using cyber effects as part of their military operations. This is all the more important as NATO will not develop offensive cyber capabilities and would therefore need to be able to rely upon national capabilities (subject to



(Photo: NATO)

At present, the United States has more "IT-soldiers" than marines, an increasingly common situation for most armed forces in NATO countries.

It was against this background that NATO had to raise its game in cyber defence. The first response was to declare, at the Alliance's Summit in Warsaw in July 2016, that NATO now considers cyber space as an operational domain. This means in essence that NATO has decided to shift the focus from information assurance to mission assurance. In order to adjust to this new reality, in which cyber is not only a new fifth domain of warfare in its own right but is also impacting on the four traditional domains of warfare (air, land,

between the Supreme Allied Commander Europe and his Allied Command Operations and the NATO Communications and Information Agency in The Hague, which is responsible for the daily protection and monitoring of NATO's networks in peacetime and for the security and acquisition of NATO's information technology. NATO is also updating its operational plans to better incorporate and prioritise cyber defence and to have a clearer sense of cyber defence requirements during operations. For instance, which cyber effects would need to be generated at an early stage and how can the cyber aspect be better reflected in graduated response plans and crisis response measures, which the NATO Council would authorise SACEUR to implement? Clearly, cyber space has accelerated the speed at which crises

Author

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(Photo: US Air Force)

Some systems need to be absolutely reliable under all circumstances.

political approval by NATO overall) in instances where NATO military commanders believe that a cyber effect rather than the use of a conventional weapon is the best way of producing a desired military outcome.

NATO's Cyber Defence Pledge

The second major initiative of NATO's Warsaw Summit was to adopt a Cyber Defence Pledge. The Pledge commits Allies to spend at least a portion of this extra investment on improving national cyber defences, even if there is no specified minimum amount. Allies have performed self-assessments of their cyber defence hygiene by reporting on seven capability areas – from strategy, organisation, processes and procedures, threat intelligence, partnerships to capabilities and investments.

They have been asked to benchmark these assessments according to four levels – from advanced to basic. The national responses will allow the NATO staff to develop more precise and relevant metrics, as well as to form a more reliable common baseline of overall NATO capabilities. In turn, this greater transparency will help the NATO staff to identify gaps and prioritise requirements. On this basis, the NATO Defence Planning process, which has already incorporated a set of basic cyber capability targets for each NATO member state, will be able to suggest

more ambitious targets and ones more adapted to the needs of individual states in the future.

Smart Defence Projects

Beyond these two flagship initiatives of the Warsaw Summit, a good portion of NATO's effort to step up its game in cyber defence is to enhance its ability as a platform to assist the Allies across a whole spectrum of cyber defence needs. For instance, a new Memorandum of Understanding has been offered to Allies to improve intelligence-sharing, incident coordination and lessons learned from cyber attacks between NATO HQ and individual Allies. Already 19 of the 28 member states have signed this new MoU.

NATO has set up a new Intelligence Division with a strong cyber threat intelligence function, which should incentivise Allies to provide more early warning and advance notice of cyber attacks or malware and not only lessons learned and post-incident information. Enhanced intelligence-sharing among Allies will not only help to parry cyber attacks or to limit the damage but also to build over time a much more detailed and comprehensive picture of hacker groups, proxies, methodologies and attribution. One of NATO's most useful contributions to its member states is in the organisation of training and exercises to improve the skill set not only of operators in NCIRC and the NATO command

structure but also national cyber defence teams.

The annual Cyber Coalition exercise now attracts over four hundred participants and the Locked Shields exercise is recognised as one of the most demanding and intensive Red Team-Blue Team exercises.

Portugal has taken the lead in the Alliance on training and education and will soon acquire the NATO Communications and Information School, which is being transferred from Latina in Italy to Oeiras in Portugal.

Belgium has successfully led a group that has developed a malware information-sharing platform, which has not only been implemented among Allies but also between NATO and the European Union. A variant of this is also being used to facilitate the exchange of information between NATO and industry and with the possibility of more open and more confidential platforms according to the level of certified access and the sensitivity of the information being shared.

A third cyber defence project focuses on situational awareness and incident coordination, including an operations and maintenance contract. The system has been successfully implemented by the Netherlands and Romania.

All in all, 21 allies and four partners participate in Smart Defence projects.

Partnership With Industry

Finally, if NATO is to raise its game, we need to have even stronger partnerships.

NATO has reached out first and foremost to industry and formed a NATO Cyber Industry Partnership. Thus far, the NATO Communications and Information Agency (NCIA) has concluded nine individual industry arrangements to share threat intelligence and early warning indicators. An improved series of NATO industry workshops, such as the annual NATO Information Assurance Symposium in Mons and a series of threat vector workshops, are bringing industry and NATO together to discuss innovation, improving procurement and acquisition and threat intelligence. This earlier engagement with industry is designed to help NATO better understand which products are out there on the market, which NATO could better exploit and help industry to see where NATO's procurement is likely to be heading in the future. It can also improve supply chain management and stimulate diversity on the supply side.

An information exchange has been set up at the NCIA and this has been conducting pilot projects to see how we can better link up with academic research and small- and medium-sized companies that are often at

the forefront of innovation but which have often been reluctant to engage NATO directly or uncertain where to plug into the NATO bureaucracy.

Formal Partnerships within the Alliance

NATO is also building stronger relationships with other countries who have concluded a formal partnership arrangement with the Alliance.

A technical arrangement on cyber defence was recently agreed with Finland. A trust fund for the provision of cyber defence equipment and analytical and forensic capabilities is in operation with Ukraine. Moreover, NATO has been helping countries such as Jordan, Moldova and Georgia with cyber defence organisation at the national level and doctrine and training. Partners are increasingly joining the Cooperative Cyber Defence Centre of Excellence in Tallinn or sending staff or observers there.

In Brussels, NATO and the European Union are now coming much closer together in the cyber defence field. A technical arrangement on the sharing of non-classified information between NCIRC and the EU CERT has been in operation for over one

year and the recent Action Plan to implement the NATO EU Joint Declaration agreed by NATO and the EU last December provides for more NATO EU interaction; for instance in sharing information on operational planning for cyber defence during military missions, harmonising training requirements, cooperating more on research and development and standards between the European Defence Agency and NATO's Allied Command Transformation, and more mutual participation in each other's training and exercises, such as NATO's CMX and Cyber Coalition and the EU's Cyber Europe.

Conclusion

In conclusion, cyber is different from the other domains of conflict. The pace of innovation is much faster. Resources need to be spread over a far greater number of functions and applied much more selectively than in a conventional capability programme if a cyber construct is to operate successfully.

Many more actors can be players with a minimum need for major investments or large organisations to gain entry level.

There is the problem of attribution and as the recent hacking during the US elections

has shown, still a good deal of uncertainty as to when a cyber attack, which does not necessarily kill people or destroy anything physical, can really be considered as an act of aggression and elicit an appropriate response.

Whereas we have a good idea how to deter a nuclear attack or a conventional attack, or to deal with crises in the traditional domains, or what kind of arms control or confidence-building arrangements can be useful to keep things peaceful, we still do not have a good idea how we can deter or respond to major cyber attacks, even when they are clearly designed to undermine our governments or our political processes.

Accordingly, the cyber domain will require NATO, as with most other organisations, to work increasingly top down on anticipating the strategic trends and adjusting policy and doctrine more quickly, while working bottom up at improving basic cyber hygiene to lower its attack surface and reduce the scope for own goals due to basic human error or a shortage of trained personnel.

We need to learn better to do two things simultaneously – learning to transform the plane while we are flying it more skilfully – if we are to keep pace, let alone ultimately master the evolving cyber threat. ■



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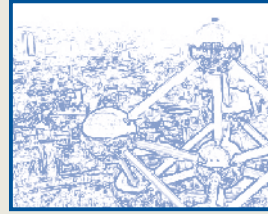
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The NATO Secretary General's Annual Report 2016

Joris Verbeurgt

On 13 March, Secretary General Stoltenberg presented the NATO Annual Report 2016. It focuses on NATO's ability to engage simultaneously in collective defence (Russia) and in crisis management around the globe (Islamic terrorism). Progress was made on

Photos: NATO



Jens Stoltenberg has been Secretary General of NATO since 1 October 2014.

last years' summit in Warsaw where the allies agreed on a great number of issues. But the long-standing challenge of fair burden sharing will probably dominate the agenda in 2017.

Deterrence, Defence and Dialogue

The Warsaw Summit in July 2016 proved to be a landmark in the process of adapting NATO to the new security situation that emerged after Russia annexed Crimea in 2014. NATO's Forward Presence forms an integral part of its deterrence and defence strategy: the size of the NATO Response Force was tripled to 40,000 and a Very High Readiness Joint Task Force of 5,000 was established. Eight small headquarters were created in Eastern Europe while the deployment of four multinational battle groups in the region (on a rotational basis) is underway. Readiness implies training, and in 2016 NATO countries conducted 246 military exercises in total. Assurance measures, like the continued air policing operations, the use of AWACS and increased maritime patrolling in the Mediterranean, the Baltic and the Black Sea help to deter Russia from undertaking hostile actions against a NATO ally. However, the political dialogue with Russia was maintained. Talks involved the Ukraine, Afghanistan and transparency and risk reduction. With regard to cyber security, the

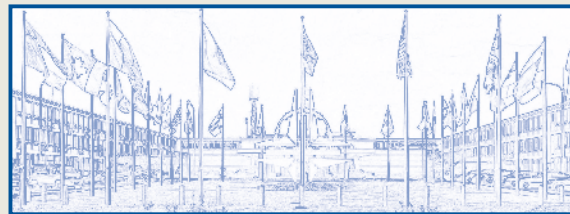
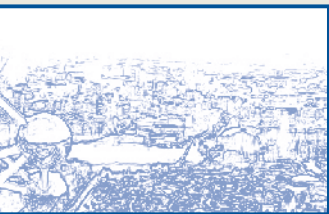
allies committed themselves to maximise their defensive capabilities. Rapid reaction teams now defend NATO's networks 24/7. The coverage of defensive systems against short- and medium range missiles was significantly increased by the AEGIS missile defence site in Romania that is now operational 24/7. NATO members also agreed to bolster resilience and civil preparedness at home. This will be one of the key areas in which NATO, the EU and other partners (like Sweden and Finland) will cooperate. NATO also continues to play its role in enhancing security by promoting arms control, disarmament and non-proliferation of weapons of mass destruction (WMD) and CBRN threats. NATO's expertise in small arms and mine action (acquired and maintained in so-called "Centers of Excellence") is highly valued by partners like the EU and the UN. Finally, NATO is paying special attention to the issue of energy security and its relations with Russia.

Projecting Stability

In order to provide safety and security, it is also necessary to project stability in the neighbourhood. NATO is already involved in the training of local forces to counter terrorism and insurgencies in Afghanistan, the Middle East and North Africa. The Mediterranean Dialogue and the Istanbul Cooperative Initiative are platforms where cooperation between NATO and regional partners takes shape. In the years ahead, the Alliance will focus increasingly on training programmes and local capacity building. In the fight against terrorism, especially against ISIL, NATO provides surveillance and situational awareness through AWACS and supports countries like Jordan, Iraq and Afghanistan with in-country training and capability building. In Afghanistan, NATO's efforts are now focused on providing training, advice and assistance and on funding the Afghan security forces. Operational effectiveness and air support capabilities of the Afghan armed forces are increasing, but combat losses remain quite high and further support from NATO remains necessary.

At sea, Operation Sea Guardian provides situational awareness, freedom of navigation and maritime interdiction. The operation also contributes to the counter-proliferation of WMD, the protection of critical infrastructure and countering terrorism at sea. Sea Guardian is also of great importance for the EU since it helps fighting illegal immigration and human trafficking in the Aegean Sea. The fight against piracy off the coast of Somalia was successfully brought to an end in the course of 2016. But NATO remains ready to act swiftly when necessary.

In Kosovo, still 4,500 NATO troops are committed to guarantee a safe and secure environment and the development of a democratic and stable country. NATO is building peace by supporting



the Kosovo Security Force. NATO's role in Kosovo is to respond to crises but in the whole of 2016, NATO did not need to intervene even once. Under the auspices of the EU, a normalisation of the

capacity Building Initiative that were launched at the Wales Summit in 2014. In 2016, five partners (Australia, Finland, Georgia, Jordan and Sweden) were entitled to enhanced cooperation, including participation in exercises and consultation in security matters.



US UH 60 BLACKHAWK during a Crowd and Riot Control (CRC) training: In Kosovo, still 4,500 NATO troops are committed to support wider international efforts to build peace and stability in the area.

situation in Kosovo and in the Balkans in general is taking place. NATO supports efforts to promote dialogue and cooperation while monitoring the threat of growing extremism and the return of foreign fighters. NATO is committed to protect civilians in general and women and children in particular. In 2016, serious efforts were made to draw up plans to protect these specific groups. NATO wants to present itself not merely as a military alliance, but also as a community of shared values, such as individual liberty, human rights, democracy and the rule of law. Within NATO, the role of women was promoted.

Partnerships and Improving Capabilities

Political dialogue is fundamental to NATO's overall strategy: in the Euro-Atlantic region, NATO is constantly seeking partnerships with local actors. Last year, the Secretary General met with counterparts from 17 partner nations while the Deputy Secretary General met with counterparts from eleven partner nations. These nations range from Finland to Qatar and from Morocco to Japan. Sweden, Serbia, Ukraine and Mongolia were also among the nations NATO wishes to develop more intimate relations with. Within the framework of NATO's Open Door Policy, talks were held with Montenegro, Bosnia and Herzegovina, Georgia and the (former Yugoslav) Republic of Macedonia to prepare these countries for future NATO membership. Cooperation programmes are implemented as the aspiring nations carry out the necessary reforms to be able to become full members. In this area NATO can build on the Partnership Interoperability Initiative and the Defence and Related Security Ca-

capacity Building Initiative that were launched at the Wales Summit in 2014. In 2016, five partners (Australia, Finland, Georgia, Jordan and Sweden) were entitled to enhanced cooperation, including participation in exercises and consultation in security matters. The evolving security environment requires NATO to adapt to new threats and to identify and evaluate the necessary capabilities to do so. More forces at higher readiness and delivering heavier and more high-end forces and capabilities are an important step towards that goal. The annual Crisis Management Exercise of 2016 helped to improve quicker decision-making in the NATO crisis management process, including responding to hybrid warfare. In 2016, significant progress was made in the fields of integrated air and missile defence, air command and control systems and aviation. The continuing implementation of the NATO airworthiness policy and projects as the European Single Sky initiative will affect NATO's missions and capabilities. The development of a new policy regarding unmanned aircraft systems and the modernisation and extension in service until 2035 of the crucial AWACS fleet will strengthen the Alliance's awareness and

capacity for strategic anticipation. Important steps were also taken with regard to Alliance Ground Surveillance and to Joint Intelligence, Surveillance and Reconnaissance programmes.

Investing in Security and Burden Sharing

The election of Donald Trump as the 45th president of the United States has a great impact on the stance of the United States regarding fair burden sharing among allies. Statistics show that in 2016, the United States, accounting for 46% of the Allies' combined GDP, is responsible for 68% of the combined defence expenditures. The Annual Report acknowledges that this disproportion has now become a political problem of the highest order: "At the Warsaw Summit, allies restated their commitment to spend 2% of GDP on defence within a decade – and in 2016, we took a step in the right direction. Defence spending by European allies and Canada increased by 3.8%, or around US\$10Bn. 23 allies increased spending in real terms in 2016. At the same time, ten allies met the NATO-agreed guideline of spending 20% or more of their defence expenditure on major equipment, up from eight in 2015. But we still do not have fair burden sharing within our Alliance. Only five allies met the 2% guideline in 2016. So in 2017, we must redouble our efforts to sustain the positive momentum and speed up national efforts to keep our pledge." Allies should accept the need for a better balance. On 25 May, President Trump will come to Brussels for a meeting with his NATO counterparts. Fair burden sharing and NATO's role in the fight against terrorism are high on the agenda.

Joint and Allied

Jörg Vollmer

In 2014 we had to recognise that our short-term hope for a more stable world had not materialised. At the Summit in Wales in 2014, at the latest, this presented a great challenge to NATO and its partners. On that occasion, it became clear for the very first time that the strategic concept that had been agreed upon in 2010 and still holds true today will only have its full effect if all three pillars – Alliance defence, crisis management and cooperation – are supported in such a way that even parallel crises might be countered appropriately. At that time, NATO demonstrated its strength as an alliance by deciding upon a comprehensive package of measures without reducing its commitment to missions.

This had a significant impact on the German Army, particularly against the backdrop of the augmentation of the Multinational Corps Northeast, the reassurance measures in Poland and the Baltic States and the Very High Readiness Joint Task Force (VJTF) as of 2015. Thus, together with Poland and Denmark, we very rapidly and successfully managed to upgrade the certification of the Corps HQ in Szczecin to High Readiness Headquarters. At the same time, the German Army already made a visible contribution in 2015 by providing approx. 4,700 servicemen and -women for project Persistent Presence, which continued into 2016. Together with the other NATO partners in Estonia, Latvia, Lithuania and Poland, we took a stand and firmly demonstrated our responsiveness.

The measures agreed upon in Wales in 2014 were confirmed last year in Warsaw, and the Persistent Presence concept was further developed and evolved into enhanced Forward Presence (eFP). Germany as framework nation agreed to assume responsibility for one of the four multinational battle groups that are to be deployed to the Baltic States and Poland on a rotational basis. Great Britain assumed responsibility for Estonia, Canada for Latvia, Germany for Lithuania and the USA for Poland. Thus, for the first time after the end of the Cold War era, German forces stand at a border on NATO territory again, side by side with allied armed forces, and send a signal of solidarity. Among the four nations that have taken on responsibilities there are two European nations and the two transatlantic Allies. In my opinion, especially the latter sends out a strong signal! Each of these battalions is under national



command but – and this is the explicit wish of NATO too – always with other partners involved. The degree of multinationality varies depending on the framework nation. We will always have a Dutch combat company with us plus up to two more combat companies on an alternating basis. Norway,

Croatia, France and the Czech Republic have already signed on as partners. Belgium and Luxembourg, who are funding parts of the infrastructure, regularly support the formation with additional capabilities. This is done with robust forces, on a sustainable basis and in close cooperation with the other NATO partners involved, as well as in close coordination with our Lithuanian hosts. A reinforcement concept, coordinated at national level, offers us the opportunity to provide the formation with additional capabilities for exercises or in case of unfolding crises.

For the German Army, multinationality is crucial, because establishing solid partnerships increases reliability and reduces interoperability issues. The cooperation with France and the Netherlands has been growing over many years and even includes cross attachments of units and formations also outside of missions. The cooperation with the Netherlands and Norway for eFP, by the way, will have positive effects on the joint task of VJTF(L) 2019 and beyond. As far as VJTF(L) 2023 is concerned, the framework

(Photos: Bundeswehr)



MARDER armoured infantry vehicles arriving at Šeštokai railway station in Lithuania on 24 February 2017 as part of enhanced Forward Presence (eFP).

Author

Lieutenant General Jörg Vollmer,
Chief of Staff, German Army.

nation group of DEU-NLD-NOR will be the first to implement the rotation model for the provision of the VJTF brigade, as favoured by DSACEUR.

We deliberately deployed all our forces as early as January 2017 and are now preparing the ground in RUKLA together with Lithuania for the first operational battle group starting in summer this year. The follow-up formations are already being trained in Germany in conjunction with our multinational partners and will then replace the eFP formation in position.

Each formation of the German Army will deploy with its own materiel. This will help us to enhance our capability profile in the areas of strategic deployment, interoperability and logistics and to reactivate capabilities that have not been practised for a long time. Regular rotation will contribute to a lasting improvement of knowledge and experience in the Army. We have already determined the responsibilities within the Army until the end of 2018 and named the follow-up formations so as to guarantee a smooth rotation. This will also give us the chance to get in contact with our partners at an early stage and to establish a trusting relationship. The commitment of the German Army in Lithuania carries on a cooperation that has been growing over the past few years.



Lieutenant General Jörg Vollmer (l.) and Brigadier General Valdemaras Rupšys signing a joint declaration on their cooperation on 1 February 2017 as part of the enhanced Forward Presence mission in Lithuania

Twice already, German formations have been on site for several months as part of Persistent Presence, practising together with Lithuanian units. The German commitment in Lithuania as part of the Transatlantic Capability Enhancement and Training (TACET) Initiative is a perfect addition to the overall eFP concept. TACET, a German-US initiative, is the joint effort of 13 allies aimed at increasing the capabilities of Poland and the three Baltic States. This also includes support for the Lithuanian armed forces in fielding the PANZERHAUBITZE 2000 self-propelled howitzer. And, in much the same

vein, it applies to the use of the BOXER MRAP as well.

After the United States, Germany is one of the largest troop providers in the Baltic States and in Poland. Right from the start, we provided reliable, rapid and comprehensive contributions to the implementation of the decisions made in Wales and Warsaw. The German Army as the core component of the land forces bears the brunt of Bundeswehr operations and standby commitments, and thus guarantees the ongoing and professional accomplishment of this mission. ■



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Viewpoint from The Hague



Jaime Karremann

Promises and Actions

As this issue goes to print it is not yet known what the composition of the new Dutch government will be, but it seems certain that, for the first time in decades, more money will be allocated to the Dutch Armed Forces at the start of operations by the new cabinet.

Extra money is desperately needed. A lot of materiel is becoming obsolete and increasingly requires maintenance. There is a shortage of ammunition and, for example, the radars of naval ships are cannibalised during maintenance with the sensors removed and installed on vessels which are ready for duty.

Will the problems be solved with the anticipated budget increase? Probably not. One billion euros on top of the current defence budget is needed to cover the logistic shortages, to improve the readiness and to prevent new reorganisations. That is a lot of money by Dutch standards. Even more is needed to replace obsolete naval vessels and army vehicles. Increasing the number of personnel, frigates and procurement of the F-35 will require a lot more money. In recent years the Dutch Armed Forces have faced many budget cuts with investments frequently postponed. While extra money for defence was actually being allocated in neighbouring countries, billions of euros were promised during the election campaigns in The Netherlands.

One of the most remarkable newcomers was VNL, a conservative party, which postulated a large defence budget. VNL even promised an aircraft carrier, the first since 1968. For the next four years VNL earmarked investments in the height of five billion euros. That would be a significant increase to the budget which is currently at €8.7Bn (1.17% of the GNP). To meet the NATO commitment of 2% in 2024, an increase of five billion euros is not that surprising considering that even then still one billion is missing.

At some point it seemed that more parties were planning to allocate increased defence budgets. For example Prime Minister Mark Rutte and Minister of Defence Jeanine Hennis-Plasschaert (both members of the VVD conservative party) said they were committed to spending 2% on defence. But as the elections drew closer and the programmes were made public, the promised budgets were shrinking. The VVD, a pro-defence party, considered not more than one billion euros. Researchers of a small

Christian party found out that when the budget is increased at the rate proposed by the VVD, the Netherlands will reach the 2% target in 2075.

The VVD was no exception, other mainstream parties planned to increase the budget between 0.5 and 2 billion euros.

On 16 March 2017 the VVD lost eight seats but remained the largest party. VNL did not get enough votes for even one seat in the Parliament's lower house.

A new cabinet is not expected to start soon, because apart from the VVD at least three parties are needed in a coalition to gain a majority in Parliament. The most probable coalition at this time is composed of VVD, CDA (centre-right), D66 (centre) and GroenLinks (centre-left). Especially the differences between the VVD and GroenLinks are significant. GroenLinks, as the result of a merger of two Christian parties and a pacifist and a communist party, did not consider any additional budget for the armed forces. D66 plans to spend 0.5 billion extra and the CDA more than two billion.

Against this background it is not expected that more than one billion euros will be added to the defence budget. That means there will be money to solve the biggest problems in the short term, but there will be no budget to replace materiel and expand the e.g. Royal Netherlands Navy with currently only six frigates, or the Air Force with 37 F-35s on order. Despite the current situation in and around Europe, the commitments made in Wales to cover the 2% objective, the national budget surplus of 3 billion in 2016 and the current economic growth in The Netherlands.

When new investments are to be postponed again, the future of the Dutch defence industry is at stake, too. The Dutch branch of Thales said in 2016 that new orders from the Government were much needed. In February shipbuilder Damen announced a force reduction of 150 jobs in The Netherlands and announced an even larger reduction for their foreign yards last April. Damen's CEO René Berkvens said in the Dutch financial newspaper *Financieel Dagblad* that he hoped that the Dutch Government would speed up the order of new submarines.

Although the Dutch politicians know what the Armed Forces' problems are, it seems that in recent years promises have been changed, rather than actions....

Slovak Air Force – Heritage as a Challenge

Georg Mader

Slovakia represents an excellent example of a central/east European state waking up to harsh new realities, in an increasingly unstable or even hostile environment. A new NATO member since 2004, it borders the unstable Ukraine and is much closer to the “zone of influence” drawn by Vladimir Putin’s Russia than to the Alliance’s decision makers in Belgium.

Despite repeated nationalist “hiccoughs” by Slovak politicians, a 2016 Slovakian White Paper on Defence, while nothing novel in terms of long-term plan-

sharing by European members of NATO, Slovakia – in company with much larger members – might be one of the allies who according to President Trump con-

History is Back?

Not only for Slovakia, but perfectly illustrative for all Eastern Europe, the new Slovak White Paper reveals that history has returned to Central and Eastern Europe, and traditional military threats once again define regional security. It therefore provides a point of departure from its 2013 predecessor in the recognition of more traditional threats and an added sense of urgency to respond to – with Donbass and rewritten borders actively affecting an adjacent country – a rapidly changing security environment. Consequently both territorial defence and the possibility of a direct attack on Slovak territory are recognised once again as a reality – a major shift in the threat perception of a country whose armed forces have been deployed since 2004 on out-of-area operations as part of the NATO-led KFOR mission in Kosovo, the UN Disengagement Observer Force peace-keeping mission on the Golan Heights, and mine clearance in Iraq.



Photo: Georg Mader

Twelve MiG-29AS are currently in service with the Slovak Air Force.

ning, again highlights collective defence in the Alliance while recognising more traditional threats. Subsequently it provides a new sense of urgency to both increasing national defence spending and to making the armed forces capable of fighting twenty-first-century warfare. For the small Slovak Air Force, these goals may read encouragingly, but progress is painfully slow.

In the view of a new US administration that has been vocal about burden-

stantly “benefitted”. With most landlocked countries a modern Air Force is the most expensive component of defence spending, and a look into the official figures gives some idea of the scale of Slovakia’s problem. Bratislava’s defence spending was slashed in the wake of the financial crisis and only stabilised at 1% of GDP in 2013. In 2015 it increased to 1.1% and again in 2016 to 1.16% or €936M. Despite the positive trend, this is still below the pre-2009 €972M level and a far cry from the 1.6% Slovakia originally committed to spend by 2020. How much that is in reality is illustrated by comparison with non-NATO neighbour and traditional non-spender, Austria, where for next year slightly over €2Bn is allocated, which is about 0.75% of the country’s GDP.

Replacing Soviet-Built Systems: a Lengthy Process

Nearly 30 years after the fall of the Iron Curtain, Soviet military equipment is visible still today. In the current and in previous White Papers, Slovakian materiel modernisation was seen as the top priority, especially getting rid of obsolete Soviet-built systems taken over after the peaceful 1993 separation from the Czech Republic. And in Slovakia many of those systems live much longer lives than in other Eastern European, former Warsaw Pact states – with crucial consequences, like the 2006 crash of a 48-year-old Slovak AF An-24 transport plane, in which 42 servicemen were killed on their return from Kosovo. Now the new White Paper again calls for the replacement of combat and support systems and modernisation

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as a priority. Article 3 of the NATO Treaty calls on member states to maintain sovereign defence capabilities, and therefore Slovakia also is obliged to keep its armed forces capable of defending its own territory. As a result, the current MOD leadership drafted a Long-Term SVK Armed Forces Building and Development Plan, which had been missing for years. Embedded is a two-stage modernisation roadmap, with Phase I running from 2016 to 2020 and Phase II from 2021 to 2030. Under this plan the Slovak AF (Veliteľstvo Vzdušných síl OS SR), radars, early-warning systems and training infrastructure will all be upgraded; new helicopters and transport aircraft will be introduced (in single digit numbers); and replacement of the S-300PMU and 2K12 KUBGBAD systems is also planned. However – again – no decision is made regarding the replacement of the remaining, ageing MiG-29 fighter-jets.

Photo: Wikimedia Commons



Saab GRIPENs are already in service in the Czech Republic.

Back and Forth: GRIPEN Lease versus MiG Toolbox

The Slovakian pendulum on how the future of the spearhead of active peacetime airspace-surveillance/policing of a NATO state embedded in the NATINEADS (NATO Integrated Extended Air Defence System) would be covered, meanwhile, has been swinging for almost a decade. Between 2005 and 2006, a first modernisation – or better “westernisation” – was carried out on 12 of the MiG-29A/-UBs taken against Soviet debts in 1994 and 1995. Former Czech AF FULCRUMs – shared equally after separation while all other airframes with the exception of MiG-23s were allocated 2:1 – were subsequently phased

out. Carried out at Trenčín, in cooperation with OEM RAC-MiG, but with a number of components from Western suppliers, the fighters were equipped with modern NAVAIDs and NATO-compatible communication systems. Avionics were changed to the Anglo-Saxon metric system and the 12 modernised aircraft were officially taken into service in 2008. They are now called MiG-29AS and -UBS and are operating from the centrally-situated airbase at Sliač. This is just a little south from the Air Force Command at Zvolen, where Major General Miroslav Korba has been in command since September 2012. He and various defence ministers have since announced the necessary steps to replace the MiGs with new, more mod-

ern and more economical fighters. But so far only the service contracts have been extended, which ensures that some of the MiGs remain operational for national QRA. But – as MoD spokeswoman Daniela Capáková confirms – “Protection of the airspace is thus ensured until the end of 2019.” Given well known timeframes in fighter procurement, it is clear that in the mentioned timeframe no new (build) fighters will be on the tarmac at Sliač. Maybe the stationing of allied aircraft – like the interim solution of F-16s and F-15s in Romania or Bulgaria – could follow. Nevertheless, the most logical solution was already very clear, but has again “faded away”.

Saab GRIPENs are already in service in two countries adjacent to Slovakia – Hungary and the Czech Republic. Both are leased solutions and – according to MajGen Korba to the author last year in Sweden – the same was apparently concluded for the Slovak selection. Saab has opened an office in Bratislava and only this year again confirmed to the author they could deliver new-build GRIPEN C/Ds within 18 months, also on a lease. In detail, Slovakia would have seen Stockholm leasing six JAS 39Cs and two JAS 39Ds for about US\$340M for a total of 1,200 flight hours per year until 2029. However, since the elections in March 2016 saw a change of Government, including the Slovak National Party, Prime Minister Robert Fico was re-elected for a second consecutive term and has praised the capabilities of MiG-29s. In June 2016 his government rejected an offer from the Swedish Government on the lease-agreement for the

Photo: Wikimedia Commons



Slovakia ordered two C-27J SPARTAN aircraft in 2008; the first will be delivered in 2017.

GRIPENs. Consequently, the ambitious plan for a joint Czech-Slovak supersonic squadron faded away.

Nevertheless, in December 2016 delegations from Slovakia and the Czech Republic approved a "Joint Sky" agreement. The Czech government has approved the accord, which still needs ratification by the parliaments of both countries. The deal means the two could help protect each other's air space beyond the standard air defence cooperation within NATO. The crews of the 14 Czech GRIPENs have acquired skills and experience in several NATO deployments – so the weak point of the agreement lies in the future of the Slovak part. If Slovakia were to choose the same type, the two countries – with Hungary – could also share maintenance and pilot training. While Hungary is another issue, in early January 2017 Defence Minister Peter Gajdos said "The government extended our mandate to negotiate with different suppliers to get the best price. It could take months to analyse the offers before the government picks one."

Silver Lining for Rotary- and Fixed-Wing Transport

Apart from the fighters, there is undoubtedly progress concerning the targeted replacement of Soviet-origin helicopters and transport aircraft. Motivated by the aforementioned high loss of life in the Antonov crash two years earlier, Slovakia selected two C-27J SPARTAN aircraft via a tender in 2008. Originally planned for delivery in 2016, according to Daniela Capáková the first is now delayed until later in 2017, due to problems on the manufacturer's part. The spokeswoman also explained in January 2017 that the MoD has postponed advance payments until new appendices to the contract are signed. During negotiations held in connection with this, the ministry managed to obtain a discount on the original price and a more favourable instalment schedule. Originally each aircraft was to have cost some €34.5M. The second SPARTAN should now arrive in early 2018, while the last Antonov twin was phased out in February 2016.

In the largest contract in the history of the modernisation of the Slovak Armed Forces, carried out via the US Government's FMS programme and signed by the former administration, Slovakia is to acquire nine UH-60M BLACK HAWKs for a total for €248M. The first two helicopters are at an advanced stage of production and should arrive at the 2nd Transport Helicopter Squadron (2. Dopravná vrtuľníková

letka) in Prešov in the course of 2017. This is also becoming rather urgent: while the former Czechoslovakian Mi-24D/V (HIND) assault/gunships have been phased out, the Mi-17 (HIP) are also showing increasing risks. One crashed in 2015, killing one and wounding two other crewmen. Subsequently all nine remaining Mi-17s were temporarily grounded: the crashed Mi-17 was produced in 1985, but had a mid-life overhaul in 2011.

Remaining Up-to-Date with the Help of NATO Partners

The Slovak AF is an established partner of NATO squadrons – to mutual benefit. In September 2016, three HAWK TMK1 jets from the RAF's 100th Squadron at Leeming were in Sliač and the RAF pilots taught dissimilar air combat training (DACT) techniques to a Slovak MiG-29 instructor-pilot. Maj. Ján Kurtík flew in

Slovakia's northern neighbour and NATO ally, Poland, will be at hand in May 2017, when pilots from Sliač Airbase and personnel of the SAM Brigade at Nitra will again practise live firing at the Ustka/Malbork training area. Currently they are preparing for the tactical exercise BALT 2017, where they can do what is not possible in Slovakia. In practising attacking and destroying targets over the Baltic Sea, the live fire exercise will see MiG-29 pilots from Sliač employed in their role in Phase 1 of the exercise, dubbed "Ex Missile I". In Phase 2 – codenamed "Ex Missile II" – Nitra-based 2K12 KUB GBAD assets will be included. For them, live firing is the most important form of training, thanks to which they can improve their skills and readiness and test the coordination of their units and small modifications to their systems.

On the other hand, Slovakia repeatedly was and remains a host nation to NATO air forces, particularly its huge live fire and

Photo: Sikorsky



Slovakia is to acquire nine UH-60M BLACK HAWKs via the US Government's FMS programme.

one of the HAWKs to observe UK tactics and techniques. The scenarios involved 1 v. 1 and 2 v. 1. combat. On the final day, Maj. Kurtík in his MiG-29 flew a 1 vs 1 scenario against one of the HAWK instructors. 100th Squadron CO, Andy Wright said: "The idea of the exercise is that we train the trainers. We teach their top level instructors, who will hopefully then take on their experiences here and develop their own air combat training. The Slovaks have done an excellent job of preparing themselves for the exercise."

bombing range Zahoríe with the adjacent Malacky airbase, right across the western border with Austria. The author has observed French MIRAGE F.1s and USAF F-16s using the base and the range, and in summer 2016, as part of NATO's Eastern reinforcement "Atlantic Resolve", it was the turn of A-10As from the 140th FW, Colorado Air National Guard, to come to Malacky for exercise "Slovak Warthog". Zahoríe by the way is unique in Central Europe because of its deep, sandy ground, which is perfect for desert preparation. ■

Underwater Warfare Platforms

NATO/US Play Catch Up as Russian Subsurface Activity Increases

Joshua T. Cohen

The acquisition of new attack submarines by several European sea services will not have an immediate impact on increased Russian naval underwater activity in the Baltic Sea and North Atlantic. Senior NATO commanders warn that subsurface activities are reaching levels not experienced since the Cold War.

In particular, an increase in Russian submarines operating off Scotland's northern coast, collecting intelligence on the Royal Navy's base at Faslane, rep-

resents one such re-emergence. Prior to retirement in 2016, Rear Admiral Mark Ferguson, then Commander of US Naval Forces Europe and US Naval Forces Africa, publicly stated Russian submarine patrols increased by 50% over 2015 figures. Ferguson's area of responsibility encompassed waters bordering the coasts of Europe and Africa, including

the Baltic, Mediterranean and Black Seas. Increased activity in proximity to undersea internet cabling has also raised concerns; in the event of a limited con-

flict, infrastructure for the worldwide web and cables routing international financial transactions may be targeted.

Christening of Russia's Latest Attack Submarine

These activities are not state secrets. Attending the christening of the fleet's latest attack submarine in late March, Russia's Chief Naval Officer, Admiral Vladimir Korolev told reporters sub crews spent 3,000 days at sea in 2016, activity levels not seen since 1991. The Admiral's remarks were echoed in the Sevmash Shipyard construction hall, containing the second Project 885 YASEN class nuclear-powered attack submarine (SSN), a follow-on to K-560, the first YASEN class hull, commissioned in 2013. The second boat, K-561, is expected

to enter service sometime in 2018. Four additional hulls remain in varying stages of construction. According to a March 17 TASS wire, the series fourth unit, K-571, was reported to be undergoing testing. A seventh unit is on order.

Intended to replace an ageing Soviet-era nuclear-powered guided missile submarine force, in particular, the OSCAR class, the YASEN class brings considerable land attack capability, with eight vertical launchers, and eight 533 mm torpedo tubes. The hull has storage for up to 30 torpedoes. A combination of 24 SS-N-24 SUNBURN (3M54) and SS-N-15 (81R) STARFISH anti-ship missiles may be carried, in addition to combat proven SS-N-30 (3M14) KALIBR land attack missiles.

In 2015, the Russian Navy operationally-validated SS-N-30, several striking targets in Syria. The missiles were launched from an Improved Kilo class diesel-electric attack submarine, B-237 ROSTOV-ON-DON, at the time situated in the Mediterranean Sea. New to the sea service, B-237 served operationally less than a year, prior to its first combat mission. While sources differ on crew size, estimates range from 50 to 90. Hull dimensions are 436 x 37 x 27 metres. The class is powered by an OK-650V water-cooled reactor, a new design capable of generating 200 megawatts, powering two GT3A steam turbines. Endurance is limited to approximately 100 days, based on internally-carried food supply. Its range is unlimited. Surfaced displacement is 8,600 tons, where maximum speed is 16 knots. Submerged, 13,800 tons are displaced, and a 31-knot speed is possible.

More Russian Programmes

Completing a major refit initiated in 2013, on April 6, K-266 ORELI, an OSCAR II Project 949B ANTEY class nuclear-powered guided missile submarine (SSGN) departed United Shipbuilding Corporation's Zvezdochka repair facility in Severodvinsk. Expected to re-enter service as this publication goes to press, K-266 had its reactors recharged, in



Photo: Russian Navy

YASEN class nuclear attack submarine K-560 SEVERODVINSK of the Russian Navy

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addition to hull, structural, electrical, and restorative work on propellers and shafts. Dehumidification and air pressure systems were also modernised. Notably, upgrades facilitating deployment of SS-N-30 (3M-14) KALIBR land attack missiles were included. Length and displacement qualify the OSCAR class as the world's largest naval submarine. In 2015, a fire was reported during K-266 modernization work, delaying the rebuild programme, which is anticipated to add at least 15 additional years of useful life to the submarine. Observers in the defence media speculate the OSCAR II modernisation programme was initiated due to the extended timeframe and expense in building the YASEN class, slated to eventually replace the OSCAR inventory. Also questionable is the ability of Russian shipbuilders to meet production schedules, as illustrated by the delay-plagued K-266 modernisation: a programme preceded by upgrades and emergency nuclear reactor repair work on sister hull K-119 VORONEZH required five years to complete. In the meantime a new remote undersea vehicle "doomsday" system may be available to deliver nuclear weapons. Initially appearing in open sources in 2015, a semi-autonomous underwater platform, intended to deliver a weapon of mass destruction within proximity of a nearshore

describes the submersible as "a massively large nuclear powered and nuclear-armed torpedo." Sutton estimates KANYON has a 1.6 m diameter and approximately 24 m length. "To put that into perspective, it is about 27 times the volume of a regular 533 mm heavyweight torpedo," Sutton writes. A report appearing in late 2016 cited US intelligence sources confirming knowledge of KANYON testing, reportedly conducted last November. A KANYON was said to have been deployed from the special purpose-built SAROV class submarine, few other details are available in unclassified formats. A KILO class variant, SAROV was commissioned in 2007, specifically for weapons and new technology development and testing.

Sutton notes Russia's fifth generation nuclear-powered attack submarine took a step forward in late May with the release of conceptual images by the St. Petersburg-based Malachite Design Bureau. The HUSKY class is planned to replace Project 971 AKULA class nuclear-powered attack submarine, offering a less expensive alternative to the YASEN class, according to Sutton's research. Although a final design has yet to be established, after analysis of the provided images, Sutton concludes that the new class strongly resembles the AKULA. "With X-form aft planes and a longer and

mini" submarine, capable of deploying anti-ship missile and torpedo armaments. These hulls were built at Malakhit Naval Machine Manufacturing Bureau in St. Petersburg.

Sweden Searching for Russian Minisubs

In October 2014, multiple mini-submarine sightings in Swedish territorial waters, suspected to be of Russian origin, sent the nation's military into search mode. An unattributed 2015 report in the "UK Express" confirmed revival of a long-dormant Russian minisub programme that could have delivered the platforms used to penetrate Swedish waters. Open references indicate two Project 865 PIRANHA class midget subs may have been reactivated, possibly involved in the sightings. With an all-Titanium hull, these diesel-electric boats were designed to support a covert penetration team of nine, with ten days' endurance in fuel and food. Numerical estimates differ but all point to a scaled-back production programme, originally envisioned at 12 units. Available data suggest only two were built. At the time, the class was considered state of the art due to non-magnetic hull properties, size and performance.

The Swedish Navy maintains modern mine countermeasures vessels, among these are the MCM-73 KOSTER and M-74 KULLEN, shown in media photographs sweeping coastal areas in search of the reported minisub(s). In addition to magnetic sweeps, the type's hull-mounted Atlas Elektronik HMS-12M triple frequency mine hunting sonar can detect small subsurface vehicles. The presence of the Saab DOUBLE EAGLE Mk III remote underwater vehicle (ROV) gives the KULLEN class a standoff detection capability. Also available, the Atlas SEA FOX C expendable mine disposal system may be deployed against a stationary or slow-moving midget submarine. Semi-autonomous and wire guided, SEA FOX C uses a camera to identify mines and undersea objects. A shaped charge is used to destroy targets. Although the SEA FOX C-shaped charge lacks sufficient force to damage conventional submarines, a midget submarine may be regarded as a mine-type target in this context.

The inshore undersea littoral is most challenging for conventional anti-submarine operations. Seafloor clutter, wrecks, and underwater terrain variations make it easy to conceal a mini-submarine from ship-based sonar. These conditions make navigation difficult for small submarines relying on passive-inertial navigation systems, if so equipped. Otherwise, navigation is via

Photo: Sweden MoD



Sweden presented this low-resolution picture as proof of the existence of a Russian mini-submarine in Swedish waters.

coastal target was confirmed in late 2016. The project, dubbed "Ocean Multipurpose System: Status-6" in Russia, is now reportedly identified as "KANYON" by the US Department of Defense, a recognition of the system's, at minimum, limited operational status. Intended to bypass NATO missile warning radars, while completely avoiding missile defence systems, the delivery vehicle is said to have a 5,400 nm range, operating at depths to 1,000 metres. Submarine expert and author H.I. Sutton

more blended sail, possibly leaving room for a three-or six-cell Vertical Launch System (VLS)," Sutton notes the lengthened sail extends further forward, relative to the AKULA, rather than behind. "It is probable each cell will carry multiple KALIBR land attack cruise missiles," he notes.

According to a 2013 report in the Russian news publication "RiaNovosti", addressing an audience in Malaysia, Igor Zakharov, vice president of state-owned United Shipbuilding Corporation, mentioned a new "super

dead reckoning, based on gyrocompass, speed and current calculations, all of questionable accuracy in unpredictable littoral zones. As seen in widely-distributed news photos, the momentarily surfaced mini or midget submarine intruding in Swedish waters indicates navigation by pilotage, relying on civil nautical buoys, transponders and magnetic compass. Past examples show mini-submarine operations in coastal areas have not always gone as planned. During a mission in September 1996, sea conditions forced occupants and crew of a Democratic People's Republic of Korea (DRPK) Navy SANG-O class mini-submarine to abandon the platform.

Photo: B. Wilke/Bundeswehr



German Class 212A submarine, the basis for the new German-Norwegian Type 212CD submarine

Strategic Partnership between Germany and Norway

Initially rejecting the Saab-Kockums A-26 diesel-electric attack sub, and later a DCNS SCORPENE diesel diesel-electric, attack submarine design, as replacement for its six ULA class diesel electric attack submarines, the Norwegian Navy decided to procure four ThyssenKrupp Marine Systems (TKMS) Type 212CD (Norway – Germany/Next Generation) diesel attack submarines in a unique arrangement with the German

Navy, forming a new strategic partnership to procure the new submarines. As part of the agreement, the German Navy will order two 212NG boats, based on the

German Navy's Type 212A. All submarines will be identical, paving the way for joint logistics, maintenance and crew training, among other cost-sharing benefits. When



Source: The Netherlands Ministry of Defence

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surfaced, the Type 212CD displaces 1,473 tons, 1,859 submerged. The hull is approximately 57 metres in length, 7 metres in height, and 6 metres in width. Range is 8,000 nautical miles, obtained at a 12 kt surface speed, or 20 kt submerged. Complement is 27. The armament includes six bow tubes for Atlas Electronic DM 2 A4 heavyweight wire-guided passive torpedoes able to reach 50 kt and to engage targets at up to 50 km range. Up to 12 weapons are carried.

Once retired and replaced by new Type 212CDs, six ULA class boats, now in service, will have an average of 35-40 years of operational usage. Under a US\$27.45M contract signed in 2016, from 2016-2020

214 in 2010-11. Since 2007, Daewoo Shipbuilding & Marine Engineering and Hyundai Heavy Industries have built nine KSS-II/Type 214 under licence. Long-standing, albeit delayed, Turkish Navy intentions to procure six Type 214 remain unclear. Three DOLPHIN II class diesel-electric attack submarines in service with the Israeli Navy are based on Type 212, but larger, to accommodate an increased complement and weapon fit.

With an impending requirement to select a replacement for its four WALRUS class diesel-electric attack submarine inventory, the Netherlands Navy is following the progress of the Germany-Norway Type 212CD agreement. The prospect for domestic

ment, work includes "extensive conservation work, such as disassembly, assembly, and installation of a variety of equipment and systems." Major modifications include new sonar installation and periscope replacement by an optronic mast. Submarine combat management systems and internal communications systems are being replaced, in addition to "modification of a number of platform systems and the complete redesign of the central radio cabin and electronic cabin." The firm is also tasked with SATCOM installation and delivery of new, redesigned combat information centre consoles. Owing to exceptional day-to-day maintenance, and extensive upgrades and modernisation, upon retirement sometime in the late 2020 timeframe, if placed on the second-hand market, ex-WALRUS class hulls may be highly attractive to nations interested in gaining an initial undersea capability.

China's SEA DRAGON

Taiwan's long-envisioned plans to develop a domestic submarine programme are now in place. Preparing for the task, the Republic of China Navy and the country's shipbuilding infrastructure will initially conduct upgrades for the navy's two SEA DRAGON class (WALRUS class) diesel-electric attack submarines. Skills will be gained as workers and engineers perform the major life extensions, enabling the inventory to continue in service for an additional 15 years. The duo will undergo hull, mechanical, and electrical upgrades. System modifications encompass the TIMNEX 4CH(V2) electronic support measures system. Installation of a new combat system, speculated to be an off-the-shelf variant of Lockheed Martin's SUBICS (Submarine Integrated Combat System), is planned.

Concerned with maintaining good relations with China, most nations capable of building submarines are not willing to openly do business with Taiwan, a situation leaving acquisition authorities few options beyond the domestic production programme now in its early stages. According to AMI Naval Analyst, Bob Nugent, "Bottom line, reverse-engineering SEA DRAGON is the best and only option Taiwan has for new sub design. They could seek to obtain another design more or less covertly, but the need for continual support from the originating country through detailed design and initial construction phases would be required." Massive Chinese military and intelligence operations to monitor and disrupt any ROC submarine programme are a near certainty, particularly in the cyber and human intelligence domains. ■

Photo: Ministerie van Defensie



WALRUS class submarine surfacing

Kongsberg Defence will perform modernisation and life-extension work, enabling the class to remain in service, awaiting Type 212CD replacements. In previous ULA class upgrade work, Kongsberg supplied a new combat system and conducted electronics upgrades required to handle new torpedoes. In 2011, Saab was contracted for work on the submarines' steering control consoles. Between 2007 and 2015, all six boats received substantial mid-life upgrades. It is unclear if these well-maintained hulls will be transferred to a new operator, sent to the scrapyard, held in reserve, used for training, or any combination thereof.

A highly successful design, four TKMS Type 212A submarines are in service with the Italian Navy, with potential for two additional hulls. Type 214 is an export version in service with the Hellenic Navy, with whom four were commissioned from 2010-2016. The Portuguese Navy took delivery of two Type 209s modernised to a technological state similar to the Type

construction of the Saab-Kockums A-26 design, by co-production agreement with Dutch Damen Shipyards Group, presents a strong contender. In the meanwhile, having exceeded the 30-year point, the WALRUS inventory may have to soldier on awaiting replacement. Accounting for an average three to four-year construction timeframe required for a new build submarine, if an order were placed this year, initial delivery should not be expected until the 2021-2022 timeframe.

Anticipating an over-extended service life, Dutch WALRUS hulls are undergoing an extensive upgrade. In 2013, the Dutch Defence Material Organization awarded Imtech Marine Netherlands a contract to upgrade mechanical, engineering, electrical elements and components on the submarines. Work is underway at the naval base in Den Helder, scheduled for completion in 2020. The life extension aims to retain the inventory until at least 2025. According to an Imtech Marine Netherlands press state-

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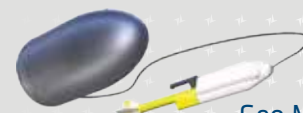
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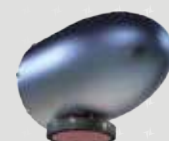
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Underwater Weapons: International Submarine Weapon Options

David Saw

Underwater warfare presents many challenges, all of which is hardly surprising when you consider the hostile nature of the operational environment. What is worth noting is that recent combat experience in the underwater domain is, fortunately, rare, with very few cases over the last half a century. Whether that will continue or not is open to question, as submarine proliferation in terms of new operators and existing operators growing their forces and capabilities is an inescapable reality.

In terms of the weapons themselves, one can divide these into what might be described as “traditional” submarine weapons in the form of the torpedo, mine laying and the ability to clandestinely insert Special Operations Forces (SOF). To these traditional capabilities, more have been added in recent years, capabilities that have significantly enhanced the operational utility of submarines. These capabilities include anti-ship missiles, land-attack cruise missiles

1971 the Pakistan Navy DAPHNE class submarine PNS HANGOR (S 131) engaged two Indian Navy Type 14 frigates INS KHUKRI (F 149) and INS KIRPAN (F 144). Hangor launched two torpedoes at KHUKRI, hitting with one and sinking the frigate. A third torpedo hit and severely damaged Kirpan. The Falklands conflict of 1982 saw the British SSN HMS CONQUEROR (S 48) become the first nuclear submarine to sink a warship. On 2 May 1982 the Argentinian Navy

waters some 1.5 km off Baengnyeong Island in the Yellow Sea. At 21:21 local, an explosion was reported near the stern of the corvette, some five minutes later the corvette broke in two and sank.

In April of 2010, the wreck of the CHEONAM was raised and taken to Pyongtaek naval base in an effort to determine what had happened. The ROK established an international investigative team with representatives from Australia, Sweden, UK and the United States. The investigation found that the sinking had been caused by a “non-contact” underwater explosion. This explosion had been caused by the detonation of a North Korean CHT-02D torpedo under the stern of the CHEONAM, with the torpedo having been launched by a YONO class midget submarine of the Korean People’s Navy (KPN) of North Korea (DPRK).

The ROKN is an efficient and well-trained navy, ROKS CHEONAM had apparently been operating its PHS-32 hull-mounted sonar and had been unable to detect the KPN submarine. All of which illustrates the difficulties of underwater warfare.

It is also important to note that the DPRK is capable of building both full-size submarines (SSK) such as the SINPO class, and midget submarine classes such as the YONO and the SANG-O, as well as torpedoes and mines. The DPRK will export its underwater warfare technologies and it reported that Iran has made significant purchases from the DPRK in recent years.



Photo: ROKN

The launch of the eighth Type 214 submarine ROKS LEE BUM SEOK for the Republic of Korea Navy (ROKN) in November 2016 at the Okpo yard of Daewoo Shipbuilding & Marine Engineering (DSME). ROKN submarines use the indigenous WHITE SHARK torpedo, as well as ATLAS ELEKTRONIK torpedoes.

and in the future the addition of air defence systems. It should be noted that we will not be covering submarine-launched strategic nuclear missiles in this article.

Experience

As noted in the introduction, actual real combat experience regarding underwater warfare is extremely limited. On 9 December

cruiser ARA BELGRANO was sighted and engaged, HMS CONQUEROR fired three MARK 8** torpedoes, two of which struck the cruiser which eventually sank.

The most recent example of underwater combat comes from the night of 26 March 2010. ROKS CHEONAM (PCC 722), a PO-HANG class corvette of the Republic of Korea Navy (ROKN) was on patrol within internationally recognised ROK territorial

Proliferation

Conventional submarine (SSK) technologies and capabilities have proliferated significantly since the 1990s. Iran is a classic example of this; between 1991 and 1996, the Islamic Republic of Iran Navy (IRIN) received three Project 877EKM submarines from Russia, along with a complete weapons package of torpedoes and mines. China

has supplied Iran with C800 and C700 series missiles and missile technology, while the DPRK supplied a single YONO class midget submarine and the technical data to manufacture the boat. Currently IRIN has 14 YONO class submarines, each with two 53 cm torpedo tubes for the indigenous VAL-FAJAR heavyweight homing torpedo (most likely a DPRK design).

Iran is currently building the FATAH class coastal submarine (SSC) and intends to acquire up to 20 of these. They will be equipped with torpedoes, mines and an anti-ship missile capability. According to the US Navy Office of Naval Intelligence (ONI) Iran is building a 1,300 ton "attack submarine (SSK)" known as the BESAT class, which will have six torpedo tubes for torpedoes, mines and missiles. A February 2017 ONI report on IRIN notes that: "Over the next five years, new weapons will likely include submarine-launched ASCMs (Anti-Ship Cruise Missile), the HOOT supercavitating torpedo and potentially a supersonic ASCM, which Iran claims is in development."

The HOOT supercavitating torpedo is a very important development, essentially this is a very high speed torpedo. The weapon is actually an Iranian version of the Russian SHKVAL, which, depending on the variant, has a range of between 7 km and 15 km, can reach speeds of 200 knots and has different guidance packages depending on the variant. Iran tested the SHKVAL in 2004 and then in 2006 tested their own version of the system.

To put all of this into context, the Strait of Hormuz links the Persian Gulf and the Gulf of Oman, through this strait passes some 20% of world oil traffic, making the Strait of Hormuz the number one global oil choke-point. Iran, via the coastal missile batteries, fast attack craft and submarine force of IRIN, has the ability to block the strait if it so desires, an act that would cause immense economic disruption on a global scale. The IRIN submarine force could also operate into the Indian Ocean, providing more opportunities to disrupt sea lines of communication and severely damage international trade.

Missile Matters

In terms of SLCM, the UGM-109 is the submarine-launched version of the TOMAHAWK Land Attack Missile (TLAM), in US Navy service it is used by some LOS ANGELES and all VIRGINIA class SSNs, as well as by OHIO class SSGNs. The missiles are deployed from a Vertical Launch System (VLS) in the submarine hull. The weapon was first used in 1991 during Desert Storm and on other missions against Iraq in the 1990s. The British procured the weapon in the mid-



Photo: DCNS

O'Higgins was the first of two SCORPENE class SSKs acquired by the Chilean Navy; since then India and Malaysia have acquired SCORPENE class boats, with Brazil due to receive its first boat in 2018. Leonardo Defence Systems' BLACK SHARK torpedoes have been acquired by the majority of users, but Brazil will likely use the DCNS F21 torpedo.

1990s acquiring 65 UGM-109 TLAM Block III missiles for Royal Navy SSN, the weapon is launched via the torpedo tube in British service. HMS SPLENDID was the first British SSNs to launch the missile during Operation Allied Force in the Balkans in 1999. Britain procured a second batch of missiles, this time 65 TLAM Block IV missiles, in 2014. According to the US Navy, Block IV missiles have a range of 1,600 km.

The Soviet OSCAR class SSN, still in service with the Russian Navy, was equipped with the NPO MASHINOSTROYENIA P-700 Granit SLCM, some 24 of these 7,000 kg missiles were carried and they could be equipped with HE or a nuclear warhead. These 600 km range weapons were designed to engage US Navy carrier battle groups. The OSCAR also carried, at different times, a range of anti-submarine missiles the 50 km range VYUGA and VODOPOD (launched from 533 mm tubes) and the 100 km range VEDER (launched from 650 mm tubes). Essentially, these systems carried an anti-submarine torpedo as a payload, with the missile transporting the torpedo to the target area and then the torpedo entering the water to engage the hostile submarine. Another Russian SLCM is the NOVATOR 3M-54 KALIBR, known as the CLUB missile for export. This is a family of missile systems for surface, sub-surface and other applications. For submarine use, the CLUB-S family consists of the 3M-54E, supersonic in the terminal phase with a range of 220 km, while the 3M-54E1 variant has a 300 km range and a 400 kg warhead, with a high subsonic speed in the terminal phase. Another variant is the 3M-14E, this is a land attack weapon with a 300 km range and a 450 kg unitary warhead. The last variant is the 91RE1, this is for anti-submarine use, it has a lightweight torpedo payload and a range of 50 km.

As well as in Russia, the CLUB-S is in service with the following KILO class SSK operators: Algeria, China, India and Vietnam. China has used the CLUB-S as the basis to develop a

replacement for the YJ-82 submarine-launched anti-ship missiles used by its SONG and YUAN class SSKs. The new missile is known as the YJ-18 and was tested in 2014, it is believed to be a major improvement on the CLUB-S, for example the US Navy credits the missile as having a range of 537 km. Like the 3M-54E, the YJ-18 has a speed of Mach 0.8 until some 20 km from the target at which point the missile divides and the part containing the warhead heads to the target at a speed of between Mach 2.5 and Mach 3. These characteristics make the YJ-18 a very difficult weapon to combat and therefore significantly increase the operational capabilities of China's submarine fleet. On 17 May 2016, the keel of the first 3,000 tonne displacement KSS-III submarine for the ROKN was laid at the Okpo yard of Daewoo Shipbuilding & Marine Engineering (DSME), this was followed on 1 July by the keel-laying of the second KSS-III by DSME. The KSS-III has a six-cell K-VLS for the CHEON RYONG land-attack cruise missile, part of the HYUNMOO III cruise missile family, built by LIG Nex 1. The weapon has a warhead of between 450 and 500 kg and is credited with a range of between 500 and 1,500 km. The first KSS-III is due to enter service in 2020, with the second unit in 2022. LIG Nex 1 also developed and manufacture the WHITE SHARK heavyweight torpedo that will be used by the KSS-III.

Pakistan is developing an indigenous SLCM capability as a strategic-level system. On 9 January 2017, a BABUR-3 SLCM was fired from a submerged platform, part of the qualification process for a submarine-launched system. BABUR-3 only has a range of 450 km, but this would be enough to give Pakistan a form of secure nuclear second-strike capability.

As regards more conventional submarine-launched anti-ship missiles, the primary western types are currently the Boeing UGM-84 HARPOON and the MBDA SM-39 EXOCET. In March, the British and French governments, along with MBDA, launched

the joint concept phase of the Future Cruise/Anti-Ship Weapon (FC/ASW), the concept phase is valued at €100 million, the aim is to develop a new weapon to replace existing types, such as the EXOCET, by the end of the 2020s.

Also emerging as a future possibility for submarine-launched applications is the Kongsberg Naval Strike Missile (NSM). Originally designed for ship-launched applications, the NSM was re-packaged to meet air-launched requirements and has the possibility to evolve further to meet VLS and submarine-launch requirements. The recent collaborative agreement between Germany and Norway on submarine acquisition potentially opens the way to a submarine-launched variant of the NSM.

ThyssenKrupp Marine Systems (TKMS) and Diehl Defence are offering a unique submarine weapon system in the form of the Inter-

variant of the missile was tested in March 2013, but most likely it will be the smaller BRAHMOS NG, stated as being half the size of the current BRAHMOS, that will be developed into a fully functional submarine-launched weapon.

Torpedo Options

For the US Navy, the heavyweight torpedo of choice is the Raytheon MK 48, this originally went into service in 1972 but has been vastly upgraded over its service life and is still in production. The torpedo is also in service with Australia, Brazil, Canada and the Netherlands, and is being purchased by Taiwan. Britain is the only user of the BAE Systems SPEARFISH heavyweight torpedo. At the end of 2014, BAE Systems were awarded a contract to deliver upgraded SPEARFISH torpedoes, with deliveries running from

guided, the torpedo is used against both surface and submarine targets, and features high countermeasures resistance. The DM2A4 is in service with the German Navy, has been acquired by Israel, the ROK and other operators of German submarines. It has also been acquired by Pakistan for its AGOSTA 90B submarines and selected by Spain for its S-80 submarines.

Atlas Elektronik also offers a unique system in the form of the SEASPIDER, this is described by the company as an Anti-Torpedo Torpedo (ATT). Designed for use from both surface ships and submarines, the system is designed to defeat all torpedo types. In a submarine it can be launched from a conventional torpedo tube with a tube insert or dedicated launchers located in the submarine hull. The availability of a true active defence against incoming torpedoes is a potentially game-changing situation in underwater warfare.

France has recently introduced a new DCNS heavyweight torpedo into service and this will equip French Navy SSBN and SSN, and has been ordered by Brazil for its SCORPENE class submarines. Capable of fibre-optically guided or autonomous operation, the F21 has a speed of 50 knots, a range in excess of 50 kilometres, endurance of one hour, and can operate at depths of between 10 and 500 metres. The French Navy has acquired an initial total of 93 F21 torpedoes.

Italy is the other major European torpedo supplier in the form of Leonardo Defence Systems. The Italian Navy had operated the A-184 heavyweight torpedo for many years and the BLACK SHARK torpedo was developed as a replacement; like other advanced torpedoes it has a maximum speed of 50 knots and a range of 50 km. BLACK SHARK has been very successful in the export marketplace, being acquired by Chile for its SCORPENE and Type 209 submarines, Ecuador for the Type 209, Malaysia for the SCORPENE, Portugal for the TRIDENTE class (Type 214) and Singapore for the ARCHER class. The torpedo is used by the Italian Navy in its TODARO class (Type 212) submarines.

Both China and Russia have developed a complete range of torpedo and mine solutions for domestic and export purposes. In Sweden, the Saab Heavyweight Torpedo (HWT) is in service with the Swedish Navy on its SSKs and will be used by the future A26 SSK. Mitsubishi Heavy Industries are responsible for torpedoes in Japan for the SSK fleet and developed the Type 89 heavyweight system; the company is now working on a successor torpedo. Finally, India will be introducing an indigenous heavyweight torpedo developed by the DRDO known as VARUNASTRA, this will initially be operated by Indian Navy KILo class SSKs. ■

Photo: JMSDF



JDS UNRYU (SS 502) was built by Kawasaki Heavy Industries and commissioned into the Japan Maritime Self-Defense Force (JMSDF) in March 2010. Japanese submarines use the indigenous Mitsubishi Heavy Industries Type 89 torpedo and the Boeing UGM-84 HARPOON anti-ship missile.

active Defence and Attack System for Submarines (IDAS). Launched via the torpedo tube, this is a fibre-optically guided missile system, with an IIR seeker and a range of 20 km. The precision targeting capabilities of the IDAS allow the system to engage MPA and helicopters, as well as surface combatants. The system has been tested from both German and Norwegian submarines.

BrahMos Aerospace, a joint venture between NPO Mashinostroyeniya of Russia and the Indian Defence Research & Development Organisation (DRDO), developed the BRAHMOS missile system for air, land and naval applications. A submarine-launched

2020 to 2024. BAE Systems currently has the SPEARFISH support contract, but this ends in 2019 and a new support package will therefore have to be negotiated.

Germany's success in terms of SSK exports has been reflected in the export success of Atlas Elektronik and its torpedoes. The operational requirements of the German Navy in the 1960s led to the development of a complete range of torpedoes for both submarines and surface combatants that started to be fielded in the 1970s. Today the current generation heavyweight torpedo is the DM2A4, also known as the SEAHAKE mod 4 in export applications. Fibre-optically

Unmanned Warrior 16

Understanding the Capabilities of Marine Robotic Systems in an Operational Environment

Conrad Waters



A major trend in underwater warfare in recent years has been the recognition of the “game changing” potential of increasingly sophisticated unmanned and autonomous systems. This pattern has been evident in other maritime domains on the water and in the air, as well as in cross-domain command and control. To date, however, the practical exploitation of marine robotic technology has been somewhat restricted.

It is true that such systems have already been widely used in a range of operational environments. However, this has typically been in scenarios where one or two systems have been deployed to perform a specific mission function. More complex applications have largely been confined to test-bed conditions. The recent British Unmanned Warrior 16 demonstration was therefore noteworthy in providing an opportunity for multiple robotic systems from different nations to exhibit their ability to achieve a spectrum of results in a “real-world” environment.

Background

For many years, the United Kingdom has hosted a series of bi-annual, multinational exercises known as Joint Warrior. Taking place in the spring and the autumn, these exercises are focussed on the Scottish Training Areas. They involve all three branches of the armed forces. In 2014, the Royal Navy's then professional head, First Sea Lord Admiral Sir George Zambellas, announced that the second Exercise Joint Warrior in 2016 would also be used to provide a large-scale testing ground for unmanned and autonomous capabilities. It was anticipated that integrating such systems into a “live” tactical exercise would accelerate understanding of how they could be best exploited. The initiative also provided industry with a showcase to exhibit its products and provided a signal of the navy's enthusiasm to use robotic

technologies to expand its effectiveness. The Royal Navy (RN) invited participants from a wide variety of sectors to engage in Unmanned Warrior. The unrivalled opportunity presented to inform and, possibly, accelerate future procurement produced a predictably strong industry presence.

Around forty companies took part. These ranged from industry giants such as BAE Systems, Northrop Grumman and Thales to smaller specialists such as ASV and Blue Bear Systems Research. There was also a good response from academia and from Britain's defence partners, notably the US Navy's Office of Naval Research (ONR). Throughout the initiative, there was a strong emphasis

together – as well as in conjunction with manned systems – to benefit naval operations. It was also hoped that the focus provided by such a major event would accelerate cross-pollination of intellectual effort and talent.

Scope

Unmanned Warrior officially took place between 8 October and 20 October 2016. However, aspects of the exercise extended beyond these dates. Essentially running in parallel with the normal Joint Warrior exercise, most activities were centred on the Ministry of Defence's ranges off the west

Photo: Office of Naval Research



A Canadian USV-2600 survey vehicle onboard the support vessel KYLE OF LOCHALSH. The USV-2600 was one of a number of robotic systems used to carry out survey tasks as part of the MCM theme.

Author

Conrad Waters is a naval and defence analyst based in the UK. He is a regular contributor to ESD and Editor of Seaforth World Naval Review.

on collaboration. This was partly influenced by a desire to establish the extent to which unmanned and autonomous vehicles from different nations and suppliers could work

coast of Scotland. There were also some intelligence gathering exercises in Cardigan Bay off Wales. Trials were carried out across five distinct specialities or themes, although

there was frequently a degree of cross-over. They encompassed:

Hydrographic & Geospatial Intelligence (GEOINT)

Demonstrations of systems within this theme commenced before the main exercises. They involved the deployment of autonomous systems providing hydrographic and geo-intelligence to gather data relating to the exercise areas. This was used to enhance the performance of Joint Warrior and Unmanned Warrior participants. The UK's National Oceanography Centre at Southampton University coordinated much of this effort.

Anti-Submarine Warfare (ASW)

A number of ASW exercises were carried out, focussed largely on the use of robotic systems for threat detection. Missions included wide area search, littoral search, task group force protection and picket defence. For example, a total of six wave-powered wave-gliders supplied by Autonaut and Boeing were used to defend Stornoway harbour in the Outer Hebrides. This included the use of a number of gliders equipped with ASW sensors and linked by Wi-Fi to provide an effective force protection barrier across the harbour approaches.

Mine Countermeasures (MCM)

MCM is one of the areas of maritime warfare where robotic systems are most firmly established. A number of proven technologies, such as Kongsberg's REMUS submersibles, participated in the exercises. However, Unmanned Warrior saw efforts to demonstrate how such systems can be used even more effectively, notably in the area of collaborative autonomy. This saw multinational squads of unmanned vehicles – in the air, on the surface and under the water – working together to complete tasks more quickly and effectively. Another interesting aspect of the exercises was a Mine Hunting Challenge. This allowed comparison of the abilities of traditional manned mine countermeasures assets and robotic systems in mine detection and classification.

Intelligence Surveillance Targeting Acquisition and Reconnaissance (ISTAR)

These exercises were intended to demonstrate the extent to which unmanned and autonomous systems could provide better situational awareness than existing technology. One exercise involved six different unmanned air vehicles being used simultaneously to achieve a layered perspective. Another saw unmanned and manned systems being paired to assess their combined

A spectrum of aerial, surface and underwater marine robotic systems pictured during Unmanned Warrior 2016. Discovering the extent to which such systems could be successfully integrated to work collaboratively was a key aim of the exercise.



potential. Amongst a number of high-profile participants was Leonardo Helicopters' SW-4 SOLO optionally piloted helicopter. Broadly similar to the US Navy's MQ-8C FIRE SCOUT, this previously undertook RN unmanned concept trials during 2015.

Command & Control (C²)

Possibly most significantly of all, trials of the ACER (Autonomous Control Exploitation and Realisation) command system demonstrated the potential to combine information from a spectrum of robotic systems to create a single tactical picture on an RN combat management system. This holds out the prospect of dispensing with the clutter of bespoke control systems and specially-trained operators often associated with current robotic technologies.

Analysis

The Royal Navy appears pleased with the results of Unmanned Warrior. On one level, the exercises carried out under its banner have significantly increased awareness of robotic systems' capabilities, providing the opportunity for service personnel and industry to work together in a way that should accelerate achievement of their potential. It has been a case of "Top Gun meets Formula 1" in the words of one Royal Australian Navy observer. More prosaically, Rear Admiral Paul Bennett, the RN's Assistant Chief of Naval Staff (Capability) and sponsor of Unmanned Warrior has stated that Unmanned Warrior provided a major step forward in understanding how unmanned and autonomous systems can be used to deliver warfighting, war-winning capacity. Speaking to European Security & Defence

after exercise evaluation, the RN's Fleet Robotics Officer Cdr. Peter Pipkin said: "Overall, Unmanned Warrior was hugely successful. It met expectations in virtually all areas and exceeded them in some." He highlighted the benefits of the collaborative approach adopted in developing the understanding of both naval and industrial participants and allowing swift resolution of challenges on the ground. The ability of the ACER command system to integrate information from various systems and act as a single point of interface with the RN's combat management system was likely to prove particularly significant in facilitating future robotic operations. The capacity of multiple systems to work together – especially in the MCM theme – was also notable.

Looking forwards, the wider integration of marine robotic systems into day-to-day naval operations still faces challenges. In the words of Pipkin, "the genuinely disruptive nature of many robotic technologies means that there will need to be changes to education, training and even doctrine to ensure their effective utilisation." The fast-changing nature of such systems and differing levels of technical maturity will also require innovations to the procurement process. For example, future acquisition of some capabilities may be more appropriate under a services model rather than as a capital acquisition. For the present, the RN can be satisfied with both the experience and kudos gained from leading such an innovative exercise. Moreover, the interest shown in Unmanned Warrior by many partner navies – in Europe and beyond – suggests it is likely to be just the first of many similar demonstrations in the years ahead. ■

Canadian Armament Programmes Update

Sidney E. Dean

Canada is an active participant in international security operations. In recent years, the Department of National Defence (DND) has felt the impact of previous deferment of investment in new military systems. A large number of service-specific and joint procurement programmes are currently underway to alleviate these shortfalls.

The most recent (2016) DND Defence Acquisition Guide lists a total of 236 initiatives, including 38 introduced that year. The projects cover everything from clothing and rations to satellites and major weapons systems, and also include service and maintenance contracts.

Photo: Royal Canadian Air Force



Aviation Systems

CF-18 Replacement

Perhaps the most visible acquisition programme centres on replacing the Royal Canadian Air Force's (RCAF) thirty-plus year old CF-18C/D combat aircraft. Attrition has reduced the CF-18 fleet from 138 aircraft to 76, too few to maintain Canada's NATO and NORAD commitments. Plans to replace the CF-18 with the F-35A JOINT STRIKE FIGHTER (JSF) were dropped because of delays and cost overruns in JSF development.

In November 2016 Ottawa announced a new plan to replace the fighter fleet. This plan takes a three-step approach. In the short term, the DND is exploring procurement of 18 F/A-18E/F SUPER HORNETs to augment the current CF-18 fleet. Negotiations with the US government and Boeing are ongoing, centring around both availability and cost; a formal letter of request regarding a Foreign Military Sale was sent to Washington on 13 March of this year. Ottawa expects a letter of offer and acceptance as early as this fall, with the signing of a purchase agreement by spring 2018. Notably, Ottawa is committed to applying its Industrial and Technological Benefits Policy to this acquisition; the ITBP requires suppliers to make investments in Canada equal to 100% of their contract value.

CF-18 demo HORNET of the Royal Canadian Air Force. The current CF-18 fleet will stay operational for another 10 to 15 years.

Also for the short term, the DND is planning a service life extension programme that would keep the current CF-18 fleet operational for another 10 to 15 years. For the long term, the DND is launching a competition for procurement of a replacement aircraft. Here, too, Ottawa considers both performance and affordability to be crucial. Benefits to Canadian industry (e.g. as subcontractors and suppliers) are also considerations. Details on the permanent fleet size, procurement timeframe and anticipated costs will be guided by the Defence Policy Review (due to be released this spring) and the subsequent defence budget proposals. The formal bid for solicitation is planned for 2019. In the meantime, Canada remains an active participant in the JSF programme, retaining options to procure the F35. Other, more affordable options frequently proposed include additional F/A-18E/Fs, the Saab JAS39 GRIPEN, and the Dassault RAFALE.

need of replacement. Here the decision has been made. In December 2016 the RCAF ordered 16 Airbus C-295Ws, with deliveries planned for 2019-2022. The new aircraft will also replace legacy CC-130H aircraft employed in the S&R role. The all-weather-capable C-295 will be specifically configured for the S&R mission, to include state-of-the-art communications systems that will allow search and rescue personnel to share real-time information with partners on the ground. Using integrated sensors, crews will be able to locate persons or objects (e.g. downed aircraft) from more than 40 kilometres away, even in low-light conditions.

The contract has an initial value of CA\$2.4M, including procurement, construction of a training centre, and five years of maintenance and support; the latter will be provided through a joint venture between Airbus Defence and Space and PAL Aerospace.

Author

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C-295 Fixed-Wing S&R

Following nearly fifty years of service, Canada's CC115 (DHC-5) BUFFALO search and rescue aircraft are in even greater

CH-148 CYCLONE Maritime Helicopter

Like the DHC-5, Canada's SEA KING maritime helicopters entered service approxi-

mately half a century ago. Ottawa has opted to replace them with the Sikorsky CH-148 CYCLONE, a military variant of the civilian S92 helicopter. The multirole CH-148 will operate from naval vessels, providing search and rescue, anti-submarine warfare (with two Mk 46 ASW torpedoes), and maritime surveillance capabilities as well as utility transport. The new aircraft offer a significant performance increase versus their predecessors: double the horsepower and five times the fuel capacity; double the cargo-hook weight capacity; room for 18 passengers versus three on the SEA KING; vastly superior avionics and sensors (including a missile approach warn-

ASW capabilities and the surface warfare suites. IOC is expected in 2018. Full operational status for the entire CH-148 fleet is expected by 2025, with continued service by some SEA KING helicopters until then. At that time, the entire fleet will be upgraded to the final configuration known as Capability Release 2.1. Acquisition and infrastructure costs total CA\$3.2Bn.

Land Systems

In 2009 the DND announced plans to modernise the family of ground combat vehicles. The CA\$5Bn project was to include several new systems as well

the TAPV contract to Textron Systems Canada. The 16-metric ton 4x4 vehicle is based on Textron's COMMANDO ELITE. The vehicle's armour exceeds the Canadian Army's requirement for TAPV, offering a high degree of protection against IEDs, explosively formed projectiles, and anti-armour weapons. The initial procurement is for 500 vehicles, with an option for an additional 100.

TAPV will be delivered in two configurations. The Reconnaissance configuration will have a crew of three (commander, driver and gunner) and room for two passengers. Of the 193 reconnaissance vehicles, 138 will be equipped with a remote weapons system mount on the roof. The General Utility (GU) variant will carry a crew of three plus three passengers. Of the 307 GU vehicles, 226 will feature the remote weapon system mount. Both configurations feature a top speed of 110 km/h and an unrefuelled range of 650 kilometres at 88 km/h at cruising speed. TAPV replaces the entire Armoured Patrol Vehicle RG-31 fleet and a portion of the COYOTE Light Armoured Vehicle fleet. It will complement the Light Utility Vehicle Wheeled.

The first six vehicles were delivered in August 2016, to be used for training operators and maintenance personnel. IOC is planned for 2018. All vehicles should be operational by the mid-2020s.

LAV III Upgrade

Under the ground vehicle modernisation plan the Canadian land forces continue to upgrade the Light Armoured Vehicle (LAV) III. Based on the MOWAG PIRANHA, the 8x8 LAV III is produced by General Dynamics Land Systems – Canada. It comes in five configurations and forms the backbone of the Canadian armoured fleet. The land forces currently have 651 vehicles, of which 550 were chosen for modernisation. Since 2011, 409 vehicles have been upgraded, extending their service life to 2035 and improving survivability, mobility and combat effectiveness. In February of this year Ottawa announced plans to upgrade another 141 chassis at a cost of CA\$404M. Work is to be concluded in 2019. Full operational capability of the entire upgraded fleet is slated for 2020. The total cost for upgrading 550 vehicles is more than CA\$1Bn.

Enhancements include strengthened passenger safety and protection against mines and improvised explosive devices, better mobility, improved ergonomics, and information management. General Dynamics Land Systems – Canada designates the newest iteration of the LAV



Photo: Sikorsky

Canada aims to replace their SEA KINGS with Sikorsky CH-148 CYCLONE helicopters.

ing system); cruise and maximum speeds improved by 80 km/h; mission radius extended by 80 kilometres;; and a fifty percent higher service ceiling. The procurement contract for 28 units was originally signed in 2004. Implementation was postponed due to developmental delays. Deliveries have been divided into five increasingly sophisticated blocks, with each block building on the previous configuration. The first six aircraft (Block 1) were transferred in 2015 for operational testing and evaluation; a total of 11 helicopters have been delivered as of March of this year. Interim test and evaluation results are receiving positive reviews with regards both to the

as upgrades to existing ones. One proposed new system, the Close Combat Vehicle, was cancelled in 2013 based on a reassessment of requirements and of the capabilities of the remaining ground combat vehicle types.

Tactical Armoured Patrol Vehicle

The Tactical Armoured Patrol Vehicle (TAPV) will fulfil a number of roles including reconnaissance, surveillance, security, command and control, cargo and protected troop transport. The vehicle's mobility and crew protection characteristics enable it to be employed within a wide spectrum of potential operational environments. In 2014 the DND awarded

III upgrade as LAV 6.0. Enhancements to the chassis include: a Double-V hull providing superior blast protection against IEDs and mines; an upgraded drivetrain and suspension; a more powerful engine (450 vs. 350 hp); larger tyres; and a wider turret. All crew stations feature energy attenuating seats for comfort and survivability. Electronic system enhancements

ity to mount tactical mobility enhancements, specifically a mine roller system, track width mine plough, and a dozer blade. In addition to these measures, 13 LEOPARD 2A4s have been converted to armoured engineer vehicles and 12 have been converted to armoured recovery vehicles. Full operational capability is slated for September of this year.



Photo: US Army

Canada was served well by their LEOPARD 2A6M CAN MBTs in Afghanistan.

include: a digital fire control system that automatically corrects for target range and vehicle speed; improved gun control electronics; an automatic warning against laser threats. Improved optics enhance target identification and targeting accuracy. At 28,000 kg, the upgraded vehicle is 9,000 pounds heavier than the original. The manufacturer states that mobility is improved despite the added weight.

LEOPARD 2 Family

In 2007, Canada acquired 80 LEOPARD 2A4s and 20 Leopard 2A6 main battle tanks from the Netherlands army, replacing the LEOPARD 1 MBT. Since delivery, the tanks have been undergoing upgrades and enhancements intended to provide the Canadian armed forces with a sustainable heavy, direct-fire capability through 2035. Since 2012 a Force Mobility Enhancement project has been implemented on the LEOPARD 2 fleet. Modifications have included the abil-

ity to mount tactical mobility enhancements, specifically a mine roller system, track width mine plough, and a dozer blade. In addition to these measures, 13 LEOPARD 2A4s have been converted to armoured engineer vehicles and 12 have been converted to armoured recovery vehicles. Full operational capability is slated for September of this year.

Ultra Light Combat Vehicle

In December, the DND awarded Polaris Defense a contract for 78 DAGOR light tactical vehicles to fulfil the Canadian Special Operations Forces Command (CANSOFCOM) requirement for the Ultra Light Combat Vehicle (ULCV). The contract is valued at CA\$15.5M.. The first 52 vehicles will be delivered this year, the remainder in 2018.

Developed with support from the NASCAR automobile racing industry, the DAGOR can carry up to nine occupants at relatively high speed over difficult terrain.

It can be carried internally by the C-130 HERCULES and by the CH-47 CHINOOK helicopter. Under this contract, the DAGOR will undergo engineering and mission configurations to incorporate new features and capabilities, including redesigned payload configuration, weapons mounts, electrical system improvements, and integrated communication systems. The final vehicle configuration, testing, and production of the ULCV will be a collaborative effort between Polaris and CANSOFCOM.

In 2016, Polaris delivered 36 MRZR-D diesel-powered utility task vehicles and 12 tactical trailers for conventional light infantry units. For the Canadian Army, each MRZR-D will be equipped with IR lighting, a 2,041 kg winch and other standard and tactical features. The trailer, designed for compatibility with the MRZR, provides an additional 454 kg (1,000 lb) payload. It has a fully independent suspension system and a removable tongue and pintle style hitch to allow for 180 degrees of rotation in small spaces, increased mobility and easier transportation and storage. The vehicles and trailers are being evaluated by three light infantry battalions in order to validate their configuration and operational effectiveness prior to a full-scale procurement decision.

Maritime Systems

An internal review conducted by the Royal Canadian Navy (RCN) in 2013 raised serious readiness considerations. Many concerns centred on outdated or inadequately maintained equipment. Particularly concerning was the lack of readiness of the formerly-British VICTORIA class submarines which had been delivered to Canada between 2000 and 2004, and the condition of the HALIFAX class patrol frigates which were commissioned between 1992 and 1996. Years of refit and upgrade efforts to the VICTORIA class long-range patrol submarines began to pay off after 2012. Since 2015 the fleet has been operating in its normal cycle of readiness. Today, three of the boats are operational while the fourth is undergoing a scheduled two-year deep maintenance period. A CA\$1.5Bn maintenance fund was approved in 2008 to finance submarine upkeep through 2023. The 12 HALIFAX class multirole patrol frigates have reached their midlife and have been undergoing a modernisation programme since 2009. The final ship is scheduled to complete the programme by the end of this year, setting up the class to remain in service until



Photo: Allied Joint Force Command Brunssum

Her Majesty's Canadian Ship (HMCS) ATHABASKAN (centre) leads the way as HDMS PETER WILLEMOES (left) and NRP VASCO DA GAMA (right) sail in formation during exercise TRIDENT JUNCTURE.

the planned Canadian Surface Combatants are introduced. The HALIFAX class modernisation programme costs \$4.3Bn and includes a new combat management system, new radar capability, a long-range infrared search and track system (SIRIUS), new electronic warfare systems, upgraded communications and missile systems, and modifications to the 57 mm gun. The HALIFAX class was originally designed for high-seas operations; the modifications will enhance the class' effectiveness in littoral waters.

HARRY DEWOLF Offshore/ Arctic Patrol Vessels

The changing environment in the Arctic requires an increased RCN presence along Canada's northern border. The HARRY DEWOLF class Arctic/Offshore Patrol Ship (AOPS) is designed for that role. The original procurement of eight vessels has been pared to five, with an option for a sixth if there are no cost-overruns during production. The contract was awarded to Irving Shipbuilding of Halifax in 2015. BAE Systems is on board to supply the primary weapon systems. The CA\$4.3Bn budget covers not only acquisition (which alone is CA\$2.3Bn) but also 25 years of

maintenance. The keel of the first-in-class vessel HMCS HARRY DEWOLF (AOPV 430) was laid in June 2016, with delivery scheduled for 2018. With two ships built annually, the fifth and the potential sixth AOPV should be delivered in 2020. Given the hostile operational environment, the vessels are programmed for retirement after 25 years service.

The AOPS can traverse ice up to one metre thick, and operate continuously and independently in the Arctic for up to four months. Missions defined by the DND will include:

- armed sea-borne surveillance of Canada's waters, including the Arctic;
- providing government situational awareness of activities and events in these regions;
- cooperating with other partners in the Canadian Armed Forces and other government departments to assert and enforce Canadian sovereignty, when and where necessary.

The 103-metre long vessels have a 19-metre beam and 6,440 tons displacement. The standard complement is 65; berthing and workspace for an additional 20 mission specialists is available. Open water sustained speed is 17 knots, with a 6,800 nautical mile range at 14 knots. All ship's systems can be controlled from the integrated bridge, easing manning requirements. The ship is lightly armed with a 25 mm gun suitable for constabulary missions but not for engaging hostile combatants. The ship design emphasises flexibility. Payload options include 20-foot ISO containers, underwater survey equipment, a landing craft or land-forces equipment. A separate vehicle bay can carry pickup trucks, ATVs or snowmobiles. Four optimisation multi-role rescue boats will provide transport for rescue operations, boarding missions, and other off-ship operations. A 20-ton crane provides independent loading capabilities at jetties, onto landing craft, or onto the ice. Arctic optimisation includes a covered focsle/cable deck to protect machinery and crew, and retractable active fin stabilisers which are pulled up when operating in ice. The hangar can accommodate one helicopter up to and including the CH-148.

Queenston Class Joint Support Ship (JSS)

The RCN retired its last operational Auxiliary Oiler Replenishment (AOR) ships in late 2016. In March of this year, Ottawa awarded Seaspan Corporation of Vancouver, Canada, the contract to build

the new QUEENSTON class Joint Support Ships. Seaspan received the production order after completing an initial design review for the ships based on designs by ThyssenKrupp Marine Systems Canada. The 15 contract covers procurement of two vessels to be delivered in 2021 and 2022, with an option for a third ship.

The multirole JSS will provide core replenishment of fuel, ammunition, spare parts, food, and water to naval task groups and individual ships. The ships will have modern medical and dental care facilities, including an operating room; repair facilities and expertise to keep helicopters and other equipment functioning; and basic self-defence functions. There will be a limited sealift capability to support operations ashore.

Canadian Surface Combatant

The Canadian Surface Combatant (CSC) is a medium-term plan to replace the HALIFAX class and the (already retired) IROQUOIS class destroyers as the major combatant arm of the RCN. Up to 15 CSC are to be procured for an estimated total cost of CA\$26.2Bn (unofficial estimates postulate CA\$40Bn). A Request for Proposal was released in 2016. Twelve companies have been prequalified to participate in the procurement process. Contract award is planned for 2021, with first delivery and IOC in the late 2020s. Final delivery is expected between 2036 and 2040, with full operational capability of the entire fleet by the mid-2040s. It is considered the largest and most complex shipbuilding initiative in Canada since World War II.

Two variants of the CSC will be built: the Area Air Defence/Task Group Command & Control variant and a General Purpose variant. Both types will share the same design and many core systems, but will likely be fitted with mission-specific weapons, communications, surveillance and other systems. The CSC will be both blue-water and littoral capable, and capable of supporting operations ashore. Both variants will be capable of housing and operating the CH-148 helicopter as well as a wide variety of small boats and unmanned air, surface and underwater vehicles. The CSC will permit interoperability with allies in international operations and be deployed for continental and domestic defence and marine security operations across the spectrum of conflict. It will feature sufficient combat capability to deploy alone or as part of a national or coalition task force, and will operate globally for prolonged periods with a limited logistical footprint. ■

Anti-Submarine Warfare: A New Era

Bob Nugent

During the centennial of World War I submarines first emerged as a strategic “game changer” in modern warfare. Since then some time has passed and so it is quite timely to review the current state of the Anti-Submarine Warfare (ASW) business.

In a word, the ASW business is booming, as navies around the world recognize (or reaffirm) the value of strategic and operational leverage provided by even a small submarine force. Add to this the

systems. One conclusion from this review is that naval investment in ASW, while increasing, generally lags the threat posed by offensive submarine platforms and capabilities, when looked at globally.

requirements and standards continue to make up a significant portion of the submarine threat pool.

However, as detailed by AMI International's proprietary naval market forecast, the next 20 years will see a significant increase in the number of countries either establishing submarine forces for the first time, or growing submarine forces with more capable platforms such as the French SCORPENE and modified BARRACUDA class, and the German Type 214 and modified versions. As an example, in Southeast Asia alone (not counting China), Vietnam, Malaysia, Singapore and Indonesia have active submarine acquisition programmes, while Thailand and the Philippines have announced intentions to acquire submarines.

Similar patterns are seen in North Africa (Algeria, Egypt, Morocco), South America, and the Gulf region. In the Gulf region, AMI forecasts future submarine acquisition by Saudi Arabia and U.A.E., while Pakistan buys new submarines from China.

Globally, AMI assesses that 37 countries will execute 68 new submarine acquisition programs through 2036. This represents €303.4 billion that will be spent to acquire 346 newly-built conventional and nuclear power submarines. Of those, 129 (almost 40%) are new submarines to be acquired in the Asia-Pacific region. India leads with 37 submarines to be acquired, while South Korea builds 20 and China 15.

Beyond the Asia-Pacific, Russia plans to build 47 hulls (13% of the global forecast), and the Mid-East-North Africa region accounts for another 46 hulls.

The world's largest navies continue to be the largest buyers of new subs—the U.S., NATO, China, Russia and India together account for 56% of future new sub acquisitions in the next 20 years.

This 20-year forecast of submarine spending has increased by 50% in value (over €95.1 billion) since 2010. This does not represent a “rising tide raising all boats” phenomenon. Rather, navies are shifting resources away from other platforms and



Photo: skydiver/mgur

USS CONNECTICUT breaking through three feet of solid ice in the Arctic Circle

increasing number of unmanned underwater platforms that add to the challenge of ASW, as well as modern information technology that has affected every aspect of ASW.

The result is an ASW environment that indeed fits the bill of New Era. In New Era ASW, tried and true principles have been modified by new technology and tactics as well as force structures and resource constraints. At the same time the enduring constants of the ocean, acoustics, and especially human factors – notably training and tactical skill – continue to define the art of ASW.

Four vantage points are crucial for modern ASW: threats, principles, means, and

There are exceptions. Development of the next generation of long range maritime patrol and ASW aircraft is one example. And the trend toward “advantage-submarine” is offset somewhat by the truism that the best platform for countering a submarine is another submarine. So the growing investment in submarine platforms can be viewed in part as a growth in ASW platforms that counter potential submarine threats.

The Return of the ASW Threat—Breadth and Depth

The Soviet submarine threat has defined the practice of ASW by the world's leading navies for nearly 50 years. Those principles, laid out in key texts such as Rear Admiral Jon A. Hills (Royal Navy, ret'd) *Anti-Submarine Warfare* (U.S. Naval Institute, 1989) and others, still apply as Russian and Chinese submarines generally designed, built and operated to Cold War

Author

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High performance sonar solution: Wärtsilä ELAC KaleidoScope

The Wärtsilä ELAC KaleidoScope is a sea-proven passive onboard sonar suite for conventional submarines. ELAC KaleidoScope is a high performance and low risk system based on the in-house developed and in-house produced hydrophone arrays, which have been ordered by more than 10 navies worldwide. The signal and data processing functions provided by the ELAC KaleidoScope make it the most modern system available on the market.

ELAC KaleidoScope functionalities include a 5 dimensional detector (5D detector) which automatically detects in four domains:

- Permanently (time)
- On all beams (spacial)
- In the full frequency band (spectral)
- In the full dynamic range (pressure dynamic)

for:

- Broadband
- Narrowband
- DEMON
- Transient signals
- Intercept

The 5D detector provides full spatial, full spectral, full dynamic and full temporal coverage. Besides, the ELAC KaleidoScope offers six types of high resolution analysis functions:

- Narrowband analysis
- Vernier analysis
- DEMON analysis
- Transient analysis
- Intercept analysis
- Audio analysis

The design philosophy features an open system architecture and commercial off-the-shelf technology. This allows for a regular software exchange with state-of-the-art PCs to maximise processing performance and minimise life cycle cost. The open architecture provides for the implementation of additional functionality by the customer without third party support. ELAC KaleidoScope performs a 56 day mission without the need for any maintenance on board.

ronment of increasing instability and the reemergence of major power contention. The result has pressed many navies to review the requirements, and identify the shortfalls, in their ASW armory. ASW investments will unfold against the backdrop of ASW principles and Concepts of Operations (CONOPS).

Requirements of Successful ASW

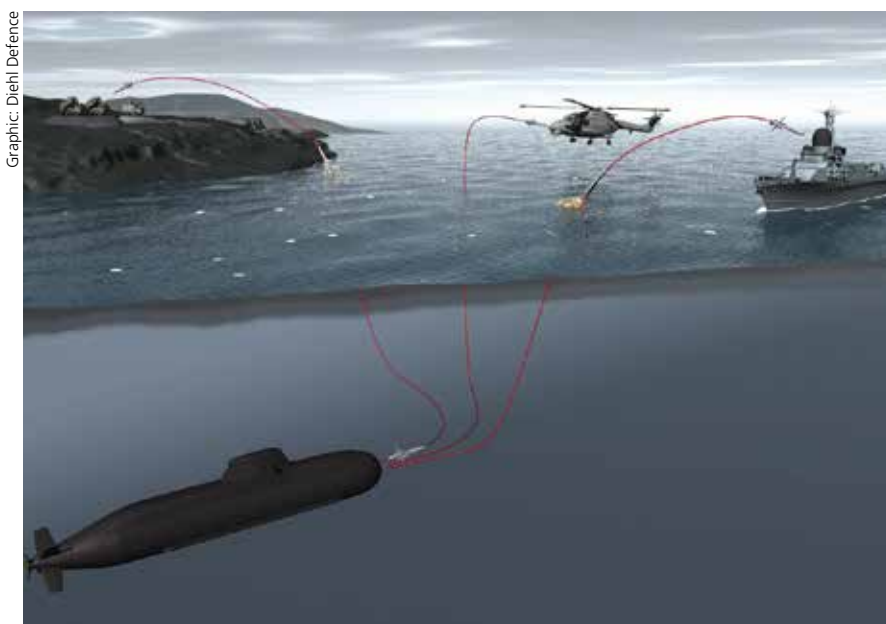
ASW is arguably a/the most demanding of naval warfare areas. As first demonstrated in World War I, confirmed in World War II, and continuing into the high intensity ASW activity characteristic of the Cold War, successful ASW requires from its practitioners a fine balance of doctrine, platforms, methods and above all training to achieve and maintain proficiency.

As Andrew Davies of the Australian Strategic Policy Institute observes, among the factors that make ASW hard today are:

- The proliferation of submarine operators and numbers of undersea platforms operated (manned and unmanned).
- Quieter submarines with lower acoustic and other signatures on conventional submarines incorporating technology such as air independent propulsion (AIP).
- The evolution of submarine offensive weapons (notably anti-ship and even anti-air missiles) which increase the ability of submarines to neutralize ASW platforms at ranges well beyond those typical of tactical ASW sensors

capabilities to invest in new submarine programmes. Forecasted submarine new build investment of US\$319Bn through 2036 makes up over 30% of the US\$1Tn that AMI projects will be spent to build naval ships of all types over next 20 years. Put another way, the global submarine acquisition budget at US\$319Bn for 2017-2036 is not far behind the estimated US\$357Bn the US Navy will spend on its new ships and submarines over the same period. As submarines continue to represent the single most expensive type of warship to build, measured on a ton-for-ton basis, spending on submarines shows that more and more navies see submarines as "must have" capabilities, despite their cost. Moreover, forecasted growth in submarines is strongest in the firmest kinds of planned spending—programmes with detailed budgets and schedules, documented requirements, and concept design/development work already underway. In the language of industry, the "Probability of Go" (P-Go) on submarine programmes is higher than many types of planned naval programmes for other ship types.

This proliferation of potential submarine threats is unfolding in a strategic envi-



New weapons, like IDAS developed by Diehl Defence, might even eliminate airborne or landbased ASW systems and therefore give submarines a completely new range of effect.

and weapons (the later mostly made up of torpedoes).

- The unchanging and difficult physics of seawater, which continues to make acoustic detection – the primary means of sensing submarines – problematic.

These factors reinforce the need to apply the proven “team game” principle of the ASW art even (especially) in modern conditions. That is, ASW is most successful when the operations sequence of “Detect, Classify, Identify, Localize, Neutralize” draws on a broad spectrum of platforms and capabilities operating across the domains from space to sub-surface (including ocean bottom).

As most navies have cut overall force structure (numbers of ships and aircraft) significantly since the ASW peak of the Cold War, and likewise ASW training of those platforms and personnel has languished amidst demands for other kinds of naval missions, most navies have little option but to bring all the resources to bear to achieve even a semblance of the ASW standard that prevailed in the Cold War.

At the same time, the disparity between the resources needed to achieve offensive aim with submarines, and means needed to counter, also influence principles of modern ASW. As noted in the US Navy’s Task Force ASW CONOPS (Concept of Operations), the modern ASW environment prioritizes: “Sensor over weapon, Network over platform.”

Arguably, this approach represents making a virtue of necessity given the decline in most navies shipbuilding and force structure over the past quarter century since the end of the Cold War. But this principle also highlights a peculiarity of ASW. In scenarios short of total and sustained war against a submarine threat numbering in the 10’s or 100’s – last practiced in World War II, planned and simulated in the Cold War – most ASW prosecutions involve pursuit of a small force or single hull. Argentina’s ASW operations seeking to neutralize HMS Conqueror during the Falkland’s War is as an example. Even the largest of today’s navies would be hard pressed to execute an

ASW scenario in which multiple targets (manned and unmanned) are pursued over an extended ocean area for a sustained period.

Therefore a CONOPS which substitutes precision for mass, information networks over platforms, and sensor data over “weapons in the water” maximizes the chances of achieving the desired ASW results against the greatest number of targets (either individually or in larger

detailed above, by the newest generation of ASW surface combatants being built, as well as the successors to traditional air ASW platforms such as the P-3 – the US P-8, Japanese P-2 and even the modified ASW-capable C-130 offered by Lockheed Martin. However, the need to “spread bets” on future ASW capability stretches and further stresses returns on ASW investment if spread too thinly over a multitude of platforms and programmes.

Photo: DARPA



The unmanned ACTUV might be capable to perform ASW missions for several months without any human intervention.

numbers) most effectively. The focus on neutralizing the submarine threat at a strategic level, by deterring an opponent from employing the platform at all, or by early detection which provides the greatest range of options to counter (in time and space), rather than “killing the sub”, are hallmarks of this approach.

Effects against Submarines

The Team Game principle of ASW results in opportunities to invest in ASW capability across the several domains of the ASW competition – space to air, surface and sub-surface platforms and sensors. That ASW investments must be made in all these areas is generally recognized, judging by the investment in new submarine programmes

Adding to the complexity of ASW investment decisions is the advent of unmanned and cyber technology developments that apply to ASW. One example of this is the US ACTUV ASW Continuous Trail Unmanned Vessel sponsored and built by the US DARPA. According to DARPA “the ACTUV programme is developing an unmanned vessel optimized to robustly track quiet diesel electric submarines” over extended periods.

The ACTUV represents a potential force multiplier of constrained manned ASW resources (aviation, surface ship, submarine) and conceivably could significantly alter the current ASW art in which gaining and maintaining contact on a maneuvering quiet submarine target remains the most resource (time, fuel expenditure) intensive

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Another unmanned system capable of performing ASW in the future is the US MQ-4C TRITON.

parts of current ASW practice. However, the risk of the unmanned system not delivering on its promise will still influence how investments are made between manned versus unmanned ASW capabilities.

Methods to Fight the Boats

A submarine's greatest vulnerability, and the one most important to ASW systems, is its acoustic signature. This signature is manifested in two ways: First sound emitted by the submarine or its systems and second the signature of the submarine's hull when acoustic energy (such as that from an active sonar "ping") reflects off that hull.

Due to submarine acoustic signature, the sonar (in active and passive types) remains the most important ASW sensor for many platforms and an area of intensive technological development. Improvements in sonars as traditionally configured – surface ship and submarine bow and towed arrays, helicopter-mounted dipping sonars – included application of improved acoustic elements and especially signal processing and other information technologies. Reduction in size and weight derived from improvements in information technology as well as incorporation of advanced materials are seeing sonars emerge that are light enough to be mounted on smaller ships and other platforms – such as ACTUV noted above, UUVs, and UAVs.

Europe remains a center of excellence for ASW sonar technology, with companies such as ATLAS ELEKTRONIK, Thales, Leonardo (Selex), and Kongsberg supplying domestic markets and a broad base of export customers. In the U.S., Lockheed Martin is a leading supplier of sonar systems to the surface and submarine forces.

The US Navy is a case study in how modern navies confronting a new era

ASW threat are investing in a variety of systems. The Navy's ASW team is still centered on the BURKE-class Destroyer (DDG-51). The BURKE mounts the SQQ-89A (V)15 Combat System, which will be aboard 64 destroyers by 2020. Of note, the US Navy is taking a page from AEGIS Combat System to provide continuous development and improvement of the BURKE's ASW combat system.

Additional players will include the Littoral Combat Ship (LCS) and its onboard ASW mission package, which is also aimed at broadening ASW capabilities. The LCS's modular approach highlights the "Team Sport" approach to ASW at the tactical sensor level, in which a combination of acoustic and non-acoustic (radar) sensors are integrated in the ASW mission:

ASW Escort Module

- Variable Depth Sonar (VDS)
- Multi-Function Towed Array (MFTA) acoustic receiver
- Launch, handling and recovery equipment
- Signal processing and systems control
- Support containers

Torpedo Defense Module

- Detection/Alert: MFTA with Acoustic Intercept (ACI)
- Countermeasures: Light Weight Tow (LWT)

Aviation Module

- MH-60R helicopter mounting:
 - Airborne Low Frequency Sonar (ALFS)
 - Sonobuoys (active/passive)
 - APS153 periscope detection radar
 - MK46/50/54 Torpedo
- MQ-8B Vertical Takeoff Unmanned Aerial Vehicle

ASW Mission Management/Command and Control (C2) Center

- Mission Package Application Software (MPAS)
- Mission Package Computing Environment (MPCE)

Land-based ASW aircraft are also entering a new era. The P-8 POSEIDON is succeeding the venerable P-3 ORION as the land-based aviation component of the US Navy's ASW team. POSEIDON, also being acquired by the UK, Norway, Australia and India, achieves the ASW CONOPS objective of detecting and deterring submarine threats at distance, with the endurance to maintain target contact over an extended period – a core ASW requirement. The P-8's suite of sensors, notably including "wingman" unmanned aerial platform (MQ-4C TRITON), also illustrates the broad spectrum of ASW sensors employed for "New Era ASW".

Magnetic Anomaly Detection remains a proven method used by ASW aircraft to detect and track submarines by sensing the magnetic signatures generated from a submarine hull's movement through the water. The "MAD Boom" extending from the tail structure of the P-3 is distinctive. However, use of the MAD sensor requires the aircraft to descend to low altitudes to detect submarines. As the US P-8 was designed with a CONOPS that keeps the aircraft at higher altitudes, it does not feature a fixed MAD installation. Instead, the US Navy is developing a MAD system mounted on a small UAV to be launched from the P-8. In January 2015, the Office of Naval Research awarded BAE Systems Electronic Systems segment in Merrimack, N.H., US\$8.9M to develop a High Altitude ASW (HAASW) Unmanned Targeting Air System (UTAS) programme for the P-8. ■

Realism in Modern Military Training

William Carter

There is no doubt that to be effective, training has to be realistic. It seems obvious that realistic training should involve real troops, real weapons, real bullets, shells and missiles. But, there's the rub, as Shakespeare said, because bullets, shells, mortar rounds and guided weapons are not only expensive, but are dangerous, particularly when mixed with own troops, some of whom will be inexperienced because they are the very people who need training the most.

It is an unfortunate truth that personnel are injured and killed in military training exercises, and the more realistic the exercise, the more casualties there may be if live fire is involved.

We need to lessen hazards in training without sacrificing effectiveness. One

areas such as the German Army Combat Training Centre (Gefechtsübungszentrum – GÜZ) north of Magdeburg, the Salisbury Plain Training Area (SPTA) in the UK or the US Marine Corps training area at Camp Lejeune in North Carolina, just to name a few examples, and equivalent

and requires troops, their equipment and vehicles to be away from home bases for extended periods.

From Large Scale Exercises to Virtual Worlds

An extreme example of large scale exercises occurred during the years of confrontation between NATO and the Warsaw Pact countries, during which annual exercises involved tens of thousands of troops on each side. Reinforcements and replacements would fly over from the USA on the annual Reforger programme, to be matched by what was called "roulement" (rotation) of Soviet formations coming from Russia, replacing units which then returned to the home country.

A point of maximum threat was thought to be if the troops who were scheduled to return in fact stayed in position to increase the threat to, or even attack, the other alliance.

Perhaps such enormous live exercises are things of the past, but training on this scale can take place today without taking thousands of troops from their home bases – by using modern simulation technology. Originally, simulators were just for basic training for individual weapon systems, but with larger databases and the ability to connect simulators together in a network, training in the modern "Virtual World" can be as sophisticated as you like. Furthermore, enemy action can be modelled, if necessary in a number of different ways so that the best response can be found to different threats.

One of the early systems for large-scale multi-role training was the US Air Force Distributed Mission Operations (DMO) system that links simulators together for collective training. Initially designed in the late 1990s, DMO was originally for training the various aircraft types in an Air Expeditionary Force (AEF) at home bases before the AEF deployed to an area of conflict, using networked simulators rather than the aircraft themselves. AEF



Photo: Israel Defense Forces

The Urban Warfare Training Center "Baladia City" in Israel

way in ground exercises is to fire lasers instead of bullets. In Tactical Engagement Simulation (TES), lasers are coded so that individual firers can be identified as the exercise progresses. Players are not only individual soldiers, but guns and other weapons on armoured vehicles, artillery, even aircraft and ships that are in the exercise. In TES, realistic training exercises can take place with real personnel, real fighting vehicles, aircraft and ships, but no live rounds. With GPS tracking of the exercise players combined with recording of laser fire and the creation of simulated weapon effects, an enormous amount of data is available as the exercise progresses and later for After-Action Review (AAR).

Such TES-based exercises are highly effective, but are limited to military range

training areas elsewhere. Within these overall military training areas there are specialist training facilities for Military Operations in Urban Terrain (MOUT). These consist of specially built villages with buildings adapted for tracking of soldiers and recording the use of their (laser) weapons.

To keep up with the three named example training areas, at GÜZ the MOUT facility is the "Schnöggersburg" training village, the UK equivalent is "Copehill Down" and at Camp Lejeune it is simply "MOUT Town". There is always the question of how to introduce enemy forces into an exercise and in general, this means that some friendly forces will play the enemy. Outside the relatively small-scale MOUT exercises, the organisation of large-scale exercises in open range areas takes time,

elements included fighters for air defence and ground attack, airborne early warning and control, transport and tanker support. To avoid the complexity, expense and time involved in setting up an airborne exercise with all of these elements, the US Air Force introduced transmission links so that existing simulators for all of these aircraft types could be used together in a combined exercise. Nowadays, new military simulators of any sophistication have these network links so that they can be used for basic drills to multi-role exercises. An example is the US Marine Corps (USMC) which stated last year that from 2018 they will double the number of their aircraft simulators, and all will be network-capable. Since the USMC is larger than the forces of many other nations, this is significant and illustrates the general trend towards more training by simulation rather than repetitive use of live weapons and vehicles in training.

Canada has stated a similar policy because, with limited resources and a large area to patrol and defend, a constant stream of live exercises became too expensive to afford.

RED FLAG Exercises

One type of realistic live training that has been successful over many years is the RED FLAG series of air combat and ground-attack exercises that are held in the Nellis ranges in Nevada, USA. RED FLAG exercises were started as long ago as 1975 by US Air Force Tactical Air Command under General Robert Dixon. The official title of the exercise area is the Nevada Test and Training Range (NTTR), with some 10,000 square miles of military airspace and 4,700 square miles ml of "restricted land" for military use. Originally RED FLAG was for US forces only, but coalition partners have participated for



Swedish engagement at COMP 2 during the Cold War

many years, starting with the UK. Over the years, other nations have included Australia, Brazil, Colombia, Denmark, Germany, Greece, India, Israel, Italy, Jordan, Norway, Saudi Arabia, Singapore, South Korea, Sweden and the United Arab Emirates. This year, the RED FLAG exercise in January and February included the F-35 Lightning II Joint Strike Fighter (JSF) for the first time, as well as other aircraft from the US Air Force and Navy, the UK and Australia.

Enemy "Red Air" activity is provided by F-15 and F-16 fighters of the 64 and 65 Aggressor Squadrons based at Nellis, and ground units operate AAA and SAM units whose tracking and potential firing at exercise aircraft is taken into account by Exercise Control (ExCon) during the exercise and later for After-Action Review. The Nellis Air Combat Training System (NACTS) is used to track

exercise participants and allows commanders, exercise directors and safety monitors to view progress in real time and document the results including simulated "kills".

This year, the performance of the F-35 is of particular interest, particularly against the F-22 RAPTOR, previously considered the most advanced fighter aircraft in the world. Initial reports as we go to press indicate that a combination of the F-22 and F-35 achieved a 15:1 kill ratio against the opposition. However, the F-35s carried out ground attack while protected by the F-22s, so it is too early to separate out the F-35 kill ratios from those of the F-22.

As each of the RED FLAG aircraft types already has a suite of simulators, these can be linked together in a "virtual" version of RED FLAG. This avoids the need to deploy to Nellis, and several exercises can be held each year. This system began in year 2000 as a series of war games called DESERT PIVOT. This was renamed VIRTUAL FLAG and by 2007 included some 650 simulation models of aircraft, vehicles and weapons, with computers processing no fewer than 37,000 exercise entities per day as the exercise situation developed. Accurate models of Red Air types, such as the MiG-23 FLOGGER, MiG-29 FULCRUM and Su-27 FLANKER were included, in marked contrast to the use of NATO aircraft types in RED FLAG to simulate the opposition. Simulation-based exercises such as VIRTUAL FLAG are co-ordinated by the USAF Distributed Mission Operations Center (DMOC) at Kirtland Air Force Base, Albuquerque, New Mexico.

Another notable VIRTUAL FLAG milestone was when the US Army 214th Fires Brigade at Fort Sill, Oklahoma, took part with its simulators for the UH-1Y SUPER HUEY

Photo: US Air Force



F-16C FIGHTING FALCONS at RED FLAG 17



Photo: US Air Force

Virtual Instrument Rating Tests

Another example of high realism in flight training is the use of a Full Flight Simulator (FFS) instead of the aircraft, for the regular Instrument Rating Tests (IRTs) that all pilots must undergo, and training for dangerous events such as upsets from normal flight due to failures or turbulence. In civil aviation under procedures of the International Civil Aviation Organisation (ICAO) and national and regional regulatory bodies such as the European Aviation Safety Authority (EASA) and the US Federal Aviation Administration (FAA), a Level D FFS must be used for regular instrument and upset training of all airline pi-

helicopter before deploying to Iraq, the first time that the USAF Distributed Mission Operations (DMO) system had been used to certify an army force before an operational deployment. Today there are four VIRTUAL FLAG exercises per year. Some are designated COALITION VIRTUAL FLAG, with the participation of other nations such as Australia, Canada, Italy and the UK. A recent development is to integrate the live flying of RED FLAG with the simulation of

VIRTUAL FLAG, a concept called "Integrated Flag". The combination of virtual and live elements enables a larger geographical area and threat envelope to be modelled, creating an exercise area up to 1,200 x 1,100 Nautical Miles in size, compared to the 100 x 100 NM area of the real-world Nevada Test and Training Range (NTTR). The Integrated Flag concept involves synchronisation between simulators co-ordinated by the USAF DMOC in Al-

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lots worldwide (Level D is the current highest civil FFS standard).

The military equivalent is a Full Mission Simulator (FMS) as long as it has 6-axis motion like a civil FFS, and most forces use simulators like this for large transport aircraft, and others for which a motion-based FMS is appropriate, such as helicopters.

Why the emphasis on simulator motion, you may ask? This is because in the real world, motion cues are processed by the human brain before visual cues, and a pilot will start to make a corrective control movement based on the motion cue before a visual change has been detected. Therefore, in a critical control situation, pilot handling in a simulator can only be like that in an aircraft if motion cues are present. This is straightforward to achieve in a civil Level D FFS and its military FMS equivalent.

However, for fighter simulators, a very large outside-world Field of View (FoV) is generally given priority over a motion platform, and many large-FoV visual display systems are not compatible with fitting a platform. This leads to impressive visuals and not particularly realistic aircraft handling, but this may not matter if the object of the simulation is tactics rather than realistic short-term control movements.

Then there are the high-G conditions that are experienced in fighter air combat, sometimes leading to fatalities due to G-induced Loss of Consciousness (G-LOC). Realistic training is possible in a centrifuge, because pilots can experience real "G" up to about a multiple of nine, first to demonstrate and then to prevent G-LOC through the use of an anti-G suit, partial pressure breathing at high-G, and training in body tensing. Currently there are only two companies in the world that are building man-rated training centrifuges with cockpit modules attached to the rotating arm. These are Austria Metall System Technik (AMST) of Braunau, north of Salzburg, Austria, and Environmental Tectonics (ETC) of Philadelphia, USA. AMST centrifuges are in service for pilot training in China, Germany, India, Poland, Russia, Singapore, with one in build for the UK, and ETC centrifuges are in Japan, Malaysia, Saudi Arabia, South Korea, Turkey, and the USA.

Tactical Engagement Simulation

Laser-based Tactical Engagement Simulation (TES) has already been mentioned, using real infantry weapons and military vehicles. For vehicles, complete simulators can also be built. The crew stations of Armoured Fighting Vehicles (AFVs) can be modelled, often with separate stand-alone



Graphic: VSTEP

Class A NAUTIS Full Mission Bridge (FMB) simulators for SIGMA class corvette bridge training of the Indonesian Navy

training devices for the driver, gunner and commander, all capable of being connected so that a complete crew can train together as well as singly. Similarly for training other large military hardware such as artillery.

Such simulators can be located at one place so that, for instance, all the different specialities in a brigade can train together. An example is the British Army's Combined Arms Tactical Trainer (CATT) multi-simulator training facility. There are two CATT sites, one at Warminster, UK, the other at Sennelager in Germany, with a total of 140 different simulators with some 450 crew stations for military vehicles and weapons of all types, all capable of being linked for combined training when required. Long-range network links are also available to simulators for APACHE attack helicopters at the Army base at Middle Wallop, east of Salisbury, and the suite of support helicopter simulators at the Air Force base at Benson, south of Oxford.

Different Simulators for Training the Navy

Turning to Navy training, it is straightforward to use simulation technology at shore bases but more difficult to apply at sea. Shore-based simulators for ship's bridges, weapons and other ship systems have been used for many years.

Engine room training simulators are particularly important where nuclear propulsion is concerned, as in many submarines and some US Navy aircraft carriers. Bridge simulators have wide view visuals and controls for ship propulsion and steering. Some have motion platforms to increase the realism of ship motion on the bridge, although unlike aircraft simulators, real motion is not

needed for precise ship control because of the longer time in which a ship responds to movements of rudder, propellers or thrusters.

Bridge simulators can be used for tasks varying from routine training, to familiarisation with docking at an unfamiliar port, formation with other ships in a task group, and unusual circumstances such as system failures, emergencies, reaction to enemy action, and adverse weather. Bridge simulators can also keep the topside crew in practice when the ship is in home port or on re-fit. A bridge simulator can be connected to a simulator for the ship's Combat Operations Centre (COC), the nerve centre for the ship's sensors and weapons. This enables the fighting crew of the ship to practise together, and when connected to the simulators of other ships, to train as a complete task group without using the ships themselves.

For continuing this training at sea, the ship's COC can have built-in facilities so that signals can be injected into systems such as electronics and weapons that simulate combat situations so that synthetic training can take place when away from home port.

Conclusion

Sophisticated training technology is readily available for the modern military to use. This ranges from instrumentation fitted to live military assets for recording their use in training, to simulators independent of the real hardware and capable of being linked together for collective training. This article shows that once up-to-date training and simulation technology is embraced in all its forms, many types of realistic training are possible that simply were not before. ■

A Simulator Training System for Forward Air Controller/Forward Observer

Walter Christian Håland

Forward Air Controller (FAC) and Forward Observer (FO) training is time consuming and expensive when aircraft sorties or artillery rounds are the only option for necessary realistic training and certification.

If the trainees, for example, have to accomplish 12 CAS runs to be ready for certification, and if something (technical/weather) causes the aircraft to be grounded, the exercise cannot be accomplished, and all has to be done again from the beginning as soon as the circumstances allow. That is time consuming and costly. So today it is unthinkable not to have a simulator for training and Virtual Reality as substitutes for real flying sorties and live firing, since a simulator reduces the need for live CAS runs to a minimum.

Fidelity's FAC/FO Training System

"This is the best in the world for training and qualification of FACs and FOs for CAS and Call For Fire/Naval Surface Gunfire," said Stephen W. Hopkins, Director of Engineering and Simulation, Fidelity Technologies Corporation, when he talked to me on 3 December 2016; the day the simulator system was installed at the Rena Camp of the Norwegian Army. Fidelity is a global supplier to NATO allies and JTAC MOA signatures. With over 20 years of experience, Fidelity has delivered over 300 accredited Joint Fires trainers and is a global leader in Joint Fires training systems.

The newest simulator system offered a full fixed installation with a large 8-metre dome, classrooms and deployable satellite simulator systems. The fixed simulator installation can be used as a "Centre of Excellence". The instructor can choose exercises within these parameters:

Photos & Graphics: Fidelity



The trainee room with the dome,, trainees and a supervising instructor

- FAC training
- Basic Selection Course
- Advanced Training
- Limited Combat Ready to Combat Ready Training
- FO training
- Basic Training
- Advanced Training

The instructors connect different basic components, pre-programmed actions, environmental factors, grouping and mission making the scenarios.

Simulator Database

The simulator's databases can be tailored to meet specific users' requirements.

The database includes a library of different elements to mimic the terrain of a country of interest. The simulator can model hilly regions, valleys or flat land featuring urban developments, desert, jungle, lakes and shorelines, as well as

different road types, power lines, buildings, military installations, bivouac areas, runways, trenches, undamaged/damaged daylight models and IR models and so on. The terrain database will show thermal imagery correctly based on physics and the features will be modified in real time in response to simulated man-made factors such as combat engineering or munitions.

The simulator will automatically visually present the correct environment, based on such factors as the geographic coordinates, time of day, time of year and ambient weather and light conditions like clouds (3D), intensity of sunlight, moonlight based upon sky conditions, and realistic shadow on the ground, as well as wind, rain, fog, mist, snowfall, snowstorms and sandstorms. The dynamic behaviour of clouds will be influenced by the chosen wind speed and wind direction.

Author

Walter Christian Håland is a former artillery officer and was a certified instructor of the Swedish Saab BT 33 artillery fire control simulator.

Included in the database is also a library with entity categories:

- Civilians, e.g. personnel, different animals, vehicles of various types and colours;
- Opposing forces and own forces with human military entities like single and groups of infantry, and most other formations;
- Military entities and materiel, like artillery, mortars, man-pads, battle tanks, infantry fighting vehicles, APCs and air defence.

The surfaces of all models and objects will emulate the laser reflection characteristics of their real counterparts. All textures will indicate the area of the vehicle that has been damaged. So a mobility kill, with vehicle burning at the rear and a weapon kill, represented by a burning turret, will appear quite realistic to the trainee. The library of airplanes includes all types of customer-specified aircraft. The ammunition database contains all different indirect and direct fire weapons. There is no limit for the addition of weapons in any future database upgrade. The ballistic factors influencing ammunition delivery take account of the "weapon platform", such as aircraft or artillery, and provide a near-correct simulation of the maximum ranging and azimuth errors. The simulator supports flashbang, tracer visualization of munition trajectory, vertex for all artillery/mortar/naval gunfire support, time of flight for munition, point of impact and damage assessment. It offers a realistic visual effect of fired smoke, in terms of obscuring terrain, drifting and dispersing, vehicle/position and target motion when encountered. Appearance of special effects (smoke, explosions, muzzle flash, etc.) will be time controlled in the visualization. This also occurs when, for example, the enemy forces hit your own position. When delivering munitions from the air or ground and targets are masked by the terrain or objects, the munition will hit the masking object or terrain. The damage assessment will report one of the following: no damage, partly damaged, or total damage.

The installation has an auditorium with an area for the dome, trainee, supervising instructor, spectators and extra monitors, a control room for instructor operators and pilot/instructor, a small classroom and the a big classroom. The visual system in the classrooms shows two video channels simultaneously. The sound system, which is synchronised according to the battlefield view presented, will provide a realistic sound that simulates a combat environment from all the models

and entities in the scenario. The supervisor and the spectators will hear the same sound as the trainee. The system allows the instructor to adjust the presentation. The instructor, supervisor and pilot have the possibility to choose the different menus/images/video/radio they want to have in the graphical user interface and

displays, are replicated/simulated and can be used like the real ones and it is possible to choose a view from any of these pieces of equipment.. The trainee (FAC or FO) will be able to use a simulated GPS to find their own position. When using the IR-pointer, the illumination shall be seen by the instructor, supervisor, trainee



Example of a HUD's view

store their profile according to who they are going to play (fire support officer, pilot, supervisor, ground commander/manoeuvre chief, higher command). The supervisor has the possibility to follow three video channels simultaneously at the position behind the trainee.

The playback function is an important tool and the video can be stopped at any time. There is also a learning side-effect. The trainees seated in the rear, rear are experiencing the action and see what's going on by monitoring up to four video channels simultaneously. The big and small classrooms can be used for an after-action review.

Communication Like Reality

The simulated communication (radio networks and data communication) will function just like it would in a real situation. The simulated military equipment, like target locators, laser target imagers, thermal imager, binoculars, NVGs, targeting pods on aircraft and head up

and the pilot on the different displays in the system. The field terminal replica will have touch screen functionality, and the trainee will be able to operate one data terminal to simulate the functions of a military field terminal. The field terminal can show the map of the terrain (actual terrain in the scenario); and the trainee can receive thermal image and target data from the main target locator instrument and display images with the view from the targeting pod in the aircraft. That really means "train as you fight".

The ruggedized transportable FAC/FO Satellite Trainer, which can be located elsewhere, consists of a pilot station, instructor operators stations and a trainee position system. Together with a deployable 3-metre dome, the satellite has the same functionality and database as the fixed one. The satellite will consist of four plastic cases, each with a handle and wheels for easy transport. The weight is not more than 100 kg in total. The system can be assembled in 45 minutes without tools. ■

“We have been working on nearly 500 development and modernisation projects.”

Photo: SSM



Interview with Prof. Dr. İsmail Demir, Undersecretary for Defence Industry, Savunma Sanayii Müsteşarlığı (SSM)

and giving directions, SSM carries out various activities in order to increase the development, capabilities and export capacity of our country's defence industry.

Since the number of private companies in the defence industry was limited in the past years, the Turkish Armed Forces Foundation was established as a public pioneer and various companies were established under the umbrella of the Foundation such as Aselsan, TAI, Roketsan, Havelsan. As of today, these companies are among the leading companies in the world in their field of activity.

SSM is a member of the Board of the Turkish Armed Forces Foundation. Taking advantage of this membership, Turkish Armed Forces companies are encouraged to invest in critical areas that are considered a priority for defence industry.

In addition, SSM encourages small-scale defence companies to become subcontractors to those Foundation companies.

On the other side, the Turkish Defence Alliance (TDA) was established in 2013 by the Defence and Aerospace Industry Exporters' Association of Turkey (SSI), to promote the sector more effectively in coordination with SSM, particularly in overseas markets, carry out activities for the promotion of the Turkish defence industry's image, organise brand building, effective marketing and joint promotional activities.

ESD: In the slightly more than 30 years since SSM was established a significant part of its remit has been the reorganisation of Turkish indigenous defence production and capabilities. What have been the main achievements in recent years? How do you manage to coordinate the private and state-owned companies and output?

Demir: SSM's primary goal is to increase the local content in defence programmes. Against this background, industry participation/offset programmes are implemented and encouraged to increase the export capacities of Turkish companies.

Regarding the main achievements, the MILGEM corvette can be seen on the top of the list. The MILGEM warship was designed

and produced in Turkey and has entered service with our Armed Forces. In addition to this, our national Landing Ship Tank (LST) BAYRAKTARIS is going to be commissioned within a few days. Besides, numerous naval projects such as coast guard boats, seismic research vessels, submarine rescue vessels, amphibious crews have been executed and supported with 100% local design and over 60% local content.

Similarly, the series production and delivery of our T-129 attack helicopters, which are produced by TAI and are a leader in this class, is continuing.

The CIRIT missile, the UMTAS long-range anti-tank missile and the OMTAS medium-range anti-tank missile have been developed to be used on our national platforms. The prototype for the ALTAY main battle tank project has been completed and the series production decision will be taken in 2017.

Flight tests of the ANKA UAV have been completed. The series production contract for ANKA-S was signed. The BAYRAKTAR tactical unmanned air vehicle is operational. The series production of the MPT-76 National Infantry Rifle has started.

The HÜRKÜ training aircraft will be introduced to the TSK inventory following EASA certification and approval of the General Directorate of Civil Aviation.

On the other hand, in the scope of R & D efforts over 60 projects are being carried out in order to enhance the level of technological competence with the objective of bringing our industrial sub-suppliers, components and technologies together.

In this context, we support the private sector in order to obtain a more important role in the defence industry. While SSM makes the strategies related to the sector, it gives utmost importance to this issue and provides credit support for infrastructure investments, R & D financing, industry participation/offset etc.

ESD: Another part of that remit has been concerning the development of the Advanced Technologies Industrial Park. Please tell us about developments here.

ESD: Please explain the mission and roles of SSM.

Demir: SSM was established in 1985 by order of the Minister of National Defence to meet the requirements of the Turkish Armed Forces and to develop a modern defence industrial base. SSM is a legal entity and controls a budget called Defence Industry Support Fund. This fund is used for defence procurement and R&D programmes. In addition to the Turkish Armed Forces, SSM also acts as a procurement agency in response to the requirements of other governmental institutions such as Turkish Police Force and Gendarmerie. The coordination of export programmes for defence products and offset obligations are also part of SSM's responsibility.

ESD: There are several organisations in Turkey that are relevant for an industrial partner/supplier from abroad: what is the relationship of SSM to them (for example the Turkish Armed Forces Foundation and the Turkish Defence Alliance) and how are interactions managed?

Demir: Similar to other countries, the defence industry in Turkey is managed in a structure in which foundations, public and private sector companies operate together. In this context, as the main leading actor and by establishing regulations, strategies

Demir: The Defence Industry Executive Committee (SSİK) decided to launch the Advanced Technologies Industrial Park (ITEP) project in 1987. The main objectives of the project are to support the establishment of the necessary infrastructure and to meet the advanced technology needs of the country with national resources. Another objective of the ITEP project is to provide a sustainable income to the Defence Industry Support Fund.

The necessary dynamic, scientific and technological infrastructure is built up through various investments and programmes in the scope of an economic development model that is related to the commercialisation of technology with the public and domestic/foreign private sector investments in order to develop the kind of advanced technology which is to be the basis of competitive power in the country.



Photo: Roketsan

Roketsan's CIRIT missile is reported to have good export potential as an upgrade measure to existing unguided 70mm air-to-ground weaponry for helicopters.

Industry and the Istanbul Chamber of Commerce with the aim of contributing to the technology development capacity of Turkey by domestic and foreign entrepreneurs. It will be financed with an investment of 2 billion dollars which is predominantly expected to be injected by the private sec-

was placed in the 1st place among the early stage technoparks and the 7th of all technoparks. By the end of 2016, approximately 20 million dollars of exports were made by the Technopark Istanbul companies. Taking an active role in the International Technoparks Association (IASP), Teknopark Istanbul will host the IASP World Technoparks Congress in Istanbul in 2017.

It is not possible to be good in all areas of technology. In that sense, it has become more important nowadays to choose certain critical areas to be good in, to deepen and to have a word in the world. In this respect, great importance is attached to the selection of companies in the target sectors determined for the Teknopark Istanbul, and the applicants are evaluated with sensitivity according to the technology fields. In this sense, we see Teknopark Istanbul as a technology base where Turkey will create its own brands, not only by advocating technologies but also by supporting the work that will be the basis for multi-use applications of defence technologies.

Photo: US Navy



Turkey's indigenous MILGEM corvette during an exercise with US Navy units in the Mediterranean

The project consists of the Sabiha Gökçen International Airport, Aviation Maintenance and Repair Centre, Teknopark Istanbul and commercial/social areas that are located on the expropriated Pendik Kurtköy area in Istanbul.

If we look at the current situation of the project, the Sabiha Gökçen International Airport, Aviation Maintenance and Repair Centre, Teknopark Istanbul and commercial/social areas have been completed. The Sabiha Gökçen Airport 2nd Flight and Routes 1st stage works (emplacements, roads and tunnels), fast departure taxiway construction and "2nd Route and Related Areas" are underway.

Meanwhile, the Teknopark Istanbul has been established as a technology development zone right next to Sabiha Gökçen International Airport in the scope of a partnership of the Undersecretariat for Defence

tor. At the end of a 15-year development period, close to 1000 companies and more than 30,000 specialist R & D staff and qualified personnel are expected to operate at the Teknopark. In the advanced technology field, an annual business volume of 5-7 billion US dollars is anticipated.

The Teknopark Istanbul, which we are assessing as an investment of strategic importance in terms of our country and set out with the aim of becoming Turkey's innovation centre, has been established with strong institutional support, pro-active management, zero-cost incubation, and active cooperation among industry and between industry and universities. It has an important role in terms of technology management within the framework of its objectives.

Thus, according to evaluations of the Ministry of Science, Industry and Technology 2015 Index criterion, Teknopark Istanbul

ESD: The Turkish defence industrial capability has progressed from strength to strength across a broad, tri-service front – land, air and sea: what capabilities within these areas would you describe as "strategically essential national resources"?

Demir: I am proud to say that we have the capability to design and develop armoured vehicles in a range from 4x4 to main battle tanks. Regarding naval platforms, we have a large number of military and private shipyard premises. By using this infrastructure, we can design all kinds of surface ships and build them with local capabilities. Through design participation activities for submarines, we have built many submarines and acquired a lot of expertise.

Concerning aircraft, as you know, we have developed attack helicopters and unmanned aerial vehicles by using a high percentage of local content. The development efforts for an indigenous national helicopter and the fighter jet programme are ongoing.

ESD: Export success is a key yardstick for measuring the success of SSM: how would you personally assess SSM's performance in this area since the turn of the century?

Demir: In today's world, countries are confronted with a broader spectrum of threats and risks. From terrorism to migration and cyber-attacks to border security, transnational risks dominate the security concerns of countries all over the world. Turkey assigns utmost importance to international solidarity and cooperation with friendly and allied nations in such a security environment.

Turkey's key role in the global arena and its increasing defence investments will contribute to international security, helping to prevent and resolve crises through working with allied countries. In this respect, Turkey has always been one of the main supporters of world peace and stability.

Against this background, Turkey is eager to cooperate with all allied countries in both bilateral and multilateral defence industrial programmes. Export of defence products is just one of several cooperation options. Turkey's defence export volume is growing gradually in line with Turkey's enhancing its defence industry collaboration capacity with its well-developed defence capabilities including air, land, maritime platforms and system solutions. I am sure that the export of defence products will significantly increase as a result of our intense cooperation activities.

I would like to emphasise that we use an approach to international collaborations on the basis of the win-win principle by offering unique options to allies such as technology transfer, joint ventures, local production, and consultancy. Defence industry cooperation between our nations will contribute to save time and money and bring the countries closer together.

ESD: Domestic development and export success often comes with import and offset consequences: what advice would you give to foreign defence companies looking to do business with Turkey? Is Turkey a good commercial partner and customer?

Demir: In recent years Turkey's defence industry has been impacted by significant momentum. We started with direct procurements in the 1990s. Then we became involved in co-development and co-production programmes with international OEMs. As our local industry continuously proved that Turkey was a reliable and capable partner, we began securing positions in high-profile international consortiums. Nowadays we are focusing on local design and development programmes for our needs. As a result, our defence industry

started to design and produce high-tech defence systems.

As it has been acknowledged for many years, offset has been implemented and executed by SSM in the scope of the defence industry projects. For the defence industry projects, the contractors are obliged to commit an IP/O obligation amounting to at least 70% of the main contract value within the framework of the Industrial Participation/Offset (IP/O) Directive published in 2011.

In the 2011 IP&O Directive we have considered all types of industrial participation and offsets in three categories.



The ATAK attack helicopter was developed and built based on a design and production cooperation with Leonardo's AgustaWestland.

The first category A focuses on the direct industrial participation. For us it is crucial to increase the local content of the project, so we urge the contractors to seek ways to increase the local portions. and if an SME is contracted for design and engineering, a higher multiplier is applied.

The export of defence, aerospace and homeland security items are categorised as B. Platform export gets the highest multiplier and, again, if an SME is involved in the export activity, the multiplier increases. Category C is for the technology transfer, technological cooperation or investment in the areas of defence, aerospace and homeland security. If the contractor brings the technology that SSM has specifically requested, the multiplier can go up to 8.

When we look at SSM projects up to 2023, there are very big projects such as Light Utility Helicopter development project and the National Combat Aircraft (FX). These projects will need many contractors and subcontractors in the long term, since they are based on new designs.

And for the coming years, these are the areas we would like to work on with a part-

ner and with the participation of the local industry. Our aim is to focus on ITAR free items and not only meet Turkey's needs but also support marketing activities to third countries.

Our focus areas can be summarised as follows: Cyber Space, Space, Guided Missiles/Smart Munitions, Indigenous Air Platforms. By using local demand we would like to make cooperation on R&D activities in the areas of material, sensor, propulsion and engine technologies.

In order to make these collaborations work in specific areas, the defence industrial

base should be ready to cooperate. Our companies are ready for such cooperation throughout the successful offset applications in the Turkish defence industry.

ESD: Finally, allowing for the fact that it is probably not possible to list all the major achievements, what would be your "top" two or three projects with which the SSM has been concerned since 2000, and what would be on your personal "wish list" for the next five years?

Demir: Within SSM we have been working on nearly 500 development and modernisation projects. Nevertheless, the MILGEM national corvette, the ATAK helicopter and the BAYKAR TBT2 tactical UAV are among the most important projects that have been successfully completed and taken into the inventory of the Armed Forces.

Over the next five years; I hope that the ALTAY main battle tank, HÜRKUŞ trainer aircraft and its armed version and the ANKA MALE type UAV become part of Turkish defence power and subject to export to the partners of Turkey.

The questions were asked by Stephen Barnard.



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COMEXPOSIUM

Between Politics and Necessity

The Turkish Ballistic Missile Defence Requirement

Korhan Özkilinc

As a NATO member seeking EU accession, the geopolitical interfaces to the sensitive regions of the Middle East, the Balkans, the Caucasus and the Eurasian area put Turkey on the front line of existing and new global challenges, such as the fight against terrorism, the refugee crisis and the Syrian civil war. Because its geographical location governs regional energy interfaces, Turkey is critical to world energy and therefore politics.

This is an important factor that many countries would enjoy, but particularly since the attempted military coup of July 2016 the country is going through hard times. The rapprochement with Russia and Israel on the one side and dissociation with Western Europe and the USA on the other do not cause any shift in Turkish geopolitics, because the country remains faithful to its strategic alignment: "Go West, Look East". But the important question here is, to what extent does the current political situation influence Turkish decision-making, and how important is NATO/Turkish Ballistic Missile Defence interoperability for the Turkish Armed Forces?

In the last 50 years relations between Turkey and the United States have sev-

eral times been confrontational. During the arms embargo related to the Cyprus conflict of 1974-1979, Turkey intensified and expanded its relations with the US: One of the highlights was, in December 1976, when Turkish Energy Minister Mehmet Selahattin Kilic signed an agreement (economic aid of US\$1.2Bn on the development of economic cooperation and scientific-technical cooperation with Moscow. As we know, some years later Turkey placed an order for F-16 fighter aircraft.

A similar situation presents itself again. The USA is acting in Syria, rather than with its NATO partner, Turkey, together with the PYD/YPG (the long arm of the PKK in Syria): but, on the other hand, Russia is also cooperating in military issues with PYD/YPG. The situation is com-

pounded by the half-heartedness of the EU, especially concerning the refugee crisis. It is a very complex triangular relationship with Turkey. Political and military developments and conflicts of interest in the Middle East also shape the relationships between the partners but in spite of everything, NATO, the EU and Turkey retain their appreciation for each other, and deep-rooted collaboration continues. One important fact should not be lost here: Turkey is more confident and vibrant than in 40 years, so sensitivity on all sides would be a useful policy.

PATRIOT

The Turkish Armed Forces are a big user of US defence industry equipment and

Photo: Raytheon



The combat-proven PATRIOT

in this respect have great expectations. In the matter of Ballistic Missile Defence (BMD), Turkey had its first contact with the PATRIOTs during the 1991 Gulf War. When, in 2007, the SSM published the Invitation to Tender for the T-LORAMIDS (Turkish – Long Range Air and Missile Defence System), expectations were very high regarding the PATRIOT Systems, but the decision was taken in 2013 in favour of the Chinese FD-2000. More about this later.

Two companies are particularly involved in PATRIOT: Raytheon Company has produced the PAC-1 and PAC-2 variants (MIM-104A, MIM-104B, MIM-104C, MIM-104D and PAC-2 GEM). The PAC-3 variant is classified into PAC Configurations 1-3 and the newest variant is PAC-3 MSE (Missile Segment Enhancement.)

all of “Air Defence” with the “Integrated Air and Missile Defense (IAMD) Battle Command System (IBCS)” and through external communication links to integrate with other air and missile defence system command and control units. This interface will allow connection to the “Joint Interagency Intergovernmental Multinational Systems”. This is a frontal assault on the MEADS concept but there are significant differences.

The core innovation is the GaN-based AESA radar technology, which will soon be made available, though it is understood that 360 degree coverage should be proven in 2022. Through the new MMS-interface (Modern Manned Station user interface), innovative processors and intelligent sensors, the system can use the most modern missile, the PAC-3 MSE.

some 3,000 ground tests and 1,400 live fire tests to date. But the system has another attribute for the owner, bringing reassurance, which is important in troubled times.

MEADS

The Medium Extended Air Defence System (MEADS) was developed on behalf of the NATO MEADS Management Agency (NAMEADSMA) by the companies MBDA Germany, MBDA Italy and Lockheed Martin Corporation. The system is designed to combat current and future threats such as Tactical Ballistic Missiles, UAVs, Cruise Missiles, and Aircraft.

A fully-equipped MEADS unit consists of a Tactical Operations Centre (TOC), a Surveillance Radar (SR), two Multifunction Fire and Control Radars (MFCR), six Missile Launcher and three reloader vehicles. The launcher and reloader can take any preferred vehicles for transport and these are transportable by A400M and C-130. The MEADS launcher uses eight vertical-launch PAC-3 MSE (Missile Segment Enhancement) missiles, optimised for 360-degree engagement and with hit-to-kill ability. PAC-3 MSE missiles offer increased performance, greater altitude and longer range compared with previous models.

MEADS is not only the world's most advanced air defence system, but through its Framework Nation Concept supports national and international interoperability, so joint and combined operations (collective defence) can be carried out optimally. The strategic objective is to bring defensive ability and responsiveness to best effect and the tactical objective is to “optimise the effect-chain”.

NATO is working on further implementation of its guidance and management architecture (Battle Management Command Control Communications and Intelligence – BMC3I), based on NATO ACCS – Air Command and Control System, the future, unified guidance management system for the integration and coordination of tactical aerial warfare operations – and AirC2IS (Air Command and Control Information System). MEADS is the promising candidate for the backbone of the NATO Integrated Air and Missile Defence System (NATINAMDS), and Turkey also belongs to the air defence architecture alliance.

The network-distributed architecture (open architecture, flexible structures, non-proprietary software) supports the Plug-and-Fight capability for sensors and shooters. Many in-house sensors, effec-



Photo: MBDA

MEADS test at the White Sands Missile Range

The prime contractor for the PAC-3 interceptor is Lockheed Martin. Through constant evolution PATRIOT Systems will remain in the US inventory through to 2048.

The evolutionary strategy consists of two phases with different timelines. The first phase, PDB-8 (Post Deployment Build-8), builds on PDB-7, which runs until 2021 and runs from 2017 until 2024. In this period the missile system will receive innovative technology replacements, new data links and its ground units will be optimised. Another report about PATRIOT testing from early 2017 by the US Department of Defense Operational Test and Evaluation directorate said that in almost all cases PDB-8 worked as it should. In the second phase, from 2018 until 2025, the aim is to integrate and interlace

The PATRIOT system has been tested in different configurations in New Mexico. Both the much cheaper GEM-T (Guidance Enhanced Missile TBM), with a conventional warhead, and the PAC-3 MSE with hit-to-kill effect, destroyed their targets. Both PAC-2 GEM+ and PAC-3 MSE missiles are some 5.20 m long but the combat weights of the PAC-2 GEM and PAC-3 MSE are 900 kg and 312 kg, respectively. The PAC-3 MSE has a dual pulse solid rocket motor for additional range and manoeuvrability and both missiles have a velocity of about Mach 5.5. PATRIOT is combat-proven and one of the best-known BMD systems in the world, with 13 customer nations of whom five are NATO members. To meet customer demand, it is essential to test, therefore the RAYTHEON family can be proud of

tors and shooters can be used through the networked interfaces.

Options for Turkey include PAC-3 MSE as a first system for interception of ballistic missiles and combat aircraft, with a second system, the ROKETSAN missile systems, HISAR-A (low altitude air defence system) and HISAR-O (medium range air defence system) for interception of helicopters and UAVs. Through intelligent interfaces to the Tactical Operation Centre (TAC) the KORKUT V-SHORAD (very short-range air defence system), self-propelled anti-air gun (SPAAG) and ATILGAN and ZIPKIN Pedestal-Mounted STINGER systems can also be integrated. An interface to Turkish F-16, and later JSF F-35, fighters allows transmission of aerial surveillance, C2 and combat data. Last but not least, looking ahead, through the naval ADS (Automatic Dependent Surveillance) capability the anti-air warfare frigates of the TF-2000 class (CAFRAD radar and Mk 41 VLS) and I-class frigates, a well-developed aerial combat infrastructure will be achieved.

The Surveillance Radar (SR) is a state-of-the-art technology radar, providing 360-degree coverage with a Pulse Doppler radar and active phased-array antenna in ultra-high-frequency (UHF). The SR is able to track many targets simultaneously, and through Mode 5 IFF interfaces is able to identify friend or foe.

The Multifunction Fire Control Radar (MFCR) is also state-of-the-art technology. It provides 360-degree coverage, and is an X-band-radar with a pulse Doppler multifunction phased array. These will be used for target tracking and interception and are activated only when needed. MFCR is also able to identify friend or foe with Mode 5 IFF. The SR and MFCR have



Photo: DGA

ASTER 30 SAMPIT firing

relatively compact dimensions and light weight so quick and simple relocation is made possible.

Plug and Fight opens further strategic opportunities; for example, civilian radars begin to play more special roles, and es-

pecially the four B-737 AEW&C airborne early warning and control aircraft and the indigenous UAVs (ANKA-S, BAYRAKTAR TB2 and KARAYEL) will play important roles in surveillance and reconnaissance. The Turkish space-based sensors, GÖKTÜRK 1 and GÖKTÜRK 2 will have additional tasks, as will the GÖKTÜRK 3 in due course.

MEADS should be in-service in five years in Germany, and more than half a dozen countries are interested, with this figure set to increase in the future.

ASTER 30 SAMP/T

In the afternoon of 15 April 1986 Libya fired two missiles at a US outpost on Lampedusa in Italy, as tensions increased in the escalating conflict between Libya and the United States. This is seen by many as the reason Europe decided to initiate development of a European BMD system, the ASTER 30 SAMP/T. The system is a part of the Franco-Italian FSAF (Future Surface-to-Air Family). The first contract was signed in 1997



Photo: Author

The S-300VM (Antey-2500) missile defence system from Almaz Antey

and both France and Italy were to receive one missile system. Under the contract for Phase 3, signed in November 2003, France received 12 SAMP/T systems and Italy 6. The success story continues also today in different countries.

The supplier of the ASTER family is EUROSAM, a Joint Venture between MBDA and THALES. A SAMP/T battery consists of four to six mobile launchers with up to eight ASTER 30 missiles. The system is highly automated, with quick response times and 360-degree defence capability. It also offers a high rate of fire, firing eight missiles in about 10 seconds from each launcher. The Thales ARABEL 360-degree multi-function X-Band Radar, which can simultaneously track up to 100 targets and has the latest ECCM (Electronic Counter-Countermeasure) capability, is used, plus a command-and-control vehicle and support vehicles. The whole module can be operated with 14 men.

The SAMP/T system, using the ASTER 30 Block 1 missile, can intercept an SRBM (Short Range – 600 km – Ballistic Missile), SCUD type: a new missile, ASTER 30 Block 1NT, is in technological development and will intercept MRBM (1,500 km range Medium Range Ballistic Missiles). The missile itself combines aerodynamic and direct thrust vector “Pif-Paf” control, giving high manoeuvrability – the missile can sustain a 60g turn – and increasing the Single Shot Kill Probability (SSKP) significantly.

But the absolute novelty is that the missile is equipped with a high-performance active RF, Ka-band seeker, offering increased interception range, interception of targets with lower radar cross section and better target angular resolution for increased direct impact probability. The current ASTER 30 Block 1 has a Ku-band seeker.

For Turkey, the ASTER Modular Family is only of interest if the domestic industry technologies can interface with the system. For example ASELSAN has developed the HERIKKS (Air Defence Early Warning Command, Control, Communications and Intelligence System) that manages tactical level air defence, and has in development the CAFRAD (Multi-functional Phased Array Radar), comprising a variety of modular systems, such as 3D long range surveillance radar, illumination/fire control radar and EO Surveillance, that will be integrated in the TF-2000 anti-air warfare frigate; and more than 20 mobile and solid Early Warning Radar Systems are in development. Furthermore, Havelsan is working on the

highly-advanced GENESIS Advent (Gemi Entegre Savas Idare System) Combat Management System. All these are very interesting in combination with the ASTER family (the ground-based air defence system and the naval air defence system), ASTER 30 Block 1, SAAM (Surface-to-Air Anti-Missile), and PAAMS (Principal Anti-Air Missile System).

MBDA is also investing in a new interceptor – ASTER BLOCK 2 – and will engage the new generation of short/medium range ballistic missiles in the medium and high endo-atmospheric domain.

S-400 TRIUMF

Due to shortcomings with the West, for some time Turkey had an intensive cooperative relationship with Russia. Although both countries work very closely in economic areas they are at the same time great rivals in many political areas. With regard to current developments, the Turkish leadership has shown great interest in the Russian S-400 to meet its BMD requirements.

Russian and Turkish media reported some positive news about the sale, but behind the scenes both the Russian General Staff and the FSB (Federal Security Service) sent clear signals to President Pu-

nology loss is very high. Statements from Russian politicians that delivery to China has begun have not been verified. It is important to note that as the Russian armed forces modernise it is likely that S-399 technology will become more widely available: Russia has a great appetite for foreign currency.

Russia could offer Turkey the enhanced version of Antey 2500 (S-300V3), the Antey 4000 (S-300V4) instead of S-400. The S-300V4 is a mature version of the S-300 missile system, which can intercept incoming missiles at speeds of 2,800 m/s and is equipped with the latest computer technology, with the newest radars and, finally, with the newest missiles. Greece illustrates how difficult it is to operate two types of BMD systems – PATRIOT and S-300PMU1 – in Crete, and the Israeli Air Force trains against S-300 systems. At the same time, however, it should not be forgotten that in the neighbourhood of Turkey there are several users of S-300s: Armenia (S-300PS), Azerbaijan (S-300PMU-2), Bulgaria (S-300P), Egypt (S-300VM), Greece (S-300PMU1), Iran (currently developing the BAVAR-373, based on S-300 technology) and with S-300PMU2 in-service), Syria (S-300V4), Ukraine (S-300PS, S-300PMU, S-300V). That means for Turkey the S-400 missile

Photo: Rocketsan



HISAR by Rocketsan

tin against selling such important missile technology – although in the near future Russia will bring its newest achievement, the S-500, into service. The reasons are Turkey's NATO membership and close relationship with China: the risk of tech-

system is the only possible decision, but this will spur an arms race for the S-400 in the eastern Mediterranean – which may even spur the Russian defence industry. The regained strength of Russia in the Middle East and in the neighbouring



Photo: Vitaliy V. Kuzmin

9A83ME launcher of the S-300VM Antey-2500 missile system

states must be seen as a consequence of the Obama administration's focus on East Asia rather than the Near East: whether the Trump administration will change course remains to be seen.

In other words, President Vladimir Putin looks to Turkey neutrally, tries to influence from a safe distance, with the intention to bind the South-Eastern flank of NATO to himself firstly through expansion of energy corridors, and then through military exports, thereby reinforcing his strategic position in the Near East.

In spite of everything, the S-400 has gained significant attention. The missile system is very powerful and can engage all kinds of aircraft, cruise missiles, guided weapons and ballistic short, medium, and long range missiles. It engages targets travelling at up to 4,800 m/s at altitudes of 0.01–27 km for aerodynamic targets, and 2–27 km for ballistic targets. It can simultaneously track more than 300 targets. For aerodynamic targets, the kill zone is 3–250 km range, and for ballistic targets it is 5–60 km. The into-action time for the S-400 is 8 minutes. The S-400 missile complex includes a Command Post (55K6E) commanding up to six air defence missile batteries. The radar complex, Detection Radar (91N6E), has a detection range up to 600 km and the Multifunction Radar (92N6E) with its double-sided phased-array antenna can simultaneously track more than 300 targets. The system is resistant against jamming. The complex involves up to 12 5P85TE2 and/or 5P85SE2 launchers with 4 SAMs in Transport Launcher containers on each launcher. There are also the All-Altitude Radar (96L6E), an all-weather 3D surveillance radar (96L6E) with detec-

tion up to 300 km, and a mobile tower (40V6M) for the antenna set from the 92N6E.

For engagement there are many different types of missiles, such as the 9M96E with target interception at 120 km range and 30 km altitude. The 48N6 missile weighs 1.8 tonnes and offers an interception range of 3–250 km. The newest missile is the 40N6, which should have an engagement range up to 400 km and 185 km altitude. Impressive though these figures are, putting them into perspective, the S-500 is claimed to engage targets travelling at 7,000 m/s at ranges up to 600 km and 200 km altitude, using the new interceptors, the 77N6-N and 77N6-N1.

FD-2000

Cooperation between China and Turkey for the development of missile technology goes back to the beginning of the 2000s: Turkish engineers have particularly to thank their Chinese colleagues for the development of three major systems. The first development is the T-300 KASIRGA, a long-range multiple rocket launcher (Chinese counterpart WS-1). The second development is the battlefield ballistic missile system J-600T YILDIRIM (Variant I-II); and the last development is BORA, with a range of 280 km (counterpart to B-611M), a short-range ballistic missile system, recently presented at IDEX 2017. In September 2013, the decision for T-LORAMIDS (Turkish Long Range Air and Missile Defence System) was made in favour of the FD-2000 missile system (export version of the HQ-9) from China National Precision Machinery Import and Export Corporation for a price of US\$3.4Bn. The

price was a major reason for the decision: the Antey 2500 was US\$5.2Bn with significantly fewer missiles, and PATRIOT US\$4.2Bn. The Chinese were highly competitive in technology transfer and in delivery time. But the agreement was cancelled in September 2015 through the Turkish Defence Industry Executive Committee due to interoperability concerns – although there are also rumours that lobbying played a major role. As a result of all this, T-LORAMIDS was buried.

Basically FD-2000 is a modified version of the Russian S-300 PMU with a two-stage missile with a total mass of almost 2 tonnes including a 180 kg warhead. The missile is vertically-launched and has a maximum velocity of about Mach 4.2. It is a bit slow in comparison to the S-300, so the Chinese probably need more rocket propellant development. The essential difference to the S-300 is in the thrust vector control. There are certain similarities between the Chinese HT-233 radar and the PATRIOT MPQ-53 radar.

The latest version of the FD-2000 was presented at IDEX 2017 and the technical data show that China is pushing forward with development. Technical characteristics are as follows: the target interception range against aircraft is 7–125 km, against air-to-surface missiles is 7–50 km, and against cruise missiles and tactical ballistic missiles is 7–25 km. Target interception altitude against jet aircraft is 0.025–27 km; 0.025–18 km against air-to-surface missiles; below 0.025 km against cruise missiles; and 2–15 km against tactical ballistic missiles.

In the face of current developments in Turkey, it is doubtful that FD-2000 will succeed, but China could make excellent business in other defence projects in Turkey.

Conclusion

The integration of systems into the existing military infrastructure will be the biggest challenge for the winner of any BMD competition, because critical hardware and software systems, with high information density, must prove their suitability in combination with existing systems. The degree of interoperability may affect not only the military effectiveness, but also the effect chain of integrated Turkish defence systems. It would seem, therefore, that Turkey should choose to move towards NATO, but with the caveat that the system supplier provide optimal interfaces to Turkey's strategic, tactical and operational levels for more effective, integrated, network-centric operations. ■

Mine Warfare Vessel Market Outlook

Bob Nugent

Mine warfare is a naval mission that can be characterised as "disproportionate". That is, the naval mine can have dramatically large operational and even strategic effects for relatively small investments in cost of mine weapons, and the means to deploy them effectively. As US analyst Scott Truver has noted: "Of the 19 US Navy ships that have been seriously damaged or sunk by enemy action since the end of World War II, 15 – nearly 80% – were mine victims."

At the same time, countering the mine threat has historically and consistently received a small – disproportionately small, many naval professionals argue – share of naval new ship construction and related system investments.

local wars prompted offensive mine warfare against commercial and naval shipping in the Persian Gulf, arguably catching navies ill-prepared to respond effectively. Even the 2011 NATO intervention in Libya included a mine warfare component.

lar mine warfare acquisition programmes over the same period is striking.

The resulting mismatch between threat and capability leaves most global navies vulnerable to the mine. Given that the near-term global security outlook ap-

Photo: Björn Wilke/PLZ Marine



German minehunter SULZBACH-ROSENBERG

Even during the Cold War, when Soviet Navy offensive mine warfare capabilities were well-understood, mine warfare requirements did not compete well with other investments in naval anti-submarine and anti-air warfare. Regional conflicts, such as Korea and Vietnam, continued to demonstrate how mines could be employed effectively to deny and delay access to critical sea space. Continuing on into the post-Cold War era, tensions and

That experience demonstrated again that, while the Royal Navy operation successfully cleared Misrata port of mines laid to prevent access by aid-carrying ships, the result depended on a "thin line" of a single mine warfare ship with a capable crew. A more intensive mining campaign during that conflict would have strained available NATO MCM resources.

In general, naval mine countermeasures investments in the modern era since the demise of the USSR continue to be characterised more by ad-hoc responses or small and separate programmes, rather than a systematic and sustained approach taken to address other fleet weaknesses. The contrast between the US Navy's AEGIS naval air defense programme and simi-

pears increasingly unstable, and with the largest inventories of naval mines held by countries such as North Korea, Iran, China, and Russia, the question arises: are navies giving the mine countermeasures mission more attention now? Are navies sufficiently alarmed over the mine threat to increase their investments in new purpose-built mine warfare ships or other MCM capabilities to be ready for the next anti-mine mission that is sure to come?

Author

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Mine Warfare Vessel Market: Current MCMV Fleets

From a global perspective, the relative standing of the mine warfare ship and mission among other components of na-



val fleets can be judged by looking at the table below. Of the nearly 13,000 naval and related coast guard and other sea service platforms that AMI tracks as in active service today, fewer than 600 are dedicated mine countermeasures ships. That translates to less than 5% of the world's naval vessels dedicated to addressing mine threats.

A regional look provides additional insight. As part of the organisation and division of labour among NATO navies, several European navies specialised in mine warfare – among them the German Navy and Royal Navy. And one of the legacies of World War II and the Cold War was the presence of many unaccounted for drifting and bottom mines in the waters of the Baltic Sea, strengthening the need for mine countermeasures ships in Northern Europe. These factors help explain why NATO countries lead the world in the number of dedicated MCMV ships in service, with 37% of the current active MCMV fleet.

The situation in the Asia Pacific is not defined by a regional security organisation like NATO. However, the geography of the region with its many straits and waters, the dependency of many nations on sea-carried trade, and the history of mine use at sea in the region since World War II have all contributed to the region's navies maintaining a substantial number of Mine Countermeasures (MCM) ships in service – 34% of the world's fleet. It should be noted that many of the MCM ships in the Asia-Pacific region now retained in service are obsolete (some 50 years old or more) and therefore not really capable of performing MCM against modern mine threats. Those older ships tend to operate as patrol ships.

The United States Navy's mine-warfare capable ships make up a mere 2% of the global fleet. This is explained by the USN's reliance on helicopter-based minesweeping (MH-53 aircraft) and the decision to retire the current fleet of OSPREY class

coastal minehunters and field future mine warfare capabilities as a mission package on the Littoral Combat Ship, with a heavy use of unmanned surface vessels and UUVs.

It is notable that Middle East and North Africa (MENA) region navies have invested so little to date in MCM capabilities. The region's operational areas include Gulf waters with many chokepoints, narrow shipping lanes and high volumes of high-value energy cargoes, such as oil and gas. This makes the Gulf region especially vulnerable to offensive mine warfare. Yet MENA navies have only 40 operational Mine Warfare ships, just 7% of the world's MCM capable fleet.

As noted in the comments on the APAC region, many of the world's current MCM ships now in service are well past their design life. With more resources, many navies around the world would be more likely to have retired these platforms already and replaced them



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Graphics: Author

Existing Naval Market Ships Currently in Navy or Coast Guard service	Aircraft Carrier	Amphibious	Auxiliary	Corvette	Cruiser	Destroyer	FAC	Frigate	MCMV	OPV	Patrol Vessel	Submarine	Totals
Asia & Australia	3	995	203	134	1	84	685	166	201	152	2097	242	4963
Caribbean & Latin America	1	111	57	32	1	1	47	45	16	53	1059	26	1449
Middle East & North Africa		127	45	44		2	249	21	40	23	1122	33	1706
NATO	3	273	230	54		21	113	126	223	83	958	85	2169
Non-NATO Europe		126	54	9			38	5	50	16	182	5	485
Russia	1	54	240	28	4	14	111	16	44	39	196	62	809
Sub Saharan Africa		29	9	1			33	6	7	25	373	3	486
USA	10	199	145	1	22	63		18	11	27	184	71	751
Totals	18	1914	983	303	28	185	1276	403	592	418	6171	527	12818

with new hulls. However, the newest generation of MCM systems, including widespread adaptation of unmanned vehicles for many parts of the MCM mission, make currently available hulls suitable for modernisation as host platforms for deploying unmanned mine warfare sweeping, hunting and neutralisation platforms. Leading companies in the mine warfare systems business – Lockheed Martin, Northrop Grumman, ATLAS Elektronik, Thales – are working together with OEM builders, such as Lürssen, to offer attractive mine warfare upgrades in pursuit of such opportunities.

Mine Warfare: New Technologies and Capabilities

As noted above, new technologies are being applied to the mine warfare mission. Unmanned platforms, better and lighter acoustic, visual and electronic sensors, and advanced command and control systems are all improving execution of the MCM mission. Improvements in IT, lighter and stronger hull and platform materials, more intensive energy storage and remote sensing all serve to make the MCM mission – traditionally long, slow, labour intensive and dangerous – lighter and

faster. These improvements combine to enable navies to achieve the same MCM mission effects with less investment, whether it be fewer and/or smaller ships or reduced numbers of people needed to perform the same missions.

There have been common technology trends and impacts on MCM over the past 40 years. Most notably, shifting the centre of mission effect from the ship itself (deploying sweep gear or operating hull-mounted mine hunting sonars) to off-platform work with a combination of small craft (RHIBs) and unmanned platforms. This has shifted modern MCM tactics, techniques and procedures closer

Vessel Type	2015 20-Year Forecasted Value US\$B	2010 20-Year Forecasted Value US\$B	Change (\$)	Change (%)	2015 Market Share (%)	2010 Market Share (%)	Change (%)
Aircraft Carrier	86.5	57.8	28.7	49.7%	9.2%	8.4%	0.8%
Amphibious	69.4	51.2	18.2	35.5%	7.3%	7.4%	-0.1%
Auxiliary	57.8	31.7	26.1	82.3%	6.1%	4.6%	1.5%
Corvette	27	25.2	1.8	7.1%	2.9%	3.6%	-0.8%
Cruiser	6.2	36.2	-30	-82.9%	0.7%	5.2%	-4.6%
Destroyer	177	113.9	63.1	55.4%	18.7%	16.5%	2.3%
FAC	13.5	9.8	3.7	37.8%	1.4%	1.4%	0.0%
Frigate	128.3	111.5	16.8	15.1%	13.6%	16.1%	-2.5%
MCMV	16.6	15.9	0.7	4.4%	1.8%	2.3%	-0.5%
OPV	40.4	23.5	16.9	71.9%	4.3%	3.4%	0.9%
Patrol Craft	22	16.7	5.3	31.7%	2.3%	2.4%	-0.1%
Submarine	300.1	198.5	101.6	51.2%	31.8%	28.7%	3.1%
Totals	945	691.9	252.9	36.6%	100.0%	100.0%	

to an “unmanned” kill chain, reducing the danger to personnel and ships.

One element of the MCM mission that has not changed over time is the vulnerability of dedicated MCMV assets to attacks from the air, surface and subsurface domains. While most MCMVs in service carry nominal self-protection systems (small calibre mounted guns, crew and individual weapons), most MCM missions still require friendly sea control and additional forces to protect the operational area for what may be extended periods. This factor is influencing future concept development and accompanying research and development to look at new options to perform MCM in contested waters. Larger diameter and longer endurance Unmanned Underwater Vehicles (UUV) are being developed that could bring MCM capability to meet the requirement to operate forward in waters where surface MCM is not an option.

Mine Warfare Ships: Market Outlook

Returning to the questions posed at the beginning of this article, a look at MCMV programmes now in progress, as well as projected new construction MCMV programmes over the next two decades, show the market sector growing only moderately compared with other ship types. AMI's forecast of future naval construction in the chart below shows that the 20 year forecast for MCMV programmes (as measured by estimated acquisition cost of the ship and systems aboard) grew less than 5% from 2010's 20 year look to the same projection in 2015.

The future MCMV market as a whole continues to centre on programmes that will acquire 4–6 hulls ranging from 500-1000 tons full load displacement, and equipped with sensors and handling systems that offer capability across the span of the MCM mission: detect – localise – identify – classify – neutralise. MCMVs building now and for the next two decades will continue to use GRP (Glass-Reinforced Plastic) or FRP (Fiber-Reinforced Plastic) materials due to the low magnetic signature of non-metallic hulls. The cost of MCM platforms varies widely, with the low end of the market being ships costing under US\$50M per hull, and the high end of the market representing vessels whose total cost exceed US\$200M per hull.

As shown in the table below, the largest construction programmes for new MCMV ships over the next 20 years (as measured by estimated total programme

value) are found in the Asia-Pacific region. In Taiwan and South Korea, requirements for the MCMV programmes building have been in place a long time – back 30 years or more. Both programmes have faced lengthy delays and are replacing ships that have been in service for several decades, well beyond their original service lives.

Japan's approach to sustain their counter-mine capability has been more consistent, with new programmes scheduled to replace older ships to ensure the JMSDF is fully equipped with modern mine warfare ships with no capability or fleet structure gaps. In 2005, the JMSDF began plan-

a foreign design. In September 2015, the Indian government extended Expressions of Interest (Eoi) to companies identified as the best candidates to participate in the new programme, including:

- Kangnam of South Korea (original awardee in 2011)
- Intermarine of Italy
- Navantia of Spain
- Lockheed Martin of the U.S.
- ThyssenKrupp Marine Systems (TKMS) of Germany
- Sredne-Nevsky of Russia

In May 2016, GSL was awarded the contract to build 12 mine countermeasures vessels (MCMVs) and teamed with Kang-

Region	Future MCMV Procurements (2017-2030)			
	Forecasted Spend		Forecasted New-Builds	
	US\$M	Regional %	Hulls	Regional %
Asia-Pacific	8,220	47%	65	40%
NATO	4,700	27%	52	32%
MENA	2,207	13%	22	13%
Non-NATO Europe	1,000	6%	12	7%
Russia	700	4%	7	4%
Caribbean/LAmerica	600	3%	6	4%
Totals	17,427		164	

ning for a new Fiber Reinforced Plastic (FRP)-hulled MSC (Project 20) to follow the HIRASHIMA class (Project 16), which was completed in 2010. The new class will continue to replace the HATSUSHIMA/UWAJIMA class MSCs. In 2013, the JMSDF funded its first AWAJI (690-ton) MCMV to follow the ENOSHIMA class MSC. Three units are being built with the first unit commissioning in 2017. The vessels are being built at Japan Marine United's (JMU) Tsurugi Yard.

India's current MCMV programme is the largest in the world, with 12 new hulls and a total programme cost estimated to be above US\$4Bn. The programme dates back to the 1990s, and the initial contract award for construction in 2011 was cancelled in 2014 amidst reports of improprieties in the bidding and evaluation process. In February 2015, the Indian Cabinet Committee on Security (CSS) re-approved the MCMV program of 12 hulls to be built at Goa Shipyard Ltd (GSL) with

nam Corporation, using a modified version of the South Korean YANG YANG class MCMV as the hull design. The first ship in the programme is expected to be delivered in 2020.

Conclusion

AMI's most recent 20 year forecast for new construction MCMVs projects \$17.4Bn will be spent worldwide to acquire 178 new hulls through 2037. This 5% increase over the 2015 outlook suggests that the current security environment may be prompting some renewed interest in acquiring new mine warfare capabilities. That said, the mine warfare ship market over the next 20 years still represents less than 2% of total projected spending on all new naval ships and on-board systems over the period. That figure indicates mine warfare continues to lag behind other missions in importance, as measured by resources expended. ■

From Policy to Action

Photos: EDA



Nicholas Fiorenza, Mittler Report Verlag/ESD correspondent in Brussels, spoke with Jorge Domecq, Chief Executive of the European Defence Agency (EDA).

ESD: What is the role of the EDA in the latest European defence initiatives?

Domecq: First, the EDA is an output-oriented agency, which I want it to remain, but expectations of the agency are changing – as the expectations of European citizens are changing – towards European defence. Last year was a year in which many policy decisions were taken on European defence: the Global Strategy and the overarching process which put this process in place in June; and three documents which contain the main defence package: the implementing plan for the Global Strategy; the Com-

an industrial and technological revolution taking place with new technologies from the innovative civil domain of more and more relevance in the defence domain. Thirdly, defence budgets are growing again and if we want to get things right, it needs to be done in an efficient manner that will serve common European objectives, which is very important for Europe in remaining relevant and more efficient. Fourthly, the challenges are transnational and therefore the solutions have to be transnational.

At the same time, the agency remains very much down-to-earth, developing new

Council to concentrate on five aspects: first and foremost to develop a capability development process and plan which is more output oriented, reflects the new reality, is more connected to the European defence industry and shows what strengths it has, and is more related to research to account for the technologies which are there now and what we will need in the future, including innovation. We are now reviewing the process, which will have to remain coherent with NATO, in particular for those EU member states which are also NATO allies. We will be able to agree on the new process this



Poland has become the 23th member of the EU SATCOM Market.

mission's European Defence Action Plan (EDAP); and the EU-NATO Joint Declaration, with a common set of proposals agreed by NATO and EU member states in December 2016. We have to move from the policies set down last year to action, and will probably really structure our defence cooperation for many years to come, so it is important that we get this right – all this is happening while there are big security and defence challenges in and around Europe. Secondly, there is

capabilities and technologies and supporting the European defence industry. One concrete example: we are now negotiating around 23 new ad hoc projects which we should be able to set in motion this year, valued at around €136M, compared with €80–100M a year in the past. This is an important indicator that defence cooperation looks better, but we want to make it more systematic. For the implementation plan for the Global Strategy, we have received guidance from the

spring and we will use it to define a new set of capability priorities by spring next year, which will allow us also to take into account the NATO Defence Planning Process targets. This is important because it will translate the level of ambition set out in the Global Strategy in military terms. The second big area of work, related to this one, is the decision to set up a coordinated annual review on defence with the main objective of giving ministers a full overview of the defence effort in Europe



Photo: Bundesheer/Fischer Maximilian

Exercises like the 10th EDA Helicopter training BLACK BLADE in Belgium are a main part of EDA's activities.

– defence plans, budgets, programmes – so we can do an ex post analysis of where the shortfalls are, what needs to be corrected, and an ex ante analysis which identifies opportunities to develop capabilities in a cooperative manner. In this coordinated annual defence review, the EDA will play the role of secretariat doing the assessments, coordinated very closely with the EU Military Staff and Military Committee to provide an analysis that helps the political level take the right decisions on how to move forward and overcome the present fragmentation in the defence effort in Europe. This will be a voluntary process and not duplicate what NATO does, based on the capability development process.

Thirdly, an important chunk of work is to give coherence to R&D efforts in Europe. Research efforts are done nationally and multinationally, some in EDA and others outside, but research funded by the EU budget is already beginning to take shape. We are now carrying forward the pilot project with three activities worth €1.5M,, and this year we will start the preparatory action, which is the next step: €25M in EU funding for research, followed by €90 million over three years. If that is a success, we will be looking at a European research programme of around €500M per year.

To provide coherence to these three research areas, it is very important to prioritise ends and means, that we do not duplicate, and that research funded by the EU budget is not used as a pretext by member states to reduce their efforts in other fields. To prioritise and give coherence to all these efforts we

are developing a tool called the Overarching Strategic Research Agenda (OSRA) which will give an overview of all the strategic research agendas in the 12 priority research areas of the capability development plan (CDP), but without forgetting that some technologies might not be only capability-driven but might be pushed by innovations that produce solutions for our challenges. Spain will provide the first version of OSRA, to be validated later this year.

Fourthly, we are working to develop a concrete concept for strategic autonomy: it is not about a fortress Europe, or building structures behind the US's back, or undermining NATO. Strategic autonomy is only meant to make sure that Europe has the right capability, allowing the EU to act on its own when decided, with partners wherever possible – because if we do not remain a relevant partner with capabilities that we fully control and are dependent on third countries, we will not continue to be a factor for our allies and will therefore no longer be relevant.

We are looking at the capability priorities to see where Europe needs to promote and preserve certain research capabilities, industrial capacities, skills and competences that we cannot lose in Europe if we want to maintain the industrial and technological base that sustains those capabilities. That means capabilities we can use without any specific dependency on third parties. Five test cases – innovative ground and user segments for government satellite communications (GOVSATCOM); field programmable gate arrays (FGPA), which are electronic components used for the management of big

data; cyber exchange and protection of military information infrastructures and critical assets; situational awareness for military critical infrastructure; and tactical unmanned aerial systems for maritime surveillance – which were welcomed by member state ministers in November are now going to mobilise the instruments the Commission has to promote these industries or supply chains. We have done that in the past in a less methodological way, but now it will be done in a systematic manner and it will be based on the CDP priorities.

The fifth area of work on the implementation plan is what we call critical enablers: how to advance harmonisation of certification environments and test and evaluation, multinational training, security of supply: all different aspects that allow our capabilities to be more efficiently pooled, used, maintained and trained. And the sixth area where we are working is EDA support in the capability development part of Permanent Structured Cooperation (PESCO) and doing the assessments for the member states which decide to go further with this idea.

A second chunk of work is related to the NATO-EU Joint Declaration: 42 sets of proposals in seven areas. EDA is involved in six of the seven areas and in 15 of the 42 proposals. We intend to contribute to the common report we will provide by the summer. Since I arrived at the agency, the EDA has had a more structured relationship with the different interlocutors at NATO. I have regular exchanges with Supreme Allied Commander Transformation, the assistant secretaries general for defence planning and policy, defence in-

vestment, emerging challenges and operations, and the chief scientist.

There is a wide and quite a strong nexus to avoid unnecessary duplication but at the same time to see where we can better serve our member states and especially those which are members of both organisations. The main focus of our work will be on capability development, where we are the lead for the EU and research. This will have to be done in such a way as to avoid unnecessary duplication, which works in both directions, but it also has to be done in a reciprocal way, as member states want the same offering for both organisations. This will develop over time with the strengthening of European defence, and I foresee keeping a strong and relevant EU defence as the end result of the whole strategy.

And last but not least is what we are doing in the context of EDAP, very welcome support of the Commission for defence within the limitations of the EU treaty. I think we have moved on because it is very difficult to distinguish between security and defence but also because there is a strong core to mobilise all funding possibilities to support member states in this area.

There are many measures in EDAP, for example, more small- and medium-sized enterprises (SMEs). We are working closely with the Commission to make sure that the supply chains in Europe are kept open and we really have access to these small industries as part of a healthy European defence industry. The more innovative part is related to the European Defence Fund.

For the research part, we have funding for the preparatory action, and there we will see what we will do with the European defence research programme. With our experience managing projects we selected the topics based on the priorities agreed by member states. We defined the technical specifications, made the call for proposals, evaluated the proposals, and negotiated the draft agreements. We received 21 proposals bringing together 83 entities – small- and medium-sized enterprises, research organisations, academia – from 20 member states, which shows how much this small amount of money triggered people to look beyond borders. We will do the same thing with the work programme of the preparatory action, where we have also selected the topics and defined the specifications, and afterwards we will ensure the results of that research will be an uptake in defence programmes and EDA will therefore be reinforced.



“Since I arrived at the agency, the EDA has had a more structured relationship with the different interlocutors at NATO.”

ESD: What is the situation with the EDA’s benchmark for members to allocate 2% of gross domestic product to research and technology (R&T)?

JD: The EDA benchmarks are collective and voluntary. My main concern regarding the European defence industry is that we need to invest more in R&T and we need to do more together. The preparatory action offers us a very good opportunity to try to jump-start this whole thing. The R&T effort has diminished by 32% in the last 10 years. It will be very difficult if we do not start to cooperate in the R&T part of capability development – or do it later – because capability development is a long process. R&T is essential, because it is the only thing that will keep an innovative and competent industrial base.

ESD: How do you see EDA’s future?

Domecq: In May 2017 the head of the agency will be presenting a set of proposals and conclusions to ministers regarding the mission of the agency in the long term, after conducting a number of sessions directed by the ministries of defence since November last year. Those proposals and conclusions will aim to ensure that the agency remains relevant and fit for purpose in this changed environment: more European defence, with PESCO, stronger relations with NATO, a Commission which is trying to see how it can support the development of new defence capabilities, and so a new map where we have to see where EDA will be and at the same time protect the inter-governmental nature of defence.

ESD: Will EDA become much bigger or do you prefer that it remain lean and mean?

Domecq: I think resources have to follow objectives and priorities, so, depending on what member states want from this agency in the coming years, it may have to grow. Member states will not be the only ones to sustain it. There are proposals and it is foreseen in our statute that we could receive funding from the EU budget.

We are now receiving funds for the preparatory action and the pilot projects but we will be receiving money to conduct other activities which are relevant to defence – for example, the energy consultation forum, where we are trying to reduce deficiencies in our armed forces in the energy domain. So we should be looking for resources in the wider sense. After being frozen for six years, there has been a small increase in the budget and I think that was a signal from all countries that things could not remain frozen.

Given the big effort that is going to be made by all with defence budgets across Europe, I would find it quite contradictory if we say in the Global Strategy – which was welcomed – that we need to make full use of the agency, and at the same time we do not recognise that funnelling part of the increase in defence budgets through the agency is not going to be something that is cost-efficient.

ESD: How will EDA work with the UK after Brexit?

Domecq: The UK will leave the agency at the latest when it leaves the EU. My understanding is that the UK authorities would like to maintain a strong relationship with EDA after they have left the EU and therefore I will work with member states to allow that to happen with minimum disruption for everybody. That has to be negotiated, and I think that re-

sponds not only to the importance the UK, but also its industry. One of the five main priorities the British security and defence association has given its government is to keep a strong relationship with the EU. So they see an added value for European defence to maintain a close relationship. We have industry from some non-member states; for example, Norway participates in Horizon 2020 and contributes to the EU budget.

ESD: Which of the many EDA projects would you like to highlight?

Domecq: I will start by highlighting the key capability programmes which were endorsed by heads of state and government in 2013, and which we continue to work on. We are making a lot of progress in air-to-air refuelling. On 16 March 2017 we signed a letter of intent with three new member states: Germany, Norway and Belgium. That idea and the common requirements were agreed at this agency before passing the procurement phase on to the Organisation for Joint Armaments Cooperation (OCCAR). This is a clear example of how reinforcing European capabilities will reduce a NATO shortfall. We continue to work on air-to-air refuelling

clearances of tankers and to retrofit some transport aircraft with pumps. We will continue to work to engage more countries in this common effort, because we have to make more headway in improving our air-to-air refuelling capabilities.

On cyber, we are establishing research priorities and there are several programmes we are launching. One is the pooling and sharing of the different capacities of cyber ranges in more than 15 member states. Several member states are involved in cyber awareness packages for headquarters.

In a third area, government satellite communications (GOVSATCOM), we will have agreed common staff requirements and the business case by this spring. The Commission will at the same time make an assessment, so we will be looking at the needs that we have to fill in GOVSATCOM in the next decade for member states, so that we ensure that there is enough capacity available by pooling the civilian and military requirements to produce efficiency. The new SATCOM market, with 22 participating member states, is quite extraordinary. Under the Athena mechanism, three or four Common Foreign and Security Policy missions and five civilian

missions receive pay-for-use satellite communication services and all terminals.

Last but not least, in the fourth key programme, the remotely-piloted air system (RPAS), medium-altitude, long-endurance (MALE), four countries are developing a definition study within OCCAR on the basis of the common staff requirement developed here. We are involved in two very important aspects: to ensure the air-space insertion of that system in Europe works and, second, we will try to bring more member states into the programme. We are also working on a syllabus and a common training system demonstrator for RPAS: a four-year programme we launched that will allow us to ensure the RPAS community has the know-how to interact between different countries. Now we have four or five European countries which already have RPAS and another three or four that want it in the near future. We want to make sure they have the same training pattern and standards, the same way of acting in different scenarios so there is a common pool when the RPAS MALE programme materialised. At the. Other areas we are working on are anti-tank weapons and additive 3D printing. ■



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Successful Demilitarisation Project in the Republic of Belarus

Waldemar Geiger

With a closing ceremony in the Engineer Ammunition Base of the Belarus Ministry of Defence in Rechitsa on 5 April, the Spanish defence company EXPAL successfully completed the disposal of 3,400,000 anti-personnel mines from the national stockpile.

EXPAL and the EU-funded demilitarisation programme helped the Republic of Belarus to fulfil its commitment in the scope of the Ottawa Treaty, which was signed by the country's government in 1999. Belarus military authorities, rep-

resentatives of the European Union and several ambassadors attended the closing ceremony and witnessed the successful destruction of the last 78 mines.

ing the construction and set-up phase. During the last few months of the project, the plant that accommodates a cold detonation chamber with a volume of 89 m³ and 100 tons of reinforced steel will be dismantled and will be made available



Photos: EXPAL

Photo left: Closing ceremony of the EU-funded Project "Destruction of PFM-1 Series Ammunition Stockpile in the Republic of Belarus". Photo right: Joint destruction of the last antipersonnel mines by Col. Andrey Petrovich Kurakov (Armed Forces of the Republic of Belarus), Andrea Wiktorin (Head of the EU Delegation to Belarus) and Javier Gonzalez (EXPAL Project Manager).

representatives of the European Union and several ambassadors attended the closing ceremony and witnessed the successful destruction of the last 78 mines.

The Project

The project started with an EU-wide tender in 2010. On 21 December 2010 EXPAL was awarded the contract for the execution of this project. In collaboration with the Belarus Government and the European Union, EXPAL's objectives included the disposal of the Belarus arsenal of Type PFM-1 and PFM-1S anti-personnel mines.

To accomplish the mission, EXPAL developed and built a mobile demilitarisation plant, which was relocated from Spain and set up in the Engineer Ammunition Base in Rechitsa. Recruitment and training of the Belarus personnel was carried out by EXPAL's specialists dur-

ing the construction and set-up phase. The terrain of the plant will be re-developed to the original condition before the demilitarisation project ends in September 2017.

The Demilitarisation Process

In a first step, the ammunition's safety status is assessed before it can be made subject to the deconstruction process in the demilitarisation plant. In a second step, the ammunition is prepared for detonation, in that the mine cartridges (each containing 72 anti-personnel mines) are armed with a detonation cord. Afterwards the mines are transferred to the cold detonation chamber using a rail trolley designed for the safe transportation of the canisters. When cartridges have reached the chamber, the door is sealed and the detonation can proceed. The dedicated cold detonation chamber

allows for a complete remote detonation process without direct human interference. All processes are designed in such a way that the time required for the workforce inside the chamber is minimal, thus maximising work safety.

Once the detonation is carried out, the gas treatment process begins. The purpose of this process is to reduce and treat the gaseous pollutants that are among the gases produced by the detonation. This treatment complies with European regulations for the incineration of hazardous substances and has a monitoring system complying with all parameters prescribed by the safety standards. After the detonation, there is a controlled delay time that ends with the opening of the front door. The chamber is then ready for the next detonation.

In a last step, the scrap resulting from the demilitarisation process (mainly composed of aluminium and steel) is separated and stored for subsequent collection and treatment. After the detonation, the remaining gas in the chamber is extracted manually. The working procedure complies with the guidelines for the control of waste before contact with the operator. ■

Sustain the Growth Momentum

“We aim to increase our effectiveness in the Middle East and Far East markets, primarily in countries like Saudi Arabia and Malaysia that we call our local markets,” said Nail Kurt, CEO, FNSS Defense Systems Inc., during an interview with ESD.

ESD: At the last IDEF, FNSS made some big and important announcements and launches: Please describe developments within the business since then.

Kurt: At IDEF'15, we launched KAPLAN 20 NG ACV and PARS 4X4, since then we improved these concepts according to the feedbacks from the potential users and evolving threats and we will show the new members of KAPLAN and PARS product families at IDEF 2017.

KAPLAN 30, the newest member of the KAPLAN product family, has higher protection and it is more powerful with a 711 HP engine, so it can carry heavier weapon systems. As well as KAPLAN 20, KAPLAN 30 also has a structure that allows up-to-date mission equipment to be integrated, including 105mm weapon systems, for instance. Its capacity is 11 personnel including driver and gunner and it is designed in such a way that allows the crew with

launched at IDEF'17 as well. New generation PARS vehicles, having fully independent ride height controlled hydro-pneumatic suspension and modular structure, provide convenience and quick reach possibility in the field and cost effectiveness in maintenance. As a pioneer in vehicle design with a more balanced weight distribution, PARS offers superior mobility and performance both on land and in the water. PARS 6X6 provides better sight and surveillance capability to the driver and the commander with the high protective transparent armour (ballistic glass).

In addition to FNSS's 25mm SABER one-man turret solution, we have been developing the 30mm TEBER two-man turret as well. As a contract requirement, we will develop Anti-Tank Turrets to utilise UMTAS & CORNET missiles.

Moreover, we signed new contracts both in Turkey and in export markets. In Turkey, we



tion process in order to successfully fulfil programme requirements in the case of capturing the business. For the Firat Shield Project, we developed tank modernisation solutions and submitted a very effective solution to SSM. Besides, FNSS is also ready for ALTAY Serial Production Program as the most experienced contender regarding serial production of tracked armoured vehicles in Turkey.

ESD: FNSS has an excellent technical and R&D capability: Please tell us about your latest and best developments in the field of technology.

Kurt: We continuously work to enhance our tracked and wheeled vehicle families by implementing new technology solutions to meet the demanding customer needs. As the destructive technologies advances, survivability solutions are getting more and more important. On the other hand, both land and amphibious mobility are also gaining more importance, as they facilitate a wide range of combat and rescue functions. Increased manoeuvrability enables execution of broad range of missions and operations on short notice, which provides a unique leverage. This competing and contradicting requirements make the utilisation of advanced technologies indispensable, and we are currently working on innovative mine blast resistant hull design, alternative materials and advanced armour solutions.

ESD: Turkey has numerous current security challenges, many of which are being met by products from FNSS: Can you comment on materiel developments specifically for the Turkish Armed Forces?

Kurt: We know that almost all the land systems that were designed before the 1990s



Photos: FNSS

The KAPLAN family of armoured vehicles was first introduced to the public at the IDEF 2015 defence exhibition.

infantry equipment to work comfortably in the vehicle. The vehicle, which can pass through the water spouts, is covered with modular inner and outer armour.

New generation PARS 6X6, which is designed for reconnaissance and special purpose missions, is the newest member of the PARS product family and will be

won two significant military land vehicle tenders in our area of expertise and signed Anti-Tank Vehicle Project and Armoured Amphibious Assault Vehicle Project contracts with SSM. Besides, we submitted our best and final offer for the Special Purpose Vehicle Program and we are proceeding with the preparations for the execu-

are intended to protect their crew against Cold War threats which are mainly conventional. The mutual threat poses itself as a direct confrontation, "head-to-head" between the manoeuvring units of opponents, in accordance with conventional warfare in the open areas and rural areas. Today, TLF faces more complex threats during different operations in Eastern Anatolia or in Syria. Terrorist tactics have started to take an important place among the armoured vehicle design criteria. The threats are evolving depending on the technology implemented. Conflicts experienced, though painfully, give us important lessons in terms of vehicle design parameters.

FNSS has planned a technology roadmap considering the vehicle and subsystem requirements of TLF for today and for the future. We focussed on general purpose



The PARS 4x4 made its debut at IDEF'15.

and mission specific vehicles with necessary growth potential to enable the integration of additional sub-systems, emerging technologies with necessary power management systems and upgrades up to effective mobility and the survivability of the vehicles in the future for Turkish Armed Forces.

As a result, we have focussed on survivability, lethality, mobility and communication improvement solutions for a number of different platforms especially under the Firat Shield Program of SSM. Besides, we provided an advanced solution/concept to SSM for Turkish Special Forces Command's needs.

ESD: In addition to providing equipment for the Turkish Armed Forces, FNSS has a robust export market. Please describe the trends for exports over the last two years



New members of the PARS and KAPLAN product families will be presented at IDEF 2017.

and how you anticipate the export market will develop.

Kurt: Although Turkey is our home market, export is very crucial for our business. FNSS is the leading exporter of the Turkish Defence Industry and in the past several years, majority of our sales have been from export sales (ca. 95% for the last two years). In fact, in the past two years, we have signed a major contract with a Middle East country for 8x8 and 6x6 Wheeled Armored Vehicles, which shows FNSS' strength and presence in the region. Another contract we signed was the Medium Tank Development Program with Indonesia, while a major contract with Malaysia is still ongoing. I can say that Middle East and Far East have been our focus export regions for almost two decades and will remain to be so, for the next decade as well.

In general, export contracts will continue to be very important for us for the coming years, especially to support our strategic growth journey. As our product portfolio expands with newly developed systems, we will have more opportunities to find new markets and new areas of exports. Our ongoing domestic programmes will also enhance our export strategies and achievements in terms of product availability, new products, and readiness to production. We will also strengthen our position in our existing export markets by completing the ongoing programmes successfully, which may lead to follow-on contracts.

ESD: To what extent do recent and current social and political developments within Turkey impact your business?

Kurt: Up to now, we have mentioned how emerging threats shape the market needs in terms of product requirements, but it has also effects on the way of doing business. The threats that Turkey is exposed to change the military needs and priorities, as a result of which project priorities of

TAF and SSM are changing accordingly. In current circumstances, a new project may emerge very quickly because of urgent needs, while another project would wait or be postponed for a long time or might be cancelled due to budgetary restrictions. There is also a strong schedule and price pressure on the companies in SSM's tender process. So, we need to adapt these rapidly changing environmental conditions in order to support TAF and maintain our leader position in Turkey.

On the other hand, there are reflections of political developments on the foreign suppliers. We are facing embargos from Austria and Belgium, and some countries seem to apply hidden embargos. Export licence-related risks are critical and represent some short-term challenges for Turkish companies however, they also constitute big opportunities for Turkey in terms of local development and production of such critical sub-systems and components. We should remember that the emergence and development of the Turkish defence industry stems from the embargo in 1970s.

ESD: What development(s) within and from FNSS over the last two years are you most proud of / satisfied with?

Kurt: In the last two years, FNSS grew by 20% annually, which is much higher than the defence industry growth rate in Turkey. This is a definite success indicator which is mainly driven by our strong presence in the export markets. The quality of our products, our follow-on support service and customer relations approach, sensitivity through occupational health and safety, public relations and support for local capability building in the export markets has led to our success. As we are always proud of our export sales, in the recent years FNSS has won all domestic programme tenders in a very competitive environment and we believe we will fulfil these programmes suc-

cessfully as we have done up to now. This growth also brought new employment opportunity in the industry, our total employee number increased by 30% in the last two years and about 35% are engineers.

Another subject matter we are proud of is the importance we give to supplier development. The local content in FNSS vehicles is around 60-80%. With regards to the training and the business opportunities we provide to our suppliers, we are also in a leading position. We are trying to spread out our experience and technology to our suppliers and increase the number of our solution partners. The suppliers that have worked with us in Saudi Arabia and Malaysia are also gradually establishing a lasting presence in these countries. Also, we are satisfied with the efficiency figures of FNSS. Our sales per employee is above US\$300K and one of the highest among Turkish defence companies. We manage our operational costs very effectively to compete in the price-sensitive markets. With its growing product portfolio and talented workforce FNSS evolves to a global player in defence. Considering these points, we see FNSS as a justified leader in the industry as well as a trusted and respected partner in defence.

ESD: Bearing in mind that this edition will appear some time before IDEF takes place, what should visitors to the show look for on the FNSS stand?

Kurt: We continue to sign new contracts with our local and international customers and run several programmes at the same time. As a result of the diversified threats and updates in the new warfare environment, we are currently widening our product range at a very fast pace. This IDEF will be a great opportunity to showcase our new-generation armoured fighting vehicle capabilities. Recently developed vehicles, for two foreign customers (PARS III 8x8 and 6x6 wheeled armoured vehicles together with Indonesian Medium Tank programmes), are very good samples of how we fit to specific user needs. In addition to this, KAPLAN NGACV, PARS SPV and TEBER 30mm turret will also be new hits on the market.

ESD: And your goals for the next phase of development of FNSS?

Kurt: We have just completed our new strategic plan for the next five years. Our most important goal that emerged in the new plan is to sustain the growth momentum we have achieved in the recent period and take the right steps towards empowering our global brand image by having a healthy growth period.

Our priorities to achieve this goal are to take part in new projects aimed at the needs of TLF and security forces, especially ALTAY serial production and New Generation ACV programmes, while fulfilling our current projects in both domestic and export markets without sacrificing user satisfaction. Meanwhile, we aim to increase our effectiveness in the Middle East and Far East markets, primarily in countries like Saudi Arabia and Malaysia that we call our local markets. While reaching the growth figures we target, we aim to keep the export share of our revenue around 60%.

In order to ensure healthy and sustainable growth, we are shaping our product and service portfolio according to the market trends and future needs of potential customers. Therefore, we also plan to invest in necessary technologies and infrastructure, and to strengthen the competencies that will support this growth in our organisation. Supply chain network growth is a prominent area for these competencies, given the increased project volume, tight project schedules, diversified customer expectations and the obligations of SSM regarding industrial participation. ■

Masthead

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New ESD Correspondent in Brussels

Photo: Joris Verbeurgt



(pb) Joris Verbeurgt has joined the team of "European Security & Defence" (ESD) as Brussels correspondent. After his career in the Belgian military he has worked as a journalist and book author since 2013. For ESD and ESD Spotlight he will

cover new developments in NATO and EU as well as Belgian defence policy, military, and defence industrial base.

GREMLINS Programme Continues

(df) General Atomics Aeronautical Systems, Inc. (GA-ASI), announced that the Defense Advanced Research Projects Agency (DARPA) has continued to contract the company for Phase 2 of the GREMLINS programme. The GREMLINS programme seeks to develop innovative technologies and systems enabling aircraft to launch volleys of low-cost, reusable Unmanned Aircraft Systems (UAS) and safely and reliably retrieve them in mid-air. Such systems would be deployed with a mixture of mission payloads capable of generating a variety of effects in a distributed and coordinated manner. GA-ASI was awarded a contract for Phase 1 of the programme in March 2016. While Phase 1 was conceptual in nature, Phase 2 aims to mature the design and perform in-flight risk reduction testing for the C-130-based recovery system. Activities will include Programme Design Review (PDR) for the aircraft and recovery system, ground testing to validate key technologies, and flight test to demonstrate safety and recovery system performance. The programme is expected to culminate in an air launch and recovery demonstration in 2019.

BAE Systems and Expal Join Forces for TYPHOON Ammunition

(df) BAE Systems and EXPAL Systems have signed a contract to integrate air launched weapons with the Eurofighter TYPHOON. EXPAL's contribution to the project will involve engineering support for the integration of various standard weapons with MK 80 series warheads. Speaking on behalf of EXPAL, Stephane Plantinet, Marketing Director, said: "With this contribution, EXPAL enlarges its trajectory of supporting weapon integration with aerial platforms, an added value that reinforces its vast portfolio of ammunition." EXPAL's support for

Photo: EXPAL



BAE Systems with this integration activity reinforces a tradition of the two companies working together, the companies stated. "EXPAL's knowledge and experience in design, development and manufacture of air armament allows it to produce a wide range of high performance aviation ammunition, as well as providing services in maintenance and modernisation of aero-

Four New Project Arrangements for European Initiatives

Photo: EDA



Four new Project Arrangements (PA) were signed by participating EDA members in the margins of the EDA Steering Board meeting in Capability Directors formation which took place under the chairmanship of Lieutenant General Erhard Bühler (Germany). The four Project Arrangements are related to the following projects:

Multimodal Transport Hub: This project involving 14 contributing member states (Austria, Belgium, Czech Republic, Cyprus, Germany, Greece, Finland, France, Hungary, Italy, The Netherlands, Poland, Sweden, Slovenia) aims to simplify the procedures for the crossing of borders and national territories with military personnel and equipment. Other objectives are to apply harmonised customs procedures and to combine a range of logistic facilities and systems. The overarching aim of the project is to develop a European Multimodal Transport Hub Network ready to be used by CSDP missions and other purposes.

ECMAN (European Centre for Manual Neutralisation Capabilities): This project aims to provide participating member states (Austria, as a lead nation, as well as Germany, the Czech Republic, Finland and Italy) with expertise and experience in the field of Improvised Explosive Devices (IED) threats. The project will provide opportunities to enhance education and training, improve interoperability and capabilities, assist in doctrine, TTPs and equipment development and testing, and validating concepts through experimentation.

PRCPC (Personnel Recovery Controller and Planner Course): This project was established in 2013 as a Cat B project under the lead of Sweden. The course was initiated by six contributing member states: Austria, Belgium, Germany, Hungary, The Netherlands, and Sweden. Main focus is to train staff officers in supporting their commanders in tasks related to personnel recovery.

M3U (Multinational Modular Medical Unit): This project will standardise national medical capabilities to achieve a high level of multinational interoperability so that different medical modules can be integrated with a framework structure offered by a frame nation. The final outcome will be a deployable and sustainable Multinational Modular Medical Unit. Nine EDA member states have signed the PA today (Austria, Czech Republic, Germany, Belgium, Romania, The Netherlands, Cyprus, Italy, Finland).

nautical systems to meet the real needs of armies and security forces," they said. EXPAL products and services are employed by over 60 countries.

DSM Dyneema Extends its Tech Centre

DSM Dyneema announced the expansion of its ballistic materials research and development capabilities specific to helmet applications. With this, DSM Dyneema seeks to create next generation lightweight, high performance helmet designs and technologies based on the company's Dyneema material. Expansion of the Tech Centre in Heerlen, The Netherlands, involves replacing existing equipment with upgraded technology, including a state-of-the-art helmet press, as well as bringing

on additional personnel to join the team of the development and testing staffs. The improved facilities and equipment add to DSM Dyneema's current R&D capabilities; already, the organisation demonstrates strong support to ballistic helmet manufacturers with its Dyneema material application development facilities and specialists in The Netherlands, the United States, and Singapore. "This investment will significantly improve our material R&D capabilities to support our customers to develop next generation helmets. This represents an area where innovation is needed desperately to keep soldiers and law enforcement personnel protected from ever-evolving threats, while lightening their load to enable them to perform their duties effectively," said Marcio Manique, Global Business Director, Life Protection, DSM Dyneema. "Adding these resources signals our intensified focus and intention to work closely with our customers to provide better insight into our materials that armour companies can use to speed up development and market introduction of new helmet designs."

Rostec's Expansion

(df) 70 more enterprises will join the Russian state-owned Rostec weapons cluster, as planned in the cluster strategy which was adopted in April 2017. According to the plan Rostec will accommodate about 20 gunpowder enterprises, about 50 companies of the JSC Spetsremont group and Uralvagonzavod, the military division of the tractor company. The enterprises transferred are the key ones in the Russian ammunition industry. Also, the creation of a centre for information and analysis on this industry is planned in the newly expanded cluster. Especially a comprehensive development and financial health programme will be necessary, Sergey Abramov, Industrial Director of Rostec, commented. "Our task after we obtain control over the plant is to set up coordination between the UVZ military segment and other holdings and entities which control the cluster directly to improve the effectiveness of the production process and to increase the competitiveness of the products." According to Abramov, the clus-

ter's holdings and entities are currently still on the stage of formation and optimisation, therefore it is possible to transfer new assets to them, to allocate assets to the direct management of the corporation, or to transfer assets within the cluster.

CMI Defence and Tecnobit Sign Turret Agreement

(jh) During the recent HOMSEC exhibition in Madrid CMI Defence of Belgium and Tecnobit of Spain signed a Memorandum of Understanding regarding the development of a turret system compliant with the



Photo: CMI Defence

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requirements of the VCR 8x8 programme of the Spanish Ministry of Defence: the COCKERILL 3030 EDICION VAN HALEN 30mm manned and unmanned modular turret. This special edition of the COCKERILL 3000 Series will combine the advantages of the modularity of COCKERILL systems and of TecnoBit's advanced electro-optic technologies, the only Spanish company able to entirely design, develop, produce and maintain high quality cameras such as those used in the CENTINELA family of thermal sights. The COCKERILL 3000 Series EDICION VAN HALEN is a single platform enabling a turret to accommodate guns of different calibres and corresponding technological modules: automatic 25mm, 30mm, 30/40mm, 35mm and 50mm calibre guns, along with direct fire guns of 90 and 105mm calibres. TecnoBit will supply a variant of the CENTINELA adapted to the specific needs of the COCKERILL 3000 series. The CENTINELA family includes fixed and mobile observation and surveillance systems that can be used in any tactical environment including quick deployment units that need high portability in order to adapt to the needs of each moment and adverse conditions.

New ESD Correspondent in Spain

(jh) Effective 1 April Esteban Villarejo supports the team of "European Security & Defence" (ESD) as regional correspondent

Photo: Esteban Villarejo



for Spain and Portugal. Based in Madrid Esteban has been the defence reporter of the Spanish daily newspaper ABC since 2011. For ESD and ESD Spotlight he will cover defence policy, the Spanish and Portuguese military and military operations abroad and the Spanish and Portuguese defence industrial base. Esteban can be reached at esteban.villarejo@mittler-report.de.

Alessandro Profumo Next CEO of Leonardo

(gwh) The Italian Government has named Alessandro Profumo as the next CEO of the Italian defence and aviation company Leonardo S.p.A. His predecessor Mauro Moretti resigned after a three years mandate as CEO of Finmeccanica which was renamed

Photo: Leonardo



to Leonardo at the beginning of 2017. The banker Profumo led the UniCredit Group from 1997 till 2010. From 2012 he has been the CEO of the Monte dei Paschi di Siena bank. None of his prior assignments was related to the defence sector.

Teaming for a Logistic System

(DF) Saab and Loomis Group have signed a global framework agreement for the use of Saab's TRACK and TRACE system. The agreement is in force for seven years and consolidates already existing agreements between Saab and Loomis Group and includes the use of the TRACK and TRACE system in four new markets. With this solution a user can gain full control over their logistic services through a work-order based system that manages, monitors and measures all services provided for the end customer. The system also creates an operational audit trail from commitment start to final execution.

Leonardo to Grow Internationally

(Luca Peruzzi) Upon completion of the main restructuring and strengthening phase, Leonardo looks to grow with organic and international opportunities. Presenting the 2016 results and highlighting the 2017-2021 industrial plan's main goals at the press and investors conferences in March, Leonardo's CEO and General Manager Mauro Moretti stated that "The group has completed the restructuring and strengthening phase and is ready for development and growth under the 2017-2021 industrial plan". Looking at the positive 2016 results, the group's new orders amounted to €19,951 million, (+61% over 2015), mainly due to the contract award as the prime contractor for 28 Eurofighter TYPHOON aircraft to the Kuwait Ministry of Defence and despite a negative impact from the GBP/€ exchange rate. The contract has a volume of some €7.95 billion. Leonardo's share in the TYPHOON deal for Kuwait has been reported to cover 60% of the total contract value, while the remaining 40% are shared by Eurofighter consortium partners and other infrastructure, equipment and service suppliers. The group's revenues amounted to €12 billion, a 7,6% decrease from 2015 while EBIT, EBITA and EBITDA registered respectively a 11%, 4% and 2% increase compared to 2015. Moretti also highlighted a double-digit profitability above target. Looking to the future and in light of the domestic defence budget forecasted to decline at least in the near term, the Italian defence and security group needs to grow and strengthen its position on the international market in addition to focussing on four growth pillars, namely industrial efficiency, customer focus, core business growth and sustainability. Leonardo's objectives include the group's involvement in international alliances to maintain its position among the first ten global players in the aerospace and defence sectors. Leonardo has already triggered a series of initiatives, including the acquisition of new entities such as the US company Daylight Solutions, a leader in the quantum cascade Lasers sector and aimed at reinforcing the optro-electronics segment of Leonardo DRS. Increasing the stake in Avio aims at boosting the space launchers sector. Leonardo is today involved in a series of international joint ventures in Europe such as with Thales in the space sector as well as ATR with Airbus in the regional aircraft segment and MBDA in the missile sector, which need to be boosted and/or fine-tuned or restructured with new investments, control or shareholding exchange. However, to grow and become a European pillar, Leonardo needs to look to new cooperation patterns or alliances with main players in Europe, reinforce its business scope in the USA and its presence abroad with the planned 'one single international presence' focused on key countries. In the scope of the new industrial plan, the current management is looking to revitalise the business model in the 'Space Alliance' in the short term, organically growing in the helicopter segment, strengthening the defence and cyber electronics segment with acquisitions in Europe and the USA, and signing an agreement with a European player in the defence arena. As was made public on 18 March, the Italian Government appointed Alessandro Profumo to run the state-controlled defence group, thus replacing CEO Mauro Moretti, the three-years mandate of who has expired. The Genoa-born 60-year old veteran Italian banker Alessandro Profumo has been assigned the responsibility to reinforce the group at a global level.

Led by the Beretta Family since the Renaissance

With an almost 500-year tradition, the Italian Beretta Group is the world's oldest privately-owned defence company. Waldemar Geiger spoke with Carlo Ferlito, Managing Director of Fabbrica d'Armi Pietro Beretta S.p.A, about the strategic alignment of the company and the special characteristics of a family-owned business.

ESD: Can you please elaborate on the structure and brands of the Beretta Group? Which tasks and responsibilities does your own assignment cover?

Ferlito: "Fabbrica d'Armi Pietro Beretta", of which I have been the General Manager since 2005, is the company owned and managed by the Beretta family since the time of the Renaissance. According to an official document, the company was already active in 1526, and so we have been making firearms for almost five centuries. Fabbrica d'Armi Pietro Beretta is based in Gardone Valrompia at the footsteps of the Italian pre-Alps.

In 1996, the company became part of the Beretta Holding group, which today embraces approx. 30 brands worldwide. Beretta Defense Technologies, also known as BDT, is an alliance of four market-leading companies of Beretta Holding, established in 2011: Beretta, Benelli, Sako and Steiner. These founding companies of Beretta Defense Technologies are recognised around the world through decades of leadership, innovation and investment. They now pro-

vide a single source contact for the high-tech military & law enforcement hardware and services for our professional customers. Beretta Defense Technologies is a concept that has grown from the needs of governments and agencies to cover a wide range of complicated scenarios and I, in my Vice President of BDT role, together with the support and enthusiasm of the Beretta family and ownership, coordinate the activities of these companies in the military and Law Enforcement sectors.

Together, we offer a unique combination of services, weaponry and equipment – from firearms, ammunition and optronics to tactical clothing – in order to meet every operational need.

ESD: Beretta is a family-owned business. Does that bring along particular advantages?

Ferlito: Certainly the family-owned business is a big advantage for the end-users or customers, because decisions are not taken merely from a financial or economic point of view, but mainly on the reputa-



tion of the brand that is the name itself of the family. Decisions on products and delivery times are in the hands of a small group of decision makers (represented by the Beretta family itself), which also helps to provide ideas and to approve investments which in other companies takes much longer. We are also talking about the stability of a business that dates back 500 years focussed on one passion, so the Beretta know-how is well proven and field tested. So I see quite a lot of advantages.

ESD: How do you organise the cooperation with the other brands in the group?

Ferlito: R&D activities in BDT are shared within sister companies in the Beretta Group to obtain the most advanced integrated arm platforms. In addition, some complementary and parallel products reinforce the offer of BDT, also thanks to acquisitions as recently done in the group. We also maintain some healthy competition among some brands of BDT, in order to enhance the product line, pushing us to be competitive in the market.

ESD: How big is the staff and what is the annual turnover of the Beretta Group in general and Fabbrica d'Armi Pietro Beretta S.p.A in particular?

Ferlito: "Fabbrica d'Armi Pietro Beretta" is a gun manufacturer which today employs approximately 850 people. The whole group boasts about 3,000 people and manages approx. 30 brands all over the world, of which less than a tenth are manufacturing companies with their own products and the rest are commercial enterprises, wholly owned by the Beretta



Almost 500 years of weapons manufacturing have led to a rather broad portfolio, with just a selection shown in the Beretta gun room.

Photos: Beretta

ARX200 Beretta Assault rifle in cal. 7.62 x 51 mm equipped with a Steiner ICS (Intelligent Combat Sight) and a MRS (Micro Reflex Sight).



Holding Group, which market the group's products in their countries.

ESD: Beretta weapons are known for their ornate engraving and craftsmanship quality: How do you achieve this?

Ferlito: The utmost attention is given to the expertise and craftsmanship which has always been maintained at the highest level. Standard production is run side by side with the handmade products created by expert craftsmen who are dedicated to making custom products for the most demanding products. The handcrafted side of the work is as important as the technological one; one makes use of the other.

ESD: What is the share of the defence business in your company?

Ferlito:

It varies from year to year, because the military sector is unpredictable. Last year it amounted to approximately 15% of the full group turnover, the rest was made up by the civilian market: field and competition products.

ESD: Who are your most important customers in the defence arena and which products and programmes do they represent?

Ferlito: Our company has been involved in the "Future-Soldier Project" in which we have played a key role and where we have had much success. One important market for us is North America, even if the Asian market continues to be a very strategic target.

ESD: During the past 20 years, many armed forces have reduced their procurement efforts. As a result, there is a kind of "modernisation backlog" to be coped with slowly and sustainably. Where are the most interesting programmes and business opportunities for you in the next three years?

Ferlito: We are focussing on a 4.0 Industry

and on a technological contribution both on the production and product, thus introducing innovation, weight reduction, advanced materials new finishing process and futuristic designs. Important collaborations with companies in the different related sectors and future acquisitions are not excluded, because they could enhance and empower the Beretta Supply and, generally speaking, our BDT military division.

ESD: If you look at Beretta's portfolio 10 to 15 years from now – what will a modern hand weapon look like then?

Ferlito: We obviously look forward to being able to present the ultimate and definitive individual weapon system to our users, one that can satisfy the law enforcement and military customers's needs, whether it be a handgun, assault rifle or individual weapon system.

We do not exclude introducing electronics into our products to add capability, as we are currently pursuing in our i-Gun project. The i-Protect is a pistol which incorporates technologies and digital features that provide support to the user in the field, reducing his or her psychological burden. Integrated aiming devices that lock the target, as well as self-learning, self-adapting systems could also soon become reality.

Preview

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