

European Security & Defence

4/2017

International Security and Defence Journal

June 2017 • www.euro-sd.com • ISSN 1617-7983



Remotely Piloted Aircraft Systems



Afghanistan

15 years of Western engagement – what has been accomplished?



Israel Defence Forces

Lieutenant General Gadi Eizenkot on the new “Gideon” multi-year plan

Interview with OCCAR Director Arturo Alfonso-Meiriño



Putting it all together for **Total Air and Missile Defense**



Full spectrum of integrated,
networked air and missile
defense solutions to defeat
threats at any range and altitude



ARROW-2



ARROW-3



VSHORAD



BARAK-8

IAI offers a comprehensive range of Air and Missile Defense Systems for land and naval applications. From VSHORAD to long-range, to theater and exo-atmospheric systems against ballistic missiles. Our unique solutions, based on lessons derived from vast operational experience, incorporate state-of-the-art technology and full networking for the most effective System of Systems. The result: IAI's solutions ensure impenetrable integrated Air and Missile Defense.



www.iai.co.il
corpmkg@iai.co.il

SEE US AT
PARIS AIR SHOW 2017
Chalet A206, Israel Area



WHEN RESULTS MATTER

Breathing Space for the EU



The outcome of the French presidential election has met with a sigh of relief in Europe. The flood tide of populist sentiment deriving from the forces of the right, which threatened to make short work of the EU, seems to have been stemmed, or at least for the moment. Nevertheless, sometimes with greater voter appeal and sometimes with less, they have succeeded in establishing themselves at the parliamentary level in a good many of the member states which makes them a force still to be reckoned with. In most cases they are enjoying the convenient role of opposition, which allows them not to become embroiled in the inevitable compromises and factual constraints incurred by every involvement in actual government. But the prospect of winning over majorities with their fundamental criticism of the EU, or at least of finding coalition partners who would allow them to latch on to their own political programme – that eludes them. Where declared Eurosceptics sit in government, such as in Poland or Hungary, they may indeed be uncomfortable for the partner states, or even be regarded as destructive, but they do not call into question the minimum consensus backing the EU.

However, even in the sense of general relief felt at the election of Emmanuel Macron it is still important to make a sober and sombre analysis of his victory. There is a great temptation to interpret his win as a vote for “more as before” in the EU. But to yield to that temptation would be fatal. There is plenty of reason to assume that the EU has been granted nothing more than a breathing space.

On the one hand, it needs to be pointed out that it was not only the Marine Le Pen campaign, which a priori had no prospect of success in the second ballot, that scored points with radical EU dressing-down. Other candidates, in particular the left-wing outsider Jean-Luc Mélenchon, adopted the same stance. Put together, in the first round they accounted for almost 50 percent of the vote. That means that France is split on this issue. And that is something the new President will have to bear carefully in mind.

On the other hand, it is striking that Emmanuel Macron may indeed not have adopted any radical positions in the campaign, but he did nevertheless set himself up as a challenger of the establishment in a populist move. The traditional party system of France appears to have gone with the wind. And this is a phenomenon which is also visible in other European states. The classic bipolarity of Social Democrats/

Socialists on one side, and the Christian Democrats/ Conservatives on the other, in which other parties only play the supporting role (although not entirely a bit part) of providing a majority, is now history. This can basically be regarded as a sign that the European democracies are in a position to renew themselves, from themselves, by themselves. At the same time, however, the dynamic and unpredictability of political change is also on the rise. The more fragmented the political landscape is in the national parliaments, the more powerful this effect is on the European level. The European Parliament today is already a confluence, if not a maelstrom, of hugely differing political currents, which are often anchored only in individual member states. The consensus of opinion among members of the very same faction is frequently weak. The European Parliament is faced with the dilemma that, as it now is, it cannot represent the wide variety of views and opinions of the citizens in 28 states, and at the same time still be capable of functioning properly. A precondition for strengthening the democratic legitimacy of the EU is that the European Parliament takes on the central role in the Brussels power structure, something that it is not able to cope with.

Above all, Macron's ambitions in the European political sphere have to be taken into account. He has indicated that he will shortly initiate a debate on reforms in the EU which might lead to renegotiating existing treaties. The French President seems to support the idea of a „Europe of different speeds“. On the table are considerations about compacting the cooperation in the Eurozone by a common budget, a common economy and finance minister, and perhaps even a common parliament. Standing shoulder to shoulder with Germany, he wants to advance a “Europe of Defence”, with a EU defence fund and a permanent headquarters. Even if he has been landed with the image of a “market radical globaliser”, it is evident that free trade is not a taboo subject. The suggestion for public agencies to adopt the slogan „Buy European“ could de facto mean the exclusion of American companies from the European defence market. This might give a boost to French industry, but not necessarily to Europe's armed forces. In line with the slogan „En Marche!“ which branded his campaign, Macron is out to get not only France on the move, but Europe, too. The real acid test, though, will be whether the direction he takes will still appeal to the citizens of his own country and the European partners, once the euphoria is over.

Peter Bossdorf

The Serbian Defence Environment



Photo: Serbian Ministry of Defence

Security challenges, armed forces modernisation and defence industrial base

Page 34

Training Pilots for 5th Generation Fighters



Photo: Boeing

The US Air Force's T-X Programme – requirements and contenders

Page 55

■ SECURITY POLICY

- 10 **China's New Geopolitical "Silk-Road-Initiative"**
Frank Umbach
- 14 **EU Defence Capabilities**
Giulia Tilenni
- 18 **Fifteen Years of Western Engagement in Afghanistan**
Martin Pabst
- 22 **Turkey's Relations with and Relevance for NATO**
Eugene Kogan

■ ARMED FORCES

- 26 **The "Gideon" Multi-Year Plan – Why and How**
Gadi Eizenkot
- 34 **The Serbian Defence Environment**
David Saw

■ ARMAMENT & TECHNOLOGY

- 39 **The Rise of the Drones**
Tim Guest
- 44 **Current Trends in Fighter Avionics and Sensors**
Doug Richardson
- 49 **GRIPEN – Still Hungry**
Georg Mader
- 55 **T-X: Training Pilots for 5th Generation Combat Aircraft**
Sidney E. Dean
- 59 **Remotely Piloted Aircraft Systems (RPAS) MALE**
Peter Preylowski
- 63 **US Army Future Vertical Lift**
Sidney E. Dean
- 67 **Looking Within**
India's Advanced Medium Combat Aircraft (AMCA)
Jay C Menon

69 **Realistic Ambitions**

Port and Harbour Security Takes New Shape
Stefan Nitschke

74 **US Navy Littoral Combat Ships**

Conrad Waters

76 **CBRN Detection and Protection in the Urban Environment**

Dan Kaszeta

79 **PIRANHA V Enters Series Production**

Gerhard Heimig

■ INDUSTRY & MARKETS

81 **"My objective is that OCCAR offers the best possible management services."**

Interview with Arturo Alfonso-Meiriño, Director OCCAR

87 **Rebooting the Austrian Armed Forces and Defence Industry**

Wilhelm Theuretsbacher

92 **"Our aim is to be the pre-eminent transatlantic defence supplier in Europe"**

Interview with Jonathan Hoyle CBE, Vice President Europe, Lockheed Martin

95 **RUAG Looking at the Future**

Paolo Valpolini

96 **Royal Netherlands Navy to Get Early Warning Capability**

Stefan Nitschke

98 **"We not only recognise the trend; we want to play a role in shaping it."**

Interview with Jörg Prediger, Managing Director, Steiner Optik GmbH

102 **IDEF Highlights**

Paolo Valpolini

■ VIEWPOINT FROM ...

- 17 **Madrid**
Esteban Villarejo Ceballos

■ THE BRUSSELS BACKDROP

- 32 **The Lasting Issue of Burden Sharing**
Joris Verbeurgt

■ COLUMNS

- 1 **Editorial**
4 **Periscope**
68 **Masthead**
100 **Firms & Faces**
104 **Preview**

■ MARKETING REPORTS

- 8 **PANTSIR-S1 Modular Air-Defence Missile-Gun System – Adapted for Various Combat Environments**
Rostec / KBP Design Bureau
37 **State-of-the-Art Defence Technology from Serbia**
Yugoimport-SDPR

Index of Advertisers

AFCEA Europe	21
Arms and Security	65
AVIASVIT	25
Autoflug	85
BIDEC	23
DSEI	80
Diehl Aerosystems	86
Elettronica	71
Eurojet	57
FLIR	4th cover
Hirtenberger Defence Systems	89
Helicopter Museum Bückeburg	66
Israel Aerospace Industries (IAI)	2nd cover
Koehler Books	13
KTK	3
MSPO	53
MTU Aero Engines	83
Rohde & Schwarz	51
Rostec / KBP Design Bureau	8/9
Schiebel Elektronische Geräte	41
sensoror	47
Yugoimport	3rd cover, 37



Visit us at
www.ktk-gmbh.de



Situational Awareness Solutions
for Military Land Systems.

■ Training with EUROFIGHTER and SKYHAWK

(df) Discovery Air Defence Services Inc. (DA Defence) has successfully completed

Photo: Bundesheer/Gradauer



its first-ever training with the Austrian Air Force over Wittmund, Germany. Seven EUROFIGHTERS from Austria's 1st Squadron trained against two DA Defence A-4N SKYHAWKS in air-to-air gunnery, and EUROFIGHTERS from the German Luftwaffe's Tactical Air Force Wing 71 "Richthofen" in supersonic intercepts.

"DA Defence's crews and aircraft played a pivotal role in the success of this Austrian Air Force training exercise," said Rolf Brandt, Senior Program Manager – German Operations, DA Defence. "We delivered highly-accurate and cost-effective air targets for Austria's elite EUROFIGHTER pilots. Discovery Air Defence helped Austria to enhance its operational effectiveness and readiness against threats."

DA Defence has provided airborne training services for the German Armed Forces since 2015. Flying embedded with the

German Air Force, DA Defence is delivering critical air combat training and combat support for the German military at home and on deployment. This special training qualified the Austrian pilots in air-to-air weapons and tactics.

"We are very proud to work with new partners and customers," said Daniel Gibeau, Chief Operating Officer, DA Defence. "Our participation in this air-to-air gunnery exercise is testament to our world-class expertise and dedication to provide a highly-advanced training for Austria, Germany, NATO and other NATO allies who train with the German military such as Austria, at home and on deployment."

■ Debut of New Maritime Thermal Cameras from FLIR

(df) At the Nor-Shipping exhibition, which took place in Oslo, Norway from 30 May to 02 June, FLIR launched its latest maritime thermal camera developments. The new M100 and M200 series thermal cameras provide enhanced awareness at night and are FLIR's most compact pan-and-tilt marine thermal cameras to date. They are engineered with FLIR's Boson high-performance thermal camera core, which features an integrated multi-core video processor that delivers superior image quality and advanced video analytic capabilities. When the M100 and M200 series are combined with an Axiom MFD by Raymarine,

a division of FLIR Systems, users can take advantage of FLIR's new ClearCruise intelligent thermal analytics that brings boaters an advanced level of awareness and safety by visually and audibly alerting the operator when "non-water" objects such as boats, obstacles, or navigation markers are identified in the scene.

Photo: FLIR



With FLIR's thermal imaging technology, the new M400 gyro-stabilised multi-sensor thermal camera is a versatile pan/tilt marine camera system that provides very good performance to spot other vessels or even people in the water.

■ New Radar System for Israeli Missile Corvettes

Photo: IAI



(df) Israel Aerospace Industries (IAI) has completed the installation of the advanced ALPHA (Advanced Lightweight Phased Array) ELM-2258 radar system on the Israeli Navy's SAAR 4.5 missile corvette. Operational sea trials have already commenced. The lightweight radar system is based on full digital AESA technology by ELTA Systems and is an integral part of the combat system installed on the units. The Israeli Navy is to receive two more ALPHA radars by the end of 2017, resulting in a total amount of 11 systems installed on this class. The ALPHA is a rotating AESA radar, capable of producing a large number of simultaneous beams for maritime and aerial targets, and to provide a high quality situation picture even in extreme maritime environments. The radar can perform several tasks at the same time, such as: detection and classification of naval targets, tracking of a large number of targets, and integration into

■ Australia Selects CONTROP Multi-Sensor Payload

Photo: CONTROP



(df) CONTROP Precision Technologies Ltd. recently provided the iSea-30HD maritime payload to the Australian Border Force. In addition, CONTROP reports the sale of iSea-50HD high definition camera systems for patrol boats to a customer in Asia and several additional iSea-20 and iSea-30 maritime systems to international customers. The iSea-30HD purchased by the Australian Border Force is a multi-sensor day/night EO/IR high definition (HD) payload. "The Australian Border Force chose to integrate the iSea-30HD on their

BAY Class maritime vessels, due to the fact that it is easy to install, easy to operate, and does not require any alterations to the vessel," said Hagay Azani, CONTROP's VP Marketing. "The iSea-30HD is ideal for OPVs, corvettes and frigates." A customer in Asia also recently procured the iSea-50HD for patrol boats. The iSea-50HD is a gyro-stabilised full size multi sensor EO/IR maritime payload with a high definition day camera, which provides exceptionally high quality images from very long observation distances. The iSea payloads are operated by CONTROP's proprietary electronics box, which includes a video tracker as well as video enhancement algorithms and a picture-in-picture feature. The advantage of the system is that it can be upgraded according to the needs.

guided missile systems for defence and attack. Due to its rather small size, it can be installed on small and medium-sized vessels such as corvettes and medium-sized patrol ships. In addition, the radar provides a solution for upgrading existing navy vessels or installation on new platforms.

■ Switzerland Orders 400 Iveco Trucks

(df) The Swiss Armed Forces have ordered 400 Euro 6 trucks from Iveco Defence Vehicles (Iveco DV). The vehicles are to be supplied between 2017 and 2021. This initial delivery order forms part of a frame contract for a new fleet of special trucks. The frame contract was awarded to Iveco DV in November 2015 following two years of market evaluation and comprehensive practical trials with several demonstrator chassis.



Photo: Iveco DV

This is the third frame contract between the two parties, following previous agreements in 1996 and 2006. "The awarding of this contract is yet another important milestone in our nearly 30-year collaboration", commented Martin Sonderegger, the Swiss National Armament Director.

As with previous contracts, vehicle drive configurations will comprise a range of variants, including 4x2, 4x4, 6x2, 6x6, 8x6 and 8x8 vehicles from the new STRALIS and TRAKKER ranges, which will be supplied with a range of different equipment, some with protected cabins. The vehicles use civil COTS (commercial off-the-shelf) components to ensure the required safety and operability of the fleet. All vehicles will be fully-compliant with Euro 6 emissions regulations and fit for single-fuel-operation.

"Projecting and producing tailor-made vehicles adapted to the specific needs of our customers is always an interesting challenge for us," said Vincenzo Giannelli, President & CEO of Iveco Defence Vehicles. "This latest frame contract bid provided us with an excellent opportunity to improve innovation and research for a new generation of trucks."

■ Major Order for Water Packaging System



Photo: Kärcher Futuretech

(gwh) The US Department of Defense contracted Kärcher Futuretech for the delivery of a water packaging system in the scope of the "Expeditionary Water Packaging System" (EWPS) for the US Army. The first system will be delivered by the end of 2017 followed by further 29 systems until 2022. The Water Bottling Plant (WBP) 900 is designed for fully automatic production of bottles from plastic preforms (food quality PET) followed by filling with chlorine-free drinking water. Because of the microbiologically superb quality of the bottled drinking water the filled bottles can be stored up to 12 months under field conditions. The capacity is 900 bottles per hour, sufficient to support major units.

Using preforms rather than large bottles to be filled up with water reduces the logistic footprint and keeps complete supervision on the whole process "from source to consumption".

■ Albanian Navy Orders Remotely Operated Turrets

(df) The Albanian Navy has ordered remotely operated 20mm NARWHAL naval turrets from Nexter. Albania has been a member of NATO since 2009 and will be the fourth country to equip its navy with NARWHAL turrets, which already provide short-range self-defence to French and Egyptian FREMM frigates, French MISTRAL Class vessels and patrol boats of the Lebanese Navy. They will be also fitted to the French Navy's patrol boats (GUYANESE



Photo: Nexter

PLG light patrol craft) and on the HORIZON Class frigates.

NARWHAL is a combination of Nexter's 20M621 20mm gun with a set of high-performance day/night electro-optic cameras and a moving target monitoring function. The turret therefore suits surveillance and maritime police missions including interception and self-defence operations against the background of asymmetric threats.

The contract with the Albanian Navy covers the supply of four remotely controlled NARWHAL systems, to equip the STAN 4207 patrol vessels, which have been in service in the Albanian Navy since 2008. The contract also covers the supply of associated 20mm ammunition, produced by Nexter Munitions, and maintenance equipment. The first two systems will be delivered at the end of 2017, with the remaining two to be delivered in the second half of 2018.

■ Russian "Skype" Offering Information Security

(df) At the CIPR-2017 Conference Rostec showed a prototype of a standardised communication system – virtually a Russian analogue of Skype with a high level of



Photo: Rostec

information security for government agencies and industry. The standardised system will be used in organisations and institutions and will be a benchmark in terms of information security, the company stated. It combines telephony and messenger functions: phone and video calls, sending text messages, and files of any format can be sent to one or several subscribers within the corporate network. The system does not access the Internet; therefore, it cannot be deciphered by hackers or foreign intelligence agencies.

"Recent cyber attacks have made it clear that most information systems produced abroad are vulnerable," said Deputy General Director of JSC Ruselectronics, part of Rostec, Arseniy Brykin. "In response to this we are creating Russian IT and telecommunications products which certainly contain no 'surprises' and are properly protected

from undue external interference. This is an almost unrivalled development in terms of functionality; it is also unique in terms of information protection. It is a modern and convenient system which allows confidential information to be transferred in any format."

■ New Lightweight Torpedo from Saab Unveiled



Graphic: Saab

(gwh) At the Undersea Defence Technology (UDT) exhibition in Bremen, Germany, Saab showcased its New Lightweight Torpedo (NLT). This has been the first time Saab demonstrated the system, which was ordered by the Swedish Defence Materiel Administration FMV in 2016, to the global defence market.

The new system is designed to fit perfectly the suits for navies operating in both littoral and blue waters. The advanced warhead in combination with a new wire control system allows for engaging modern threats in close vicinity of friendly units as well as in narrow spaces.

After one year of development the first water tests will take place in autumn 2017. The delivery of combat ready systems is scheduled to end by 2024.

■ Storage System with Biometric Access Control

(df) Ruselectronics, part of the Rostec State Corporation, has presented its storage system with biometric access control during the "Information Technology of Industrial Russia 2017" conference for the first time.



Photo: Rostec

It has a two-stage access control using 3D face and iris recognition techniques.

The storage system has a built-in camera that identifies an individual and captures two of his biometric details, i.e. quasi 3D model of the face and the iris. The solution provides high-grade security access control. For example, unlike fingerprints, the mentioned data is hard to forge. It is easy to use since one does not have to remember a password or carry a card or a paper slip. The system automatically unlocks the necessary box after identifying and verifying the owner. The biometric recognition takes a maximum of 3 to 5 seconds.

The camera has an option of remote computer control and management via local area network. Over time, it will become possible to use this function via a smartphone or even a smartwatch. This system is therefore highly autonomous in operation and requires minimum maintenance costs.

■ SFC Energy's Fuel Cells for British Armed Forces

(gwh) SFC Energy, a provider of hybrid power solutions to the stationary and mobile power generation markets, announces an exclusive new defence industry sales partnership with ZeroAlpha Solutions Ltd., Cardiff, UK, supplier of networking hardware, software and sustainable power solutions to the



Photo: SFC Energy

UK and European defence and security markets.

As a communications and power systems integrator for the UK defence and security industry, ZeroAlpha Solutions will sell and customise SFC Energy's portfolio of defence and security power products to meet the specific off-grid power requirements of UK customers in those industries.

In partnership with ZeroAlpha Solutions, SFC's range of defence products were selected to undergo extensive field trials by the UK MoD under both the Army Warfighting Experiment and Information Warrior exercises.

With an objective of providing sustainable and tactical power at the tactical edge the fuel cells successfully provided extended silent watch capability and enhanced mission endurance to both vehicle and dismounted applications.

■ SAL-Guided Missile for the H145M Helicopter

(df) Thales has been awarded a contract and received a notice from Airbus Helicopters to proceed with the integration of its Semi-Active Laser Guided Rocket FZ275



Photo: Thales

LGR on a H145M helicopter. This contract follows the selection of Thales solutions to provide rocket systems to Airbus Helicopters' platforms with its new weapon management system HForce. Thales will provide engineering support for the integration of its FZ275 LGR Laser Guided Rocket on H145M helicopters including a 70mm/2.75' unguided rocket system.

With FZ275 LGR deployed soon on H145M with a 12-tube FZ231 rocket launcher, it will be the first armed commercial helicopter of Airbus Helicopters with a laser guided rocket capability. Because FZ275 LGR uses standard 2.75' launchers, the rocket system does not require modifications and enables the use of existing rocket system subject to the addition of a lens protection kit. Other candidate helicopters for the integration of LGR include the medium-sized twin-engine helicopter H225M and H125M.

The first firings tests on H145M are scheduled in 2017 for technical qualification and operational assessments.

■ New Loitering Munition System

(df) UVision Air Ltd. unveiled the HERO-400EC at the Ground Warfare and Logistics Conference in Latrun, Israel in May. The HERO-400EC is a new enlarged, extended-range, precise loitering munition system. The system's cruciform aerodynamic design delivers high-accuracy and reduces collateral damage. Its electric motor enables it to loiter silently above a target, ready to instantly respond to pop-up threats. Noam Levitt, CEO of UVision said: "We recognised the need for a long-range platform that could remain in the air for extended periods of time, provide a substantial warhead effective against a wide variety of targets, and also deliver missile-level pinpoint strike capabilities. The HERO-400EC answers these critical needs."

The HERO-400EC uses man-in-the loop technology and advanced Electro-Optical/Infra-Red (EO/IR) payloads that can locate, track and strike static or moving targets with pinpoint accuracy and surprise. The system features a low noise and thermal signature modular multi-tube launcher that is adaptable to a wide range of platforms, thereby offering air, land and sea capabilities. The abort capability allows automatic reen-



Photo: UVision

try into the loitering mode, re-engagement of the enemy, or return to the recovery area using a parachute. The HERO-400EC has a maximum take-off weight of 40 kg and a warhead weight of 10 kg, with an endurance of up to 2 hours.

■ BMT Signs Submarine Framework Agreement in Norway

At this year's UDT exhibition and conference in Bremen BMT Defence Services (BMT), a subsidiary of BMT Group Ltd, announced a contract with the Norwegian Defence Materiel Agency (NDMA) to provide consultancy support for the new Norwegian Type 212CD submarine acquisition programme. Following an international competition,



Photos: TKMS

The picture shows a German Class U212A submarine during a visit to Bergen, Norway.

the contract, which was signed in May, is a framework agreement through which BMT can either conduct stand-alone tasks or provide resources to address any shortfalls in capacity, capability or confidence within the organisations of key project stakeholders. BMT will provide initial support over a two-year period with an option to extend to five. As a replacement to the ULA Class submarine, the Norwegian Government has

selected ThyssenKrupp Marine Systems as the preferred bidder for four new submarines. The submarine design will be based on the German/Italian Type 212A. The German Navy, which has been selected as a strategic partner, will procure two identical submarines.

BMT has previously supported the predecessor of NDMA, the Norwegian Defence Logistics Organisation, providing independent client advice on a variety of topics and issues relating to their submarine programmes including feasibility studies into the ULA Class service life extension programme.

■ Demonstrating at the Double

(David Saw) In April, French company ECA Group conducted a demonstration of their unmanned air and ground vehicle capabilities over a number of days near Paris to an audience of potential customers and journalists. The equipment demonstrated is similar to that in service with the French Army, that is currently being used on operations in the Sahel in Africa as part of the Operation Barkhane mission.

ECA Group operates in five business sectors, both military and civil, with the company having a turnover of €130M in 2016, with more than 50% for export, and it has 700 employees. The company is perhaps best known for its activities in the naval sector, in the 1970s it introduced the PAP Mk3 mine disposal system and since that time the company has manufactured over 1,000 underwater vehicles.

In the mid-1990s ECA Group expanded into the Unmanned Ground Vehicles (UGV) segment for identification, detection and disposal in the Explosive Ordnance Disposal (EOD) and Chemical, Biological, Radiological and Nuclear (CBRN) sectors, developing both mini and lightweight UGVs. The first sale of their COBRA Mk1 UGV for the EOD application was in 2009 for Afghanistan, then in 2010 their tracked CHAMELEON UGV for EOD was sold, subsequently the CHAMELEON version for CBRN would be acquired by French firefighters. The COBRA Mk2 for EOD was acquired by the French Army and used in Afghanistan in 2012, while the Canadian Forces would select the COBRA Mk2 after an international competition in 2013. In 2014 the company introduced the IGUANA tracked UGV that can be used for both EOD and CBRN applications.

What ECA has tried to do with these UGVs is to keep the Man-Machine Interface (MMI) highly intuitive to allow operators to control the system in a simple and straightforward manner. This strategy was continued as ECA expanded its unmanned capabilities into the Unmanned Aerial Vehicles (UAV) sector through the introduction of the IT180 UAV family. This is a mini long-endurance VTOL UAV that can be powered by an electric or gasoline motor and can carry various modular payloads. The IT180 has been selected for both military and commercial applications.

The ECA demonstration focussed on the collaborative operation of an IGUANA UGV and the IT180 UAV. In the demonstration scenario the operator was unable to obtain a direct line-of-sight on a car containing a suspect device and was therefore unable to deploy the UGV for the EOD mission. By using the UAV in an overwatch role the operator had a direct view of the suspect vehicle and could successfully direct the UGV to the target using the most efficient route and commence EOD operations.

The IT180 was used in Afghanistan by French Army Engineers for route surveillance where it would look for disturbed soil or other evidence of IEDs being planted. More recently the IT180 was used in Operation Serval in Mali (December 2012 to July 2014) and is currently operational in the Sahel under Operation Barkhane.

The Sous-groupe tactique interarmes (SGTIA) or Combined Arms Tactical Subgroup, a strengthened company-sized formation, commanded by a captain, is the baseline operational unit used by the French Army in the Sahel and includes mechanised infantry, supporting armour, and the ability to call for and direct fire support from artillery or air. The unit also has a combat engineering platoon with the IT180 UAV, this provides the SGTIA with a critical organic reconnaissance asset and the ability to see "the other side of the hill". The ability of the IT180 to operate in hot and high conditions, plus cope with wind is critical in this environment, as is the level of detail provided by its high quality camera payload.



Photo: ECA

PANTSIR-S1 Modular Air-Defence Missile-Gun System – Adapted for Various Combat Environments

An analysis of the latest local conflicts shows that high-precision air assault weapons along with unmanned aerial vehicles constitute air threats of absolute priority. The large number and high density of air threats in an air strike requires from the air defence assets to provide both high combat performance and a large ready-to-fire ammunition capacity and quick replenishment capability. Thanks to the specific features of its design, the PANTSIR-S1 Air Defence Missile-Gun Sys-

tem (ADMGS) can comprehensively respond to all requirements for the defence against modern air threats in today's and tomorrow's combat scenarios:

- Combined missile and gun armament covering an engagement zone of up to 20 km in range and up to 15 km in altitude;
- Jam-proof multimode and multispectral radar-optical control system operating in decimetre, millimetre and infrared wavebands;
- Automatic operation;
- Capability to fire on the move and during short stopovers;
- Short reaction time of 4-6 seconds due to automatic tracking of up to 40 targets by a search radar and high-precision target designation (0.3° in azimuth, 0.5° in elevation, 30 m in range) providing for quick fine search and target lock-on by the multifunction tracking radar and optronic system;
- Self-contained combat operation and coordination of actions within a battery;
- Simultaneous firing against four targets within a sector of $\pm 45^\circ$ in azimuth and elevation.

Development Challenges

The PANTSIR-S1 system completed a large spectrum of field tests and proved its excellent performance in various combat conditions.

It also allowed designing and developing an air defence missile-gun system that meets the highest tactical and technical standards and has been unmatched in the sector of SHORAD systems.

Modularity

A novel approach in designing the PANTSIR-S1 as a modular system provides for the option to install it in various chassis - including



Missile launch of the PANTSIR-S1 system



PANTSIR-S1 can be successfully operated in different climate conditions.

During the development of the PANTSIR-S1 ADMG system and its adaptations to the requirements of numerous customers a number of scientific and technical challenges had to be coped with, including:

- System configuration and structural considerations to ensure a modular design of the system;
- Development of the new multifunction radar for target and missile tracking;
- Integration of the PANTSIR-S1 with the customer armed forces' communication networks;
- Development and integration of an IFF system customised for the respective customers;
- Development of an automated day/night all-weather control system common in terms of instrumentation and featuring customised settings and combat operation algorithms according to the customer's requirements;
- Development of a common ammunition load for customised variants of the system, unified SPTA and training systems.

The fundamental R&D experience of KBP provided for the successful coping with all chal-

lenges and allowed designing and developing an air defence missile-gun system that meets the highest tactical and technical standards and has been unmatched in the sector of SHORAD systems.

Moreover, the modular design of the system ensures substantial growth potential for future upgrades in terms of increased combat efficiency at minimal expenses, which - without any doubt - increases its commercial attractiveness for the customer.

Sensor Performance

The PANTSIR-S1 system's multifunction tracking radar provides tracking of three targets in parallel and transmission of control commands to four SAMs, thus featuring superior defence in response to a wide range of air threats: fixed and rotary-wing aircraft at

stand-off ranges, small-sized guided missiles and bombs as well as remotely piloted air vehicles.

Thanks to the development of a single multi-mode and multispectral optical radar control system operating in dm, mm, and IR wavebands and featuring a multifunction tracking radar as one of its components, high resistance of the system to jamming is provided which, as a consequence, supports the superior combat performance of the system.

Integration Issues

The current practice of using air defence missile-gun systems brings along very strict requirements regarding their integration with the communication infrastructure of the customer's existing AD system.

These requirements are determined by the following factors:

- Mandatory availability of the same target environment at all levels and all components of a common air-defence system;
- Complex geo-/topographical conditions dictate the necessity of flexible target distribution both between combat vehicles (CVs) within a battery and within the elements of a common air-defence system;
- Continuing and increasing propagation of high-precision weapons and UAVs constituting air threats imposes specific requirements on the use of anti-aircraft systems including the capability of combat vehicle operation without radar emission; instead the required data are acquired from CVs in the vicinity and remote search radars.

The availability of a mapping computer with digital maps ensures dedicated automated planning of combat actions taking into account the particular geo-/topographical conditions of the customer's combat environment.

The challenge of protecting the transmitted data from jamming was responded to successfully. When a command post is used as a part of the system an increase in the data transmission range (up to 20 km) is obtained and interfacing with all types of the customer's existing command posts is provided without major modifications.

The modular concept was not only applied to the design of the system but to its software as well. That was the way to solve the issues of integration with existing IFF systems of each of the customers. Growth potential for an upgrade of the customer's IFF system - if so required - has also been considered.

The use of the self-contained day/night all-weather control system significantly increases the engagement zone in all conditions, reduces the psychophysical load on the crew

and minimizes shortcomings related to the human factor in a tough and strained combat environment.

Customised Performance Features

The following specific problems had to be found a solution for in response to the needs of a specific customer. The task was successfully accomplished:

- Search radar operation without false tracks in complicated terrain patterns;
- Target detection above water and deserts;
- Determination of the optimum frequency-spatial separation to provide electromagnetic compatibility within the existing AD system, taking into consideration the particular topographical pattern of the customer's theatre of operation;
- Integration with the customer's existing IFF system;
- Minimising of the time required for the shaping of the search and track zones by a topographic map (with limited resolution in azimuth) thanks to the use of an integrated mapping computer processing digital maps of the respective customer;
- Integration with the customer's existing air-defence system and generating potential for AD system improvement based on the combat management principle implemented in the PANTSIR-S1 ADMGS;
- Implementation of various ways of SAM system operation ensuring operational safety according to the customer's requirements:
 - a) Air blast initiated by a command during climb trajectory;
 - b) Air blast initiated by a command during dive trajectory;
 - c) Dive trajectory without air blast, destruction by ground impact.

Logistic Considerations

The modular structure and standardisation of parts and sub-assemblies ensure successful integration with the customer's existing chassis maintenance system, including the supply of maximum unified individual, common, and base-stored SPTA kits, the arrangement of service centres and the crew training system. Constant combat readiness of the PANTSIR-S1 system is ensured by built-in test equipment in each combat and maintenance vehicle. The modular design allows for the development of different variants of the system and installation on a range of chassis as well as the development of its stationary modifications.



The modular layout of the PANTSIR-S1 ADMGS allows for its integration with different chassis of both Russian and foreign origin.



PANTSIR-S1 is regularly displayed at military parades on the Red Square in Moscow.

The system can be installed on lightly armoured vehicles and can be used as a lethal air-transportable AD asset. It can also be mounted on wheeled and tracked chassis in air force air defence units and on naval ships.

Conclusion

Today and in the near future the PANTSIR-S1 ADMGS fully satisfies all requirements for the successful engagement of modern air threats. Appropriateness of the technical solutions implemented and the superior performance specifications of the PANTSIR system were proved by acceptance trials and state tests; more than 500 SAM launches were performed, series production has commenced.

At several of the annual Victory Day Parades in Moscow PANTSIR combat vehicles were displayed on the Red Square; a battery of the PANTSIR-S1 CVs took part many times in parades marking the Republic of Belarus' Independence Day in the City of Minsk.

Also, the PANTSIR system was on display at a number of international defence exhibitions like IDEX, MAKS and others.

Now and in future the Pantsir-S1 ADMGS will remain a reliable asset capable to ensure the protection of airspace against all types of air threats.

This Marketing Report is based on the article by A.A. Zubarev and A.A. Nikiforov.

China's New Geopolitical "Silk-Road-Initiative"

Infrastructure and Security Political Dimensions

Frank Umbach

In September 2013, Chinese President Xi Jinping launched the "One Belt, One Road (OBOR)" initiative in a speech at Nazarbayev University in Astana (Kazakhstan). The framework concept, which combines the previous programmes of "China's Silk Road Economic Belt" and "21st-Century Maritime Silk Road Strategy" (MSR), makes the country's regional neighbourhood – both on the continent and in the seas – the main strategic priority in its economic, foreign and security policies.



Photo: Bilal/Bestnews/mag

China has always seen itself as the Middle Kingdom.

As it did centuries ago during the times of Marco Polo, China views itself as the "Middle Kingdom" geographically and geopolitically and, therewith, as the global

Author

Dr. Frank Umbach is Research Director at the European Centre for Energy and Resource Security (EUCERS), King's College, London, and has been a member of the new Ukraine 2020 Task Force - an initiative of the US-Ukraine Foundation in Washington and the Pylyp Orlyk Institute for Democracy in Kyiv, organised by the East-West-Institute in Brussels, since 2010.

political centre of world trade, when it had used the silk road as a superhighway for the export of Chinese goods and commodities as well as for imports from abroad.

Should China successfully implement its OBOR initiative and its ideas of regional as well as global order, the Eurasian map will be newly defined and the geopolitical influence of the USA, Europe and Russia will be continuously marginalized. But as big as China's geopolitical ambitions are, thus huge are also the economic and security challenges of the OBOR initiative.

With the OBOR initiative, China envisages integrating China's bilateral relations with its neighbours into a geopolitical bloc of the region. It should spur regional co-

operation by leveraging China's huge potential of its economic and financial power of up to US\$1 trillion for regional investments and trade. It will not only link China's economy with those of South-east, South and Central Asia, but also with Africa and Europe. China is already the world's largest economy (based on GDP and the World Bank's purchasing power parity calculations) as well as its biggest producer, exporter, and energy consumer. It accounts for between a quarter and a third of manufacturing imports in Japan, the EU and the United States. By 2020, China will become the world's largest overseas investor. Its off-shore assets might triple from US\$6.4 trillion to almost US\$20 trillion.

Infrastructure as a Key Instrument

China's geo-economic strategy of its interconnected economy with its neighbouring and more distanced countries can complement each other, creating an integrated economic network of supply and value chains, especially in the production, transport and energy sectors. It demands massive investments in ports, airports, transnational railways, highways, container trade and fibre optic cables.

This could transform dramatically the way commerce is conducted globally, directing a much more significant share of the European-Asian trade over land. Currently, 90% of global container trade is conducted via vulnerable sea lines safeguarded and controlled by the US Navy – an aspect that China distrusts and seeks to counter by building its own blue-water navy.

Neighbourhood Interest

The OBOR initiative has met widespread interest from China's neighbours in engaging in partnerships with the initiative. Most of the five dozen plus countries involved have begun to coordinate their economic and regional policies with Beijing, integrating production, trade and finance with China. However, with six different trade and policy "corridors" involved, and encompassing over 4 billion people, the strength of this complex initiative – its size – could also be its deficiency. Ultimately, it will require an unprecedented cooperation not just between individual governments, but also businesses, NGOs and the involvement of the public at large, both within China and its regional partners.

Officially, China views its OBOR initiative not so much as a competition with the US and Europe, but rather as a Hercules task, which demands cooperation with all regional powers. But Beijing's bilateral relations with Japan, India and the US are very ambivalent and determined by geopolitical competition as well as economic cooperation.

The OBOR initiative will build upon already existing regional economic and security organisations, such as the Russian-led Eurasian Economic Union (involving Russia, Armenia, Belarus, Kazakhstan and Kyrgyzstan) and the Shanghai Cooperation Organisation in Central Asia.

Domestic Drivers

Along with its goal of regional integration, the Chinese government sees OBOR as an instrument to solve its increasing economic difficulties. It is connected with its econom-

Source: Stratfor.com



ic development strategy domestically. Beijing views the new Silk Road concept as a driver for future economic growth in order to decrease the economic gap between its coastal cities in its eastern regions and its poorer border regions in the West. In addition, it is also an important instrument to strengthen the central government's direct control over China's economy.

The present investment strategy is focusing on six regions – especially Xinjiang and Fujian – and on the energy, shipping, construction, commerce, tourism, and manufacturing sectors. These investments are also considered to safeguard social stability and lasting political order in China and its neighbouring regions. But China's provinces may also try to follow their own specific interests in the future, which could further increase their influence on China's foreign economic policies – running contrary to the central government's intention to strengthen its control over its provinces. Hence conflicts in the implementation of the OBOR-strategy appear inevitable and might hamper Beijing's development of a coherent strategy.

As part of the OBOR initiative, China is also expanding rapidly its domestic railway infrastructure. It will connect China's western provinces with its eastern industrial centres as well as the region of Xinjiang with Central Asia and Europe (up to Duisburg and Spain). All larger domestic transport infrastructures in China are defined and designed with military implications (such as transporting troops and goods for the PLA).

Chinese companies are also building new rail lines in many foreign countries, as high-

lighted in Turkey between Istanbul and Ankara or between Serbia and Hungary. China and Russia are also interested in building a Moscow–Beijing pan-Eurasian high-speed rail. Whether China's support of transport infrastructure outside the country as part of the OBOR initiative (as in Central and South Asia) also has military implications is unclear. Officially, of course, this is denied. However, India and other countries are suspicious of Beijing in this regard.

Financial Instruments

One of the most important instruments for China's investments in various transport, energy and other infrastructure projects as part of its OBOR grand design initiative is the newly created Asia Infrastructure Investment Bank (AIIB), which began operating in December 2015. Despite US opposition, it has 57 founding members (including the United Kingdom and Germany). The AIIB aims to finance the building of roads, rail, maritime transport links and energy projects on the Eurasian continent. Despite China's crucial role in setting up the bank, it has officially only a minority status with a share of 30.34%, providing Beijing 26% of voting for decision-making. This helps China to counter any criticism at the bank being merely an instrument of China's foreign policy and geopolitical ambitions. But China's informal weight is considerably more influential, as the decision-making of the AIIB needs to respect the interests and will of Beijing.

In addition to the AIIB, the BRICS nations (Brazil, Russia, India, China, and South Africa; making up some 20% of global GDP)



and Russia have already cooperated in regional security as members of the Shanghai Cooperation Organization (SCO) and the Conference of Interaction and Confidence Building Measures in Asia (CICA) in order to weaken the US influence in Central Asia. While Russia has officially welcomed China's OBOR initiative, it runs counter to Moscow's largely protectionist strategy for its Eurasian Economic Union. But as Russia has become geopolitically more dependent on China after the Ukraine conflict and its annexation of Crimea in 2014, Moscow has recognised that it cannot afford to stay on the sidelines of China's OBOR initiative. But China has also avoided - in regard to its own security concerns about the regional role of the US in Eurasia - to use the increasingly asymmetric power balance with Russia in its bilateral geopolitical competition with Moscow in Central Asia for its own geopolitical benefit at the expense of Russia.

have created the New Development Bank (NDB). The NDB has officially launched with just US\$50 billion, but might be increased up to US\$100 billion capitalization. Both the AIIB and NDB have their headquarters in China, and they will cooperate and complement each other's initiatives and projects. Furthermore, China has already invested more than US\$50 billion in Central Asia's infrastructure and has established another US\$40 billion Silk Road Fund to finance future infrastructures and transportation networks as part of its OBOR initiative

Security Challenges

The OBOR initiative and future Chinese investments in the OBOR regions are highly dependent on a stable and politically safe neighbourhood. But neither Central and South Asia nor China's own bordering province of Xinjiang in its western region or Tibet in the southwest are politically stable regions. As a result of its new Silk Road grand strategy, China has increased its diplomatic and security engagement in Central and South Asia as well as Africa during the last years. Beijing has also used the OBOR initiative to increase its political pressure on the Tibetan exile community and the Islamic minority of Uighurs in Xinjiang. On the other hand, the increasing investments in infrastructure projects and trans-border trade can contribute to more political and socio-economic stability in Eurasia.

Beijing's primary security concerns are directed towards Afghanistan and Pakistan. China has become more proactively engaged as a supporter of reconciliation

negotiations between the Taliban and the Afghan government. China has not only become motivated because it sees Afghanistan as a safe haven for Uighur militants. The Muslim Uighur population in Xinjiang is still growing and local tension in Xinjiang has increased after worsening terrorist attacks during the last years. In Afghanistan, Beijing was largely able to ensure with the Taliban leader Mullah Mohammed Omar

Asian Reactions

It can hardly be surprising that some countries have explicitly expressed their security concerns about China's OBOR initiative and, like Vietnam, have rejected some China-proposed rail links between their countries.

Even more concerns have been voiced against the 21st-century Maritime Silk



that its economic assets would not be attacked by the Taliban. While the Taliban benefited from Chinese arms, money, and modest political support, the death of Mullah Mohammed Omar in the summer of 2015 has made Chinese investments and assets (i.e. raw material projects) much more unsafe and insecure.

Despite their competing strategic interests in Central Asia and the Caucasus, China

Road (MSR) as Beijing may use it to camouflage its execution of its "string of pearls" strategy. These voices posit that China will build up key military and commercial facilities (such as the Pakistani port of Gwadar) along the Indian Ocean for the expansion of its blue-water navy in the future and to safeguard its military interests in the region - which India sees as its sphere of influence. But Chinese experts insist that the

MSR is instead intended to make China's maritime policies more cooperative – otherwise it would conflict with the overall strategic objectives of OBOR that also require enhanced cooperation with India. These conflicting views of China's OBOR initiative are common among many of its neighbours as OBOR is identified in many Eurasian countries with strategic risks as well as economic opportunities.

Western Ambivalence

In the US, the initial reactions to the announcement of OBOR were that it was simply a response to the Obama administration's 'New Silk Road' initiative of October 2011. But the US plan never committed comparative diplomatic and economic-financial resources to the project. As US troops pulled out of Afghanistan and the security situation there began to deteriorate again, its commitment to the region and the project waned.

In the view of China, the EU-28 had initially overlooked its OBOR initiative and its strategic importance and is only now beginning to wake up to some of the op-

portunities for cooperation. Nonetheless, EU countries have reacted on a bilateral basis without involvement from Brussels. As a result, it has allowed Beijing to play the individual EU countries against each other and to undermine the EU's new global strategy of its common foreign and security policy. Fourteen member states, for instance, have joined the AIIB. Through its 16+1 regional cooperation framework, in which China engages with Central and Eastern European countries, it is also bolstering support for OBOR in Europe. Beijing is already giving financial support to the construction of the Belgrade-Budapest High-Speed Railway and has developed the vision of the trans-Balkan high-speed railway, which will connect the Greek port of Piraeus (which is partially managed and controlled by a Chinese firm) with European markets. It has considerably increased all kinds of investment in the Balkan states and, therewith, significantly its geopolitical influence in Europe.

The new economic-financial dependencies of Southeast and Central European EU-member states on China have al-

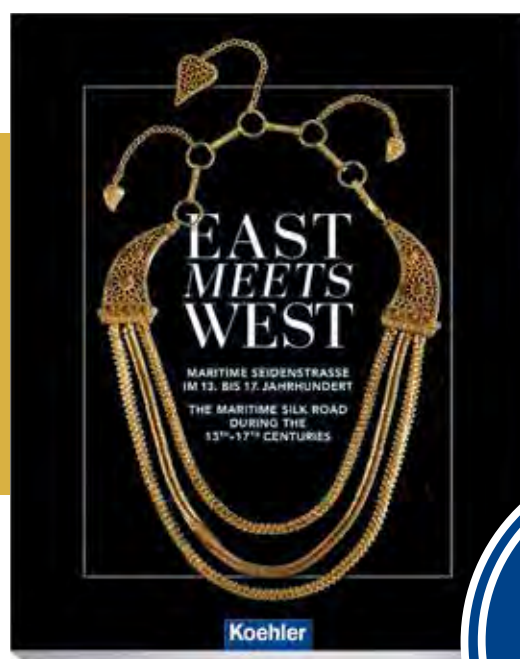
lowed Beijing to prevent critical statements of the EU in its already ambivalent relations with China. Thus China's two-pronged strategy of political pressure and economic incentives ahead of the Asia-Europe Meetings (ASEM) summit of July 2016, for instance, was successful, as Hungary, Croatia and Greece refused to support a common critical statement of the EU towards China's sovereignty claims in the South China Sea.

Against this background, the EU now has to decide whether it wants to take part in OBOR, or whether it will stand by and cede the EU's future OBOR policies to its individual member states without coordinating them. If the US and Europe do not become more actively involved in China's OBOR initiative, they not only risk losing business and investment opportunities in the most economically dynamic region in the world. It might also undermine the EU's own wider global economic and geopolitical influence in Eurasia – and leave the future regional order of the Eurasian map – to which Europe itself belongs – to be determined solely by China's ideas and geopolitical designs. ■

EAST MEETS WEST

THE MARITIME SILK ROAD DURING THE 13TH – 17TH CENTURIES

The exhibition
EAST MEETS WEST
at the International Maritime Museum
is open till 10 September.
WWW.IMM-HAMBURG.DE



**THE MARITIME SILK ROAD
DURING THE 13TH – 17TH CENTURIES**

Paperback
21 x 26 cm | 160 pages
€ (D) 19,95 (plus shipping)

**The book
on the exhibition
is now
available!**

Koehler
koehler-books.de

EU Defence Capabilities

Giulia Tilenni

Since the 1990s, the creation of common capabilities has been considered as an important step towards an integrated defence policy. Nonetheless, such EU defence capabilities are still far from a reality.

The European Union Global Strategy (EUGS) released in 2016 demonstrates the EU's increased ambition in the defence domain. The idea is that EU crisis response to external threats can be quick and effective only if the organisation strengthens its international role. So, the EU should be able to speak with one voice and to express a credible, common military potential. This means EU member states should

related supports (e.g. intelligence, logistics) within 60 days from the eruption of a crisis. Forces were expected to face five pre-arranged scenarios – separations of parties by force; stabilisation, reconstruction and military advice to third countries; conflict prevention; evacuation operations; and assistance to humanitarian operations. The 2001 Helsinki Progress catalogue made a comparison between the capa-

and the EU level) have been achieved, and the Headline Goal is far from a reality. Although a number of bottom-up joint programmes are in place, their development is still driven by national interests rather than common values. In addition, tools such as Battlegroups (the supposed EU rapid reaction forces), although fully operational, have never been deployed. The political ambiguity at the national and the EU level makes mapping EU defence capabilities particularly complex, as official figures on member states' contributions to EU defence do not exist.

EU Capabilities to Be?

As top-down initiatives are stuck, a number of EU bottom-up joint programmes have been developed in the last decade to fill capability gaps at the European level and to stimulate governments to resume EU-level ambitions. Programmes aiming to create a European defence industrial base are the most notable example. Nevertheless, a bottom-up approach means that EU programmes are the outcome of continuous compromises among participating member states. Their planning/development lasts for long periods, thus affecting negatively the response to operational requirements. They are often slow and costly, just the opposite of what they were intended to be. Yet they are pretty significant in Europe. In particular, there are four capability programmes that have been developed within the European Defence Agency framework by a sufficient number of members to be called "EU programmes":

The Air-to-Air Refuelling (AAR) programme, which should optimise existing capabilities, enhance A400 AAR capabilities and increase the overall EU tanker capability by 2020. Operations in Kosovo (1999) and Libya (2011) have demonstrated that fragmentation and insignificance of the number of deployable assets make EU states inefficient in air-to-air refuelling. To date, EU countries can field 42 tankers of 12 different types (the US has +550 tankers of four types).

The Remotely Piloted Aircraft Systems (RPAS) programme is a comprehensive programme including RPAS integration in non-segregated air space, the harmonisation of airworthiness certification for military RPAS, support to the development of a European

Photo: NATO



NATO Secretary General Jens Stoltenberg and Antoni Macierewicz, Minister of National Defence of the Republic of Poland, during Stoltenberg's attendance at the European Union Foreign Affairs Council in defence format.

provide the organisation with dedicated military instruments to rapidly deploy when a crisis erupts.

The 2003 (approved in 1999) and the 2010 (approved in 2004) Helsinki Headline Goals describe in detail how EU defence capabilities should look. According to those documents, the EU should have been able to deploy self-sustained forces up to corps levels (15 brigades or 50,000–60,000 troops) and

bilities deemed necessary to reach the Headline Goal and actual forces pledged to the issue by member states. Conclusions identified a number of huge capability gaps which negatively affected autonomous EU missions – even admitting political will to implement that agenda for real. The most critical included carrier-based air power, early warning, Intelligence-Surveillance-Reconnaissance (ISR), Unmanned Aerial Vehicles (UAV), airlift and strategic transport. Since then, a number of legal and economic initiatives have been implemented to stimulate the creation of EU defence capabilities. Yet, neither effectiveness nor political consensus (both at the member states

Author

Giulia Tilenni is an analyst for international affairs based in Paris, France.

MALE (Medium Altitude, Long Endurance) RPAS to be operational by 2025.

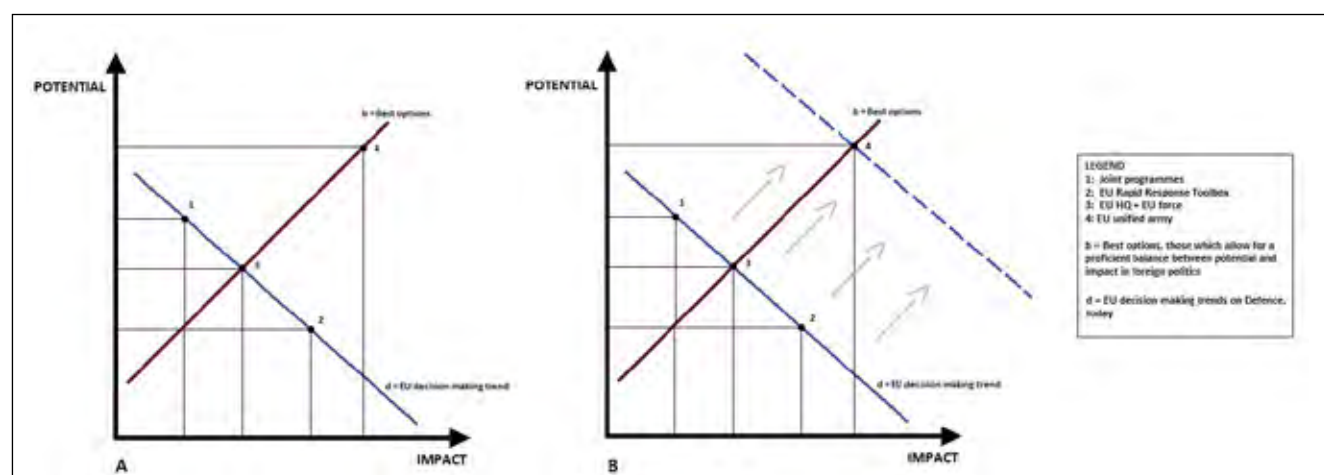
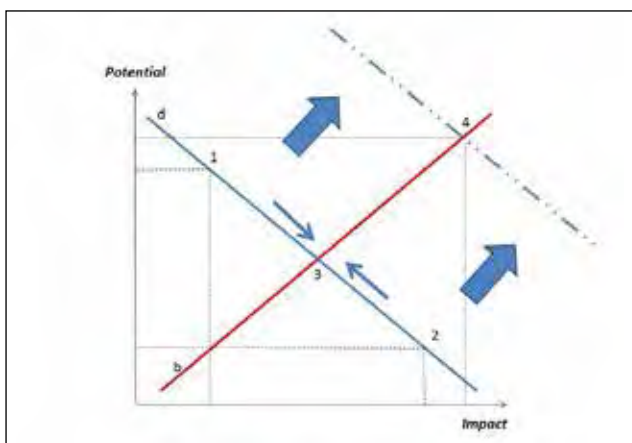
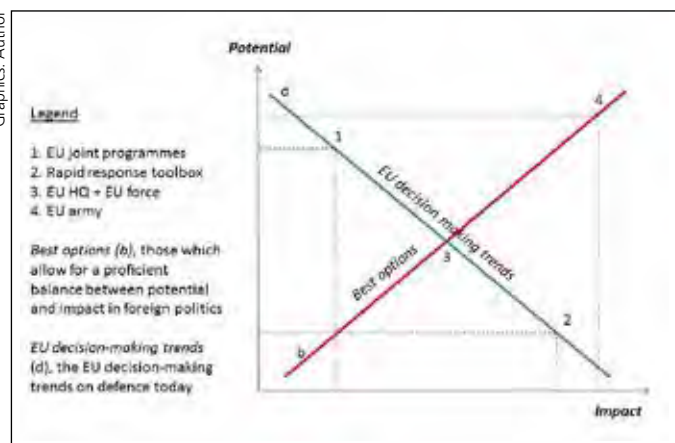
The Governmental Satellite Communication programme is expected to prepare the next generation of EU-tailored satellite communications in the 2025 timeframe. This ambitious programme is developed in collaboration with the European Space Agency and the European Commission.

Limited Capabilities or Lack of Political Will?

The recent EU Parliament report on the opportunities the Lisbon Treaty offers for defence cooperation (March 2017) identifies the advantages EU member states could gain through closer defence cooperation. According to the report, duplication, overca-

systems of weapons (154 items for Europe, 17 in the US) and armoured personnel carriers (37 items for Europe, 9 in the US). According to EU Parliament estimates, these two sectors alone could originate €1.1Bn savings. Furthermore, joint procurement per se could originate up to 30% savings, which could be reinvested in equipment/R&D, thanks to economies of scale.

Graphics: Author



Pooling and sharing satellite capabilities would have two implications. First, it would fill an important capability gap with limited public investment and would provide CSDP military missions with a fundamental asset. Second, such a capability could be exploited in the civilian sector as well. The roadmap for the preparation phase is expected in May 2017.

A Cyber Defence programme focused on training, technology, and protection of EU assets.

Other ongoing programmes within the EDA framework tackle capability gaps through a higher interoperability. The European Air Transport Fleet is a notable example. In order to reduce the shortages on airlift capabilities, this three-phase programme (expected to end in 2021) includes joint training and courses to increase interoperability.

capacity and barriers to defence procurement cause €26.4Bn to be wasted each year. National defence budgets are spent inefficiently, and allocations for investments and maintenance remain lower than allocation for personnel. To better explain this imbalance, the Parliament takes the comparison between the EU and US armed forces as an example. EU total armed forces (the sum of the 28 member states) consist of 2,149,800 servicemen and spend an average of €23,829 in equipment/R&D per soldier. The US armed forces consist of 1,382,250 servicemen, and spends €102,264 on equipment/R&D investment per soldier. Furthermore, European countries are able to deploy 4% to 5% of their overall manpower (60-100,000 servicemen out of 2 million), half of which are British and French. Inefficiency is magnified by procurement duplications, for instance the diversity in

In sum, EU countries spend inefficiently because they cooperate less than allowed by the EU framework. The scarce resources for defence are sub-optimally allocated, and, consequently, the inefficiency of their national defence systems is growing, especially in terms of equipment. Domestic factors (e.g. sustaining national industries to maintain occupational levels, hiring plenty of servicemen just to create jobs, theoretical national defence priorities, and so forth) have been leading member states to procure the most relevant systems domestically, and leave to EU cooperation only military programmes with a lower impact (e.g. air-to-air refuelling). Instead of pooling and sharing to solve the aforementioned capability gaps, member states are amplifying them. In fact, they struggle for full-spectrum domestic capabilities (even when financially unsustainable) rather than spe-



Photo: Irish Defence Forces

Soldiers of the Nordic Battlegroup (NBG) comprising contingents from Sweden (Lead), Estonia, Finland, Ireland, Latvia, Lithuania and Norway

cialising in niche capabilities (thus raising the level of efficiency).

EU Capabilities and the EU Political Weight

According to the 2016 EU Global Strategy, the EU should enhance its external role and its ability to promptly respond to international crisis by 2020–2025.

However, it is unlikely this scenario will ever take place in this timeframe for at least two main reasons. First, joint programmes are supposed to fill existing capability gaps (highlighted since 2001) in the same timeframe, which is too short for accomplishing significant military programmes. This means the EU will be unable to have those military capabilities ready in an eight-year horizon, and it is already clear. Second, the tools already available in theory have never been implemented in practice. For example, member states are planning to reshape Battlegroups in a modular and flexible way, as deploying a high number of troops in a small amount of time is too expensive and difficult – 1,500 servicemen does not seem like such an impactful force in comparison, for instance, to the 350,000 servicemen Russia deploys in its Unified Strategic Command (OSK) West only (kept ready through massive drill).

In sum, 28 states, despite their 2+ million soldiers and thousands of weapons systems of hundreds of types, declare they are unable to provide the EU with two deployable battlegroups (about 3,000 soldiers with relevant assets) per semester. Each of them cannot avoid purchasing national items for

“national security reasons”. None of them can deploy a single regiment for the same reason.

On the one hand, this could be explained by the economic constraints and the sub-optimal allocation of defence budget, on the other the lack of a stable and strong political willingness has a crucial role.

If the situation remains unchanged, the EU would be unable to advance its objectives at the international level. Even if member states decide to pledge more political capital to a stronger EU external role, the EU would remain a secondary actor due to the lack of credible military capabilities.

EU decision-making trends on defence tend to have high potential and poor impact in foreign politics or vice versa. Today, impact and potential are inversely proportional. Hence, joint programmes have a high impact, as pooling and sharing can fill capability gaps more efficiently than national solutions, and can contribute to fleshing out EU military capabilities and credibility. Yet they have a low potential in foreign politics as they are too small. Furthermore, deals among EU participants take longer than usual because of national claims.

So far, EU cooperative programmes are not the best options on the table but, rather, the only ones feasible with a general consensus. Conversely, the EU Rapid Response toolbox – e.g. Permanent Structured Cooperation or Battlegroups – is another example of current trade-offs. In effect, EU Rapid Response toolbox has higher potential than joint programmes, as it comes from a top-down approach and its use generates some kind of political-military

outcome in a reasonable time, thus with limited costs in comparison to bottom-up defence programmes. However, its current impact is very low in comparison to joint programmes, as the toolbox is underused as well as almost empty when it comes to leveraging on military power. Hence, to have a more decent EU performance on defence given the current framework, member states should establish a more proficient policy approach. For instance, the independent EU Headquarters commanding self-sufficient EU assets to perform even a small mission would make the EU more credible decision-making politics and military actor. In perspective, the creation of the EU unified army is not compatible with today’s decision-making trends. To achieve it, EU members should push forward the whole line, which means a major scale-up of treaties, as well as a substantial reshape of EU-NATO ties.

What’s next

On paper, embryonic EU military capabilities might already be established in the short-term through the existing tools, such as Permanent Structured Cooperation and Battlegroups. In order to gain some degree of strategic independence from NATO and the US, this cooperation should start from gap fillers. The aforementioned EDA programmes can be read as pushing factors in this sense. To sum up, if the EU really wanted to pursue the “level of ambition” set by the EUGS, it should change its approach to defence cooperation in order to steer its policies towards equilibrium between best options and decision-making trends.

In theory, in a longer timeframe, member states might go further. For instance, they might specialise in different niche capabilities to be put together in case of need instead of insisting on full-spectrum capabilities they cannot afford – a problem the EU shares with NATO. The only true experiment of this kind is represented by the Estonian experience. Tallin maintains basic military capabilities, but it has especially focused on the cyber domain. In sum, Estonia has to rely on allies for its territorial defence, but in turn offers valuable cyber assets. Nevertheless, to mirror Estonia, EU member states should be perfectly aligned in foreign and defence politics and they should modify their posture towards national defence industries. So, although feasible in theory, this scenario is not viable within the current trend. Given NATO-related binds, it is unlikely member states’ commitment could be pushed so far. Yet, everything will depend on future EU members’ commitment and strategic foresight. ■

Viewpoint from Madrid



Esteban Villarejo Ceballos

Gibraltar and Brexit – The Unexpected Opportunity for Spain

A few days after initiating the Brexit process the United Kingdom received the first setback from the European Union. The twenty-seven nations adopted the thesis of the Spanish Government based on two principles:

1. Upon completion of the Brexit, the British colony will automatically no longer be an EU member, either;
2. Any extra agreement between the UK and the EU affecting Gibraltar will require a „green light“ from Madrid.

In practice, the Spanish Government will have the right to veto any advantageous framework of relations between the EU and Gibraltar. That decision announced by the President of the Council, Donald Tusk, was considered a success of Spanish diplomacy. For instance, this veto could change the special tax status of Gibraltar, its access to and from the EU markets, its thriving online gambling business or bunkering activities at sea.

As a result of this exceptional nature, Gibraltar is a privileged place with one of the highest income levels in Europe: its GDP per capita (€74,381) was ranked third in the world in 2015, only surpassed by Qatar and Luxembourg. Not bad considering the location in the South of the Iberian Peninsula and surrounded by the Province of Cádiz, a territory with one of the highest unemployment rates in the EU.

Truly, Gibraltar has benefitted from a highly advantageous situation for the last 44 years, which has to do with the way the UK negotiated its accession to the European Communities in 1973, when Spain was still a dictatorship under the regime of General Francisco Franco.

Spain has been an EU member state since 1986 and could say nothing against that special „regime“ of Gibraltar during these four decades. But now, the opportunity has suddenly come up in the most unexpected way: after a referendum in the UK!

„The Rock“, as this geostrategic enclave from where you can see

Morocco is dubbed, was captured by the British in 1704 during the War of the Spanish Succession on behalf of the Habsburg claim to the Spanish throne.

Therefore it has had a historical and emotional value for UK governments. For example, it was Gibraltar that the dead body of Vice Admiral Horatio Nelson was brought to by the ship „Victory“ after the battle of Trafalgar (1805); however, his tomb was placed in St Paul's Cathedral (in London). The „Trafalgar cemetery“ is a must see visit to understand the deep historical feelings of the UK towards Gibraltar.

Also, during the Second World War, Gibraltar's civilian population was evacuated and the Rock was strengthened as a fortress. Reportedly Winston Churchill ordered to save all the monkeys of the Rock since legend has it that Gibraltar will not be British anymore the day all the monkeys die.

The Rock runs from North to South in 40 minutes walking, has an area of 6.8 square kilometres and 30.000 inhabitants and, despite its small size, accommodates 24,000 companies – many of them, of course, virtual.

But there is another special „company“: the „British Forces Gibraltar“ (560 troops), the name given to the British Armed Forces stationed in the overseas territory, at its naval station, a cheap port call for submarines or frigates of the British Royal Navy on its way to the Mediterranean Sea.

The Brexit can be a drama for Gibraltar but an opportunity for Spain. The Spanish Government will play its cards together with the EU. „It will be a long and hard negotiation“, Spanish authorities recognise. Today Gibraltar is facing a dilemma: it can either follow the UK and give up all the EU special conditions of free movements or reconsider the Spanish offer of co-sovereignty or other „Spanish“ agreements. The shadow of a Spanish veto will be there.

Fifteen Years of Western Engagement in Afghanistan

What has been accomplished?

Martin Pabst

A good 15 years after the start of the international military intervention in Afghanistan, the outcome is uncertain. The promotion of democracy and cooperation in development have been boosted, the international military presence has been significantly reduced. However, the country continues to suffer from reckless warlords and endemic corruption and the security situation has continually deteriorated. An overdue political solution to the conflict is only slowly being implemented.

The “emirate” of the archaic Taliban islamists, which was founded in 1996, was not in the focus of the international community until 11 September 2001, because it guaranteed a certain degree of stability. The US government and the Union Oil Company of California contacted the Taliban in order to realise the planned strategic oil and gas pipelines from Turkmenistan via Afghanistan to Pakistan and India. However, the presence of al-Qaeda under its leader Osama bin Laden in Afghanistan became a source of problems. The devastating al-Qaeda bomb attacks of 7 August 1998 on the US embassies in Nairobi and Dar-es-Salaam with over 200 deaths made Afghanistan a security issue. US President Bill Clinton responded with Cruise Missiles, directed towards a suspected al-Qaeda training camp.

After the devastating al-Qaeda attacks of 11 September 2001, US President George W. Bush ultimately demanded the extradition of Osama bin Laden and the closure of the Taliban’s al-Qaeda bases. When the Afghan government failed to comply, the multinational Operation Enduring Freedom-Afghanistan (OEF-A) was launched, allied with the oppositional “Northern Alliance”. Already on 13 November, the Taliban were expelled from Kabul, and in December a transitional government was established under US-friendly President Hamid Karzai. In the years 2004 and 2005, free presidential and parliamentary elections were organised and a new era in the country’s

Photo: Tourism World



history began. The OEF-A supported the anti-terrorist fight, and the International Security Assistance Force (ISAF), established under the leadership of NATO in December 2001, sought to create a secure environment for reconstruction and humanitarian activities.

But there was no coherent Afghanistan concept – the United States had gone there exclusively because of Osama bin Laden, not for reasons of democracy and development policy. The international powers, however, decided to remain in Afghanistan. Soon, high-flying plans were being developed in order to create a “Switzerland in the Hindukush” within a few years. These promises aroused immense expectations among the Afghans, which were not met and led to bitterness and even widespread hate, especially against the USA. As of 31 December 2014, the deployment

of ISAF was terminated and replaced by the greatly reduced Mission Resolute Support (13,000 men) with the tasks: Train, Advise, and Assist. At the same time, the combat mission OEF-A ended. The downsized US successor mission Operation Freedom’s Sentinel (OFS), together with the Afghan security forces, is carrying out anti-terrorist operations and supporting the work of Resolute Support.

The international community promoted the growth of Afghan security forces (army and police) with massive training and equipment expenditure. Between March 2009 and December 2011, their number increased from 163,000 to 323,000. But what one had neglected in the first years, one could not attain in “fast forward”. The Afghan security forces are well equipped today, but they have to deal with logistic problems, loyalty to the government is lim-

Author

Martin Pabst, Political Research & Consultancy, Munich, Germany.



Photo: U.S. Army

US Army's CH-47 CHINOOK helicopter flies over Kabul, Afghanistan.

ited, and corruption reduces the fighting power.

Problematic is the massive action of the US forces against the enemy, even boosted now under US President Donald Trump. Drone attacks and "monster bombs" lead to many civilian victims and drive new volunteers to the Taliban after each operation. The independent Bureau of Investigative Journalism in London has meticulously recorded the civilian victims every year. But this is not talked about by US agencies or Afghan institutions. The latter have anyway lost any credibility because of constant lies. For example, the Afghan government carries on arguing that Taliban fighters had been hiding in Kunduz's hospital run by "Doctors Without Borders", which was bombed by the US Air Force on October 3, 2015 (30 people killed, 37 injured).

Ambivalent Outcome

Today, the outcome of the international engagement in Afghanistan is mixed. The euphoria of the comparatively safe and undisturbed early years has long since vanished. On the positive side, there are visible advances in health, education, and infrastructure. For example, the under-five mortality rate dropped from 257 per 1,000 live births to 55. School enrolment for general education has increased from 1 million in 2002 to around 8.7 million in 2016 – with 39% girls – and more than 185,000 teachers. In 2016, there were nearly 310,000 students (30% women) in institutions of

higher education, during the Taliban regime there were fewer than 10,000 (and only male) students at the end of 2001. But strong patriarchal traditions are opposed to women's emancipation. Especially in rural



Photo: U.S. Army

Medical care has been increased by ISAF, while the mortality rate of children has been significantly reduced.

areas, they cannot go to schools or benefit from healthcare in many places. The comparatively high degree of freedom of the press is certainly positive, and no fewer than 3,000 non-governmental organisations are active in the country.

A major problem is the low level of economic growth, which amounted to 0.8% (2015) and 1.2% (2016) in real terms. Considering the annual population growth of almost 3%, there is no perceptible improvement, rather a real annual loss of income. The unemployment rate rose from 25% to 40% between 2014 and 2016, not least due to the massive reduction of international missions. The agricultural development was neglected, which is becoming more and more negative. The deterioration of the security situation is also detrimental to the agricultural sector, and organisations (natural gas, petroleum, coal, gold, iron, copper, lithium, chromium, marble, etc.) are therefore not adequately developed. Chinese companies have the lead in this field, they run a huge copper mine and have been extracting oil since 2012.

In the coming years, only slight improvements in the economic situation can be expected. In addition to the poor security situation, this contributes to massive emigration. After the Syrians (4.9 million), Afghans (2.7 million) now rank second among the world's refugees. The city of Herat in the north-western province of the same name has become the point of crystallisation for Afghans intending to migrate. Professional networks of trafficking have been established there. In addition, there

are 1.2 million internally displaced persons, who are mainly located in urban agglomerations and contribute to the aggravation of the problems there.

The country's four major problems are corruption, abuse of power, drug cultiva-

tion and the poor security situation due to Taliban offensives. In Transparency International's Corruption Perception Index 2016, the country ranked 169th out of 176 countries. The endemic bribery paralyses the development efforts. Since 2001 alone, the US has invested US\$1.5 trillion in the civilian reconstruction and the military stabilisation of Afghanistan. But a lot of subcontractors were involved, and corruption in all stages, as well as the lack of absorption by Afghan institutions

and 20,000 refugees residing in Pakistan must now be cared for. For many Afghans, the warlords are the biggest system error. Their involvement destroys the legitimacy of the government.

The government of unity, led by President Ahmad Ghan and "Chief Executive" Abdullah Abdullah, which was formed under pressure from the US in 2014 after massively controversial presidential elections, is also hopelessly at odds with itself. Many government posts are still vacant.



Photo: Youtube

Many Afghans rely on poppy production for the opium market, since no other crop generates similar revenues in the area.

and organisations, meant that only a small part of the funds made it to recipients. To date, dubious warlords control regions and resources and occupy important government offices. They played an important role in the "Northern Alliance" allied with the intervention troops and were accepted as reliable partners in the fight against the Taliban. Leaders such as Abdul Rashid Dostum (Vice President of Afghanistan), Ismail Khan (former Minister of Water and Energy) and Atta Mohammad Noor (Governor of the province of Balkh) received important government offices, although they are accused of massive enrichment, abuse of power and human rights violations. With their own militia, they secure their influence and loyalty of the people. Critics are silenced or pushed abroad. Their militias are part of the army operations against the Taliban, with little concern for human rights and warfare.

This policy is not restricted to the usual suspects, but more warlords are co-opted. Thus, in 2016, a peace agreement was concluded with the former Mujahideen leader Gulbuddin Hekmatyar, whose Hizb-i-Islami (Islamic Party) killed thousands of civilians in the early 1990s. His entourage, 10,000 to 20,000 fighters

The warlords are responsible for opium cultivation, too. Already at the time of the "Northern Alliance", the zone which they controlled was an important drug-producing area, whereas the Taliban were rigorously opposed to drugs. Warlords and corrupt politicians have once again boosted drugs production. Now the Taliban also use this profitable business to finance their insurrection. According to the UN Office for Drugs and Crime Control (UNODC), the drug-producing area has risen in 2016 to the third-highest level in more than 20 years. It is assumed that the opium harvest in 2016 was more than 40% higher than in the previous year.

Finally, the security situation in Afghanistan has deteriorated considerably. The massive increase of international forces in the years 2009 to 2011 (the number of US troops rose to more than 100,000 by 2011) could not bring any lasting improvement. Since 2009, civilian casualties have risen steadily from 5,669 (2009) to a record level of 11,418 (2016). Today, everywhere in the country is war. The Afghan security forces now only control slightly more than half of the territory at most, and they have to concentrate on the protection of urban areas. In many rural districts the Taliban have the say.

On 16 April 2017, US National Security Advisor General Herbert R. McMaster, on a visit to Afghanistan, had to concede that there was "a big security problem". Only a few days later the statement was impressively confirmed: Ten Taliban fighters in Afghan army uniforms on 21 April succeeded in penetrating the regional army headquarters at Camp Shahin near Mazar-i-Sharif (province of Balkh) and killed over 130 Afghan soldiers. The result was a massive loss of confidence in the government and security forces.

Causes of the Problems

After 2001, Afghanistan's international supporters, led by the US, set themselves on two pillars: civilian reconstruction and military security. In their civilian efforts, the Americans concentrated on extensive financial support. But less money and more sensitivity to local needs would have produced better results.

These nations have also neglected to put more pressure on the Western partner Pakistan, as Taliban and al-Qaida have continued to rely on support networks there. The US wanted to win over the Taliban with military means, without however taking into account that the opponent represented a significant part of the population and could get additional support due to Western failures. Still in 2001, Commander Mullah Omar had offered negotiations, and Hamid Karzai had responded positively, but the US Americans declined the offer sharply.

After the military re-emergence of the Taliban, Washington became interested in talking to the enemy. At the end of 2010, the first secret talks were held with the Taliban, and at the Petersberg conference the following year, the peace dialogue was to be launched and continued from a position of relative strength (numerous Taliban commanders had been liquidated). However, the unexpected death of the US Special Envoy and committed dialogue advocate Richard Holbrooke on 13 December 2010, resistance in certain Washington circles, and the shift of Afghanistan's President Karzai undermined the promising approaches. Undoubtedly, a favourable time was missed. After the June 2011 Obama announcement of the gradual withdrawal of most international forces by the end of 2014, there was no longer any incentive for the Taliban to negotiate, but it was a good idea to await the weakening of the Afghan government.

In 2007 the German social-democratic politician Kurt Beck was ridiculed for his "naivety" when he suggested peace nego-



Cooperation during OPERATION OVERLORD, a division-level air assault mission designed to trap Taliban forces in 2011.

tiations with moderate Taliban leaders. Today it has become commonly understood in Berlin, Washington and other capitals that the political pillar has to complement the economic and military. In 2013, the Taliban spokesperson distanced themselves from international Jihad. There have been preliminary negotiations in Doha, Qatar, in 2016, where the Taliban run a liaison office, but there has not been a breakthrough yet.

The regional power constellation has also become much more complicated compared with 2010. Similar to Syria, Russia now seeks involvement in Afghanistan as an independent actor. Some reports already indicate that Moscow is trying to put pressure on the West with its contacts with the Taliban and possibly even with arms deliveries to them. China and Iran have also strengthened their activities in

Afghanistan. In the opponent's camp, the situation has also become more complicated. As a new factor, so-called Islamic State (IS), which is hostile to the Taliban, was added in 2015. Although Afghan security forces and US forces were able to reduce its strength to 600 to 800 fighters and to restrict its presence to a few districts in the east of the country, IS could regain strength, should its fighters leave Syria and Iraq.

The Afghan political analyst Hashmat Moslih ("The Taliban and obstacles to Afghanistan peace talks", Al-Jazeera, 25.2.2016) identifies four options for a negotiated peace agreement: firstly, the creation of a "national unity" government; secondly, direct national elections in which the Taliban would participate; thirdly the creation of a "southeast frontier" administered by the Taliban, similar to Pakistan's autonomous "northwest frontier" run by ethnic Pashtun tribes; finally, a phased peace process entailing the devolving of power to Afghanistan's provinces, with each electing its own governor and forming its own police force.

It is safe to say that no lasting peace in Afghanistan will be possible without the involvement of Taliban leaders who are open to peace and renouncing terrorism. ■

2nd European GeoInformation Symposium and Exposition

20 - 22 June 2017, Berlin, Germany



"Big Data - Key for Future GeoInformation Services"

The **2nd European GeoInformation Symposium** of AFCEA Europe and the Bundeswehr Geoinformation Service, held under the Patronage of the Ministry of Defence, Germany, will focus on how huge and constantly growing amounts of related data and datasets can be handled simultaneously, efficiently and effectively to provide guidance for future-oriented decision making.

Session Topics:

- Requirements and Architectures
- Strategies and Methods
- Analytics of Environmental and Geospatial Data
- GeoInformation Services

Up-to-date Event
Programme



Registration, exhibit and sponsorship opportunities:
<http://news.afcea.org/GEO17>



Turkey's Relations with and Relevance for NATO

Eugene Kogan

It should be remembered that Turkey's relations with NATO were not as smooth as perhaps some experts wish to think, even before the failed coup on 15 July 2016. For instance, back in November 2009 the AKP government was adamant that despite Turkish soldiers' participation in the ISAF mission they were not combat troops.

Turkey's position at the time irked allies in NATO and the US in particular, and it has not changed since then. Although Prime Minister Erdogan played hardball in the April 2009 decision against the nomination of new NATO Secretary-General Anders Fogh Rasmussen, it did not help at the time to assuage Turkey's grievances, and it only irritated EU NATO leaders and contributed to the already strained relations between the EU NATO member states and Turkey.

There is no doubt that relations between Turkey and NATO further worsened after the failed coup, with plenty of uncertainty at the NATO Headquarters on what exactly did happen in Turkey. The massive arrests following the failed coup and in particular those arrests of the highest echelons of the Turkish military further contributed to the strained relations between Turkey and its NATO partners. The numbers of the military purged are staggering. Since the mass purges beginning on 27 July 2016, about 44 percent of the land force generals, 42 percent of air force generals, and 58 percent of naval admirals were removed from the office.

Simply Surviving as an Institution

Admiral James Stavridis, former NATO Supreme Allied Commander Europe of NATO Allied Command Operations (SACEUR), said shortly after the failed coup in August 2016 that: "The importance and service capability of the Turkish armed forces in NATO is likely to decrease. Unfortunately, it is likely that the military in the wake of

Photo: Yildiz Yazicioglu



Parts of the Grand National Assembly of Turkey were destroyed during the coup on 15 July 2016.

the coup will be laser-focused on internal controversy, endless investigations, and loyalty checks – and simply surviving as an institution. This will have a chilling effect on military readiness and performance. While some operations have resumed at the crucial Incirlik Air Base, co-operation is already frozen across many US and NATO channels."

The current SACEUR General Curtis Scaparrotti conceded in December 2016 that the purge of Turkish staff at the NATO Headquarters "impacted [on NATO's integrated command] because it was largely very senior personnel, and you lose a good deal of experience. I had talented, capable people here and I am taking degradation on my staff for the skill, the expertise and the work that they produced." General Scaparrotti added that the purge has also affected Turkey's military readiness. "One of the ar-

eas is their air force. Those [removed] were the senior pilots, so they are working now to train younger pilots. It had an impact. I would not say it was serious, but I would say it is noticeable."

Asylum-Seeking Military Staff

One also needs to remember that an unknown number of Turkish military personnel stationed in NATO member states such as Belgium, Germany, Greece, The Netherlands, Norway and the US, to name just a few, asked for asylum. President Erdogan issued a warning to NATO countries against granting asylum to the military in November 2016. He said at the time that: "NATO cannot entertain accepting asylum requests of this kind. Those in question are accused of terror." Jens Stoltenberg,

Author

Dr. Eugene Kogan is a defence and security expert based in Tbilisi, Georgia.

UNDER THE PATRONAGE OF HIS MAJESTY KING HAMAD BIN ISA AL KHALIFA, KING OF THE KINGDOM OF BAHRAIN



**BOOK YOUR
STAND TODAY**

BAHRAIN'S PREMIER INTERNATIONAL TRI-SERVICE DEFENCE SHOW

16 -18 October 2017

Bahrain International Exhibition & Convention Centre



100+ EXHIBITORS



3000+ INDUSTRY VISITORS



Fully-Hosted International VIP
Delegation Programme



/visitbidec



@visitbidec



@visitbidec2017

T: +971 (0) 4 435 6101

E: sales@bahraindefence.com

W: www.bahraindefence.com

Platinum Sponsor



Gold Sponsor



Media Partner



Officially Supported by



Bahrain Defence Force



Royal Bahraini Air Force



Royal Bahrain Naval Force

In Conjunction with



Event Partner



شركة فعاليات لإدارة ذ.م.م.
FADAT MANAGEMENT CO. W.L.L.

Organised by





Photo: Mstyslav Chernov

Demonstration of supporters of President Erdogan right after the coup in 2016

NATO Secretary-General, said at the same time that “the officers’ asylum requests would be processed by the concerned NATO members independently and the alliance would not interfere into this process.”

Stoltenberg’s statement irked Erdogan but the latter decided not to respond. What is clear is that both asylum-seeking officers’ requests and Erdogan’s warning further exacerbated already-strained relations between Turkey and NATO. It is too early to make any forecast on the nature of the implications.. However, one thing is certain – the implications of the asylum applicants and Erdogan’s unyielding demand to extradite these military personnel will be a protracted process for both parties concerned.

Core Values of Democracy and Rule of Law

In addition to the aforementioned facts, the EU decision (made in late April 2017) to stall negotiations with Turkey regarding its potential membership indicates that Turkey’s place in the Alliance comes under closer scrutiny since EU NATO leaders’ perception of Turkey has substantially changed. If the Alliance was [and still is] as Stoltenberg said in March 2017 “based on the core values of democracy, rule of law and individual liberties” then the leadership of Turkey is no longer abiding by these principles. As a result, the Alliance is put in a tight spot, and so far the Alliance has failed to address the issue of democratic values by simply hoping that things in Turkey will get better. However, we know today, 11 months after the failed coup, that Turkish democracy remains under siege. The Things in Turkey

have not improved thus far and may not get better before the next presidential and parliamentary elections scheduled for November 2019.

Even if, as Stoltenberg says, “Turkey is a key country for the security of Europe and without doubt, NATO would suffer from weakness without Turkey,” the opposite is also likely to be correct; namely, that NATO without Turkey may become more resilient, since Turkey is currently an impediment to NATO’s further development, as previously mentioned.. Furthermore, the idea that Stoltenberg has finally given voice to the concept of NATO without Turkey is, in itself, a breakthrough for the NATO vernacular known for its caution and careful wording. It means that finally the genie is out of the bottle and the issue of NATO without Turkey is no longer a taboo for the public debate.

Yes, it is correct that NATO has included non-democratic states among its members for a very long time. Yet, today, it will have to ask itself whether or not it can permanently endure the tensions arising from an increasingly authoritarian, less democratic, and more pro-Islam state in its ranks. For now, the only thing that prevents serious discussions of a Turkish exit (or Turxit) from NATO is the fear of what might happen if Turkey were not to be an ally, but an opponent sided with Russia. Russian leadership is certainly grinning with delight, since it has wanted Turkey to drift into Russia’s orbit for a while and sees what is happening. The cosiness in Turkish-Russian relations has made the Alliance wary of its own member and there might be an understanding at the NATO Headquarters that to a certain degree the Russians have sub-

ordinated Turkey in the Black Sea region. The recent case of Turkey potentially purchasing the Russian-built S-400 air-defence system has added further suspicion to and aggravated already-strained relations between Turkey and the Alliance. I dare say that the relevance of Turkey to NATO under the aforementioned circumstances comes under a big question mark.

It is a known fact that Turkey possesses limited capabilities to affect its relations with its NATO partners. Turkey can only suspend or halt participation in the NATO joint projects to its own detriment. On the other hand, as was highlighted in the recent case of blocking the participation of Austria, a non-NATO member state, mostly in military training (after Vienna’s repeated statements that the EU should end Turkey’s membership talks), Turkey has the right to contradict and will take advantage of this right when it deems it appropriate. Just to remind the reader that back in 2009 the Turkish government refused to approve NATO activation orders for both Kosovo and Afghanistan operations that involved cooperation with the EU, since Turkey is not an EU member state. It was clear then as it is clear now that Turkey will not hesitate to impede NATO unity when it believes its interests are at stake. Thus, the famous motto “One for All and All for One” becomes questionable in Turkey’s case.

Finally, the May 2017 decision by Ankara not to grant permission to members of the German Parliament’s Defence Committee to visit staff currently serving at a NATO mission Incirlik Air Base raises serious doubts about the Alliance’s unity and cohesion. We need to remember that back in June 2016 Turkey banned German lawmakers from visiting the base until the Turkish government relented in October 2016. Following Ankara’s May 2017 decision, Chancellor Angela Merkel said that: “Berlin could move its soldiers to another country from Turkey, such as Jordan.” Germany’s potential move would be the first time in NATO’s history that a member state withdraws a military contingent from one ally country and moves it to a non-ally country, noting that the move would have a negative repercussion on the Alliance’s solidarity.

Expelling Turkey from NATO?

To conclude, does this all mean that if the worst comes to the worst NATO may consider expelling Turkey out of the Alliance? What is known is that the North Atlantic Treaty makes no mention of leaving or being expelled from the Alliance, nor of any penalties for misbehaviour. We need to re-

Photo: WarLeaks



Turkish land forces deployed in the fight against ISIS at the Turkish-Syrian border

member that when the treaty was signed back in April 1949, it has envisaged as such an important article. April 1949 was a different era and Turkey was not yet a member of the Alliance. However, Article 12 of the Treaty says explicitly that "After the Treaty has been in force for ten years, or at any time thereafter, the Parties shall, if any of them so requests, consult together for the purpose of reviewing the Treaty." Apparently, no party thus far made a request and, as a result, NATO failed to adjust itself to the current difficult reality vis-à-vis its member Turkey.

Furthermore, what is known is that the treaty can only be terminated by the member state itself. In other words, regardless of Turkey's geographically strategic position for NATO (as Stoltenberg says "Turkey is a key country for the security of Europe") and Turkey's disregard of democratic credentials today, the Alliance cannot expel its member state. And even if NATO members decide to expel Turkey, such a decision would have to be approved by consensus within the North Atlantic Council (NAC) and, as a result, it would be vetoed by Turkey. Furthermore,

Turkey is not going to leave the Alliance on its own since within the Alliance it defends its interests, can block non-NATO member Turkey, such a NATO programmes, and, finally, influence NATO's internal decisions.

This is indeed a vicious circle where both Turkey and NATO are trapped in an uneasy relationship without, for the time being, a clear way around the impasse. As more time passes, further problems are likely to be piled onto the Turkey and NATO policy agenda that is no longer equally shared by both parties. ■

XI INTERNATIONAL AVIATION AND SPACE SALON **AVIASVIT-XXI**

9-12
October
2018



International Exhibition Centre

Ukraine, Kyiv, Brovarsky Ave, 15,
"Livoberezhna" underground station
tel./fax: +38 044 201 11 63, 201 11 64
e-mail: fire@iec-expo.com.ua

www.iec-expo.com.ua, www.tech-expo.com.ua

The “Gideon” Multi-Year Plan – Why and How

The need to formulate a multi-year plan for the IDF demanded an analysis of force employment needs and consequently of the force generation processes of the IDF. Since the “Tefen” plan, which was approved in 2007, the Israel Defence Forces (IDF) has not had a multi-year plan. The fact that the IDF was lacking such a plan has caused several phenomena: difficulties in long-term planning; damage to the IDF’s effectiveness and difficulties in maximising the utilisation of resources; continued damage to the IDF’s readiness for emergencies; and damage to the IDF and those serving in it which ensued from a broad public discourse on the budget and resources (instead of defence outputs) which caused damage to public trust in the IDF.

Gadi Eizenkot

Accordingly, the formulation of this plan was defined as a key endeavour within the IDF. In recent days, the IDF has reached the midpoint of the second year of the plan. The impact of the plan can be seen on a wide range of fields within the IDF and most importantly on operational readiness for all major contingencies. This article will deal with the process of formulating the multi-year plan and the principles which guided the process of designing, planning and executing it.



The Key Shaping Factors

A number of key factors have accompanied the IDF’s force generation and employment processes:

Significant Changes in the Regional Threat Picture: Alongside a reduction in the status and strength of the threat from neighbouring states, an absence of “governability” has enabled the growth of organisations that are creating new threats with new characteristics. This challenge is a part of a series of challenges which includes an increased likelihood of a deterioration in the Palestinian arena, the continued military buildup of the Hezbollah organisation in the northern arena and also the increased

threat from missile and rocket fire and underground weapons. In addition to these, Iran’s negative role is prominent as an influential and powerful actor engaged in war by proxies against Israel – both through its involvement in the fighting in Syria as well as the assistance

it provides to terror actors. These trends have increased over the last two years and have led to increased sub-conventional and cybernetic threats against the State of Israel and to an ongoing reduction in the conventional and nonconventional threats.

IDF Capabilities: The joint capabilities of the IDF to fulfil its missions are sufficient for dealing with the reference threat, as defined, and are even perceived as a deterrent by our enemies. These capabilities enable us to feel confident in our force employment capabilities, alongside the permanent need to constantly work to improve our combat readiness and fitness for all major contingencies. Over the years, the IDF has struggled to maintain the level of combat readiness and fitness for the primary combat forces because of difficulties in implementing a consistent training programme. This was due to the operational demands on most of the combat forces from routine

operations and as a result of shortages in inventory and spare parts due to the “depletion of inventory” which characterised the ground forces. These led to an ongoing erosion of the IDF’s readiness to realise its purpose and execute its missions.

Changing National Priorities: Over the years, a broad national discourse has developed regarding changing national priorities in favour of social-economic factors, alongside the need to maintain/retain an ability to provide a high level of defence. Additionally, the Government of Israel had decided to shorten compulsory military service by four months and to publish the recommendations of a governmental commission in June 2015, which increased pressure on the IDF to

engage in significant organisational change and to change the way that the organisation was managed.

**Go with this, your might
and save Israel
(based on Judges 6:14)**

This all took place within a complex resource reality which has continued for several years and which forced the IDF to engage in major efficiency and streamlining processes to match the resources that were allocated and to enable the development of force generation processes.

An analysis of these factors led to the conclusion that the IDF needed to engage in a series of changes to its structure and organisation. This presents a window of strategic opportunity, limited in time, which would enable the taking of calculated risks to implement the required changes to the IDF’s structure, capabilities and principally its combat fitness. At the same time, there is a need to constantly maintain and improve

Author

Lieutenant General Gadi Eizenkot,
Chief of the General Staff, Israel
Defence Forces

combat readiness for new developments and possibilities which would require the employment of force.

Accordingly, the IDF must undergo significant change which could provide a response to the need to adapt the IDF to future challenges, the characteristics of modern war and conflict and enable a more effective maximisation of resources. At the basis of this recognition is the understanding that in the future, the IDF will have to deal with threats of even greater significance and will therefore need different capabilities to face significantly larger challenges. This requires the IDF to adapt today.

Over the years, a gap has developed and grown between the need for multi-year plans and the permanent resources available for their implementation. This gap has prevented the inclusion of all force generation needs under an organised plan. The fact that resources are not allocated with a multi-year perspective not only prevents programme implementation and multi-year planning, but also creates a permanent gap in readiness. Consequently, over the years, a crisis of confidence developed between the IDF and the MoD on the one hand and between the Finance Ministry and its personnel on the other. This process



An IRON DOME air defence system intercepting rockets from the Gaza Strip

This agreement and these resources will enable a basic capability to implement the plans in an effective manner. In addition to the ability to implement the "Gideon" multi-year plan in a stable and effective manner, the agreement imposes on the IDF the requirement to fulfil its commitments in the fields of resource maximisation and human resources and to engage in effective management of its budget.

The choice of the name "Gideon" for the multi-year plan was not by chance. In the biblical book of Judges, chapters 6 to 8

ble personality of the judge Gideon. These characteristics were all worthy of inclusion as the basis of the plan.

The IDF's Vision

As a basis for this process and after the design phase, the IDF formulated a vision for the multi-year plan which defines where the IDF should be at the conclusion of the process in the year 2020. The vision was formulated as follows:

A fighting, high-quality, ready and fit military that defeats its enemies and develops capabilities for future threats which are likely to develop in the war arena. A national people's army based on high quality, committed and trained manpower, on high quality platforms and on an improved and professional vanguard on the ground, in the air, at sea and in cyberspace. An army based on missions, combat fitness and appropriate and focused capabilities. A modest military based on an efficient organisational culture, which enjoys the public's trust.

This vision needed to serve as the compass for all the processes included in the multi-year plan. Alongside this vision, a number of objectives were defined as the basis of the plan, including: constant improvement of IDF readiness for escalation and for war in all dimensions; endeavouring to increase deterrence and reduce the enemies' force buildup while avoiding war; implementation of the multi-year plan as published, while being responsive to needed changes during its execution; and finally striving to strengthen the public's trust in the IDF.

Initial Strategy

In parallel to the design of the multi-year plan, we formulated the "IDF Strategy" document whose core was a definition of principles for force employment and force generation. In general, it was appropri-

Photos: IDF



Karakal winter training of the IDF

also affected the public's trust in the IDF and the perception of IDF personnel by the public. In the process that accompanied the formulation of this multi-year plan, MoD and Treasury officials reached an agreement which was the first of its kind and which formalised many of the issues which were the focus of disagreements over the years. At the conclusion of the process, the IDF received a stable, permanent and approved budget for each of the years of the multi-year plan.

describe in detail the story of the judge, Gideon ben Yoash and his war against the Midianites. In his unique manner, Gideon was able to deliver a glorious victory which contributed to dozens of years of quiet. The biblical text describes Gideon's battles as a reflection of the inherent power of an effective combat vanguard, with an approach based on choosing an appropriate force, preparing it for its mission, the use of subterfuge, creativity and initiative in force employment, alongside the hum-

ate that the IDF Strategy be formulated on the basis of Israel's existing defence concept, but given the lack of a written concept, the document was composed on the basis of an oral doctrine and through dialogue with the political echelon. The document is of great importance, and its essence is in building a joint language for those serving in the IDF and outside it, and to accompany all military endeavor – from the planning of strategic processes to the

within the IDF, we have begun a process of updating the IDF strategy with the intention of publishing an updated version during 2017.

The Principles of the Multi-Year Plan

Within the framework of designing the multi-year plan, several principles were defined as the basis for the plan. These would

Dynamic Readiness: Maintaining readiness for the possibility of a deterioration over a short time frame as a concept based on existing capabilities and basic combat fitness, in a manner that will also enable the conduct of long-term force generation processes.

Risk Management: An understanding that a significant window of opportunity exists and enables sophisticated risk management and avoiding investment in fields that



Israeli MERKAVA Mk IV main battle tank

training of the officer corps up to the last of the soldiers. The document's importance stems from the fact that operative plans and operational concepts for force employment in the primary headquarters are derived from it.

Given the importance of the document, and considering the need to inform the public of the missions facing the IDF, we decided for the first time to publish an unclassified version of the IDF Strategy. This enables a glimpse of the security challenges and professional aspects which influence IDF action.

With the passing of two years, the IDF Strategy document has become a significant tool in force generation processes and operational planning and therefore also serves as the basis for the process of formulating the multi-year plan. Currently, considering the operational need and primarily due to a desire to ensure the relevance of the document to processes taking place

serve commanders at all levels to implement the work processes to be derived from plan. These principles include several elements:

Prioritising Readiness: Placing readiness at the top of the order of priorities while emphasising the execution of a training plan, procurement of inventory and spare parts and preventing the 'depletion of inventory' over the course of the multi-year plan. At the same time, providing a long-term response for improving preparations in the combat arena as well as defensive infrastructure.

Differentiated Combat Fitness: Restricting resources and the desire to use them in an effective and efficient manner requires a meticulous and clear prioritisation of the buildup of 'decisive' military power over 'sectoral' or 'area' military power. This will be conducted in a manner that clearly differentiates between these different types of capabilities.

are not required at this time. Concurrently, the freeing of resources for long term investment which is likely to decrease capabilities over the short term but will enable the rapid growth of capabilities in the long-term. Only significant risk management as a basic concept can enable the fundamental management of the required changes and adaptations.

Focus: The need for continuous focus on the processes that are taking place within the army. An understanding that every framework needs to focus on its core missions and avoid divergence from its activities.

Think Before You Act: There is great importance to serious design processes, alternatives analyses and a considered choice of the mode of action, based on a desire to make significant and successful decisions. **Choosing the Right Path:** Avoiding compromises which are made to avoid friction, making and implementing correct deci-

sions which serve the organisation even if they cause disagreements in the short term. This is based on the understanding that the most effective use must be made of each opportunity.

Jointness – Inter-service and inter-organisational jointness, as a concept that serves the operational effectiveness and the maximisation of resources.

The Key Elements of the Plan

The key element of the plan, which has complete and clear prioritisation over the other elements, is IDF readiness to defend the State and achieve victory in war. Within this framework, the plan includes a broad training programme and allows for the procurement and maximisation of inventory and spare parts alongside a planning process to focus and organise operational plans in a manner that effectively exploits IDF capabilities and our understanding of the way future wars will be won. Already in the 2016 work year, a prioritisation was implemented which favoured readiness and was reflected in an increase in the number of exercises for the regular forces, in the implementation of an expanded training programme for the reserve forces, in an inventory procurement programme, a definition of the required level of readiness within the services and the provision of a full budgetary response to the training needs of the ground forces. The challenge of enabling the process of maintaining readiness is increasingly significant when considering the routine security challenges faced by the different sectors. Nonetheless, the commanders at all levels understand that sophisticated risk management of routine operations enables a significant leap in readiness for emergencies and war. In 2017, we are continuing to engage in processes to improve readiness, centred on the conduct of a Northern Command exercise (the first corps-level exercise to be conducted in the IDF in the last 18 years) and the conduct of an advanced process to implement a training cycle of 17 weeks of operational duty followed by 17 weeks of training for the frontline manoeuvre units. With regard to the IDF's manpower, together with the need to reduce the number of career personnel (to free up resources to strengthen IDF units and their readiness) and the number of reserve personnel in the IDF, and in addition to the fact that the number of soldiers completing their compulsory service will shrink due to a shortening of the period of compulsory service, a need arose to ensure the fostering of those currently serving, with an emphasis on maximising the service of the drafted soldiers and those

completing their initial contract in the career army. Career personnel were the focus of several decisions that were made within the framework of the IDF's multi-year plan, such as reducing the number of career personnel to 40,000, introducing a new model for career service and stimulating

treatment for the IDF's manpower and its maintenance.

An additional unique challenge relates to compulsory service, given that the IDF drafts only 67% of those eligible for the draft from the different population sectors within the state, among whom thousands



An Israeli soldier tosses a grenade into a Hezbollah bunker.



Desert warfare exercise in southern Israel

a discourse on the total salary costs of the IDF. These changes introduced a feeling of discomfort among many career personnel due to the large number of changes which demand study and a deep understanding of their impact on the motivation of those who serve. Additionally, essential steps were taken to retain quality personnel – through the provision of significant specific resources, implementation of wage agreements for NCOs and recently a wage agreement was signed for the initial contract period of career service. These are all expressions of the emphasis that the plan places on quality

drop out before the end of their military service. An ethical statement is required to ensure the drafting of all 18-year-olds to full service. In dealing with this trend, a number of steps have been taken to encourage recruitment, while increasing the stipend paid to soldiers and developing a plan 'From Uniform to Studies' which is intended to show respect for those who complete their full service. Additionally, there is a critical importance to involving commanders in the maximisation of manpower and improving the effectiveness of military service.



Artillery, infantry and armoured corps exercise in the Golan.

Over the years, the IDF has given a sufficient response to the everyday needs of the soldiers, but this response has not enabled a dramatic improvement in the quality of the everyday infrastructure in the IDF. In practice, severe phenomena did develop, including neglected bases, the need to raise charitable donations and a lack of a capability to provide those serving with a respectable response. The multi-year plan has created opportunities for a quantum leap in the field of infrastructure, with the sale of various military bases and the "Transfer to the Negev" process in the background. This was alongside an internal prioritisation of resources and the reduction in the number of units which enables the freeing of resources for the improvement of infrastructure. Already during the first year, we can see a change in the vector of response to everyday needs and an improvement in the training bases, war reserve storage bases, combat equipment and urgent infrastructure needs. Concurrently, broader processes are underway to provide a response for the infantry brigades' training bases. This change also requires the IDF to undertake a cultural shift to ensure it maintains this investment over the long term.

In the framework of the plan, a large emphasis was placed on the organisation and structure of the IDF in a professional and high-quality manner that would enable implementation of the vision on which the multi-year plan is based. An understanding was developed of the clear need to engage in changes to the structure of the IDF; out of a desire to focus on the expected core missions while preventing duplication; a desire to adjust the size of the army to its missions; and the need for streamlining. On the basis of this concept a series of steps were articu-

lated in the field of organisation, centred on reducing the size of the IDF, changing the structure of the staffs at the senior level in the IDF, reducing non-core arrays (behavioural science, field trackers, finance, legal etc.), closing other fields (military boarding schools), closing and adapting the order of battle (closing artillery units, single-gender battalions, combat support battalions, one F16 squadron and Homefront Com-



Infantry officer course cadets practising combat in a densely wooded area

mand districts), the creation of a Commando Brigade, the creation of a School for Command and Control and an expansion of the number of border defence battalions (to four battalions). Alongside these steps, the process of combining the staffs of the Ground Force Command and the Technological and Logistics Directorate is ongoing, a process whose origin was in a desire to strengthen the totality of activities among the ground forces. Staff work is be-

ing conducted for the cyber organisation which is being established relatively slowly considering the challenges in this dimension. However, it has already defined which processes are needed to execute the expected improvement under the multi-year plan, which is centred on a fundamental change in our defensive capabilities in this dimension.

Even though military armament is of secondary priority in the multi-year plan, given the procurement processes that were initiated in previous years, armament receives a significant share of the resources. The Israeli defence industries are developing groundbreaking capabilities which will enable an enormous range of armament possibilities. However, under the "Gideon" multi-year plan the process of armament must be based on force multipliers and the development of multi-service capabilities as well as on existing capabilities or of those that are expected to enter service during the multi-year plan. Consequently, a master capabilities concept was formulated based on the IDF Strategy which enables the effective management of resources. In practice, this concept enables the planning of IDF capabilities with a long-term perspective based on an understanding of the need to integrate key platforms and force

multipliers to maximise IDF capabilities but with a clear internal prioritisation of capabilities that are to be strengthened under the multi-year plan. A clear example of this is the force buildup in the cyber dimension. Finally, an additional clear need arose to improve and change the IDF's organisational culture. In addition to several steps which have already been taken in this area, there is still a substantial unfulfilled field of activity and a basic requirement that commanders

realise their personal responsibility to take care of their equipment, maintain military bases and the bases' appearance as well as contribute to the ongoing efficiency and streamlining efforts. This is in addition to changes in a wide range of fields which still need to be examined in depth and which will enable the improved use of time, enhanced effectiveness of service and the ability to combine family life with service.

Methodical Control and Monitoring

The process of designing and planning the multi-year plan was the focus of activity whose peak was the approval of the "Gideon" multi-year plan by the security cabinet on 20 April 2016. Over this entire period, there was a clear understanding that, regardless of the quality of the planning process, and as with any military action, the true test would be in the execution of the multi-year plan. Under this concept several principles were defined: the supremacy of the "Gideon" multi-year plan – the multi-year plan and its components are the leading process in the IDF and the General Staff echelon has a responsibility to protect the execution of the plan. Small victories – there is great difficulty in internalising change capabilities among IDF personnel due to past disappointments. Accordingly, a series of decisions were defined which could be implemented immediately and which would highlight the seriousness of the plan. One of the key tools for execution is a process of methodical control and monitoring conducted by General Staff actors and by myself, personally. On a weekly basis, I devote several hours to the execution of the processes that have been decided upon. Finally, the need to motivate personnel – change is first and foremost led by IDF personnel, therefore there is great importance in motivating them through internal ongoing explanatory processes which will lead the personnel to believe in the plan and to continue to lead it within their units based on the principles which are included within it.

On 1 October 2015, Rabbi Eitam and Naama Henkin (z"l) were killed. This event marked the beginning of a wave of terror with unique characteristics. This wave accompanied IDF activity during 2016 and in practice presented a challenge to the IDF both in the need to formulate a unique preventative concept while executing the IDF's basic mission – to provide security and a sense of security for Israeli civilians – as well as the need to lead the force generation processes which were decided upon in the multi-year plan, despite the more



Part of the "Kedem" search and rescue battalion serving in Nablu

complicated reality. Accordingly, over the year, several adaptations and changes were made, but the basic principles and vision which the multi-year plan were based on were retained, which enabled the IDF to maintain planning stability. Maintaining the principles of the plan in this challenging period only strengthened IDF personnel's support for the multi-year plan and the processes conducted under it. Alongside the successes which the multi-year plan has delivered, it was not free from mistakes and failures. In this context, we are continuously undertaking intermediate assessments of the different processes. At the end of the first year, a day-long General Staff research and learning workshop took place which enabled the implementation of adaptations to the decisions which had been executed and to assess the required changes in the implementation of the entire plan. Furthermore, these required adaptations are being implemented within the entire annual work plan.

Conclusion

The "Gideon" multi-year plan is based on ongoing force generation over many years. The essence of the decisions which were reached and the overall direction are familiar to the IDF's soldiers and commanders and constitute the basis for IDF activity. Nonetheless, there is still a large gap between the explanation of particular components of the plan to IDF personnel and an understanding of decisions which were reached, based on a desire to link the command backbone to the processes in the plan. Many issues have not yet been the subject of detailed study and the overall significance of some issues cannot yet be understood. Therefore, there is a need to deepen our learning and research processes throughout the multi-year plan.

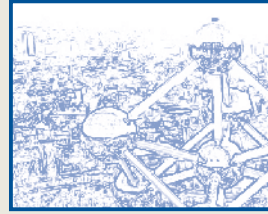
Based on the understanding that the IDF requires even longer term planning, we have begun to formulate an "IDF 2030" plan. The essence of this plan relates to armament processes based on US military aid as well as additional processes with an emphasis on the field of human resources. Concurrently, we are also working on formulating a "leap strategy" which is intended to analyse fields and approaches in which the IDF needs to make significant progress based on a future-focused perspective.

The "Gideon" multi-year plan is the key process that defines for the IDF which force generation channels it will follow and the principles which will accompany its work. However, more than anything, it constitutes a contract between the IDF and its personnel with the Israeli public – a contract in which the IDF manages risks, makes changes and works to improve its readiness and transparency while executing unprecedented important processes.

It is worth thanking everyone who took part in the formulation of the multi-year plan, especially the Deputy Chief of Staff, the Planning Directorate, Operations Directorate, Manpower Directorate, the Financial Advisor to the Chief of Staff and the thousands of IDF personnel who took part in the planning process and work every day to execute it.

It should be recalled that alongside force generation processes, regardless of their quality, IDF victory is achieved first and foremost by the personnel: the quality of the commanders; the way that they perform their missions; their combat spirit and that of their subordinates; the way they make decisions; their actions which are undertaken with responsibility, professionalism and ethical behaviour in executing their missions to achieve the objectives and to strive for victory in war. ■

The Brussels Backdrop



The Lasting Issue of Burden Sharing

Joris Verbeurgt

At the meeting of heads of state and government in Brussels on 25 May 2017, US President Trump made it again clear that, as far as the American Government is concerned, the free riding days for the European allies are over and that fair burden sharing is a condition sine qua non for the United States. Since the end of the Cold War, most European nations have continuously cut down on defence spending, leaving the main burdens and risks to the United States, including the provision of security for the Alliance and stability in the neighbouring regions. Just two statistics to illustrate how critical the situation is: in 2016, the US was responsible for 68% of the combined defence expenditures while accounting only for 46% of the Allies' combined GDP. And in the war in Afghanistan, the largest military conflict NATO has been involved in, the US suffered 67.8% of the 3532 fatalities (2001 to April 2017). Adding Canadian and British fatalities to those of the US, these three NATO countries alone account for 85.2% of all NATO fatalities in the Afghan theatre.

Photos: NATO



This year's summit of NATO's Heads of State and Government was held in Brussels on 25 May.

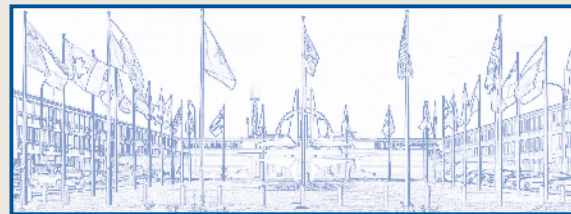
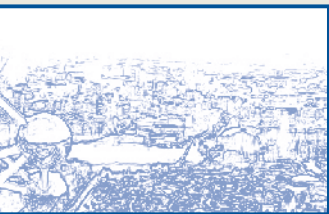
In his address to members of the European Parliament on 3 May NATO Secretary General Stoltenberg acknowledged the discrepancy between the potential and the actual contribution of the allies. Anticipating the NATO meeting with President Trump later that month, he stated that cooperation was now the norm and not the exception and that a strong European defence will contribute to fair burden sharing. Since NATO and the EU face the same challenges and share a majority of 22 members, common values and interests, he considers the EU a unique and essential partner for NATO.

A Love-Hate Relationship?

Since the foundation of NATO in 1949 until the end of the Cold War, the Alliance served as an umbrella preserving Western Europe against a Soviet invasion on the one hand and protecting American strategic and economic interests on the other. Although NATO was highly successful in defeating the communist bloc, relations with the European partners were not always self-evident: in 1966, France left the Alliance (to return in 2009) and in the 1980s public opinion in core European NATO member states fiercely opposed the installation of American cruise missiles on European territory following the NATO Double-Track decision, leading to mass demonstrations and government crises. In 2002-2003, when a 'Coalition of the Willing' (led by the US and the UK) was in full preparation for the invasion of Iraq (for the second time), countries like Germany, Belgium (N.B. host country for the NATO Headquarters and SHAPE) and Luxemburg opposed the invasion and even threatened to close their airspace for the American war effort. Although Operation Iraqi Freedom was not a NATO operation, the political and diplomatic upheaval around it left scars on both sides of the Atlantic. Minor incidents, like the possible prosecution of the American general Tommy Franks and US Secretary of Defense Donald Rumsfeld by the Belgian Justice Department on accounts of genocide did not quite help to bolster confidence among NATO allies.

However, as noted by Secretary General Stoltenberg, NATO needs the EU and the EU needs NATO: in the 1990's, the EU - as well as the UN - demonstrated its incapacity to deal with security issues in its own backyard: for years, Serbian President Milosevic had got away with large-scale aggression and genocide in Croatia, Bosnia and Kosovo. After years of talks and massive bloodshed, it took NATO (on the initiative of US President Clinton) just a couple of weeks to end the biggest onslaught in Europe since the Second World War and to engage in the difficult process of stabilisation and peacemaking. Two decades later, Slovenia and Croatia have become EU members while former enemies Serbia and Montenegro (as well as Macedonia) are in the waiting room for membership. Montenegro has just joined NATO as the 29th member state. The rather limited contribution of the (continental) EU NATO members to the operations in Afghanistan was already mentioned.

The military intervention in Libya to remove Colonel Khadafi from power in 2011 proved to be another example of how Europe depends on support from the US and NATO. Initiated by France (and shortly after joined by the UK), the US and NATO had to step in to effectively enforce an arms embargo and a no-flying zone over Libya - just a couple of miles from the European coast line. It became clear that EU countries do not have the strategic assets



that are necessary to conduct large-scale military operations, let alone to deploy considerable forces for an extended period of time in remote areas. For command and control, detection, reconnaissance and battle management (e.g. AWACS), logistics (e.g. air refuelling), strategic transport (e.g. the readily and constant supply of material and ammunitions) and for conducting combat operations, NATO (and the US) gradually had to take the lead, at sea as well as in the air. Currently, NATO is cooperating with the EU in the Mediterranean to deal with the refugee and migrant crisis, to combat human trafficking and criminal networks with a possible link to terrorism. On its own, the EU is not capable of even defending its own borders.

Steps Towards Cooperation

However, cooperation between NATO and the EU is not a recent thing: during the 1990's, the first steps were taken to build institutionalised relations between NATO and the EU with the objective of promoting greater European responsibility in defence matters. In 2001, this resulted in the NATO-Western European Union cooperation. One year later, the EU was assured access to NATO's planning capabilities for the EU's own military operations with the NATO-EU Declaration on a European Security and Defence Policy. For op-

closer cooperation. A more comprehensive approach towards crisis management and operations and the effective application of both military and civilian means was deemed necessary. They agreed on over forty measures in the fields of countering hybrid threats, cyber defence, enhancing resilience, defence capacity building, maritime security, and exercises.

In the past, the European NATO partners did not lack good intentions to fulfil their contractual obligations towards NATO and its chief contributor, the USA. The problem existed in translating the good intentions into deeds. The financial crisis of 2008 made most European governments economise even more on their defence budgets. And although little progress was made in 2016 by some European nations, only 4 out of 28 committed a minimum of 2 percent of their GDP to defence. Some countries (Spain, Belgium, Slovenia and Luxemburg) have not even spent 1% of their GDP on defence.

The Way Ahead

Are NATO-EU relations at the crossroads? For sure, the Warsaw Summit in 2016 was a milestone and there is a will to broaden and deepen this special relationship on both sides of the Atlantic – also because there is no real alternative readily available. But several

factors that have an influence on NATO-EU relations have recently changed: the election of Donald Trump as president of the USA is one of them. The harsh way in which he reproached the European partners for their lack of commitment to fair burden sharing may sour relations for some time to come. Angela Merkel already concluded on 28 May "... that old alliances are no longer self-evident and that Europe should take its fate in its own hands". She might find willing ears: the newly elected French President Macron is in favour of a permanent European headquarters and is willing to cooperate with any EU partner without waiting for the participation of all EU countries. Together with Germany he wants to create a



NATO Secretary General Jens Stoltenberg visited Malta and attended the informal EU defence ministers meeting on 26 and 27 April 2017.

erations in which NATO as a whole is not engaged, the so-called "Berlin Plus" arrangements (2003) provided EU-led operations with support from the Alliance. At the 2010 Lisbon Summit, the NATO-EU strategic partnership was strengthened by the acceptance of the Strategic Concept, committing the two organisations to work more closely with other international organisations to prevent crises, manage conflicts and stabilise post-conflict scenarios. More recent, at the Warsaw Summit in July of last year, areas were outlined in which NATO and the EU would both benefit from

European Defence Fund for the financing of military equipment. Will this become the basis of an EU army instead of 28 national armies? Will an integrated European defence industry emerge from these proposals? If so, will these developments take place in cooperation with NATO or parallel to it? And last but not least, what will be the effect of the Brexit on NATO-EU relations? What about the nuclear deterrent with France remaining the only EU country in control of nuclear weapons? The future of NATO-EU relations has become unpredictable. Several options are on the table.

The Serbian Defence Environment

Armed Forces & Defence Industry

David Saw

In a little over a quarter of a century, Serbians have experienced tumultuous times, including the collapse of a nation, civil wars, economic disaster, international isolation and more. Today, Serbia is gradually overcoming this painful legacy, but there are still many challenges to deal with as the country attempts to move towards the European mainstream.

Now Serbia faces some very hard choices as its politicians must define what they actually see as the European mainstream. The time for these choices comes ever closer, especially since 28 April 2017, when the Parliament of neighbour Montenegro voted to approve the accession treaty to join the NATO. Russia put an awful lot of pressure on Montenegro to reject NATO membership using both diplomacy and more active measures. Those in Montenegro who rejected NATO membership and who look to Serbia and Russia as the

have to make a choice between the EU and perhaps eventually extended cooperation with NATO as one path, or turning towards Russia as the other alternative. At this point Serbia has no aspirations towards NATO membership, the legacy of the NATO bombings of Serbia in 1999 are still too real to contemplate closer links with NATO. However, NATO does represent a factor to be considered when Serbia plans its overall future security policy.

The reality is that Serbia is still a prisoner of the past, something that is also true for

overall need to satisfactorily resolve all outstanding border and population issues.

These key security issues are complex enough in their own right, but now other factors are coming into play. The alleged Russian involvement in anti-NATO agitation in Montenegro and ongoing Russian interest in port facilities in Montenegro is just one example of the external players taking an interest in the Balkans. Non-state actors are also present in the region bringing in their wake the threat of Islamist terrorism. Then there is the question of refugees seeking to access Europe via the Balkan route. In consequence, Serbia faces a diverse set of security threats, the potential magnitude of which is liable to be influenced by the direction of the foreign policy choices made by the Serbian government, either a pro-European direction or pro-Moscow. Increasingly there appears to be little possibility of and little benefit to be gained from attempting to steer a neutralist course between west and east.

Economic Questions

Serbia also has to define the overall direction of its economy, it has to find the right mix between the public sector and private enterprise, and, most importantly, it has to grow the economy. Fortunately, there are some positive signs in the Serbian economic picture over the past year. In the fourth quarter of 2016, the unemployment rate in Serbia was 13%. This 13% figure was also the result for the first quarter of 2017. This is an excellent performance; in contrast, between 2008 and 2016, the average unemployment rate was 18.53%, the first quarter of 2012 saw the worst figures with an unemployment rate of 25.5%. The unemployment rate is forecast to fall further over 2017, with a rate of 12% expected in the third quarter. This reduction in the unemployment rate is a very important development.



Photo: Darko Dozet

Many Serbians have not forgotten NATO bombing during the war and therefore do not favour their country becoming part of the Alliance.

path for Montenegro to follow potentially represent a factor for instability in an already complex regional security environment. Montenegro is also in ongoing negotiations to join the European Union (EU) and potentially these negotiations should be successfully completed in 2019, setting the stage for EU membership soon after. All of this means that eventually Serbia will

many of the new nations that emerged from the collapse of the former Yugoslavia. This creates an ongoing security problem for Serbia and it is a problem that also includes Albania. For security planners in Belgrade the key issues are the fate of the minority Serbian populations in surrounding non-Serbian territory, the destabilising possibilities of a "Greater Albania" and the



Photo: Serbian Ministry of Defence

The Serbian Air Force MIG-29 fleet consists of four aircraft (three flyable) at present, but Russia is to supply six surplus MIG-29 aircraft, while Belarus will supply eight surplus MIG-29s. The fleet will then be upgraded to a common standard, with Serbia funding the upgrade programme.

The problem for Serbia is that it has so much ground to make up in economic terms, with the genesis of the economic difficulties starting with the death of Josip Broz Tito in May 1980, an event that started the momentum towards the end of the Socialist Federal Republic of Yugoslavia. The Yugoslav economy was in trouble in the 1980s, with the main sources of foreign exchange being remittances from Yugoslavs working overseas, tourism and the defence industry. Economic problems, the advent of competing nationalisms in Yugoslavia and the rise of Slobodan Milosevic to power, set the scene for the turmoil that was to engulf Serbia in the 1990s.

By the time that Milosevic fell from power in 2000, the Serbian economy was half of the size it was in 1990, according to the "CIA World Factbook". Primary causes of this were economic mismanagement by the Milosevic government, the economic impact of the wars in the 1990s, international economic sanctions on Serbia and the damage caused by the 1999 NATO bombing campaign on infrastructure and industry. The need to transition from a socialist command economy to an open economy was obvious, but it took time. Furthermore, rising public debt has limited what the government could do, with progress also limited by the post-2008 economic downturn.

The need for Foreign Direct Investment (FDI) to stimulate the economy was clear and Serbia has been able to attract such investment. Arguably the strength of Serbia's defence industry has helped Serbia attract

FDI from the United Arab Emirates (UAE). UAE FDI in Serbia covers investments in commercial aviation, real estate agriculture and defence. In terms of commercial aviation, Etihad took a 49% stake in Air Serbia. The Eagle Hills company of the UAE could invest up to €3Bn under a contract signed in April 2015 to develop a new business, residential and commercial district known as the Belgrade Waterfront project. In 2013 the Al Dahra Agricultural Company invested US\$400M in a joint venture with the Serbian government covering farming activities, in parallel the UAE provided a US\$400M loan for agricultural development in Serbia. The Abu Dhabi Investment Authority also granted Serbia a US\$1Bn low-interest loan in March 2014.

The UAE investment company Mubadala Development signed an agreement with the Serbian government in 2013 to invest in aerospace manufacturing, telecoms, renewable energy and semiconductors. Then in 2014 a military cooperation agreement was signed under which UAE personnel



Photo: Yugoinport SDPR

The BUMBAR short-range anti-tank missile system has a range in excess of 600 metres and a tandem warhead that can penetrate 1,000 mm of RHA. This missile is testimony to the extensive capabilities of the Serbian defence industry, which covers everything from small arms up to guided weapons.

Photo: Serbian Ministry of Defence



The Serbian Army has over 200 M-84 tanks (the locally produced Yugoslav variant of the T-72) in service. A comprehensive upgrade programme has been developed for these tanks, but thus far it has proven impossible to allocate the funds to make the upgrade a reality.

would train in Serbia, there would also be exchanges of information and defence technology and the UAE would fund various weapon developments in Serbia. A key programme in this regard is the Advanced Light Attack System (ALAS), which is a missile system with two variants for multipurpose precision strike applications, ALAS-A with a 25 km range and ALAS-B with a 60 km range. The third variant is the ALAS-C, which is a coastal defence missile designed to meet the needs of the UAE, which will be mounted on a NIMR 6x6 vehicle, with each vehicle carrying six missiles. Currently the ALAS-C has a range of 25 km, though there is talk of an extended range 60 km version.

The Military

The Yugoslav National Army (JNA) was established by Tito in 1945 as the military of the Socialist Federal Republic of Yugoslavia. Equipment was whatever had been supplied by the Western Allies and the Soviet Union, captured from Axis forces or even pre-1941 equipment that had belonged to the Royalist military. Post-1945 Tito cleverly navigated a path between the United States/NATO and the Soviet Union, acquiring defence equipment from both, as well as building an indigenous defence industry. Prior to 1941 Yugoslavia had its own defence industry capable of meeting the majority of its needs, including artillery, naval construction and aircraft design and manufacture.

Under Tito, JNA doctrine was focussed on a territorial defence strategy that combined conventional and asymmetric elements, where conventional division-sized units would initially confront any invader providing enough time for reserve units to mobilise and prepare for partisan warfare in the interior of the country. Later, the JNA reorganised and by the end of Yugoslavia

its conventional forces were organised as brigade-sized units. With the end of Yugoslavia, the JNA disappeared from the scene, breaking apart like the state it once served. The Serbian military of today was established in 2006 and consists of two primary components in the form of the Serbian Army and the Serbian Air Force & Air Defence. Unlike previous eras, the Serbian military is far smaller in terms of personnel numbers but it is a professional force. Serbia's economic problems have inevitably limited the amount of funding available to the military, resulting in much legacy equipment from the JNA era still remaining in service and much of it being in need of substantial upgrade. However, there has been support for the indigenous defence industry and this has seen the acquisition of some new equipment. What has sustained Serbia's defence industry is its considerable success in the export marketplace (of which more later).

A new source for enhancements to Serbian defence capabilities has emerged though, primarily as part of a Russian diplomatic effort to expand its influence with the Serbian government. In addition to which Belarus has joined the party and will also be supplying surplus equipment to Serbia. In December 2016 it was agreed that Russia would supply a total of six MIG-29 aircraft, comprising a MIG-29A, three MIG-29S and two MIG-29UB aircraft. These would be provided for a nominal amount of money, but then Serbia would be responsible for

Photo: Serbian Ministry of Defence



The LAZAR II and III Light Armoured Vehicles (LAV) are being acquired by the Serbian Army. Weapon options include a turret-mounted 30 mm cannon or a machine gun mounted in a Remote Control Weapon Station (RCWS). Serbia intends to purchase large numbers of LAZAR vehicles.

State-of-the-Art Defence Technology from Serbia

From the very beginning, trade in armament and defence equipment (ADE) has been the primary activity of Yugoimport-SDPR, including both export and import, rendering services of ADE overhaul and modernisation, training and education of personnel, and establishing complex modes of cooperation, such as transfer of defence technologies, capital investment in defence infrastructure, joint development, co-production, etc.

The business policy of Yugoimport-SDPR is oriented towards established business missions, the first and foremost being that of an integrator of the Serbian defence industry on the global defence market. Another equally important mission is Yugoimport-SDPR's own development and production of complex weapon systems. We are pleased to present some of our most important products hereafter:

NORA-B52 155mm Self-Propelled Howitzer

The NORA-B52 155mm SP howitzer is designed to provide fire support to own units. Fire support is achieved by powerful, sudden and rapid fire against tactically, operatively and strategically significant targets at large distances.

State-of-the-art design and manufacturing technologies were applied to the design of the third generation of NORA, which resulted in multiple savings in time as well as in increased accuracy. The weapon is modular, which provides for the delivery of a number of different options depending on the user's choice.

The introduction of ballistic protection has increased survivability when exposed to fragmentation effects of ordnance and rocket missiles.

Apart from protection against fragmentation effects, the applied solution of ballistic protection also provides resistance to ambushes or raid effects of enemy special units using small arms.



Armament:

- Primary armament: 155mm gun with a 52-calibre barrel, installed in a turret (partly armoured) on a modified chassis of an off-road vehicle;
- Secondary armament: 12.7mm machine gun with a cupola;
- Smoke pot launchers (two groups with 82mm launchers each, installed in the front part of the vehicle cabin);
- Training armament: coupled 20mm M55 gun.

LAZAR 3 8x8 Multi-Role Armoured Combat Vehicle



LAZAR 3 is designed for various applications and missions. The power train is accommodated in the front right-side of the vehicle in a protected space completely separated from the crew. The central transfer case transmits the torque to all wheels that have independent suspension and provide for the vehicle's high mobility.

LAZAR 3 has a highly sophisticated, modular ballistic protection. The hull is made of armoured steel and can be fitted with a spall liner. The applied ballistic protection can be tailored to the specific needs of the user. The vehicle floor has two levels of mine protection.

The crew compartment is located in the rear of the vehicle. This part of the vehicle can be accessed through the rear ramp, through the two doors embedded in this ramp or through the big hatches on the vehicle roof.

The number of the crew depends on the type of a mission and the weapons used with the vehicle.

Basic protection: from level 3 Stanag 4569 to level 5 Stanag 4569.

The vehicle may be equipped with various weapons, ranging from a 12.7 mm RCWS to a 30 mm cannon turret.

MILOSH 4x4 Armoured Multi-Purpose Combat Vehicle

MILOSH belongs to the category of modern armoured vehicles for a wide range of missions of police and armed forces. The main concept of the vehicle is based on a self-supporting hull and independent suspension system which ensures high mobility in any terrain with the maximum combat weight exceeding 14 tons.

The vehicle can be used for patrol and reconnaissance missions, as a command vehicle, for transportation and to support special operations.

In its basic version the hull provides a very high level of ballistic protection (Level III on the front side and Level II on the other sides as per the NATO standard Stanag 4569), as well as a high level of mine protection (Levels IIa and IIb as per STANAG 4569).

The vehicle can be equipped with different types of weapons and special equipment: remote control weapon station with 12.7mm machine gun, different types of manually controlled armoured turrets equipped with machine guns and grenade launchers, anti-tank guided missile systems, AD rocket systems,

as well as optoelectronic thermal imaging and TV and radar systems mounted on telescopic masts for border control and surveillance.

The standard version of the combat vehicle accommodates a crew of eight, of which four are located in the rear part of the vehicle with the possibility of fast disembarking and embarking by means of the rear hydraulic ramp or the rear door.





Photo: Serbian Ministry of Defence

The Serbian defence industry can meet requirements for artillery and ammunition in both NATO and Soviet calibres and has some unique solutions to offer. The NORA B-52 155 mm 52-calibre self-propelled gun system, as shown here, is in service with Serbia and has been exported to customers in Africa and Asia.

the full cost of the repair, overhaul and upgrade of the aircraft. Reportedly Serbia will receive RVV-AE (R-77) medium-range missiles as a part of the Russia package. Currently the Serbian Air Force has two flyable MIG-29Bs and a single MIG-29UB, with another MIG-29UB that could be made flyable with some work.

Russia will also supply 30 T-72S tanks, most likely these will replace a similar number of old T-72 tanks currently in use with the Serbian Army reserves, additionally 30 BRDM-2 vehicles will be delivered. Serbia has also received two MIL MI-17V-5 helicopters ordered from Russia in August 2015. Ideally Serbia would have liked to broaden the Russian defence package to include the BUK-M2 SAM system, other air defence systems, air defence radars and more helicopters. This failed to occur, but some compensation is being gained by the defence arrangements activated with Belarus in early 2017.

Initially the Belarus arrangement will see Serbia receive eight MIG-29 aircraft and two BUK-M1 SAM batteries at no cost. However, Serbia will then pay for the repair/overhaul and upgrade of these systems in Belarus. There is also interest in acquiring surplus S-300 SAM systems from Belarus using a similar approach. These links with Belarus will also be expanded to include defence industrial collaboration.

Although Serbia will only make limited foreign purchases, it is not restricting itself to

acquisitions from Russia and Belarus. At the end of December 2016, it was announced that the Serbian government would be acquiring nine Airbus Helicopters H145M helicopters with deliveries from 2018 onwards. Six of the helicopters are destined for the Serbian Air Force, with the remaining three for the Ministry of the Interior.

Defence Industry

The roots of the modern Serbian defence industry can be traced back to 1853 and the establishment of the Kragujevac Cannon Foundry. Today Kragujevac is the home of Zastava Arms which covers the small arms segment, with everything from pistols and assault rifles to sniper rifles and grenade launchers. Prvi Partizan in Uzice produces all of the main small arms calibres, both NATO and Soviet, and also produces a vast array of other calibres, many of which are unique. Elsewhere, Serbia produces mortars and artillery, along with ammunition in both NATO and Soviet calibres. Krusik in Serbia produce a course correcting 120 mm mortar round, as well as anti-tank missiles, including the BUMBAR short-range missile system (600-metre range, tandem warhead, 1000-mm RHA penetration).

The ability of the Serbian defence industry to supply in NATO and Soviet calibres, plus the scale of their of their capabilities in small arms, ammunition, artillery and mortars, armoured vehicles, precision-

guided munitions and missiles gives them some significant advantages in the export marketplace. Yugoimport SDPR, the state-owned company responsible for both defence exports and imports for Serbia, seeks to maximise these advantages. As previously noted, the UAE has become a significant customer for Serbia, as have Saudi Arabia and Iraq (a US\$235M equipment package signed in March 2008 included the supply of 20 UTVA LAST 95 training aircraft to Iraq). However, the Serbian defence industry has developed a global footprint, successfully meeting needs in Africa, Asia and South America.

The importance of defence exports to Serbia cannot be understated. Serbian Prime Minister Aleksandar Vucic is on record as saying: "I adore it when we export arms because it is a pure influx of foreign currency." Vucic then added: "It is one of the industries from which we earn a lot. I want to increase it even more, to earn even more." The majority of the Serbian defence industry remains state-owned and it is one of the very few state-owned sectors of the economy that is delivering a positive outcome. Apart from the fact that the defence industry is a major generator of foreign currency for Serbia, it is also, as we have seen in the case of the UAE, a key factor in attracting desperately needed FDI into Serbia as well.

Looking into the future, it appears extremely unlikely that the export markets that the Serbian defence industry is currently servicing are going to significantly decrease their appetite for equipment. And while Serbia is not going to be in a position to build advanced combat aircraft or other similar high cost/high risk products, it will continue to be a very successful niche market player. This will continue to sustain the industry and provide a positive economic impact for the country.

What would be beneficial for the defence industry, and for the Serbian military, is for the government to find the money for the acquisition of new equipment in reasonable quantities and for the upgrade of legacy systems that remain in service. An increase in domestic demand will increase the production runs of Serbian equipment and further enhance the price competitiveness of their products, potentially expanding their export possibilities. Another benefit would be that it would also allow the Serbian military to retire some extremely elderly equipment that has remained in service for lack of any suitable replacement. Obviously these desirable outcomes for the military and the defence industry are dependent on a continuing positive trajectory for the Serbian economy. ■

The Rise of the Drones

Tim Guest

Drones are changing land-based warfare. Where once reconnaissance patrols and isolated forward observers invariably risked their lives to undertake discreet intel gathering and target location, machines in the form of tactical drones are gradually taking their place in the skies above the battlefield.



FLIR's BLACK HORNET is one of the most deployed, combat proven drones in global army service.

Unmanned aircraft have now become an important part of battlefield inventories, since they were first used initially as remote recon assets. With added strike features, as well as real-time, actionable intelligence-gathering capabilities, many theatres of operations including Afghanistan, Iraq, Pakistan, Somalia, Syria and Yemen have seen the use of tactical drones of one sort or another. Larger systems such as the General Atomics, US\$4M MQ-1 PREDATOR stole headlines as long as 15 years ago as they evolved from intel-gathering machines into real-time strike assets that could reduce the sensor-to-shooter timeframe and enable immediate actions to be taken by the pilot/operator. The addition of a laser-guided, AGM114 HELLFIRE made the PREDATOR a comprehensively fearful tool.

Earlier this year, however, the USAF finally announced – having discussed this for years – that it would be replacing its full PREDATOR fleet with the new MQ-9 REAPER next year. REAPER has improved altitude capabilities from 25,000 feet to 50,000 feet and has increased speeds from 84 mph to 194 mph; its payload is almost double PREDATOR's, at 800 lbs, ensuring its close air support capabilities are truly enhanced. The full US PREDATOR fleet is slated to be replaced

by the REAPER upgrade by end 2018. Ten REAPERS have been in use by British forces in Afghanistan for the last few years.

Most Used Tactical Drone

Designed to gather tactical intelligence, surveillance and reconnaissance (ISR), the tactical UAS/drone portfolio from AeroVironment offers small, UAS/drones with advanced payloads including electro-optical or infrared sensors. Over a wireless data connection, the company's PUMA AE, RAVEN and WASP AE can transmit critical live video and other information directly to their respective hand-held, ground control systems (GCS), providing troops with real-time tactical reconnaissance, tracking, combat assessment and geographic data. For its part, the RAVEN is claimed to be the most widely used tactical drone.

All these systems from AeroVironment are man-portable and require minimal training. They can be assembled without tools in under five minutes and launched and operated by one person. Using efficient and reliable electric motors each is powered by replaceable modular battery packs that can be replaced quickly, enabling rapid return to flight. Designed for durability and incorporating an intuitive and user-friendly interface, the ground control systems are the same for each aerial vehicle and allow either manual control of the drones, or GPS-based autonomous navigation using operator-designated waypoints. Using a

common ground control system cuts training time and costs considerably.

The RAVEN B DDL system, an enhanced version of the battle-proven RAVEN B system, is a lightweight solution designed for rapid deployment and high mobility for military applications requiring low-altitude surveillance and reconnaissance intelligence. With a wingspan of 4.5 feet and a weight of 4.2lbs, the hand-launched RAVEN provides aerial observation, day or night, at line-of-sight ranges up to 10km, has an optional stabilized gimbaled payload, and delivers real-time colour or infrared imagery to the GCS. Flight duration is between 60-90 minutes at speeds from 32 to 81 kph. The RAVEN can be operated manually, or programmed for autonomous operation, using the system's advanced avionics and precise GPS navigation. According to Dyke Weatherington in the US Office of the Under Secretary of Defense (Acquisition, Technology & Logistics), "The RAVEN has made more of a difference than any other single tactical UAS DoD has developed."

While each Brigade in the US Army has 20 RAVENs deployed down to company level, this same unit structure is also likely to take on using smaller quad-copter drones and micro-sized drones such as the BLACK HORNET. It is also reported that USMC General Staff are recommending that micro-system drone assets be held at every individual infantry squad level, each squad having its own system to perform ISR activities during ongoing operations, or prior to moving on an objective.

Author

Tim Guest is a freelance defence journalist and former Royal Artillery officer.

A Mimic for Forward Observation

As any Forward Observation Officer (FOO) will tell you, his job is not only tough but also perilous in its often dangerously close proximity to enemy lines, if not behind enemy lines if the operational situation so dictates. This is where a drone system such as the EXPAL SHEPHERD-MIL comes to the rescue. The single-propellered system is a silent, autonomous aerial reconnaissance drone constructed with the shape and markings of a bird of prey. Deployable in under six minutes, it is launched by hand and brought back to land easily in any field, has "waypoint" guided navigation – i.e. pre-programmed flight plan – and incorporates day/night cameras, as well as real-time video. Its electro-optical video capabilities are delivered using a SUPER HAD



Photo: Airelectronics

EXPAL's SHEPHERD-MIL imitates a bird of prey.

control. It will also return and land autonomously in case signal is lost between ground station and the bird. Its communications data-link frequency range is 900MHz/1.4Ghz/2.4Ghz and transmits using 1W of power. The airframe is Kevlar/Epoxy with the wings made of a 'triple compound' highly resist-



Photo: AeroVironment

AeroVironment's RAVEN can be launched right from the hand of the soldier.

CCD 600TVL high-resolution system. An optional Zenithal IR sensor can provide its night vision capability.

SHEPHERD-MIL can also be equipped with geo-location software and can be integrated into the EXPAL TECHFIRE fire support information system to complement and support the efforts of forward observers to provide accurate fire support data / target acquisition data, as part of a complete indirect fire solution. It is powered by a silent 24V DC motor; this allows it to get closer to its objectives and perform ISR and target acquisition missions without being detected. It can also mimic a bird of prey's circular, soaring flight pattern further adding to the deception of the SHEPHERD-MIL's overall camouflage.

The system's ground station comprises a tablet PC IP65 and MIL-STD-810G/416F with an RC Joystick/PAD controller/user interface that is easy and intuitive to use. Its flight control include an inertial stabilization system with an auto-throttle speed

ant to impact. Its wingspan is 1.65 m and length 0.85 m with a maximum take-off weight of 2.8k g. SHEPHERD-MIL has a maximum flight time of 60 minutes using Li ion rechargeable batteries, which have a charging time of 30 minutes. The drone's mission radius is 20 km depending on meteorological conditions; it can perform in winds up to 32 km/h and in moderate rain and flies at between 55 and 77 km/h. Typical operating altitudes are between 20 and 300 metres, although its ceiling is 4,000 m. As well as ground launch, it can be launched from an aerial platform from a maximum launch altitude of 2,500 m.

Long-Duration Surveillance

Safran Electronics & Defense has a range of combat-proven tactical surveillance drones/UAVs built with the company's expertise in flight control, navigation and observation systems, embedded electronics, airborne optronics and transmission.

The company's SPERWER MKII UAV system can be deployed easily and rapidly from the ground, and is suited to tactical missions operated at brigade and task force level to provide real-time target evaluation. Ten years of operational experience logged by Safran's/Sagem's SPERWER drone system in Afghanistan has led to the design of the company's PATROLLER tactical drone, which is a long-distance tactical drone system designed for long-duration surveillance over extensive areas. The ruggedised system with a composite airframe (certified by EASA to civil aviation standards EASA CS 23) is modular allowing it to be equipped with a bespoke range of sensors and transmission equipment of a customer's choice, including: Synthetic Aperture Radar (SAR), laser rangefinder, laser designator, intelligence-gathering sensors or electronic warfare sensors for COMINT, ELINT purposes. The PATROLLER tactical drone system is upgradeable with multiple sensors that can be added/removed and configured for each mission. The aircraft can conduct operations day or night with its day/night optronic sensor, flying to an altitude of 20,000 ft with payloads of over 250 kg for as much as 20 hours duration. Requiring a landing strip of around 600 m, the drone can add extended-range fuel tanks under each wing. Its compact control station has two or three operators depending on the sensor payload, which can provide direct image transmission to ground units or intervention vehicles equipped with Remote Video Terminals (RVTs). PATROLLER complies with NATO's interoperability standards and its open architecture means that it can support a wide spectrum of military and homeland security missions. Air-transportable in a standard container, it can be deployed in zones of interest at very short notice, and also take off from unprepared fields. Sagem has demonstrated the PATROLLER's in-flight ability to process data from different payload instruments simultaneously; these include an optronic pod, radar, electronic warfare system, distress beacon detector and Automatic Identification System receiver.

SCHIEBEL
CAMCOPTER® S-100



UNMANNED

Wide Area Patroller

MULTI-SENSOR PERFORMANCE

At Paris Air Show, Le Bourget, please visit us at hall 4, booth # B30.

Drones Downsize

Just over two years ago, the Defense Advanced Research Project Agency, DARPA, in the US announced the Fast Lightweight Autonomy, or FLA, programme, aimed at enabling micro drones to operate autonomously and at high speeds in urban warfare scenarios where major clutter presents a threat to the drones' radio frequency connection to its controller. The aim of the programme has been to develop an ISR capability in such environments with micro drones emulating the flight of birds or insects and even being able to penetrate buildings and structures. Such a capability would provide troops facing the horrific prospects of urban, house-to-house, building-to-building warfare with the advantage of a system that would help them see any threats present inside such structures before entering. Such programmes have helped drive the arrival of some of the smallest drones available for military use.

In early May this year, for example, AeroVironment unveiled the new SNIPE NANO QUAD, a miniature (Class 0) and field-rugged tactical drone designed to support close-range intelligence, surveillance and reconnaissance (ISR) missions. Equipped with electro-optical/infrared (EO/IR), low-light-capable and long-wave infrared (LWIR) sensors in an integrated tilt mechanism, SNIPE can relay high-resolution images and record real-time video both day and night. In addition, SNIPE's integrated UHF radio provides for excellent non-line-of-sight operation. The software-defined radio (SDR) allows SNIPE to be sold commercially. With its quiet electric motors, flight speeds exceeding 20 mph and more than one kilometre range, SNIPE is difficult to detect in operating environments with even minimal ambient noise. Its rechargeable batteries power approximately 15 minutes of flight time. Despite its small size, the company says the durable nano-UAS is capable of operating under challenging environmental conditions, including winds over 15mph and gusts up to 20mph. No assembly is required for the five-ounce (140-gram) nano-UAS, which is designed to be worn by its operator, so it can be deployed in less than a minute. Operator training requires four hours only.

SNIPE is controlled using an intuitive app on a standard, ruggedized (MIL-STD 810) touch screen controller with intuitive user interface and automated operation for ease of use. Other critical functions include the drone's ability to return to its operator automatically if it loses its radio link. Snipe benefits from advances in nano unmanned

technology achieved by the company in its development of the Nano HUMMINGBIRD. The first US DoD delivery of 20 SNIPE systems took place in April and the system will be available to other customers to order in autumn this year.

BLACK HORNET

Another military micro drone or UAV is the PD-100 BLACK HORNET Nano developed by the Norwegian company Prox Dynamics which is in use with 23 forces worldwide, including: Australian, Norwegian, British, German and US Army and USMC. Turkey has adopted the system and in the Middle East a number of countries have the BLACK HORNET including Jordan and the UAE, with several others not disclosing their use of the micro drone.

In November last year, FLIR Systems of the US acquired Prox Dynamics for ap-

proximately US\$134 million and in February, a night vision capability to the BLACK HORNET was added with the addition of a micro thermal camera from FLIR. The company refers the BLACK HORNET as an 'aerial sensor'; it comes with a hand controller, is pocket sized and is hand-launched by a soldier in the field, enabling a significant advantage in situational awareness, mission planning and force protection. The total cost of the 2.3kg system (comprising a VDU, case, cable, control stick/UI ground station plus two aircraft/BH drones) is around US\$50,000.

The system uses FLIR's LEPTON micro thermal camera, visible spectrum cameras, advanced low-power rotor technology, and proprietary software for flight control, stabilization, and communications. It is one of the lightest, stealthiest, and safest drones in the market, being in a size class so small it requires no air-space authorization to fly.

Successful CAMCOPTER S-100

(df) One of the most successful military UAVs is the CAMCOPTER S-100 from the Austrian company Schiebel. Originally intended for navy use only, it has already proven its value in many operations, at sea and on land. The launch customer was the United Arab Emirates because the "parent army" in Austria has no significant naval branch and saw major budget cuts at the time the CAMCOPTER was invented. But Austria uses the Camcopter to examine the country's power lines.



Photo: Schiebel

"Schiebel has closely followed regulations levied by both military and civilian authorities in the design, manufacture and operation of the S-100, bringing the company in line with the established best practices of the aviation industry", the company states with regard to flight certificates. "This

approach has brought recognition and acceptance from various military organisations and an EASA flight permit. In April 2007, the S-100 complied with approved EASA flight conditions and each aircraft has been issued a flight permit. This certification is granted at a European level, stating that the S-100 system is able to perform safe flights and shall be recognised by all other national European safety agencies." Many navies have already fielded the CAMCOPTER. In October 2007 it underwent sea trials on the Indian Navy's INS SUJATA. In autumn 2008 it was tested on the German Class K130 corvette BRAUNSCHWEIG and on the French MONTCALM frigate. These tests were successful and the CAMCOPTER has even been further upgraded, especially with regard to integrated tested payloads and propulsion. The CAMCOPTER has also been fielded for army operations; for example the OSCE used it in the Ukraine to gain a better operational perspective without sending personnel into dangerous theatres. Most recent tests have been conducted in northern Norway 300km north of the Arctic Circle when the CAMCOPTER S-100 performed a series of challenging demonstration flights this May.

Among the known operators – some countries prefer to remain disclosed – are Australia, Brazil, Canada, China, Egypt, India, Italy, Jordan, Libya, Pakistan, Russia, South Africa, United Arab Emirates, the United States and the Organisation for Security and Co-operation in Europe (OSCE).

based technologies that are far less stealthy and not suitable for covert operations.

The Future is here

In January of this year the US DoD announced that “one of the most significant tests of autonomous systems” by their Strategic Capabilities Office, partnering with Naval Air Systems Command, in which one of the world’s largest micro-drone swarms was successfully demonstrated at China Lake, California. The test had been conducted in October 2016 and consisted of 103 PERDIX drones launched from three F/A-18 SUPER HORNETS. The micro-drones demonstrated advanced swarm behaviours, such as collective decision-making, adaptive formation flying, and self-healing. In May, it was also reported that a new disposable “micro air vehicle”, the CICADA or Covert Autonomous Disposable Aircraft, was also being trialled by the DoD for swarm drone operations. The system has no motor and only about 10 parts, and is effectively a flying circuit board designed to glide to pre-programmed GPS coordinates after being dropped from a “mother” craft, either an aircraft, balloon, or larger UAV system. The test in May saw drones released from 57,600 feet, flying and landing on target. They are not intended to return to base. Sensors sent back meteorological data, but the vehicle can be equipped with the likes of microphones and seismic sensors to carry out a variety of other missions, such as listening to enemy conversation, or sending seismic data back from behind enemy lines to monitor troop and vehicle movements.

No Going back

From larger drone/UAV/UAS systems to the kinds of micro solutions and aerial sensors outlined above, the military drone market has evolved to deliver life-saving and battle-defining assets for today’s and tomorrow’s armed forces. Even as these innovative technological platforms continue to evolve it remains reassuring that a man continues to be a key player in the drone operations’ loop. Nano systems and mimic systems in the form of insects and birds are just some of the other developments that, with little doubt, will find their way into the pockets of soldiers in the field. Yet with such a big commercial drone market, such non-militarised systems will continue also to find their way into the inventories of terror organisations, as has already been clearly shown by IS’ use of drones in Syria and elsewhere. So, as fast as these systems evolve, so too must counter measures against them. ■

Photo: Sagem



Safran's SPERWER MKII tactical drone

Photo: FLIR



Soldiers deploying a BLACK HORNET to explore territory before approaching

The system offers a highly advanced, life-saving surveillance solution for traditional military forces and special operations forces. BLACK HORNET can fly for up to 25 minutes at line-of-sight distances of up to one mile.

BLACK HORNET's rotor span is 120 mm, each aircraft weighs 18 g including cameras, it has a maximum speed of 5 m/s (18 kph), with a 25 min endurance, with a digital data link that remains in contact beyond 1,600 m LOS (Line Of Sight). It uses GPS navigation or visual navigation through video, as well as autopilot with autonomous and directed modes. The drone/aerial sensor can hover and stare along pre-planned routes and is steerable using EO cameras with pan/tilt and yaw functionality.

The British Brigade Reconnaissance Force at Camp Bastion in Afghanistan have been using it in Afghanistan since 2013, have praised the system's ability to provide life-saving intelligence. While high winds can hamper the PD-100's flying ability, troops who have used it say it's quiet, it cannot be

heard even if it's only 20 m in the air, and when 100 m high it can neither be seen nor heard providing excellent arcs for looking into compounds and other dead ground. One UK BLACK HORNET operator said of the system: “It's a life saver. We have two per station; if one has not finished its mission it can be returned home and the next one programmed and sent out to complete the recon mission until the operator is satisfied.” FLIR's Surveillance Group VP and GM, Kevin Tucker, said at the time of the FLIR acquisition of Prox Dynamics, that they had been the company's first customer to integrate FLIR's smallest thermal camera LEPTON in its products. All generations of the BLACK HORNET offer the LEPTON thermal product, integrating thermal imaging with electro-optical sensors, providing soldiers with the ability to see in complete darkness or through smoke or other obscurants. He said the BLACK HORNET system typically includes two micro-UAV's, a custom controller and a video monitor and that the airframe differs radically from quad-rotor-

Current Trends in Fighter Avionics and Sensors

Doug Richardson

This article will look at electro-optical systems, data links, the process of sensor fusion which combines all the data from multiple sensors into a single integrated tactical picture, and the latest trends in improving the man-machine interface and making this data easy for the pilot to use. We will also look at how the long production runs for combat aircraft make it necessary to offer improved avionics, and how export customers may require that the avionics suite be tailored to meet their specific requirements.

Although electro-optical (EO) sensors were fitted to some western fighters from the 1950s onwards, equipment such as the AN/AAA-4 infrared search and track (IRST) sensor on early examples of the F-4 PHANTOM and the Northrop AN/AXX-1 TISEO stabilised telescope introduced on late-production F-4E PHANTOMS proved of limited tactical usefulness. However, the performance of these early systems has been eclipsed to today's EO hardware.

The EUROFIST Passive Infra-Red Airborne Track Equipment (PIRATE) system is an infrared search and track (IRST) system mounted on the port side of the EUROFIGHTER TYPHOON fuselage, forward of the windscreen. It operates in the 3-5 and 8-11 micron bands, and can be used against air and ground targets. Thales' Optronique Secteur Frontal (OSF) is a similar system for the RAFALE. In March, French Defence Minister Jean-Yves Le Drian announced the start of development work on the RAFALE F4 standard. This might include the installation of a redesigned IR channel into the OSF system.

The former Soviet Union adopted this technology with enthusiasm, and most of its recent fighters have featured an EO sensor located just ahead of the cockpit canopy. The MIG-29 introduced the OEPrNK-29 incorporating a collimated OEPS-29 IRST/laser ranger, while the Su-27 carries an OEPS-27 electro-optic sighting system that uses a 36Sh OLS-27 IRST. This trend has continued with the new Sukhoi FAK FA



Photo: Aselsan

A video created by Aselsan shows the quality of the video from the company's ASELPOD.

(T-50) fighter whose OLS-35 includes TV, thermal imager, and laser rangefinder/designator subsystems.

Two EO systems are key components of the avionics of the Lockheed Martin F-35 LIGHTNING II. Developed jointly by Lockheed Martin and Northrop Grumman, the Electro-Optical Sensor System (EOSS) is located behind sapphire windows on an angled fairing beneath the aircraft's nose. It combines forward-looking infrared (FLIR) and IRST functions, providing high-resolution imagery, automatic tracking, laser designation, laser rangefinding, and laser spot tracking, and can be used when engaging ground and air targets.

Six CMC Electronics conformal compact lightweight imaging infrared sensors positioned around the airframe act as sensors for the AN/AAQ-37 Electro-Optical Distributed Aperture System (EODAS). This

provides day/night vision over a full 360 degrees around the aircraft, and supports the navigation function of the aircraft's forward-looking infrared sensor. It provides situational awareness, and will warn the pilot of incoming aircraft and missile threats.

Variants of Electro-Optical Pods

Electro-optical pods are a convenient way of adding additional capabilities to a fighter, or even to a bomber. A wide range of products are available, a good example of which is the Lockheed Martin AN/AAQ-33 Advanced Targeting Pod (ATP), which has been further developed to create the SNIPER Extended Range (XR), and SNIPER Advanced Targeting Pod - Sensor Enhancement (ATP-SE). The basic version contains visible-light HDTV, FLIR, dual-mode laser,

Author

Following an earlier career in engineering, **Doug Richardson** is a defence journalist specialising in topics such as aircraft, missiles, and military electronics.

laser spot tracker, laser marker, video data link, and a digital data recorder.

Another is Rafael's AN/AAQ-28(V) LITENING, which teams a CCD camera operating in the visible portion of the electromagnetic spectrum, a high-resolution, forward-looking infrared (FLIR) sensor, an automatic target tracker, a laser designator, and a laser rangefinder. Further-developed LITENING II/ER/AT, LITENING III, LITENING G4, and LITENING SE variants are also available.

Due to enter service next year, the RAFALE F3-R will introduce new operating modes for the AESA RBE2 radar, add the Thales TALIOS new-generation multi-function targeting pod, and integrate the MBDA METEOR BVRAAM. F3R is also expected to include the installation of a satcom link. First tested on a RAFALE in July 2016, TALIOS is of modular design, which will facilitate updates during its operational life. Currently it combines high-definition FLIR and TV sensors both incorporating a continuous electronic zoom function, a 1.5 micron laser rangefinder, a 1.06 micron laser designator and spot tracker, and a 0.8 micron laser marker whose light is visible to combatants equipped with NVGs. In addition to conventional air-to-ground roles such as locating and if necessary designating targets, or scanning the terrain to locate fixed or moving targets, it can also



Photo: Lockheed Martin

The faceted housing for the Electro-Optical Sensor System (EOSS) can be seen beneath the nose of this F-35 fighter.

be used for air-to-air target identification. Twenty pods have already been ordered for the French Air Force and Navy for delivery starting in 2018. The current requirement is for a total of 45.

New suppliers have entered the EO pod market. For example, China offers the WMD-7 targeting pod with IR, TV and laser subsystems, while the Turkish company Aselsan is marketing the ASELPD, which combines a high resolution FLIR, la-

ser rangefinder, laser target designator, and laser pointer.

Fusing Data from the Sensors

In the latest generation of fighter aircraft, the most significant trend is probably the move toward fusing the data from the individual sensors, plus data and information from offboard sensors in order to create a unified tactical air picture. Like the use of

ESD Spotlight

MITTLER REPORT

New Fortnightly Newsletter

European Security & Defence is escorted by the new bi-weekly newsletter **ESD Spotlight** which is distributed by email. **ESD Spotlight** is available free of charge. You can order your subscription by sending an informal email message to esd.spotlight@mittler-report.de.

Alternatively, there is a subscription order form on the magazine's website at www.euro-sd.com.



MITTLER REPORT VERLAG GMBH Baunscheidtstraße 11 · 53113 Bonn · Germany
Fax: +49 228 35 00 871 · info@mittler-report.de · www.mittler-report.de

Photo: Rockwell Collins ESA



Use of this Rockwell Collins generation III Helmet Mounted Display System (HMDS) to present extensive symbology and other data to the pilot removes the need for the F-35 to have a Head-Up Display (HUD).

more user-friendly controls and man-machine interfaces, this is intended to make the pilot less of a sensor manager, and more of a tactical decision maker.

In the RAFALE, data from the RBE2 AESA radar, the Infrared / Laser / TV Front-Sector Optonics (FSO), the internally-mounted Spectra EW suite, and the aircraft's IFF system are merged into a unified visual symbolism, keeping the pilot fully aware of the tactical environment surrounding the aircraft. This data fusion process can even exploit imagery from the infrared seeker of MICA IR missiles carried at the aircraft's hardpoints, using the weapon as an additional sensor.

Sensor fusion requires a massive amount of data processing. The F-35 uses more data fusion than any other current fighter, so has around 8.3 million lines of software code – more than four times than the 1.7 million used by the F-22 RAPTOR. Russia's PAK-FA is reported to use more than four million lines of code.

Radio-based datalinks allow aircraft to share data, and communicate with the ground. Combat aircraft operated by the US and its allies rely on Link 16. This secure and jam-resistant high-speed digital data link operates in the 960-1,215 MHz band, and uses time-division multiple access (TDMA) to allow several users to share the same frequency channel. It uses Data Link Solutions' Joint Tactical Information Distribution System (JTIDS), or follow-on Multifunctional Information Distribution System (MIDS) terminals.

Operating in Ku-band, the Harris Multifunction Advanced Data Link (MADL)

is a secure directional communications data link intended to allow communications between stealth aircraft. Originally planned for use of the F-22, it was not incorporated due to perceived technical risks. It was adopted for the F-35, and the USAF hopes to eventually deploy it on all its stealth aircraft, including the B-2 and F-22. However its short range means that it can only communicate with the aircraft that form a single tactical flight.

Due to enter service around 2015, the RAFALE F4 is expected to incorporate digital radios, a discrete but high-speed datalink, and improved satcom capabilities that will

be based on military rather than civilian standards.

The MiG-31 FOXHOUND relies on an APD-518 digital inter-aircraft datalink to allow a four-aircraft flight to conduct a line-abreast scan of the airspace ahead. Only the lead aircraft is linked to AK-RLDN automatic guidance network on ground.

Reducing Pilot's Workload

Improvements are being made to the man-machine interface in order to reduce pilot workload. In the past, most head-down displays (HDDs) were square or had an aspect ratio of around 4:3, a shape probably dictated by the cathode ray tube (CRT) technology originally used. When liquid crystal display (LCD) technology gradually replaced the CRT as the basis for the displays used with computers, the 4:3 format was retained at first, but as a visit to your nearest computer shop will demonstrate, these near-square displays have been supplanted by wide-screen models. Like today's flat-screen television sets, they use a format such as 16:9.

A similar trend can be seen in fighter cockpits. The F-35 cockpit is dominated by a panoramic display measuring 20 x 8 inches (51 x 20 cm). This can show several moveable and resizable windows whose size and position can be customised to meet the pilot's preferences. The largest type of window is called a Tactical Situation Display (TSD), and is used to show the fused sensor information. The pilot may specify three types of TSD, each measuring 10 x 7 inches (25 x 17 cm), with two being displayed simultaneously side-by-side.

Photo: French Air Force



View of a RAFALE cockpit showing the symbology of the HUD and the infinity-collimated Head-Level Display

One of the most interesting features of the RAFALE cockpit is the head-level display (HLD). This is 254 mm x 254 mm in size and has a resolution of 1,000 x 1,000 pixels. It acts as the aircraft's primary situational awareness display, and can show fused sensor data superimposed on a moving map. The HLD is collimated to infinity, so that its imagery seems to the pilot's eyes to be located far ahead of the aircraft. As a result he does not have to refocus as his gaze moves from the display to the HUD or to the external view. The HLD is flanked by two multipurpose 127 mm x 127 mm touch screen LCDs. These can display information such as EO imagery, RWR data, or ordnance and subsystem status.

Three screens and a HUD dominate the cockpit of the TYPHOON, but the avionics designers rejected the idea of using touch-sensitive screens on the grounds that the technology of the time was deemed to be unreliable if the user's hands were gloved.

Helmet Mounted Displays

Other fighter programmes are also adopting new-generation displays. For example, India's TEJAS MK1 fighter has two 76mmx76mm colour LCD MFDs and an ELBIT DASH helmet mounted display, but the MK2 is expected to incorporate larger size displays, a new HUD with an improved field of vision, and a helmet mounted display based on optical sensor.

The head-up display (HUD) has long been a feature of the modern cockpit, allowing pilots to observe tactical data without switching their attention from the forward view. At first these used a cathode-ray tube to project symbology onto an angled combiner glass positioned between the pilot's eyes and the aircraft windshield.

The traditional combiner glass incorporated partially reflective dielectric or metallic coatings, but this technique has given way to the use of wavelength-selective holographically manufactured coatings. These improve both the reflectivity of the combiner and the transmission of light from the external scene.

Designers sought to reduce the size of the mechanical mounting used to hold the combiner, and to increase the effective field-of-view. On a modern HUD such as the Thales CTH3022 wide-angle holographic HUD fitted to the RAFALE, the mounting is so minimal in size that the pilot is almost unaware of its presence.

The idea that a pilot's helmet might incorporate some form of display first emerged in the mid-1970s when the South African Air Force introduced a helmet-mounted weapon aiming sight in its MIRAGE F1AZ fighters, than later on its attack helicopters. The former Soviet Union saw the advantage of this concept, and in 1985 introduced a helmet-mounted display (HMD), on its then-new MIG-29 FULCRUM fighters, then later on the SU-27 FLANKER. When the pilot turned his head toward a target, the SHCHEL-3UM-1 helmet-mounted aiming device steered the seeker of the aircraft's R-73 (AA-11 ARCHER) IR-guided missile toward this.

The first modern Western HMD to achieve operational service was ELBIT Systems' DASH III. Developed during the mid-1980s to meet an Israeli Air Force requirement for F-15 and F-16 aircraft, it entered production around 1986, and the current GEN III helmet entered production during the early to mid-1990s. In the US, Vision Systems International (VSI) developed the Joint Helmet-Mounted Cueing System (JHMCS). Originally fielded on the F/A-18 HORNET and SUPER HORNET, variants are now used on the F-15C/D/E, F-16 Block 40/50, and F-22.

2008 saw the introduction of Thales' SCORPION Helmet-Mounted Cueing System, the first HMD to operate in colour. Promoted by the US company GENTEX, this was selected as the Helmet Mounted Integrated Targeting System (HMIT) for use on USAF A-10 THUNDERBOLT and for the Air National Guard/Air Force Reserves' F-16 Block 30/32 VIPER aircraft.

Until recently, the modern fighter cockpit included both a HUD and a HMDS, but the F-35 dispenses with a HUD, and relies on a Rockwell Collins Gen III Helmet Mounted Display System (HMDS) to present tactical data and imagery to the pilot. All flight data (such as airspeed, heading, altitude, targeting information and warnings) are displayed on the hel-

GYRO

TACTICAL GRADE



1:1 scale

STIM210 is a small, lightweight Three Axis Gyro Module for accurate pointing and stabilization, flight control and guidance applications.

- ITAR free
- Small size, low weight, power and cost
- Insensitive to magnetic fields
- Low gyro bias instability (0.5°/h)
- Low gyro noise (0.15°/√h)
- Excellent performance under vibration and shock
- Available in 1, 2 or 3 axes
- Fully calibrated and customer configurable to the specific application
- Weight 55 grams, volume <2cu.in, power 1.5 W

STIM210 is field proven in **Missile systems, Target acquisition systems, Airborne surveillance, DIRM, Remote Weapon Systems, Launch vehicles, Military Land navigators and Satellites.**



When size, performance and robustness matter

sales@sensoror.com • www.sensoror.com



Photo: Eurofighter

This air-to-air close-up of the Eurofighter TYPHOON shows the housing for the EUROFIST PIRATE EO system, and gives a good view of the BAE wide-angle HUD.

met's visor, a scheme intended to reduce pilot workload and allow a faster response to the tactical situation. A helmet-mounted integral camera provides night vision, while real-time imagery from the six EODAS infrared cameras mounted around the aircraft allow the pilot to look in any direction, and even to "look through" the airframe to see what is below the aircraft.

Challenges due to Long Production Runs

Given the long production runs of modern combat aircraft, the avionics suite of the current version may be very different from that of earlier examples. Since first entering service almost 40 years ago, the F-16 has evolved through a process involving four generations of core avionics, and five different radars. In some cases, an export customer may want different avionics than that used by the domestic customer, or even much-improved avionics that will make the aircraft superior to those of other users or even that of the domestic customer. In the case of the F-16, the F-16E/F Block 60 DESERT FALCON is the latest variant. The MIL-STD-1553 data bus used in the Block 50/52 version on which the Block 60 is based has been replaced by a MIL-STD-1773 fibre-optic data bus which offers a 1,000 times increase in data-handling capability. A built-in FLIR and laser targeting system is used rather than an external pod. Development of this variant was funded by the UAE, which is currently the only user. Plans to purchase a follow-on batch of 30 Block 61 aircraft and to upgrade the existing fleet to this standard were reported in 2014, but details of the changes were not disclosed. Avionic equipment associated with the Block 61 include an inertial navigation system with embedded GPS, IFF systems, and night vision devices.

In some cases, manufacturers are having to replace existing subsystems in order to meet the requirements of an export customer. RAFALE DQ01, the first for the Qa-

tar Air Force, flew for the first time on 9 January, 2017. Features specific to the Qatari requirement include a helmet sight and integration of Lockheed Martin's SNIPER pod. The selected model of helmet sight has not been revealed, but press reporting based on photographs of the aircraft has suggested that the ELBIT Systems TARGO-II has been selected.

Photo: Eurofighter



The multifunction displays in the Eurofighter TYPHOON cockpit are of the conventional pattern incorporating an array of push buttons.

Such a choice may seem controversial, but it is possible that the hardware is being procured not from Israel but from the ELBIT's Brazilian subsidiary AEL Sistemas (AEL). A possible precedent could be Saab's decision to buy TARGO helmet sights from Brazil following the unit's selection for use on the JAS-39E/F GRIPEN. Announced in November 2016, the US\$13M contract forms part of Sweden's offset commitment to the Brazil, which has ordered 36 JAS-39E/F to replace its ageing Northrop F-5EM and Dassault MIRAGE 2000C fighters.

AEL is responsible for providing two other subsystems for the Brazilian GRIPENS. One is the Head-Up Display (HUD), while the

other is the wide-angle display (WAD), a panoramic 19 by 8 inch head-down touch-screen display due to be integrated into the cockpit in order to meet Brazil's F-X2 requirement.

The first examples of the SU-30MKI delivered to the Indian Air Force in 2002 were Russian-built, but in phase I of the programme to manufacture the aircraft in India, HAL assembled aircraft from knocked-down kits. The locally-manufactured content increased in phase II and III, but by 2013 HAL was producing aircraft from scratch.

To meet India's requirements, avionics systems from various countries were integrated by Ramenskoye RPKB. Currently the aircraft is fitted with the NIIP NO11M BARS passive electronically scanned radar, but India is reported to be planning to upgrade its fleet with Russian Phazotron ZHUK-AE Active electronically scanned array (AESA) radars. Indian-developed hardware for the Su-30MKI is reported to include a TOTEM

ring laser gyro dual INS with embedded GPS, DARE RC1 and RC2 radar computers, DARE MC-486 and DP-30MK mission computer/display processor, and a HAL INCOM 1210A integrated communication suite.

The displays include a customised version of the Israeli ELBIT SU 967 head-up display (HUD), and seven multifunction liquid-crystal displays. From 2010, these components were indigenously designed and built by the Delhi-based Samtel Group.

When Malaysia ordered the SU-30MKM in May 2003, it adopted a build standard similar to that of the basic SU-30MKI, but specified a Thales wide-angle HUD, Sagem SIGMA 95 navigation system, and an LDP DAMOCLES thermal imaging pod. ■

GRIPEN – Still Hungry

Georg Mader

In medieval times, belief in the existence of the mythological figure of half-eagle/half-lion was widespread and 'Grijp' or 'Greif' remains to this day a popular name in Northern and Central Europe. At least a dozen cities from North-Eastern Germany to Silesia and Austria are named after the Griffon, (Greifswald, Greifenstein etc.) and carry his image on their coats-of-arms. A similar long-lasting legacy can be predicted for its little fighter-cousin, named by SAAB after the Swedish version (once GRIEPEN) of this combat legend.

While flying out from a well-established but remote and cold 'nest', it has spread its wings from there as far as Asia and Africa. And its latest progeny is the most capable clawed sibling in the family – and has already 'landed' as far as the Amazon. No, the hunger of this adventurous creature has not yet been satisfied. The author chose this fairytale-like opening to describe the news around the SAAB JAS-39 GRIPEN family, because sagas are deeply-rooted in the consciousness of our Swedish colleagues: just recall the names of the unique predecessor-designs of the GRIPEN, LANSEN (Lance), DRAKEN (Dragon) or VIGGEN (the lightning-strike of Mjolnir, Thor's hammer). And when SAAB's CEO Håkan Buskhe presented the latest annual figures of the conglomerate's aviation sector earlier this year, self-confidence definitely was not what he was lacking. Order intake more than doubled from SEK4.6Bn. the year before to over SEK9.7Bn. Profit before tax reached SEK475M, compared with SEK291M in the year before.

When Buskhe described "a good start into this year", one has to mention that the largest new single order was an additional GLOBAL EYE MMA for the UAE twith a value of some SEK2Bn. But the GRIPEN family – in both the C/D-versions as well as the nascent E/F or SUPER GRIPEN – will remain SAAB's solid aerospace cash-cow for at least two decades to come. It came as a surprise when in March 2017 Ulf Nilsson, head of SAAB Aeronautics and thus responsible for the GRIPEN project, departed at short notice and was replaced by Lennart Sindahl, who had previously held the same position. As Buskhe said,

(Graphics & Photos: Author)



Rollout of the JAS39 – E-Type – SUPER GRIPEN

"it's not a sensation when sometimes the responsible executives have different views on how to lead and manage a business. It has nothing to do with any project; Ulf still is in the company. No more drama than that."

The "Legacy" GRIPEN is still around – and Growing

SAAB has sold or – uniquely amongst high-end fighter aircraft – leased 225 GRIPEN-C and 45 GRIPEN-D to Sweden's Flygvapnet and the five export customers, the Czech Republic, Hungary, South Africa, Thailand and the UK's Empire Test Pilots' School. Opening up the Russian toolbox to modernise Slovakia's MiG-29s seems still to be on the table; the company says it is in the final stages of discussions with Bratislava. It has offered it to replace the Ukrainian-upgraded Croatian MiG-21s as well. Although resources have now been re-directed to produce up to 70 GRIPEN-Es for the Flygvapnet and 28 GRIPEN-E for the Brazilian Air Force (FAB), SAAB stresses that it remains

committed to the GRIPEN C/D. Contrary to 2017 reports by British defence media colleagues that the JAS-39-C/D would be "gone", SAAB's Head of Communications for Asia Pacific, Rob Hewson, emphasised angrily at LIMA 2017, Malaysia, that the C/D at Linköping has a "hot" production line. According to Hewson – responsible for the visible footprint of the aircraft in key markets like India and Malaysia – there will be no real cut-off point for stopping marketing the C/D in favour of the E/F. With the latest MS20 standard, and as the first one of the three EUROCANARDS fighters to be fitted with METEOR BVR missiles for the Swedish QRA, it remains a very capable and cost-effective aircraft. Although the last legacy GRIPEN was handed over to the Flygvapnet in February 2017, there will be a continuous development programme for the C/D: SAAB actively prevents it from becoming – in the court of the media – an "old" aircraft, just because the E/F will be around soon. And not all the countries would want the extended range or the improved sensor suite of the latter.

Author

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

Hewson was soon to be proven correct. On April 26th, Bulgaria announced the decision to start exclusive talks with Sweden to acquire eight new-built SAAB GRIPEN C/Ds. According to Deputy Prime Minister Stefan Yanev, the Swedish government-to-government offer to replace the Soviet-era MIG-29A/Bs was picked by the interim administration in preference to – as chosen by neighbouring Romania – an offer from Portugal of secondhand US F-16s equipped with US weaponry and an offer from Italy of secondhand EUROFIGHTER TYPHOON Tranche-1 fighters. No value was given, but exclusive sources in Sofia suggest a deal for some Levs 1.5Bn. (€770M), including Sofia's requirement for Western air-to-air and air-to-surface weapons, ground support equipment, training and logistics support. Regarding the pure aircraft acquisition costs, sources report that the Swedish offer was preferred because its €510M price tag was less than the F-16 bid, which was valued at around €767M. As with the Malaysian contest, the GRIPEN bid proposes delivery of the first new-built aircraft within 18 months, and for Sofia, a deferred payment scheme is expected to relieve the financial burden on Bulgaria's defence budget. According to Yanev a commission for the negotiations has been set up, while talks with Sweden are to be held by Bulgaria's new centre-right government of Boyko Borisov, with parliamentary approval expected as we go to press.

The Cold War Reloaded

For over 20 years, peacetime air-defence or air-policing over Western countries was seen – by many citizens and the media – as merely a tool to suckle manufacturers of unnecessary and expensive systems, instead of building more kindergartens and hospitals. The “over-social” Swedes did both quite well, but even their red-green government has had to acknowledge a visible change in the regional security climate. In 2016 it announced successive increases in defence spending over the next five years by 11% or 2.2% per annum. Nevertheless, former Cold War-numbers – like 650 J35 DRAKENS built – will never return, and by 2014 there were a combined total of 134 JAS 39s in Swedish Flygvapnet service. But whether the MS20/METEOR combination, the radar-upgrade or even the biofuel, the service will definitely gain from efforts described ahead. While short on manpower and just recently re-introducing conscription, Swedes feel the quadrupled Russian presence in the Baltic region and have accepted that the post-cold war “strategic timeout” or “peace-dividend” are gone.



GRIPEN colours in 2016

Comparison of the Gripen-Evolution's technical data (single seater)		
	JAS 39C	JAS 39E
Empty weight, kg	app. 5,900	app. 6,300
Internal fuel, kg	app. 2,270	app. 3,350
Max. takeoff weight, kg	14,040	16,540
Ordnance/weapons, kg	5,170 (8 stations)	7,200 (10 stations)
Engine	VOLVO RM12	GE F-414-GE-39E
Thrust dry / AB, KN	54,5 / 80,5	64 / 97,8
Supercruise	No	up to Mach 1.25
Radar	Mechanical	AESA-type
IRST	No	Yes
Cockpit-Displays, cm	3 x 15 x 20	1 x 20 x 50

Regarding the Air Force, this is shown by – a scared reaction to a 2013 unannounced mock nuclear-profile attack by Russian Tu-22M BACKFIRE bombers with SU-27 escort on Stockholm – a “fast response GRIPEN jet squadron” based on the strategic island of Gotland; or re-installation of RBS-15 coastal-based anti-ship missiles; or the mid-May 2017 exercise of the F7 Wing from State Road 44, a practice abandoned many years ago.

In trying to guarantee continuing operational competitiveness to the Flygvapnet – but also in parallel the current as well as future operators of the legacy series – SAAB is investing fresh money of its own into improvements. On 27 April 2017 SAAB unveiled a major upgrade of the C/D's radar, intended to double its detection and

tracking range and give it the ability to track low-radar-cross-section (RCS) targets. Developed with company funds over the last two years, the Saab PS-05/A Mk.4 bucks the trend toward electronically scanned arrays (AESA) in radar design by retaining a mechanically scanned antenna – mostly for reasons of cooling requirements that would require substantial changes. Today's Mk.3 radar can be converted to Mk.4 by replacing two LRUs with new hardware: an all-digital TX/RX and a radar processing unit. Part of the performance improvement comes from the TX/RX unit, which the manufacturer claims has such a low noise level that their engineers found it hard to procure test equipment that could measure it. The new processor includes a high-capacity, solid-state data recorder

and is based on commercial COTS-components. It supports new processing algorithms derived from SAAB's family of GIRAFFE ground-based air-defence radars, including sub-metre-resolution, synthetic SAR-radar modes and non-cooperative target recognition features.

Another clever push towards fresh domestic and foreign attractiveness was announced in late April. While airliners have flown on bio-fuel, a two-seater GRIPEN-D became the first ever fighter worldwide to fly entirely on such alternative fuels. According to Göran Bengtsson, Director of Research and Technology, Future Business and Aeronautics, gaining this verification and valuable knowledge for future possible use of it, demonstrates independence from oil imports, is important from a strategic defence standpoint, and opens the way for additional sources of fuel, which creates flexibility: "It's naturally also good if we in the long term can contribute to reducing environmental impact from military aviation. And the test team reportedly noted no differences between the CHCJ-5 made of rape seed and ordinary kerosene. However, further certification of the fuels and access to amounts that correspond to operational needs still are goals to pursue," he said. The Swedish Defence Material Administration (FMV) backs the project and through a bilateral agreement between Sweden and the United States, the US Navy and US Air Force have contributed with valuable knowledge and experience regarding certification. System testing, ground testing and flight testing have been conducted at SAAB in Linköping, together with GKN Aerospace (the maker of the RM12 engine).

Rejuvenating the Myth

Meanwhile most of the existing operators continue to invest in the -C/D-series. The CzechAF will have its fleet with MS19 Block-3 software upgraded to the MS20 configuration. The upgrade delivers a host of new capability options for air-to-air, air-to-surface and ISTAR missions plus many improved mission systems and other changes. Following the GRIPEN philosophy, operators are free to choose how, when and to what extent they implement the new capabilities that the upgrade enables. In the air-to-ground role, MS20 delivers further enhancements, like integration of the Boeing GBU-39 Small Diameter Bomb (SDB) for a high-precision, long-range strike capability. A so-called "smart launcher" can carry four SDBs, with a maximum of 16 weapons on a single GRIPEN. A further improved Link-16 datalink supports what is claimed to be a significant increase in data exchange and therefore situational awareness between other fighters and C2 nodes. MS20 has been agreed since February 2017 between FMV and leasing-customer Hungary. The 14 GRIPENs at Kecskemet will enjoy 400 extra flight hours from 1,600 to 2,000/year and an updated aircraft. As per agreed terms, the Hungarian GRIPENs are to fly until 2026 and Sweden will provide support to cope with the extended timeframe. Since October 2014 Kecskemet is responsible for air-policing coverage of Slovenian airspace, jointly with Italian fighters.

The first batch of 12 GRIPENs in Thailand- ordered in 2008 and 2011 and delivered in 2011 and 2013 – will be technically supported by a new order placed in January with FMV to span until 2019, including maintenance and spare supply. While one JAS-39C was fatally lost at an airshow in January, SAAB reports that another 12 -C/D are sought by the RTAF, budget permitting.

To the contrary, South Africa has become a sobering experience – through no fault of the Swedish OEM. Despite acquiring South African "claws" since March 2015, like DENEL's A-DARTER, since 2013 12 out of 26 GRIPEN-C/Ds are reported to be in long-term "rotational" storage, due to lack of funding to fly them.

Solutions for aviation? Rohde & Schwarz.

With Rohde & Schwarz on board, you can count on reliable and secure radiocommunications. More than 7000 airborne radios demonstrate the great trust placed in us. Our military radios are the only radios available on the market that also meet civil certification requirements.

Our portfolio includes complete, state-of-the-art, IP-based ATC communications solutions – from the controller working position to the antenna.

For further information, visit
www.rohde-schwarz.com/ad/airborne

Visit us at
Paris Air Show
Le Bourget
German Pavilion
Hall 2A, Booth B286



ROHDE & SCHWARZ

The E-Model, GRIPEN's Latest Breed

For sure the most visible proof of this "new" Swedish commitment, is the fruitful development of the latest GRIPEN-version – the model -E, sometimes also called SUPER GRIPEN. It "hatched" after a six-year risk-reduction-, demonstration- and verification-effort with the converted two-seater 39-7, shown to the public from Fairford to Axalp as the JAS-39NG. After full development for over another year, prototype 39-8 was rolled-out in front of hundreds of guests, Swedish and international air force leadership and media on 18 May 2016 at Linköping, in a truly jaw-dropping light- and laser show.



Production of GRIPEN-C

JAS-39NG – Ready, Steady ...

Yet so far the JAS-39NG has not left the ground and the first flight will now take place sometime during the second quarter of this year – right around when these lines are going to print. At the annual press-conference mentioned, Buskhe was of course asked why and explained: "We are in no hurry, we keep to our schedule. We are the only one in the West in construction of a new fighter aircraft with new technology and of course there are some adjustments back and forth. But overall it looks good and 39-8 has done engine-runs and taxi- and weapons-fitting tests. Why we postponed the first flight is not on some problems discovered, (but a) deliberate decision to fully qualify an innovative avionics and software system before getting airborne. The new aircraft will function like a giant App and as software always is a critical area, we as the manufacturer – and not up to a customer requirement – are going for the highest standard with a very high level of quality and risk reduction, also to make sure that the software installed on the GRIPEN-E meets civilian standards by DO-178C. The customer requirement is to a lower level, but this will bring us a lot of benefits and we will also achieve savings when we do the future, inevitable, necessary upgrades, by getting a much higher level of maturity in our complete system at a much earlier stage and more cost-efficient."



GRIPEN cockpit

A Step Forward

JAS is the Swedish abbreviation for Jakt (Fighter), Attack (Strike) and Spanning (Recce). JAS-39E is again covering all these three core criteria, but is a new aircraft in detail. It has only a few structural or systems components in common with the



GRIPEN FMS simulator

current C/D, but it shares enough with its predecessor to take full advantage of weapons-integration experience. Com-

pared with the earlier variants, JAS-39E has a higher gross weight and can carry 2,400 lb. more internal fuel, mostly due



range version of the SAAB/Diehl Defence produced, 600 kg, RBS15 anti-ship missile, with 200 km range. Flygvapnet's fixed-price contract is for 70 aircraft (with an option for 10 more), partly converted from JAS 39Cs but with the new G414-engine, avionics and all-new SAAB-developed EW system with gallium-nitride antenna-technology. This equates to a flyaway price of around US\$43 million, intended to be lower than the JAS 39C, despite its greater capability, and with lower operating cost than any comparable fighter available. Deliveries are planned from 2018 to 2027.

Brazil – Giving away your Baby

While Swiss voters rejected 22 new GRIPEN-E/F in 2014 for at least five more years, the other launch-customer for the new variant by far outweighs alpine hesitancy and scepticism. When the huge and diverse nation of Brazil selected 36 GRIPEN-E/F over the RAFALE, and F/A-18E/F SUPER HORNET, in December 2013 and signed a contract in October 2014 which became effective in September 2015, SAAB could book US\$4.7 billion onto the balance sheets. The real milestone in the GRIPEN's

to a redesigned main landing gear that retracts into underwing bulges rather than the body. The nose gear has also been changed, from a twin-wheel unit to a larger single wheel that is compatible with emergency arrester cables on runways. The main structure has been redesigned with continuous wing-fuselage frames that extend to the inboard wing pylons, where the outer wings are attached, and the fuselage contours have been changed, partly to accommodate more fuel. However, the redesign has reduced the airframe's

proportion of the unladen weight, boosting useful load.

While the JAS 39E is not a classic externally stealthy aircraft, the development contract stipulates a significantly lower radar cross-section (RCS) than the JAS 39C. It will also be able to engage stealth targets with a fused, multispectral sensor suite. It will be able to supercruise at Mach 1.25 without using afterburner, and will enter service in 2018 with a full suite of weapons, again including the MBDA METEOR ramjet-powered BVR-missile, or an extended-



25TH INTERNATIONAL DEFENCE INDUSTRY EXHIBITION

5-8.09.2017, KIELCE, POLAND

so far completed path however is the scale of local participation the Swedes have offered – and accepted.

At Saab Aeronautica Montagens (SAM) in São Bernardo do Campo (Greater São

local giant EMBRAER – itself the fourth largest global aerospace house – are working, with currently 56 engineers (40 Brazilians and 16 Swedish expatriates). Up to April 2017, besides EMBRAER SAAB

on-the-job training on over 60 projects in Sweden of up to 24 months. The simulator for the FAB-pilots will come online in 2017 and the first aircraft to be delivered is already in production at Linköping. It

Photo: SAAB



RBS-15 on GRIPEN

Paulo) they will not only manage the supply chain and produce wing and front and rear fuselage subassemblies for both the production line in Sweden and in Brazil, the two-seat F-model will be completely developed and manufactured in Brazil. The Flygvapnet does not see a requirement and so a “GRIPEN Design and Development Network” (GDDN) was inaugurated in November 2016 in Gavião Peixoto. Here personnel from SAAB and

has announced local agreements for the programme with ATMOS-Sistemas, DCTA, INBRA, AKAER, AEL-Sistemas and A-Tech.

In exchange, 150 Brazilian engineers underwent training at SAAB’s various facilities in Sweden. More than 30 have already returned to Brazil, some of whom are working at the GDDN. And until 2024, more than 350 Brazilian professionals will take part in courses and

will be handed over in 2019 and the final locally-built F-model is targeted for 2024. And there could even be 108 E/Fs over the Amazon in the future: local designation is F-39E/F.

Make in India?

To demonstrate how far cooperation with a customer can go, for SAAB the Brazilian programme is a role-model for another, potentially a magnitude “heavier” campaign. At Bangalore in February, Bushke said that GRIPEN-E offers the best capability for India’s fresh single-engine fighter requirement of up to 100 aircraft. SAAB is willing to offer a similar deep collaborative industrial partnership like for Brazil, in line with New Delhi’s “Make-In-India” initiative. If India were to consider the GRIPEN over the only other contender - F-16 Block-70 - SAAB would be able to roll-out the first aircraft from Indian soil in 3-5 years, Buskhe said.

And for the Indian Navy (IN) – and until the recent decision to phase-out its sole aircraft carrier, also for Brazil – there also exists a study for a possible sea-going GRIPEN-Maritime. The Indian Navy is actively requesting a carrier-based fighter, since it rejected the indigenous naval TEJAS LCA-N. SAAB has assured ESD that it can be done – but that will become an extra Swedish saga. ■

Legacy GRIPENs Are Far from “Second Class”

A GRIPEN pilot from neighbouring Kecskemet some years ago told the author in Vienna about their true performance and results in an earlier “Spring Flag”-exercise at Italy’s Decimomannu in Sardinia. Flying against F-16C, AV-8B HARRIERS, F/A-18Cs and RAF TYPHOONS for the first time, Gabor recalled: “In Deci we faced COMAO (combined air operations) packages of 20, 25 or even 30. Training value for us was to work with that many aircraft on our radar – and even with our limited experience we could see that the GRIPEN radar is fantastic! We would see others at long ranges, we could discriminate all the individual aircraft even in tight formations in using extended modes. The jamming had almost no effect on us – and that surprised a lot of people. Also, other pilots couldn’t see us – not on radar, not visually due to our small size – and we had no jammers of our own. We nevertheless got one Fox 2 kill on a TuAF F-16 who turned in between our two jets but never saw the second guy. It was a perfect shot. Our weapons and tactics were limited by ‘Red Force’ rules and in a scenario layout like this, the Red Force is always supposed to die. But even without our AMRAAMs and data links we got 8 or 10 kills, including a TYPHOON. Often we had no AWACS or radar support of any kind, just our regular onboard sensors. But flying like that in ‘free hunting’, we got three kills in one afternoon. It was a pretty good experience for our first time out and everybody else, all the others, came over to clap our shoulders.”

T-X: Training Pilots for 5th Generation Combat Aircraft

Sidney E. Dean

The US Air Force (USAF) is seeking a new jet trainer aircraft tentatively designated the T-X. The aircraft will be operated by USAF's Air Education and Training Command (AETC). The new plane's primary mission is preparing pilots to fly fifth generation combat aircraft, such as the F-22 and F-35 and the future B-21 bomber, as well as legacy combat aircraft.

The T-X will replace the T-38 TALON as the primary platform for the advanced phase of Joint Specialized Undergraduate Pilot Training (JSUPT) for the fighter/bomber aviation career track and for the Introduction to Fighter Fundamentals training course. Additionally, the plane will be used to train test pilots and flight test engineers. The cockpit layout, handling and sensor systems of the T-X will be as close as possible to those of 4th and especially 5th generation combat aircraft in order to provide optimal preparation before new aviators join operational squadrons. A major aspect of future JSUPT will be training pilots to handle the immense data flow experienced in 5th generation cockpits. "Our ability to get the most out of our fifth-generation aircraft depends on success in the Advanced Pilot Training programme," Air Force Chief of Staff Gen. David Goldfein said in December. "In terms of both providing realistic, holistic training and reducing flying hours on our fifth-generation platforms, T-X is a programme we've got to get right."

The USAF released the industry Request for Proposal (RfP) in December 2016. Candidate submissions were due by March 2017, with flight test data to be submitted three months later. Overall the Air Force presented more than one hundred technical or performance requirements for the T-X. The decisive requirements are identified as: minimum sustained 6.5 G (objective: 7.6 G) load capability and a 20 (objective: 25) degree angle-of-attack; embedded training with synthetic sensors and data link which closely approximate operational systems on 4th and 5th generation aircraft; and sustainment of an 80 percent readiness rate.

Author

Sidney E. Dean is President of Transatlantic Euro-American Multimedia LLC. and a regular contributor to ESD.

Photo: Lockheed Martin



Lockheed Martin's T-50A

The cockpit must be night vision capable. Supersonic capability is desired but not required; threshold performance is given as Mach 0.9. Air refuelling must be practised in the simulator, but a physical aerial refuelling capability of the aircraft is preferred. Cost saving aspects such as reduced maintenance requirements and ten percent greater fuel economy over the T-38 are also prerequisites.

While the obvious focus is on the aircraft, the USAF emphasises that it is acquiring a "training system." A significant portion of key training components – including data flow management, sensor operation and aerial refuelling – will take place in the simulator. Each firm competing for the T-X contract must include ground-based training systems as an integral part of its proposal.

Cost will be a major consideration determining contract award, but performance and perceived reliability of the contractor will also weigh heavily. This is evidenced, among other things, by the fact that the USAF has taken the uncanny step of offering bonus points for exceeding certain

threshold requirements. For example, bidders will receive an evaluation bonus for every 0.1 G load limit over 6.5 (up to a maximum of 7.6 G). While normal procedure is to favour the lowest credible bid which meets all threshold requirements, in this case a moderately higher bid could win the award if it is associated with significantly superior performance.

The USAF has a requirement for 350 T-X. The contract is valued at US\$16.3Bn. This figure includes: development costs; delivery of the first five test and evaluation aircraft; Low-Rate Initial Production (LRIP), consisting of procurement lots 1-2 beginning in 2024; full-rate production consisting of lots 3-11 beginning in 2026; sustainment transition support; and ground support systems, including 46 ground-based simulators, mission planning and processing systems, support equipment and spares. Contract award is expected by the end of the current fiscal year, with Initial Operational Capability (IOC) of the first 16 LRIP aircraft planned for 2024. The transition from the T-38 to the T-X will take a decade, with the final T-38 set to retire in 2038.

A total of five companies or consortiums are competing for the T-X contract. Lockheed Martin (LMCO) and Boeing are considered clear front runners, although a “dark horse” candidate could theoretically be chosen based on a competitive price/performance ratio. The contract winner will be well placed to provide the next-generation trainer to other nations acquiring the F-35 and other advanced combat aircraft in coming decades.

Lockheed Martin/KAI T-50A

Lockheed Martin’s T-50A is based on the T-50 GOLDEN EAGLE. That aircraft was developed jointly with Korean Aerospace Industries a decade ago and is strongly influenced by the F-16. Some 150 planes are currently serving with the armed forces of South Korea, Indonesia and the Philippines, with more than 142,000 cumulative flight hours. LMCO built two prototype T-50As for the T-X competition. The single-tail, single-engine plane is propelled by a GE F404 turbofan engine. Major performance parameters include Mach 1.5 maximum level airspeed and a G stress range of +8 to -3. In addition to the basic airframe’s extensive operational experience, the T-50A enjoys a major advantage: LMCO produces both the F-22 and the F-35, and can tweak the new trainer for maximum compatibility with the fifth generation fighters. To meet

is a 50x20 cm large area avionics display (LAAD) similar to that in the F-35. On the trainer, the LAAD can simulate a realistic tactical situation including radar, infrared, and other target information displays. It also allows students to deploy simulated weapons with real-time feedback within the tactical scenario. The simulated data provides student pilots experience working with the sensor input, despite the fact that the training aircraft does not actually carry the frontline aircraft’s sensors.

LMCO stated in April that the T-50A could achieve IOC by 2022, two years ahead of the planned USAF schedule; this could save USAF money by allowing earlier retirement of the T-38. Lockheed Martin presents the T-50A as a low-risk, proven solution preferable to risky unproven designs. This positive attribute could have a negative aspect. While the T-50A has been modernised to reflect 5th generation technology, the decade-old design offers limited flexibility, and may be challenged to incorporate new technology in coming decades.

Boeing/Saab BTX

Boeing’s submission is currently designated the Boeing T-X or BTX. It was developed in cooperation with Saab, which is expected to take a major role in construction. While the twin-tailed BTX was developed from the ground up as a “clean sheet” aircraft,

According to Boeing Phantom Works president Darryl Davis, the company is keeping performance close to the threshold requirements in order to keep costs down and underbid Lockheed Martin. Boeing also hopes to reduce costs by applying their secret “Black Diamond” manufacturing technology initiative, which introduces more automation into the assembly of complex aircraft structures. Increased use of adhesives and 3-D printed polymer parts are also slated to reduce cost. This could bring the clean sheet contender into competitive price range with the more mature models being offered. An inherent risk is the possibility of underestimating production costs, which could ultimately lead to cost overruns.

Boeing presents the BTX as an all-new advanced system tailored specifically to USAF’s training mission requirements; a press release emphasises the “flexible design that [...] can evolve as technologies, missions and training needs change.” Simultaneously the firm downplays the risk factors which often plague new systems. Boeing T-X programme manager Ted Torgerson stated in March that the two extant planes are not prototypes but “EMD [Engineering and Manufacturing Development] ... representative” aircraft very similar to the planned final configuration. He said Boeing could achieve Milestone C – readiness for production – by 2022, two years ahead of schedule.

Leonardo T-100

Italy’s Leonardo SpA is proposing the T-100, a modified version of the M-346 MASTER advanced trainer currently in service in Italy, Poland, Israel and Singapore. In Israel and Italy the M-346 is used to train F-35 pilots. The twin engine T-100 features a fifth-generation cockpit [command systems, displays and avionics]; open system architecture designed to receive next-generation enhancements; and in-flight refuelling capability. Corporate statements maintain that students experience manoeuvrability and flight characteristics very similar to 5th generation fighter aircraft, including a limit load factor range of +8 to -3 G. The Honeywell F-124 engines allow the T-100 to achieve transonic speeds (in which a range of airflow velocities just below and above the speed of sound exist simultaneously around the aircraft) but not true supersonic flight.

Major selling points are the onboard-embedded and ground-based simulators. The onboard Embedded Tactical Training Situation (ETTS) system simulates the complete suite of sensors and weapons found



Photo: Boeing

Boeing’s T-X

the T-X requirements the T-50A has added aerial refuelling capability, embedded ground training systems, a HUD, and a digital cockpit layout and avionics suite similar to the F-35’s. “You’d have to be an expert to tell the difference,” says Mike Griswold, LMCO’s business development director for the T-50A. Among the cockpit systems

the design reflects features of the F/A-18EF and the GRIPEN (both considered “generation 4.5” aircraft). The design features open architecture, a glass cockpit, aerial refuelling and a single GE 404 engine which enables low supersonic flight. The first of two BTX prototypes conducted its maiden flight in 2016.

"When you're in a hostile environment, miles from a safe landing area, the last thing you need is a question mark about reliability.

I had complete confidence in the EJ200 engines,
allowing me to focus on the combat task."

UK RAF Wing Commander in Libya

**The EJ200: the engine
that gets you home.**

With cutting-edge technology and unrivalled build quality, the EJ200 has proven time and again to be the most reliable engine in its class.

To find out how our market-leading design and maintenance concept ensure that you will always be able to fulfil your operational requirements, visit us at www.eurojet.de

Photo: © Eurofighter / Geoffrey Lee



EUROJET

Power. Precision. Performance.



Photo: Leonardo

Leonardo's T-100

on operational aircraft, preparing students to deal with the real-world flood of information during flight operations. The ETTS can also simulate a tactical scenario with interactive friendly and hostile air, land and sea forces on the sensor screens. Additionally, the firm describes its "Live, Virtual and Constructive" (LVC) embedded training system as the most advanced and integrated of any system being offered. The LVC system allows the linking of several training aircraft and student-piloted simulators for a wide variety of cooperative scenarios. This system, already in use in Italy and Israel, permits more student pilots to participate in complex training exercises at one time.

The T-100 is one of the more mature designs competing for the T-X contract, reducing technological risk when compared to clean sheet designs. However, chief test pilot Enrico Scarabotto's 2016 statement that the plane's manoeuvrability and turn rate only marginally met USAF's performance threshold, could harm Leonardo's chances.

Stavatti JAVELIN Mk 30 and SM-47 T-X

Minnesota-based Stavatti Aerospace submitted two different aircraft for T-X consideration.

As expected, Stavatti proposed a derivative of the (never built) ATG JAVELIN Mk 30 trainer first presented in 2005. The new JAVELIN design is a single engine (1x Honeywell F-125) plane with a maximum level performance of Mach 1.5 and a limit load factor of 9 G. Stavatti estimates a total system price of US\$4.7Bn for 350 aircraft and 46 ground training systems, by far the lowest bid of any competitor.

In a surprise move, the firm also submitted a trainer version of its SM-47 SUPER MACHETE strike fighter concept. The SM-47 T-X has an unconventional forward swept wing configuration which enhances ma-



Photo: Stavatti Aerospace

Trainer version of Stavatti's SM-47 SUPER MACHETE strike fighter

noeuverability but increases structural stress. The fuselage and wings are composed of aluminium and titanium foam metal sandwich construction. Propulsion up to Mach 2.2 is provided by a single GE F414 turbofan engine. The limit load factor is 9 G. Stavatti estimates a total system cost of US\$8.4Bn, the second-lowest of all bids.

Low cost notwithstanding, Stavatti's chances are considered minimal. The firm has no track record for constructing military aircraft and has so far failed to identify a partner who does. Prototypes of either

model will not be available before 2018 at the earliest, raising the spectre of technical setbacks. The extremely low cost estimates must also raise suspicion regarding either the quality of the aircraft or Stavatti's grasp of the complexities of aircraft production.

Sierra Nevada/TAI FREEDOM TRAINER

Colorado-based Sierra Nevada Corporation (SNC) has teamed with Turkish Aerospace Industries (TAI) to produce an original design called the FREEDOM TRAINER. The lightweight twin-engine plane will have an all composite airframe, fully digital fly-by-wire instrumentation, and be powered by two Williams International FJ44-4M turbofan engines. Maximum possible use of off-the-shelf systems is expected to lower cost and development time, while the lightweight design could enhance fuel efficiency. There is no confirmation that the prototype has ever flown.

Few other details have emerged publicly regarding the FREEDOM FIGHTER. SNC's

expertise lies in systems integration rather than aircraft development. TAI is developing a jet trainer together with BAE. That plane, designated TF-X, is expected to make its maiden flight by 2023 and achieve IOC by 2029. TAI Chairman Temel Kotil describes the TF-X as a twin-engine supersonic, low-cost, long-range, stealth fighter. It is unclear to what extent the TF-X and FREEDOM TRAINER designs overlap, but SNC's lack of a track record in aircraft development seriously dampens the FREEDOM TRAINER's odds in the T-X competition. ■

Remotely Piloted Aircraft Systems (RPAS) MALE

RPAS for Long Endurance Missions at Medium Altitudes

Peter Preylowski

In the past few years, the importance of Remotely Piloted Aircraft Systems (RPAS) for the equipment of modern armed forces has significantly increased. In particular, RPAS for long endurance missions at medium altitudes (Medium Altitude Long Endurance - MALE) are being deployed to crisis and conflict regions all over the world. The MALE RPAS operational spectrum covers intelligence, surveillance, reconnaissance (ISR) missions and can also be weaponised to protect the warfighter on the ground. This article provides an overview of the worldwide MALE RPAS development and production.

Medium Altitude Long Endurance (MALE) in terms of Remotely Piloted Aircraft Systems means a service ceiling between 15,000 and 45,000 ft (about 5,000 and 15,000 m) and an endurance of more than 24 hours. As the capabilities of RPAs become more widely utilized in a variety of operational environments, the demand to support new and different missions has increased. This has led to capability enhancements that include sense and avoid systems which further allow the MALE RPA to be certified to operate in National Air Space; as well as improved SIGINT and other sensor capability; longer wings to provide more fuel capacity and better take off performance on shorter runways. Moreover, the dominating companies in the MALE RPAS market include the US American manufacturer General Atomics Aeronautical Systems Inc. (GA-ASI) and Israel Aerospace Industries Ltd. (IAI). Yet remarkably enough, in the past few years Europe and many countries in Asia, and Africa have turned to developing and implementing MALE RPAS.

General Atomics Aeronautical Systems

In 1984, Leading Systems Incorporated (LSI), was awarded one of several UAV research project contracts by the Defence Advanced Research Projects Agency (DARPA) for the development of an RPAS to be used both for reconnaissance missions. The pusher-prop-driven aerial vehicle, then known as AMBER, performed its maiden flight in 1986. Seven AMBERs had been built before the programme was cancelled in 1990. Faced with bankruptcy, LSI was purchased by General Atomics in 1991. General Atomics Aeronautical Systems Inc. (GA-ASI) was established as an independ-

Photo: GA-ASI



The PREDATOR was the first major RPAS success of General Atomics Aeronautical Systems Inc.

ent company in 1992, remaining as part of the larger, privately held, General Atomics Corporation, originally founded in 1955 and headquartered in San Diego, California. GA-ASI developed the MQ-1 PREDATOR A from LSI's legacy.

GA-ASI MQ-1/(RQ-1) PREDATOR A

The MALE PREDATOR family of remotely piloted aircraft (RPAS) was developed in the scope of the Tier II programme. One system is comprised of four UAVs, one Ground Control Station (GCS) and the PREDATOR Primary Satellite Link (PPSL). Packed in containers, these components can be deployed by C-130-sized airlifters. This RPAS is controlled by a qualified pilot and a sensor systems operator and requires maintenance personnel on twenty-four-seven standby. Although the PREDATOR system has primarily been designed to perform reconnaissance activi-

ties, it may also be used for armed operations. The system was initially designated as RQ-1, with "R" referring to reconnaissance and "Q" to remotely-piloted aircraft. It was renamed MQ-1 – with "M" for multi-role – in 2002 when PREDATORS were equipped with AGM-114 HELLFIRE air-to-ground missiles to be the first RPAS to perform armed operations.

The PREDATOR A has a span of 16.8 m; it is 8.22 m long and 2.1 m high. Its maximum take-off weight is 1,020 kg, its payload is 204 kg. It reaches a maximum speed of 222 km/h and a service ceiling of 7,520 m.

After its first flight on 3 July 1994, it was brought into service in the summer of the following year, and series production started. Approximately 400 PREDATORS have been built. They have proved successful in numerous missions, to include Afghanistan, Pakistan, in the Balkans and the Middle East. In addition to the US Air Force, French and Italian Air Forces are using this system.



Photo: UK MoD

The MQ-9A REAPER RPAS has already been introduced by several NATO partners – the picture shows the British version.

GA-ASI MQ-9A PREDATOR B

The MQ-9A PREDATOR B constitutes a fundamental advancement of the MQ-1 PREDATOR A (designated by the US Air Force as REAPER) which took off for the first time on 2 February 2001. It is larger in size and, most notably, more powerful. It is capable of covering a wider mission spectrum and is used for armed operations. Controlled via satellites and C-band line of site, it can perform 24-hour-missions in remote locations. It was designed as a weapons-capable ISR platform. Its armament includes the GBU-12 PAVEWAY II and GBU-38 JADM guided bombs and the AGM-114 HELLFIRE guided missile. Its comprehensive equipment also features the MTS-B multi-spectral targeting system of Raytheon and the Lynx syn-

Another advancement of the PREDATOR is the MQ-1C GRAY EAGLE, originally designated as MQ-12 WARRIOR, ALPHA WARRIOR or SKY WARRIOR. The prototype of this variant took off for the first time in October 2004. The GRAY EAGLE is driven by a diesel engine with a pusher propeller. Its endurance is 36 hours. It may be equipped for both reconnaissance and combat missions. A MQ-1C version (Improved GRAY EAGLE, IGE) with higher performance first flew on 27 July 2013. In 2015, the US Army procured the first 29 GRAY EAGLES of a targeted total of 152 systems by 2022.

GA-ASI PREDATOR C AVENGER

Another example that GA-ASI designed and produced from their own resources is the AVENGER or PREDATOR C. AVENGER represents a unique UAV that utilizes a turboprop engine which provides high speed and permit operations over regions of contested airspace. It is driven by a turboprop engine (Pratt & Whitney PW545B with 17.70 kN) enabling a sustained speed of 740 km/h, a service ceiling of 18,300 m and an endurance of 18 hours. Sensor systems and armament are internally carried on board. The PREDATOR C AVENGER took off the first time on 4 April 2009.

In 2016, the AVENGER Extended Range took its first flight. With an increased wingspan of 76 feet and 2,200 pounds of additional fuel, AVENGER ER extends the legacy AVENGER's already impressive endurance from 15 hours to 20 hours providing an optimal balance of long loiter Intelligence, Surveillance, and Reconnaissance (ISR) and precision-strike capability, supporting a wide array of sensors and weapons payloads to perform ISR and ground support missions.

GA-ASI MQ-9A REAPER Technical Data

Length	11.00 m
Span	20.10 m
Height	3.8 m
Max. take-off weight	4,760 kg
Payload	1,701 kg
Max. speed	444 km/h
Service ceiling	15,240 m
Endurance	up to 30 h
Engine	1 Honeywell TPE 331-10T

thetic aperture radar developed by GA-ASI. The PREDATOR B can be disassembled and packed into containers to be airlifted in a C-130 HERCULES. For the longer term, the USA has envisaged the acquisition of 401 MQ-9s, more than 230 of which have already been delivered.

Apart from the USA, also the air forces of Great Britain (armed operations in Afghanistan), France and Italy use the PREDATOR B. Spain selected the MQ-9 Block 5 over the IAI Heron TP.

MQ-9B SKY GUARDIAN

Initially called "Certifiable PREDATOR B", this new variant was designed from the ground up to obtain type certification approval for operation within the European airspace. SKYGUARDIAN will comply with the NATO UAV System Airworthiness Requirements (STANAG 4671) and the British DEFSTAN 00-970. Its equipment includes a high-resolution electro-optic and infrared sensor with full-motion video camera, a Synthetic-Aperture-Radar (SAR), as well as devices for electronic intelligence and support measures. It provides the following performance data: maximum speed near 400 km/h, endurance 40 h, maximum payload 2.177 kg. The prototype was completed in July 2016, its maiden flight took place on 12 November 2016, and the first series products are will be available for delivery in late 2018. Great Britain has ordered 16 such RPAS – designated as PROTECTOR in the United Kingdom – and the type certification process is already underway. Once complete, Britain's type certification will facilitate rapid airspace integration approval procedures also for other customers.

Israel Aerospace Industries

Israel Aerospace Industries Ltd. (IAI) is a globally operating defence technology company with some 17,000 employees. Apart from proprietary combat aircraft developments like the KFIR and LAVI, it distinctly focuses its activities in the field of RPAS. To this end, it has set up joint ventures with manufacturers from the USA and Switzerland primarily with a view to RPAS beneath the MALE category. The HAROP RPAS is an in-house development which has already been procured by international customers. MALE RPAS from IAI include the successful HERON 1 and its advanced version HERON TP. RPAS of all categories of the IAI MALAT Division have reportedly reached more than one million flight hours operated by more than 40 customers.

IAI HERON

Although the HERON RPAS fails to meet all requirements of an MALE RPAS, it has nevertheless been allocated to this category. It had its maiden flight on 15 July 2006. Series production started the same year, and the first systems, designated as MACHATZ 1, were taken into service in Israel in 2007. With 68 systems, India has taken the lead in using the HERON. Other users include Singapore and Turkey. In total, 15 air forces and other organisations are said to operate HERON systems.



Photo: CHP

Die Iraqi armed forces have already engaged the IS with the Chinese armed CH-4B RPAS.

In 2007, Germany approved the Operational Requirement for a system for theatre in-depth imagery reconnaissance (System zur abbildenden Aufklärung in der Tiefe des Einsatzgebietes - SAATEG). Because of urgency (Afghanistan), a contract for a SAATEG interim solution with the available HERON system was concluded in October 2009 involving the lease of three UAVs, two ground control stations and peripheral equipment from IAI. Personnel of Rheinmet-

ANG, the UAV took off first on 9 September 2006. Starting early 2009, the system was employed from the Bagram Air Base in Afghanistan. HARFANGs performed missions also in Libya and Mali. France phased out the system in early 2014.

IAI HERON TP

The MALAT Division of IAI first presented the HERON TP (Israeli designation EITAN) at

an interim solution until SAATEG would be ready for operation, but finally abandoned these considerations in favour of the HERON 1. India is the first export customer to purchase the HERON TP. In 2015, the Indian Government approved the procurement of ten armed RPAS for the Indian Air Force, which will presumably be delivered in the middle of this year after some problems have been resolved. IAI has recently offered the HERON TP to Australia.

In Germany the HERON TP was once again brought up for discussion in January 2016 in the search for a new SAATEG interim solution. The German Ministry of Defence opted for leasing three to five HERON TP, a decision not only causing amazement among experts but also inducing the outgunned competitor GA-ASI to take legal measures. In February 2017, IAI announced the presentation of a new version, the HERON TP-XP, which is supposed to be particularly inter-

Photo: CHP



China could already export the WING LOONG RPAS to several nations.

all and the German Air Force were trained in Israel in the operation of the UAVs. Starting in February 2010, the three HERON UAVs and the two ground control stations were deployed to the German Air Force's operations wing based in Mazar-e Sharif, Afghanistan, where it took off for its first flight on 17 March 2010. On 27 May 2011, the Bundeswehr reported the HERON system in Afghanistan fully operational where it has meanwhile reached approx. 30,000 mission flight hours.

The leasing contract was extended for the years of 2016 to 2018 because of the United Nations Multidimensional Integrated Stabilization Mission in Mali (MINUSMA). The first takeoff of a German HERON in Mali took place on 1 June 2016.

France purchased four HERONS in the scope of the "Système Intérimaire de Drone MALE" procurement project with on-board equipment supplied by EADS and Thales. First designated as EAGLE, afterwards as HARF-

the Paris Air Show in 2007. The HERON TP (TP refers to turbo prop) is based on the HERON, albeit being considerably larger in size and more powerful. The date of the maiden flight has been reported as 15 July 2006. The HERON TP has so far been employed by the Israeli forces (entering into service with the White Eagle Squadron on 21 February 2010) including applications as a weapon platform. As early as 2008, Germany had given thought to using the HERON TP as

esting for export customers. It is efficiency-improved and is to comply with, among others, international air safety standards such as STANAG 4671.

European MALE RPAS

In 2015 European defence ministers had agreed on carrying out a study on a European UAV (Future European Medium Altitude Long Endurance, FEMALE). On 18 May 2016, after talks with her ministerial colleagues from Italy and France, Roberta Ponetta and Jean-Yves Le Drian, the German Defence Minister Ursula von der Leyen signed a Declaration of Intent (DoI) referring to the development of a European drone of the MALE category in Brussels. The stated objective is to have an RPAS developed by 2025 capable of performing reconnaissance and combat missions.

The actual development of the RPAS will be preceded by a definition study, which

IAI HERON TP Technical Data

Length	14 m
Span	26 m
Max. takeoff weight	5,400 kg
Payload	1,000 kg
Max. speed	330 km/h
Service ceiling	14,800 m
Endurance	36 h
Engine	P&W PT6A with 895 kW

was commissioned on 5 September 2016. This study is to identify the technical system requirements and the basics for approval and operation. This first phase is to be funded by about €75M. At the end of this phase a decision will be made on development and procurement. Germany, Italy and France have invited other European countries to participate in the development programme; Spain is going to acquire a financial interest in the project. Participation in the definition phase does not commit partner countries to take part in the implementation phase.

Airbus Defence and Space, Dassault Aviation (France) and Leonardo (Italy), which had presented their MALE2020 initiative two years ago, explicitly appreciated this DoI. The development of an RPAS of this volume and with this distribution of tasks as well as its subsequent production and supply would provide an important buttress for the European aerospace industries to retain worldwide competitiveness.

The European MALE RPAS is supposed to close an existing capability gap in the Bundeswehr as it may serve as a SAATEG system for theatre in-depth imagery reconnaissance including the option of armed operations with air-to-ground precision weapons. The development phase is scheduled to start in 2018, the first flight of the prototype is anticipated for early 2023. The first European MALE RPAS might then be ready for delivery from 2025.

RPAS Worldwide

In addition to the leading RPAS manufacturers USA and Israel (apart from IAI, the Elbit group as the manufacturer of the successful HERMES family should be mentioned), at least seven more nations are focusing their efforts on the development of RPAS: Iran, Italy, South Africa, the United Arab Emirates, China, India and Turkey, with the latter three considered hereafter:

China

The WING LOONG (also "PTERODACTYL I/II") was developed by the Chengdu Aircraft Design Institute and presented to the public



Photo: DRDO

The Indian Defence Research and Development Organisation's RUSTOM-2 during its maiden flight



Photo: TAI

Weapon tests with the ANKA RPAS from Turkish Aerospace Industries started in 2017.

in 2010; it features a length of 9.05 m, a span of 14 m, an endurance of 20 h and a payload of 200 kg. Originally designed for reconnaissance missions, it is now carrying guided and unguided air-to-ground weapons. China has been selling the WING LOONG to countries in Africa and the Middle East since 2011; in May 2014 Saudi Arabia purchased an undisclosed number of these systems. In March 2017, Egypt used it to engage insurgents in the north of Sinai. Developed by the governmental China Aerospace Science and Technology Corporation the CHANG-HONG-4 (CH-4) was first presented at the China Air Show in 2014. Its maximum takeoff weight reportedly amounts to 1,300 kg, its payload is 350 kg and its endurance up to 30 h. The CH-A variant is a reconnaissance RPAS with a range of 5,000 km and an endurance of up to 40 h, while the CH-4B variant can take on both a reconnaissance and a combat role (laser-guided air-to-ground and anti-tank guided missiles). For the time being, export customers include Egypt, Saudi Arabia and Iraq.

India

Developed by the Aeronautical Development Establishment of the Indian Defence Research and Development Organisation (DRDO), the RUSTOM-II (also called TAPAS-

BH 201) completed its maiden flight on 16 November 2016. The RPAS has a span of 21 m, is 9.5 m long and has an empty weight of 1,800 kg. Reportedly, the payload amounts to 350 kg, its endurance is 24

h and it reaches a service ceiling of 10,660 m. It is driven by two Russian NPO SATURN 36T turbo props. Die RUSTOM II is supposed to be introduced to all three services to perform primarily intelligence, surveillance and reconnaissance missions.

Turkey

In seeking independence from foreign arms suppliers, Turkey is increasingly banking on domestic production. The Kale-Baykar consortium developed the BAYRAKTAR TB2 RPAS which took off for the first time in 2014. The first systems were handed over to the Turkish police in the same year. After armed tests had been carried out successfully in 2015, the Turkish armed forces received their first six systems starting in 2016 and are said to operate twelve systems to date. The BAYRAKTAR, which has already attracted the interest of foreign customers, is 6.5 m long, has a span of 12 m and a maximum takeoff weight of 650 kg. With a payload of 55 kg it is capable of cruising at an altitude of 9,000 m for 30 h.

The development of the ANKA RPAS of Turkish Aerospace Industries dates back to the year of 2004, and 30 December 2010 saw the maiden flight of ANKA-A. Because a crash had caused some delay, ANKA-B did not take off until 30 January 2015. The ANKA has retractable landing gear and is driven by a turbo diesel engine and equipped with a redundant flight control system and comprehensive sensor equipment. Its maximum takeoff weight is 5,000 kg and its payload 200 kg. Its span is 17.3 m and its length 8 m. Endurance and service ceiling come up to 24 h and approx. 10,000 m, respectively. The initially unarmed ANKA has most recently undergone its first tests in a weapon platform role.



Photo: Kale-Baykar

The BAYRAKTAR reconnaissance RPAS from Kale-Baykar has been subject to procurement by the Turkish armed forces since 2014.

US Army Future Vertical Lift

Sidney E. Dean

The Future Vertical Lift (FVL) programme aims to develop a family of rotorcraft for service with all branches of the United States armed forces. It grew out of the multi-service Vertical Lift Initiative which was established in 2009 “to address vertical lift capability requirements, focus technology development and determine feasible and affordable solutions in support of the joint warfighter beyond 2030,” states Richard Kretzschmar, project manager for Improved Turbine Engine and Future Vertical Lift within the US Army’s Project Executive Office (PEO) Aviation. “FVL is envisioned as a family of vertical lift aircraft that is subdivided into multiple payload classes with significant overlap and commonality of software and hardware components. Each class of aircraft will have the potential for service-unique or mission-specific variants.”

The United States Army is the programme’s lead agency; it is actively supported by the US Marine Corps (USMC) and the joint US Special Operations Command (USSOCOM), which provide technical expertise and participate in establishing requirements. Oversight is provided by a twelve-member steering committee chaired by a senior Defense Department official; USSOCOM and all five service branches (including the US Coast Guard) are represented on the committee at flag rank.

The FVL family of systems is intended to replace (over time) all 25 helicopter variants currently in service with US forces, and will be required to support a variety of missions including air assault, reconnaissance, attack, special operations support, anti-submarine warfare, search and rescue, and cargo transport. Up to 5,000 new aircraft – both conventional helicopters and tiltrotor aircraft – could be procured under the programme over the course of several decades. All FVL aircraft must be optionally-manned, i.e. be capable of autonomous or remote-controlled unmanned operations; manned FVL aircraft will also be capable of coordinating with and controlling unmanned reconnaissance and strike aircraft (manned-unmanned teaming).

While fixed-wing combat aircraft have undergone significant technological leaps in recent decades and now field 5th Generation weapon systems, rotorcraft (with the exception of the V-22 OSPREY) have not made significant technological advances

Graphic: Bell Helicopter



Concept of an attack variant of the V-280 VALOR supporting ground forces

since the Vietnam era, notes Colonel John Barranco of the USMC Rotorcraft Requirements Office. By introducing new materials, technology and designs under the FVL programme, the Pentagon expects to receive rotary aircraft with significantly improved performance characteristics across the board, including speed, range, endurance, payload and survivability. In addition to state-of-the-art airframes, the new aviation systems will benefit from enhanced sensors and from lightweight precision munitions. Sensor fusion – real-time sharing of sensor data and situational awareness among aircraft and other force elements – is already a current capability which will be incorporated into the FVL family in an enhanced form. “Think Link 16 but even more so,” says Barranco. “The ability to

have the open architecture and have all of our aircraft linked, sharing threats, sharing friendly location and enemy locations, mission data, et cetera, real-time simultaneously on the battlefield, that is one of the greatest aircraft survivability equipment pieces, threat reduction things that we could possibly do.”

Under current planning, FVL is intended to develop rotorcraft in five different size classes (also referred to as “capability sets” or CS):

- CS1: Light (scout, light attack, light assault – equivalent mission profile to the OH-58 and MH/AH-6);
- CS2: Medium-Light;
- CS3: Medium (a utility/assault carrier/medevac aircraft and an attack aircraft, probably utilising two different and spe-

Author

Sidney E. Dean is President of Transatlantic Euro-American Multimedia LLC. and a regular contributor to ESD.

cialised airframes – equivalent mission profiles to the UH-60, the AH-64 and the AH-1);

- CS4: Heavy (transport, assault, S&R – equivalent mission profile to the CH-47); and
- CS5: Ultra (rotary transport aircraft with a carrying capacity comparable to the C-130).

The aircraft are expected to be modular and incorporate as many common elements as possible in order to simplify maintenance and logistics and reduce cost. These common elements should – whenever possible – include such systems as sensors, avionics, engines, and countermeasures. Maximum use should be made of “plug-and-play” open architecture to ensure easy and timely upgrading of hardware and software components over the life of the aircraft. This will also enable deployed forces of all services to maintain and refit one-another’s aircraft. “We need shared technologies, we need shared systems, we need shared aviation supply and logistics,” says Col. Barranco. “It’s not just a fiscal reality; it’s going to be a battlefield reality. We’re not going to be able to sustain, move [and] supply multiple, unique systems across the services like we’ve done in the past.”

Joint Multirole Helicopter Programme

The services are pursuing development of Capability Sets 1 and 3 first, having determined that the most urgent demand across the various services is for attack, scout, and medium utility rotorcraft. Requests for Information (RFI) for both categories were released in 2016, with both domestic and foreign firms invited to participate. Six firms responded to the RFI for CS1, and eight to the RFI for CS3, says Colonel Erskine Bentley, US Army Training and Doctrine Command capability manager for FVL.

The Army, USMC and USSOCOM are currently conducting an Analysis of Alternatives (AOA) to validate requirements for both capability sets. While the three participating agencies share many operational priorities, differences persist. For example, the Army’s first priority for the medium-sized aircraft is developing a utility transport to replace the UH-60, while the Marines are equally dedicated to both a tactical troop assault carrier and an attack helicopter. The Army sets a higher priority on the number of combat soldiers the assault carrier can transport, while the USMC and USSOCOM operational requirements are more concerned with maximising range. Given the modular nature of the FVL concept, it is likely that such conflicts can

Photo: Lockheed Martin



The Sikorsky S-97 RAIDER concept for a multi-mission helicopter first flew in 2015 and is considered a potential successor for USSOCOM’s MH-6 LITTLE BIRD. The SB-1 DEFIANT participating in the JMR-TD is based on the S-97, but heavier. Note the coaxial rotor system and pusher propeller.

be resolved through trade-offs, such as installing twelve passenger seats in the Army variant, and eight seats plus additional fuel tanks on the USMC and special operations variants.

Concept evaluation is currently being conducted through the Joint Multi-Role Technology Demonstrator (JMR-TD) programme, which was initiated in 2013 and will continue through 2019. The JMR’s primary purpose is to channel technology progress and design concepts into realistic operational systems.

The JMR programme is divided into two major parallel components, says Bentley. The first component involves development and demonstration of concept aircraft. Two

competing teams are providing technology demonstrators: Sikorsky-Boeing with the SB-1 DEFIANT and Bell-Textron with the V-280 VALOR.

The SB-1 is a high-speed rigid rotor co-axial helicopter with an aft-mounted pusher propeller. Cruise speed is given as 250 knots; the target operational radius is circa 230 nautical miles without refuelling. This is roughly double the speed and 160 percent the range of current utility helicopters of this size class; the SB-1 also displays 50 percent better high-hot hover performance.

The V-280 is a tiltrotor aircraft with the ground/deck footprint of a UH-60. While resembling the V-22 Osprey, the V-280 is faster and more maneuverable. Cruise



An artist’s conception of future army rotorcraft using ducted fans rather than conventional rotor systems

Graphic: US Army by AMRDEC VizLab

speed is given at 280 knots, with mission radius varying from 500 to 800 nautical miles, depending on environmental and operational conditions.

Two other firms are providing airframes for wind-tunnel testing. Bentley adds that up to ten additional firms are participating in the JMR-TD's second component, the presentation of open architecture mission systems such as communications and sensors. Demonstration flights of the SB-1 and V-280 are scheduled to begin in September of this year and run through 2018. If successful, the Technology Demonstrator programme will lead to a Request for Proposals (RFP) in 2019. The RFP will, for the first time, define precise performance parameters and system specifications for the individual classes and variants. The Army would then assign prototype development contracts to selected firms. This Milestone A decision (formally described as award of technology maturation and risk reduction contracts) will probably take place in 2021.

Initial Fielding

According to Richard Kretzschmar, a Milestone B decision to enter engineering and manufacturing development is expected

in 2025. Under the current timetable, a Milestone C decision to initiate production and deployment could follow circa 2029, with Low-Rate Initial Production for the first capability set beginning in 2030. Full Rate Production would begin in the early 2030s, with Initial Operational Capability for the Army, Marine Corps and USSOCOM circa 2033.

In keeping with the schedule of RFI's published to date and the services' own pronouncements, the first production systems are expected to belong to Capability Set 3, beginning with the medium-weight utility aircraft (one core aircraft configured in multiple variants to meet the needs of each service or major command). The next priority will most likely be an attack aircraft. Barranco confirms that the USMC is set on a CS3 replacement for their AH-1 ZULU VIPER attack helicopters, with delivery beginning circa 2035. The Army will also be seeking an attack helicopter replacement – both for autonomous offensive operations and as an escort for assault carriers – but is currently less sure about which approach to take.

"We have some additional study to do and work on where we see the next attack platform coming from," says Bentley.

"We definitely want to explore the Marine approach to Capability Set 3 as an attack platform and we definitely want to explore possibly a smaller airframe [in a] lighter reconnaissance attack role." The latter would be an armed CS1 aircraft. Bentley does not rule out a third alternative, namely an add-on weapons kit which could be mounted on the CS3 utility aircraft.

Outlook and Budget

While Army leadership has expressed interest in shortening the development cycle and bringing the first FVL medium-lift aircraft into service in the mid-2020s (a feat Bell-Boeing has said it could accomplish with the V-280), most observers remain focused on the original 2030 target date. Even that might prove to be optimistic. Recent experience with acquisitions projects of a similar magnitude have been plagued by major technological delays and cost overruns. The sheer complexity of developing a common family of aircraft, optimised to satisfy the needs of multiple services plus the special operations community – each with divergent operational concepts and mission profiles – is daunting.

Scan the QR code



ARMS AND SECURITY

XIV INTERNATIONAL EXHIBITION
October 10-13, 2017



General Information
Partner



General Media
Partner



Technical
Partner



INTERNATIONAL EXHIBITION CENTRE

Ukraine, Kyiv, Brovsky Ave, 15

Ⓜ "Livoberezhna" underground station

☎ +38 044 201 11 63

✉ zbroya@iec-expo.com.ua

www.iec-expo.com.ua, www.мвц.укр,
www.tech-expo.com.ua



Graphic: Bell Helicopter

Artist concept of a mountaintop insertion of special operations forces via a V-280 utility variant

The most immediate challenge, however, may be financing. Unless sequestration caps are lifted and Congress brings greater stability to defence budget planning, competition to fund the Pentagon's various developmental programmes could inhibit full financing of the FVL programme, slowing progress rather than accelerating it. The Trump administration has also been sending

mixed signals. On the one hand, thenew president has announced plans for a massive military buildup; on the other hand he has appointed Congressman Mick Mulvaney, a notorious "deficit hawk", to head the Office of Management and Budget (OMB). Senator John McCain, a noted advocate of increased defence spending, has accused Mulvaney of "torpedoing" efforts to bolster

the Pentagon budget. "He has spent his last six years pitting the national debt against our military," McCain said, arguing that Mulvaney as OMB director would impede efforts to recapitalise the Defense Department. Mulvaney aside, the Pentagon has more acquisition, development, upgrade and maintenance programmes running than any realistic budget increase could fully accommodate. In a fiscally constrained climate, programmes such as FVL would be particularly vulnerable to budget reduction, warns Douglas Berenson, managing director of the consulting firm Avescent. He cites factors such as unpredictable cost development, and the inclination of legislators to support funding for projects which will create employment in their constituencies today or next year rather than fifteen or more years down the road. Finally, he points out that the new president has announced plans to quickly increase military personnel strength and the number of combat units; such a growth – should it be realised – will require the armed forces to acquire additional aircraft which are in production today or to refurbish and upgrade current inventory. Either option could reduce funding available for long-term projects such as FLV. ■



Be amazed by almost 50 original helicopters and 1000 helicopter models.

Meet the pioneers in the history of the helicopter.

Learn about and understand the technology behind rotary wings.



Visit

The Helicopter Museum

Sablé-Platz 6 | 31675 Bückeburg | Germany
opening hours: 10 to 17
phone: +49 5722 5533
www.hubschraubermuseum.de



Looking Within

India's Advanced Medium Combat Aircraft (AMCA)

Jay C Menon

With the joint development of the Fifth Generation Fighter Aircraft (FGFA) with Russia in limbo, and a short-fall of fighter jets in its own air force, India is forging ahead with building its own low-observable Advanced Medium Combat Aircraft (AMCA). "We have almost finalised the preliminary design of the aircraft, with a target of flying it in 2024 and making it ready for service as early as 2030," says a senior official of the state-owned Aeronautical Development Agency (ADA), which is developing the fighter. "The serial production is expected to start from 2036, after getting all necessary certificates."

AMCA's primary purpose is multi-role fighter capability, which includes air superiority missions, attack missions, strike role, precision targeting, interceptor, and bombing missions: it is intended to replace the Indian Air Force (IAF) Sepecat JAGUAR and Dassault MIRAGE 2000, which are assigned the role of multi-role aircraft, mainly in the fighter bomber role. It will fill that role along with the attack aircraft role as it is also going to replace the Mikoyan MiG-27s and Mikoyan MiG-23s.

Though ADA has not yet finalised the engine that will power the aircraft, the choices are the Eurojet EJ200 of the Eurofighter TYPHOON, the Safran M88 of the Dassault RAFALE, and the GE F414, used in the Boeing F/A-18E/F SUPER HORNET, KF-X, Saab JAS 39E/F GRIPEIN and the Hindustan Aeronautics Ltd. (HAL) Light Combat Aircraft (LCA) TEJAS Mk. 2. "The engine will be chosen soon (...). We are looking at GE's F404 engine and GE F414, which powers the LCA TEJAS, and the TEJAS Mk.1," the official says. ADA sees advantages in choosing the GE F414, says the official, without elaborating. GE's F414 could be the preferred choice for ADA as AMCA needs an engine of 110 kN (24,700 lbf) and GE is offering an enhanced F414 that it says is in the 26,000 lbf thrust class. "We have working experience with GE and GE has the experience in integrating the F414 and its predecessor, the F404, in different airframes," the official says. "However, nothing has been confirmed."

ADA has also proposed a carrier-borne version of the aircraft, and is allowing at least six years between flight testing and entry into service in part because of its experi-

ence in developing the TEJAS light fighter, which needed 14 years of flight testing. Experience in verifying TEJAS systems will support the shorter period for the AMCA, according to the ADA official.

Aircraft for Stealth Operations

The aircraft will be shaped for stealth operation. For the stealth mode, AMCA will carry a mix of four munitions, either bombs or missiles, in an internal bay. "About 60 to 70 per cent of the stealth we intend will come from the aircraft's shape. The rest we are discovering as we develop the aircraft. Nothing like this has ever been attempted before," the official commented. A non-stealthy version has also been planned with fuselage hard points, as well as three additional hard points on each wing. The two inboard hard points will be able to carry external fuel tanks. "We have completed the configurations and the feasibility study, and proposed users are happy with them," according to ADA.

Features will include a weapons bay, serpentine engine intakes, thrust vectoring, modular avionics, integrated health management, and a radar with an active, electronically scanning array using gallium-nitride technology. Maximum speed is intended to be Mach 2.5 with afterburning and Mach 1.6 without. In the meantime the slow progress of the FGFA programme has encouraged ADA to start the AMCA project at the earliest opportunity and to deliver on time.

India Teams with Russia

In 2010, India and Russia signed a preliminary design agreement to jointly produce the FGFA for use by both countries, after which each of them invested US\$295M for preliminary design work, which was completed in 2013. Since then, despite several

rounds of discussions, the two countries have failed to reach an understanding over the final contract. "The India-Russia Cooperation has recently stalled," a senior Indian defence ministry official informed ESD. "The work could be revived but there is no certainty it will be," says the official.

The cost of producing 127 of the FGFA single-seat fighters in India is estimated to be US\$25Bn. India has set up a panel to look into the FGFA programme, which is likely to report soon. Among several issues, the panel will take a critical look at the actual technology transfer that India stands to gain through the deal.

Photo: Author



Design study of India's Advanced Medium Combat Aircraft (AMCA)

The urgency for developing the AMCA also stems from the fact that India is grappling to make available to its armed forces cutting-edge weapons in the light of volatile neighbouring countries and the need to upgrade or replace legacy equipment. With a depleted fleet of just 33 squadrons – much lower than the 42 required to ward off a joint threat from principal adversaries China and Pakistan – the IAF is burdened by systemic dysfunctions in the budget process and capital allocations.

Author

Jay C Menon is a senior journalist based in New Delhi, India, covering civil

Masthead

European Security & Defence

Issue 4/2017 · June 2017
ISSN 1617-7983 · www.euro-sd.com

Published by



Mittler Report Verlag GmbH
A company of the Ta mm
Media Group

Editor-in-Chief: Dr. Peter Bossdorf (pb)
Deputy Editor-in-Chief: Henning Bartels (hb)
Managing Editor (Magazine): Stephen Barnard (sb)
Managing Editor (Newsletter): Dorothee Frank (df)
Industrial Editors: Waldemar Geiger (wg), Gerhard Heimig (gwh), Jürgen Hensel (jh)
Editor Special Assignments: Stefan Nitschke, Ph.D. (sn)
Correspondents: Rolf Hilmes (Army Technology), Peter Preylowski (Airborne Systems)
Regional Correspondents: Tamir Eshel (Israel), Tim Guest (UK), Jaime Karremann (The Netherlands), Beka Kiria (Georgia), Shinichi Kiyotani (Japan), Yury Laskin (Russia), J. Bo Leimand (Denmark), Jay Menon (India), Chet Nagle (USA), Luca Peruzzi (Italy), David Saw (France), Joris Verbeurg (Belgium/EU/NATO), Esteban Villarejo (Spain)
Supported by the editorial team of "Europäische Sicherheit & Technik"
Publishers: Rainer Metzner, Henning Bartels

Layout:

davis creativ media GmbH, Germany

Production:

Lehmann Offsetdruck GmbH
22848 Norderstedt, Germany
APA Uniprint
Istanbul, Turkey

Office address:

Mittler Report Verlag GmbH
Baunscheidtstraße 11, 53113 Bonn, Germany
Phone.: +49 228 3500870, Fax: +49 228 3500871
Email: info@mittler-report.de, www.mittler-report.de

Director of Marketing

Jürgen Hensel (jh)
Baunscheidtstraße 11, 53113 Bonn, Germany
Phone: +49 228 3500876, Fax: +49 228 3500871
Email: juergen.hensel@mittler-report.de

Advertising Representatives:

Dipl.-Betw. Uwe Nemeyer, optiproject GmbH –
Agentur für sicherheitspolitische und wehrtechnische Kommunikation
Von-Imhoff-Weg 5, 53359 Rheinbach, Germany
Phone: +49 226 909637, Fax: +49 226 909653
Email: uwenemeyer@optiproject.de, www.optiproject.de

France/Italy

Diana Scogna
Phone.: +33 6-6252-2547, Email: diana.scogna@mittler-report.de

Israel

Tamir Eshel
P.O.Box 2696, Qadima 609200, Israel
Phone: +972 54-450-8028, Email: tamir.eshel@mittler-report.de

Turkey

Özkilinc Consulting
Korhan Özkilinc, General Manager
mobile: +49 (0) 163 6930925, Email: korhan.ozkilinc@mittler-report.de

UK/Ireland/Eastern Europe:

Stephen Barnard, c/o Mittler Report Verlag GmbH
Phone: +49 228 35 00 886, Email: stephen.barnard@mittler-report.de

USA/Canada:

Black Rock Media, Inc., Diane Obright,
810 Val Sereno Drive, Olivenhain, CA 92024, USA
Phone: +1 858-759-3557, Email: blackrockmediainc@icloud.com

Russia & CIS:

Laguk Co., Yury Laskin, General Director
Krasnokholmskaya Nab., 11/15, 132, RF-109172 Moskau, Russian Federation
Phone: 007-495-911-1340, Fax: 007-495-912-1260, Email: ylarm-lml@mtu-net.ru

Subscription/Reader Service:

PressUp GmbH, Postfach 70 13 11,
22013 Hamburg, Germany
Phone: +49 40 38 66 66-319, Fax: +49 38 66 66-299
Email: mittler-report@pressup.de

European Security & Defence
© 2017 Mittler Report Verlag GmbH

The views expressed are not necessarily those of the editor or publisher.
All rights reserved. No part of this publication may be reproduced without prior
written permission of the publisher in Bonn.

Cover Photos: IAI, US Army, IDF

Annual subscription rate (8 issues):
€49.80 incl. postage



Photo: vishak

A HAL TEJAS parked next to an F-16 FIGHTING FALCON (centre) and Eurofighter TYPHOON (top) at the AeroIndia show 2017 in Bangalore, India.

RAFALE Deal with France

Having signed a US\$8.6Bn RAFALE deal, although the Indian government has increased the defence budget to 2.74 trillion rupees for the current financial year, which began 1 April 2017, an increase of about 6% over the last fiscal year, it is hardly enough to pay for the new orders. The capital acquisition component of the defence allocation for the current fiscal year is just over 864 billion rupees, compared to about 785 billion rupees during the 2016-2017 period. But the Ministry of Defence has returned about 360 billion rupees from the current year's capital expenditure as it was not adequately organised to spend it efficiently last year.

Apart from deciding to buy 36 RAFALE aircraft from France, the country's Defence Acquisition Council (DAC) recently approved a proposal to acquire 83 home-made LCA Mk 1-As for the Indian Air Force (IAF) at a cost of 500.25 billion rupees (US\$7.5 billion) as part of its efforts to replace the ageing fleet of MiG fighter aircraft. This is in addition to the 40 TEJAS fighters that the IAF has ordered. The IAF had indicated a requirement for 100 of these 4.5 generation aircraft, being made by state-owned HAL. HAL plans to manufacture and complete the project from 2018 to 2022-2023. The IAF has already started inducting TEJAS, but the aircraft will not take up combat responsibilities until 2018. The IAF began with two aircraft following which the squadron will get six more aircraft by the end of 2017 to make it fully operational. "The amount earmarked for new purchases in the 2016-2017 Budget was so low that it has been exhausted on just one purchase alone – the RAFALE fighter, whose 15% signing advance amounts to 87 billion rupees," according to domestic brokerage ICICI Securities. "Significant allocations are now inevitable for fresh acquisitions over the next couple of years," it adds. Though India's defence budget has been growing over the years, allocations have been increasingly skewed away from procurement and towards salaries, allowances and pensions for the three services.

"These budgetary trends will negatively impact India's defence posture, particularly with respect to air power," reports the Stimson Centre, a Washington DC-based policy research organisation. An IAF official also agrees, saying, "Given the challenges that the IAF faces, the fragile security environment that it operates in, and given the possibility of engaging two fronts simultaneously in a future war (with Pakistan and China), allocations on the capital front have been much below the genuine requirements of the IAF."

Realistic Ambitions

Port and Harbour Security Takes New Shape

Stefan Nitschke

Top industry officials say ports and harbours need to step up additional measures to prevent against threats of any kind.

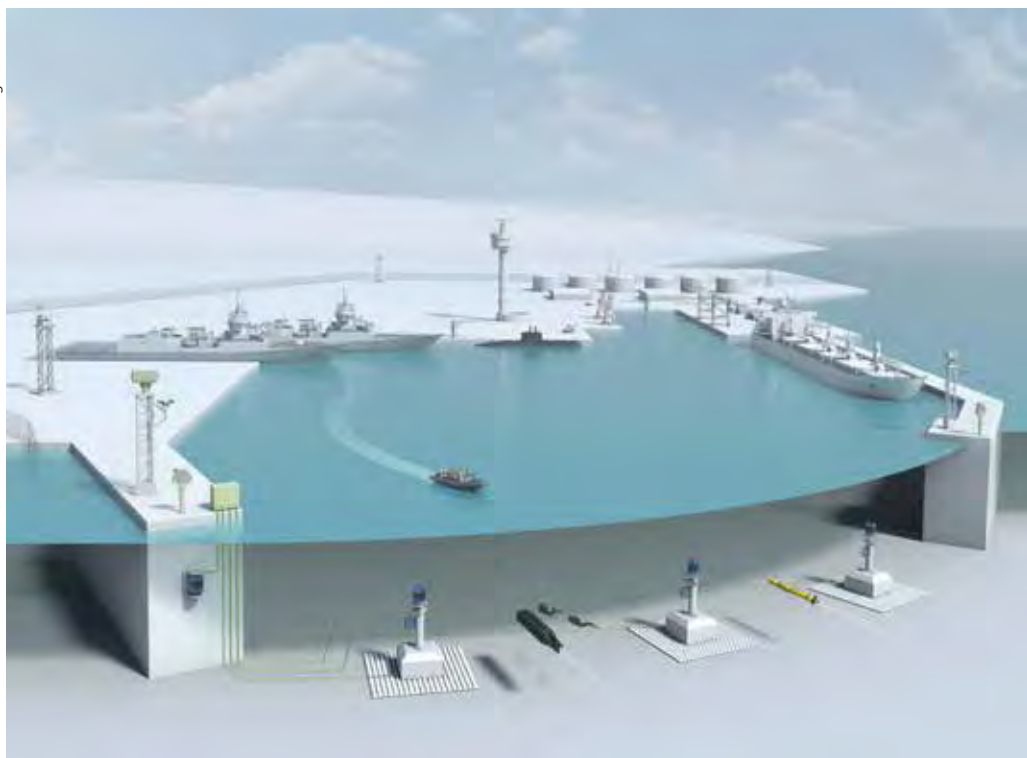
There are ample opportunities for both industry and authorities to address port and harbour security problems. The past several years saw a number of threats developing against ports, most of which came from the sea and from the land. Increasing in numbers, threats are also from the air, meaning that there is truly a three-dimensional threat spectrum, this of course applies anywhere in the world.

"The bulk of activities focus on commercial ports because it's easier to gain access to their most critical assets and facilities [...] since there is often a lack of security measures," a security advisor stated at last year's MS&D conference in Hamburg. ESD was told that commercial port operators and authorities are often not fully aware of the spectrum of threats, all of which are asymmetric in nature. This raises concerns over how they will balance the demands of advanced defensive measures, Amir Dan, Naval Radar Marketing Manager at Israel Aerospace Industries' (IAI) subsidiary Elta Systems, confirmed in a telephone interview on 8 May. Smaller ports also have fewer resources to get the material they need. Many countries are searching for adequate programmes that need a fresh look and ways to be more efficient with available money. In its effort to improve port and harbour security, IAI-Elta headed towards investing in a comprehensive and cost-effective security and protection system, called IUHDSS (Integrated Underwater Harbour Defence and Surveillance System). It was told that the Indian Navy raised the need for such a system. IUHDSS is aimed at closing existing capability gaps in the safety and security of port and harbour infrastructures.

Author

Stefan Nitschke, Ph.D., is Editor Special Assignments.

Photo: Signalis/AEUK



STYRIS enables seamless integration of above- and underwater sensors.

Rather than sit back and await the next serious incident, port and harbour authorities need to know that the situation can easily escalate, such as when attackers use hijacked vessels carrying high-risk cargo. Likewise, industry is also targeting "active" systems to adequately defend against maritime terror: laser dazzlers; floating barriers; high-power electromagnetic boat/engine stoppers; and acoustic hailing devices (AHDs).

The latter include a fully "marinised" system developed by UK-based Drumgrange Ltd. Some of these systems prevent explosives-laden small boats speedily approaching their targets in harbours. "Too many port authorities are not aware of the threat posed by boats that can be used as 'floating bombs'," the company warns. Potential threats from the sea must be identified in time, with some sort of mobile equipment automatically scanning and electronically notifying of approaching vessels long before they reach the coastline. Vessel Image Processing Systems (VIPS), as developed by Stratech Systems from Singapore, can provide the

operator with the bearing of an approaching vessel.

Taking Control

According to a recent report issued by the Maritime and Port Authority of Singapore (MPA), the presence of explosives adds an "extra layer of threat" affecting port infrastructures. The report advises port authorities to get ahead of those activities, starting with enhanced communications and information sharing.

The demand for "waterborne anti-IED security platforms" is growing exponentially; this is a worldwide trend, Saab representatives said at UDT 2016. The company teamed with US authorities to defend against below-the-surface terrorist actions, delivering SEA WASP prototypes to three explosives ordnance disposal (EOD) agencies, to test the system in "real-life mission scenarios" and to adopt it for EOD purposes and procedures. The 1.7-metre-long remotely-operated vehicle (ROV) relocates, identifies, and neutralises IEDs (improvised explosive devices) in the confined areas of ports and

harbours. Identifying IED-like objects placed on a ship's hull, a harbour wall or the seabed takes extra measures by port authorities, Saab noted, adding that SEA WASP represents a "significant change in underwater operations," allowing bomb technicians to "easily configure [the ROV] to meet the spe-

propulsion vehicles (DPVs), and unmanned underwater vehicles (UUVs). Production of the SENTINEL IDS currently continues to meet the underwater security requirements of private, commercial, government, and naval end users, the company says. But there also is a requirement to detect

along with remote control for drones. "This was otherwise only possible with large-scale lab equipment," the company says. By changing frequency continuously, several devices can find frequencies or channels that are unoccupied. Elettronica earmarks its Multi-Role Operations Sup-



Photo: 5G International/Al Seer Marine

Unmanned systems like the ECLIPSE marine robot can increase harbour security and protection.

cific requirements of any mission."

Unmanned surface vehicles (USVs) performing autonomous harbour security missions, "can also tackle the problem with increasing above water and underwater threats," says 5G International of West Palm Beach, Florida, developer of the ECLIPSE system.

MPA's report cites another tendency: a dramatic increase in attacks undertaken by submersibles such as mini subs, along with drifting and partially submerged containers, swimmer delivery vehicles (SDVs), and swimmers or divers. "The threat from submerged terrorist divers is very real," MPA says. Sonar technology reliably detects, tracks, and classifies divers and small underwater vehicles approaching a protected asset from any direction, offering by far the lowest cost-per-square metre of underwater coverage of all other means of surveillance (radar, video, visual). Recent deliveries of diver detection sonar (DDS) systems for both naval and commercial ports are imminent, says UK-based Sonardyne, producer of the SENTINEL Intruder Detection Sonar (IDS). "We increased development and production of DDS as a result of an increasing development and use of [SDVs], diver

and neutralise unmanned aircraft threats. Industry currently promotes a variety of counter-drone systems, with two examples including Rheinmetall Defence Electronics' (RDE) Universal Multispectral Information & Tracking (UMIT) system and the fully integrated Anti-UAV Defence System (AUDS) jointly developed by UK-based Blighter Surveillance Systems, Chess Dynamics, and Enterprise Control Systems. "Counter-drone/UAV [unmanned aerial vehicle] is a rapidly growing niche around the world," an RDE source claimed in 2016.

Industry sources also warn of the "new land-based menace" – unmanned ground vehicles (UGVs). In an asymmetric threat scenario, they can be detected by certain methodologies like COMINT (Communications Intelligence) in general, or even COMJAM (Communications Jamming). Germany's LS telcom AG cleverly designed new concepts for COMINT that can monitor those threats, intercepting data-links used to operate UGVs.

A solution developed by Narda Safety Test Solutions GmbH is the IDA 2 handheld interference and direction analyser that allows the analysis and localisation of signal structures, e.g. WLAN and Bluetooth,

port (MUROS) mobile system for stationary and mobile observations in urban and semi-urban environments, including harbours and their surrounding land environment. MUROS can be employed to fuse information derived from imaging sensors with critical intelligence gained from ELINT/SIGINT (Electronics Intelligence/Signals Intelligence) receivers. The solution also includes a counter-drone capability, with target information derived from a Frequency-Modulated Continuous Wave (FMCW) radar.

Network Sensors to Spot Intrusion

One major challenge associated with IAI-Elta's IUHDSS was to create a fully-fledged harbour monitoring network to monitor these threats. It is based on an advanced command and control (C2) suite and network sensors, IAI-Elta's Amir Dan said. He noted that the company, while developing the system, took advantage of the complete expertise it gained from designing and testing military systems. IAI's electronics unit Elta Systems started developing the system in 2012.

IUHDSS' radar sensor, the ELM-2226 Advanced Coastal Surveillance Radar (ACSR), functions in combination with thermal and daylight cameras, DDS devices, Electronic Support Measures (ESM), direction finding (DF) devices, and Automatic Identification Systems (AIS). The latter presents the bearing and distance of nearby ships in a radar-like display format.

"Once a surfacing diver is detected by the radar," said Amir Dan, thermal or daylight cameras can be used to classify and verify the suspect. ESD learned that ACSR employs an FMCW architecture to track up to 500 targets simultaneously. A rubber boat can easily be detected at more than 20 kilometres under extremely adverse sea conditions, say Sea State 3. Dan told ESD that more than 150 examples of the ACSR family have been delivered to worldwide customers.

Another solution is the Integrated Maritime Surveillance & Security System (STYRIS) jointly developed by ATLAS Elektronik UK (AEUK) and Signalis, part of the ATLAS Elektronik family. STYRIS includes AEUK's CERBERUS Mod 2 DDS, "so the move will deliver a new coastal surveillance system," Signalis said, providing operators with a complete solution for the surveillance and

tracking of both surface and subsurface targets.

A simple but sophisticated solution, the Harbour Monitoring Network System developed by Japan's NEC is another example that employs various types of imaging sensors installed both on land and underwater. The system also uses radar and a hypersensitive thermal camera to detect, track, and monitor small suspicious objects travelling on the sea surface. The manufacturer noted that multiple sensors can be installed on the ocean floor to detect and track divers invading underwater and small submersibles that cannot be detected by radar.

Complementing the radar picture is a challenge. Existing coastal radars can be teamed with C2 systems and other sensors to generate full-scale security. One such example is the SBS-700 radar on delivery to the Port of Marseille Fos in France. Kelvin Hughes already delivered five examples earlier last year that were integrated with the port's Vessel Traffic Management System (VTMS).

More to Imaging Sensors

Detector technology found in thermal cameras can do a lot. According to Belgian

Advanced Technology Systems (BATS), the use of MCT (mercury cadmium telluride) detectors enables them to penetrate smoke and dust, delivering imagery with a fourfold enhancement in resolution compared to earlier systems. They can detect small-scale targets (generally smaller than 2.3x2.3 metres in physical size) at 4.5 times the range (8.5 kilometres) in marginal weather conditions. MCT detectors identify and recognise those targets as friendly objects or discriminate them from false targets at 2-3 kilometres or better.

Although MCT detectors are also functioning in the mid-wave IR (MWIR) frequency band, InSb (indium antimonide) detectors have been found to be the ideal material for larger arrays. A unique feature of the XCO-640 camera the Belgian manufacturer Xenics introduced at DSEi 2015 is that it can be operated with different sensor types, based on either MCT or InSb detector materials, offering up to 300 Hertz full frame rate for tracking fast moving objects. Security measures at harbours depend upon sophisticated imaging technology, Controp Precision Technologies confirmed last year. The Israeli manufacturer delivered thermal cameras for a number of harbour protection programmes, underlining that

MUROS

PUBLIC SECURITY SOLUTIONS

Surveillance | UAV Detection | Cyber | C2



Technologie für Innovation





Electronica GmbH
www.electronica.de

there is a growing demand for systems delivering a full panoramic view. One of the company's products, named SPIDER, is described as a very long-range, stabilised panoramic automatic intruder detection and recognition system that can be mounted on mobile platforms and high masts. Controp's latest addition, called SPEED-ER, was developed as a Short-Wave IR (SWIR) system. It offers an option for rapidly shifting security tasks in complex environmental conditions at sea and on land, providing the user with a clear advantage in low-visibility conditions. SWIR technology ensures sharp, clear, and stabilised imagery obtained over "ultra-long-range" distances, the company explained. With SPEED-ER,

(the latter caused by genuine underwater contacts); and if automatic algorithms are capable of detecting and tracking many contacts simultaneously.

The latter requires well-trained sonar operators able to recognise the type, shape, and behaviour of a threat. For this reason, commercial DDS devices like Sonardyne's SENTINEL IDS use automation to simplify the sonar display by suppressing the echograph and displaying only the chart and detection and tracking information. In a similar way, the AQUASHIELD ER (Extended Range) SDV detection sonar DSIT of Israel is continuing to promote has a fully automatic mode of operation with automatic detection, tracking, threat classification and

technology is needed in the face of today's growing variety and complexity of threats.

Conclusion

Complete sensor networks are fast becoming "big business" when it comes to port and harbour security, as readiness for different kinds of underwater and above-the-water threats has to be further improved. As UGVs, drones, and underwater threats are likely to emerge, the domain awareness picture will certainly be more complicated in the future. Monitoring small moving objects below the water's surface could be a challenge. "There is [also] much concern regarding the ability

Photos: THALES

MARGOT 3000V is a man-portable long-range surveillance system based on the SOPHIE handheld thermal imager.



Controp offers a system that can form part of a "virtual fence", with different sensors scanning at long ranges "without the need for a physical wall or fence", and overcoming different environmental conditions.

Preventing Intrusion

NATO sources claimed in a report released in 2006 that for complete port security, a diver or intruder detection sonar is mature, if it demonstrates 360-degree coverage with detection ranges of 300 to 800 metres against intruders wearing open-circuit breathing equipment; offers reduced detection range and track fragmentation (due to environmental/sound propagation conditions); poses a minimum of random false alarms and non-random false alarms

alert, thus reducing the need for trained sonar operators.

"We undertook final tests [with the AQUASHIELD ER] and achieved detection ranges of up to 1,800 metres for open circuit divers, and 1,200 metres for divers using closed-circuit apparatus," a company representative said.

To enhance the "detect-track-classify chain" further, DDS devices need to be integrated with the surface surveillance and security systems employed at ports, coastal facilities, and offshore installations, and they also require automatic detection features. One major challenge with AEUK's CERBERUS DDS is in combining the underwater picture with above water sensors to provide a fully comprehensive security system, the company said. Such a mature

[of modern cameras] to differentiate between a friend or foe," a source at FLIR Systems said. The advantage of the next generation of EO/IR detectors in countering those threats is that they can monitor, localise, and identify small objects over increasingly larger distances.

Completely new sensor concepts, among them unattended ground sensors or UGS, can play an inherent role within this scheme. One such example is the B-SEALED bio-inspired autonomous surveillance camera developed by the French-German Research Institute of Saint-Louis (ISL). It is an easy-to-deploy UGS that consists of a pan & tilt head with detailed vision up to 200 metres (human signature), and offers permanent peripheral vision for versatile 120-degree change detection and movement analysis. ■

INTELLIGENCE FOR THE INTELLIGENT



European Security & Defence

- Politics
- Armed Forces
- Economy
- Technology

**ESD –
for the step
beyond thought
leadership**

EUROPEAN SECURITY & DEFENCE is a specialist magazine tracking events and developments in the defence and security arena.

One of the magazine's objectives is to describe, explain and interpret European and transatlantic security policy – which extends far beyond conventional defence with military forces – in all its complex and sophisticated correlations.

EUROPEAN SECURITY & DEFENCE provides answers to questions on international affairs, business, technology and defence/security matters. Our analysis is based on neutral and in-depth investigation.

The primary mission of **EUROPEAN SECURITY & DEFENCE**, both in print and online, and including the daughter publication **ESD SPOTLIGHT**, is to convey information and influence within the European theatre, to and from decision makers at all levels in the security and defence arenas.

➔ **Annual Subscription Rate: € 49.80 (print format; postage included)**

Annual subscription includes 8 issues, special issues and free access to the "subscribers' area" at www.euro-sd.com.



Test EUROPEAN SECURITY & DEFENCE and order a free copy now!

Mittler Report Verlag GmbH – Subscription/Reader Service

PressUp GmbH · Postfach 70 13 11 · D-22013 Hamburg

Phone: +49 40 38 66 66-319 · Fax: +49 38 66 66-299 · mittler-report@pressup.de

www.euro-sd.com

US Navy Littoral Combat Ships

Programme Status & Future Prospects

Conrad Waters

The US Navy's littoral combat ship programme has proved to be one of its most complex and controversial. Some 15 years have elapsed since the project was first launched, but it is only now that a significant number of ships are being delivered. Meanwhile, 2014 and 2015 saw two major restructuring initiatives.

A major revision to the navy's planned crewing and operating approach was subsequently announced in September 2016. Looking forward, the new US presi-

LCS was intended to be a relatively small and cheap "seaframe" that could be rapidly reconfigured to counter a range of anti-access threats in littoral waters. This was to

in 2004. The Lockheed Martin FREEDOM (LCS-1) variant features a steel, semi-planing mono-hull with an aluminium superstructure. The General Dynamics INDEPENDENCE (LCS-2) type is an all-aluminium trimaran. Including the prototypes, 13 of each LCS variant had been ordered through to FY2016. By early 2017, nine ships in total had been delivered.



Photos: US Navy

DETROIT (LCS-7) on trials in 2016. In spite of many changes, the LCS programme has been a remarkable survivor. With increasing numbers of ships now in service, the type will have a major impact on USN operations.

dency, a changing international security environment and ongoing examination of the US Navy's force structure mean the programme's future direction is far from clear.

Programme Recap

The Littoral Combat Ship (LCS) project was announced in November 2001 as part of the Future Surface Combatant Programme aimed at acquiring a new generation of surface warships. Drawing on conceptual studies such as the 1990s "Streetfighter", the

be achieved through a modular design that could house one of a series of interchangeable mission packages in a similar fashion to the Danish STANFLEX system. A high speed was specified to allow swift transit to and from a forward operating base, where mission modules could be swapped. Other key design aims were an ability to undertake sustained deployment across the globe and to operate with a limited core crew. Up to 55 – quickly reduced to 52 – ships initially envisaged.

The LCS programme enjoyed strong sponsorship from the US Navy's then-professional head, Chief of Naval Operations Admiral Vernon E. Clark. He described it as "the Navy's most transformational effort." This was a key factor behind a rapid initial development process that resulted in two very different concepts proposed by teams led by Lockheed Martin and General Dynamics being selected for prototype production

Recent Programme Restructurings

It is this changing international security backdrop that largely explains the two major changes to the LCS programme announced in 2014 and 2015. The process commenced in a February 2014 address by then US Secretary of Defense Chuck Hagel. Citing a need to "examine whether the LCS has the independent protection and firepower to operate and survive against a more advanced military adversary and emerging technologies," he announced plans to terminate production at no more than 32 ships in favour of a more lethal small combatant consistent with the capabilities of a frigate. The restructuring plan did not survive long before further revision. This was triggered by the arrival of a new Secretary of Defense, Ashton Carter, and ongoing financial constraints. Criticising the navy for prioritising ship numbers over total capability, in December 2015 he directed a reduction in total LCS/frigate acquisitions to just 40 units. Production of the frigate variant was to commence from the 29th ship in FY2019. At this stage, just one of the two LCS variants was to be selected for ongoing production. Savings realised were to be invested in additional aircraft, munitions and electronic capabilities required to deter and defeat "high-end" adversaries. Secretary Carter's direction to reduce LCS construction to a 28+12 ship programme was made in the face of significant US Navy opposition. Its 2014 Force Structure Assessment (FSA) had endorsed the need for the 52 small combatants that had informed previous LCS production planning. This di-

Author

Conrad Waters is an independent naval, defence and aerospace analyst based in the UK and is a regular contributor to ESD and editor of Seaforth World Naval Review.

vergence in opinion was subsequently confirmed in the December 2016 FSA update, which maintained the 52-ship requirement. In any event, the advent of the new Trump administration means future programme direction and numbers remain a matter of conjecture. Irrespective of the outcome of this debate, there must be questions about the wisdom of making two major changes in two years given the inevitable impact on programme stability.

A Revised Operating Concept

This instability has also been evident in significant changes to the way the US Navy plans to operate the LCS type that were announced in September 2016. The original concept relied heavily on the type's modularity to allow rapid switches between missions by the embarkation of specialised equipment and supporting personnel. However, under new arrangements, ships will be assigned to a division focussed on just one single mission and crewed accordingly. This revised crewing and operating approach involves:

The first four LCS prototypes being dedicated to training and evaluation under the control of one crew.

The remaining 24 series production vessels being assigned to one of six, four-ship divisions based either at Mayport FL or San Diego CA. Basing will be determined by variant, with FREEDOM (LCS-1) mono-hulls being concentrated in Florida and INDEPENDENCE (LCS-2) trimarans in San Diego.

One division on each coast being assigned to each of the mine countermeasures, anti-submarine and anti-surface missions. One ship in each division will have a single crew and be dedicated to training; the other three ships will have alternate "Blue" and "Gold" crews in a similar arrangement to that adopted for strategic submarines.

All ships in the six divisions being manned by a unified crew of 70 sailors, as opposed to the previous core crew/mission-specialist split. In addition, each ship will deploy with a 23-strong air detachment.

The revised approach is arguably more straightforward than the previous 3-2-1 model, which envisaged three core crews rotating between two ships to keep one deployed. Its single mission-focus also reflects practical difficulties with the multi-mission model; difficulties which also saw Denmark relinquish the STANFLEX concept in its original form. However, critics have argued that abandonment of the multi-mission approach just as sufficient ships are being delivered to give it an effective trial is a reflection of the muddled thinking that has blighted the whole LCS programme. Given also that the multi-mission modularity was an essen-

tial *raison d'être* for the littoral combat ship concept, its abandonment raises further questions on their ongoing acquisition.

Future Prospects

Certainly, the LCS programme still has many critics who believe production should be terminated at an early date. Notably, three separate Future Fleet Architecture (FFA) studies have recently been produced under congressional direction. In contrast to the FSA, these documents took a broad perspective, considering revised deployment strategies and the acquisition of new ship types. Of the three, only the US Navy's own internal study saw a need for continued production of LCS-derived ships in the medium term. The others envisaged a transition to a more powerful, traditional frigate – perhaps based on a foreign design – within a short to medium timeframe. Influential supporters of the truncation of LCS production include Senator John McCain (R-AZ), Chairman of the Senate Armed Forces Committee.

In spite of this, there are reasons to believe that the LCS will retain an important part in the 350-ship fleet mooted by the new Trump administration when greater clarity on its future naval plans is achieved. Much of this is down to simple practicalities. Speaking to ESD, respected US naval analyst Christopher P. Cavas said, 'Whilst there is some evidence of a growing *de facto* need for an escort frigate, the absence of any investment in funding such a design means there is little option but to continue LCS production in the immediate term.' This is reflected in current, March 2017 discussions relating to

the FY2017 shipbuilding programme, which could see as many as three of the baseline LCS type ordered.

Reflecting also on the US Navy's traditional reluctance to adopt foreign designs and the need to protect American industrial infrastructure, Cavas also speculated that a further development of the LCS-frigate variant might eventually find favour. Certainly, VLS and AEGIS-equipped derivatives of both LCS variants have previously been proposed. Saudi Arabia has also tentatively selected an air-defence derivative of the FREEDOM design for its own requirements. Development work already underway on the upgraded LCS frigate variant – not least potential installation of long range anti-ship missiles – also play well to the concept of distributed lethality that is becoming an increasingly important theme in countering more capable potential opponents.

Conclusion

As for many US Navy projects, the LCS programme has attracted considerable controversy over its 15-year lifespan. Whilst much of this criticism has been exaggerated or ill-informed, the project's frequent changes of direction mean that the resulting ships will be equipped and operated in a very different manner from that envisaged when they were first conceived. In spite of this, the programme has been a remarkable survivor and considerable numbers of ships are entering service. Whatever the outcome of current deliberations over future procurement, littoral combat ships will exert considerable influence on the US Navy for years to come. ■

LCS survivability has been a major concern, although the US Navy has been satisfied with the results of shock trials. This is JACKSON (LCS-6) undergoing tests in June 2016.



CBRN Detection and Protection in the Urban Environment

Dan Kaszeta

A large percentage of modern warfare happens in built-up areas. Cities are easily defended but also easily besieged. Stalingrad, Sarajevo, Aleppo, Mosul and many others have been the scene of some of the most intense warfare in the last century. How does the spectre of CBRN warfare affect the urban environment? The author's own experience, having been a serving CBRN defence officer and the graduate of several "military operations in urban terrain" short courses, is that the situation is quite muddled.

Both in World War One and during the protracted Cold War, armies developed doctrine and technology, particularly in the chemical arena, that assumed that such warfare was primarily happening in the countryside. During World War One, chemical users were focussed on either use the weapons to break the gridlock of trench warfare, or as a force multiplier on the wide-open (and often now-ignored) Eastern front.

In World War Two there was some use of chemical weapons in towns by the Italian military during Mussolini's invasion of Ethiopia, but few of those towns resembled much of what we would call urban areas today.

Cold War doctrine saw biological weapons only as a strategic weapon with cities not directly addressed. Nuclear weapons were either strategic or tactical. Strategic nuclear weapons eradicate cities entirely. Tactical nuclear weapons destroy parts of cities. But the use of chemical weapons in cities causes no end to the urban warfare – neither for the offense nor the defence.

Detection Problems and False Alarms

In most of their historic uses, chemical weapons were effectively an adjunct to conventional warfare. Therefore, the main potential combatants were worried largely about big mechanised forces fighting against one another in the broad swathes of Europe or Asia. Cities were a complicating factor for military planners, and chemical and nuclear doctrine spent

Photo: US DoD



Beside conventional environments the need for modern CBRN protection extends to MOUT scenarios.

little effort addressing them. Offensively, cities did not figure in the chemical target analysis methodologies for the US military, and manuals from that time stress the avoidance of using lethal chemical agents in cities to minimise non-combatant casualties. Defensively, there was little specific guidance. The author's old copy of "An Infantryman's Guide to Combat in Built-Up Areas" (US Army, 1993) devotes precisely one error-riddled page to the subject. But wars and chemical attacks do occur in the built environment. So, how does the urban environment affect military forces trying to operate in a CBRN environment?

Detection, warning, and reporting are all far more difficult in the urban environment for a variety of reasons. Rapid and accurate detection of chemical warfare

agents or radiation is critical to protecting forces. Sadly, "rapid" does not yet exist for biological warfare materials.

The urban environment is full of chemical substances for industrial, commercial, and household use that provide ample scope for false alarms, even for the current best-in-class military chemical detectors. For example, firefighting foam gives false alarms for one of the nerve agents. Numerous cleaning chemicals in routine use befuddle many detectors. Smoke and dust from burning or destroyed buildings might clog the vapour inlets of detection instruments. Likewise, radiation in building materials (some bricks are infamous) and medicals routinely cause the radiation false alarms in security operations during peacetime, and these sources do not go away in war.

Author

Dan Kaszeta is Managing Director at Strongpoint Security Ltd.

A US Marine Corps manual (Military Operations in Urban Terrain, 1998) says that “a systematic survey of all buildings, rooms, and underground facilities must be accomplished before occupation by unmasked personnel” – but there seems no realisation by the authors that this could take many days.

Templates and Strategies Made for Rural Areas

CBRN materials, in gas, vapour, aerosol, or particulate matter, become hazards over wide areas because they move along with the wind. However, modelling and predicting their activity in an urban area is very difficult. There always is the possibility of funnel winds in strange areas, and cities also have numerous microclimates. Additionally, the urban “wind canyon” effect around buildings is a well-known phenomenon.

Furthermore, a barrage of chemical shells or warheads will detonate in a variety of places. Some will detonate at or above street level. Others will strike rooftops. These factors – and others – mean that plumes of CBRN material can form and move in ways that seem counterintuitive.

set up for this kind of work, since they were optimised for rural areas. They make a number of assumptions that may not be useful for defensive purposes in a city.

Troops will find that using a NATO-standard template (the so-called ATP-45) may not help them very much in a large city. Work on urban modelling and prediction of such hazards is vitally important for counter-terror and civil protection use, and great effort has been made in this area. However, it has focussed on critical infrastructure protection in one’s own country; models for expeditionary use in other parts of the world take more time and effort. Furthermore, useful urban models rely on a high volume of accurate local meteorological data that is unlikely to be available in most foreseeable conflict situations.

Deficiencies in Protective Equipment

Individual protective equipment in military use is generally not optimised for urban warfare. Militaries generally procure their protective suits in woodland or desert camouflage patterns. While camou-

designed for chemical warfare agents, provide little or no protection during fires in buildings. Filter-based respirators only rarely screen out carbon monoxide, and cannot provide oxygen in an oxygen-deprived environment.

The nature of CBRN materials may also complicate the ways in which troops can protect themselves in the urban environment. Most of the CBRN materials that cause widespread hazard are heavier than air. Troops faced with a chemical attack can therefore use height as a defensive measure in simply moving upwards in buildings. “Vertical evacuation” is a legitimate concept in civil protection and being on higher levels of a building provides a margin of safety against nearly all outdoor chemical warfare agents and most toxic industrial materials.

However, there is an inherent problem with this approach: safety against many conventional threats, such as indirect fire and aerial attack, is often gained by going downwards in buildings. So basements and bunkers below street level are likely to be more vulnerable to chemical attack.

Use of Chemical Agents Analogous to Classical Mines

Use of persistent chemicals, such as Mustard or VX, in an urban conflict raises additional possible complications. These chemicals are liquids and are primarily skin-contact hazards. In open terrain, they can take days or weeks to dissipate through evaporation and degradation. Inside a building and out of contact with sunlight and sheltered from wind, chemicals remain more persistent, therefore the military developed warfare agents that interdict and deliberately contaminate special terrain or equipment.

Such chemicals could easily be used in a scorched earth defence. A retreating adversary could channel the attacker’s movement and prevent the use of certain buildings. In effect, persistent chemicals can be used as a counter-mobility method analogous to anti-tank and anti-personnel mines in more open types of terrain. There is basically no rationale to use such chemicals in the offensive role in a city.

Decontamination In the City

A key component of CBRN protection is decontamination, and it is the obvious countermeasure to contamination by persistent materials. Although technical advances have been made in decontami-

Photo: D. Kaszeta



Swedish training facility providing the option of CBRN exercises

All of this can be modelled, given the right software and computing power, but it takes a lot of time to set up the computer models and this also requires for the data input a large amount of very accurate information.

The templates and methodologies for military hazard prediction are really not

flage in urban patterns is certainly made by the various major manufacturers, most armies do not have many of them in stock, especially not in large quantities. One can easily envisage troops being resistant to wearing items of clothing that make them obvious targets for direct fire. Military protective masks, while well-

nating the interiors of buildings (see this author's article in ES&D Issue 2/17 for a more complete discussion), it is extremely demanding and highly intensive in terms of materiel, time, and labour.

Military CBRN doctrine for decontamination is not well adapted to the urban environment. While such things as combat engineers and sappers exist for the purpose of clearing obstacles ahead of infantry troops, military decontamination units have never trained for an "urban terrain decontamination under fire" task and would clearly incur heavy casualties. Certainly, no such mission was ever discussed – even theoretically – during the author's own extensive military CBRN training. On the other hand, the availability of urban infrastructure may make decontamination of personnel and equipment easier. If water mains, drains, and sewers are still intact, then it may be much easier to decontaminate troops as well as their individual and heavy equipment. Despite the advances in decontamination solutions, soap and water remain the cornerstones of much military decontamination, and they are more easily obtained in an urban environment.

The likely presence of non-combatants in urban areas further complicates CBRN defence. One of the reasons international arms control takes a dim view of chemical and biological warfare is that civilian populations are disproportionately vulnerable to such warfare methods, vis-à-vis their military counterparts. Civilians, who haven't fled conventional conflict, may be further encouraged to flee by the use of CBRN materials. Ill civilians may further choke the medical system. The use of some persistent agents, like Sulfur Mustard, that have a latent period (a time delay between exposure and adverse effects) may even spread contamination from the scene of an attack, as contaminated victims flee to seek safety. A further aspect of conflict in urban areas is the possibility of CBRN warfare by proxy. Facilities that produce, handle or



Photo: US Air Force

US Air Force reservists assigned to the 919th Special Operations Civil Engineer Squadron firefighters battle a huge blaze during a live-fire training exercise. Fires always have the potential to release chemical agents, therefore firefighters have a great deal of experience relating to CBRN in urban areas.

store dangerous materials may become targets themselves, maybe even with the intent of using their dangerous contents as force multipliers by causing dangerous releases. A warring party without access to chemical weapons could use conventional strikes to achieve similar ends. Such attacks were a concern in the wars following the break-up of Yugoslavia, particularly in Croatia, which had a well-developed chemical industry. Similar concerns are true for Syria and Ukraine.

Lessons Learned by Civil Emergency Services

Civil emergency services have knowledge in this area that can be adapted by military. The vast majority of civil-sector CBRN defence operations take place in

urban areas, even if they are conducted in conditions less than full wartime.

Fire brigades around the world respond to industrial and transportation incidents involving hazardous materials, many of which involve chemicals that are, in many respects, more dangerous than military chemical weapons.

Much of the response to SARS and Ebola outbreaks occurred in urban areas and is therefore relevant to military planning.

Police teams raiding clandestine methamphetamine laboratories are engaging in the sort of operation that the best-trained infantry squad would not necessarily consider.

These examples show that CBRN operations are a growing field in civil protection, antiterrorism, major event security and VIP protection, and most aspects of this work occur in urbanised settings. CBRN work in the civil sector has been

affected, adversely at times, by military CBRN knowledge seeping into the civilian sector. If militaries are going to take this particular field seriously, then they likely need to mine the civil sector for some valuable expertise.

Clearly, the prospect of CBRN usage in cities brings an extra layer of complexity to military operations. This complexity remains somewhat unaddressed in terms of doctrine and equipment. ■

Find us on facebook!

European
Security
& Defence



Daily News – Upcoming Events
www.facebook.com/eurodefence



PIRANHA V Enters Series Production

Gerhard Heiming

Sixteen months after signing the contract, General Dynamics European Land Systems (GDELS) handed over the first seven armoured personnel carrier PIRANHA V in serial configuration to the Danish Defence Acquisition and Logistics Organization (DALO). Following extended tests of the pre-series-vehicles the acceptance-paper is expected at the end of 2017 and will lead to the start of the series production in 2018.

As of May 2015 DALO published the selection decision for the armoured wheeled vehicle 8x8 PIRANHA V and concluded with GDELS-Mowag on 15 December 2015 a contract to develop and deliver 309 vehicles for the Armoured Personnel Carrier (APC) requirement. The €550M contract includes a multi-year sustainment for the through-life support of the vehicles in the future.

The ceremonial handover on 17 May 2017 of the first seven pre-series-vehicles in Infantry Vehicle configuration marks the new stage in the procurement programme. The vehicles will now undergo a comprehensive test programme, starting in the second half of 2017 to verify performance and functionality. DALO and the Danish Armed Forces will perform tests in hot and cold climates and will conclude the tests by the end of 2017. Upon successful completion of the test program, deliveries to DALO will start early in 2018 and the subsequent deliveries to the Danish Army will start early in 2019.

Modern Technologies

Piranha V is the latest member of the family of armoured wheeled vehicles by GDELS-Mowag used worldwide with more than 10,000 pieces. To achieve the compromise between mobility, safety and functionality modern technologies came into play. The modular protection system, together with energy absorbing seating and occupant restraint systems, provides protection against mines, improvised explosive devices (IED) and ballistic threats. The flexible survivability-system can be adapted to future threats as the different modules – for example, against IED or EFP (Explosively Formed Penetrator) – are easy to exchange.

At the heart of the mobility is the 550 hp-diesel-engine from MTU, the power of which is distributed via the automated ZF-

Photo: GDELS



The infantry version of the PIRANHA V will get a remotely controlled weapon station.

Photo: Heiming



PIRANHA V enters the stage for the handover to the Danish armed forces.

gearbox to the eight steered wheels with height-adjustable McPherson strut suspension technology.

Production

The components for protection and running gear are produced with a high vertical range of manufacture in Kreuzlingen. The production of the hull with protection-elements of high-strength armour steel takes place on a newly built production line mostly by welding robots. This is the way to satisfy the tolerances

for the many mechanical interfaces. For the final assembly Mowag put an assembly conveyor in a new immovable into operation on February 2017. Starting with a painted hull, 12 stages are used to assemble the PIRANHA V to a complete armoured vehicle – ready to leave the hall under its own power. To fulfil the Denmark-contract a production rate of six vehicles per month is scheduled. The production-rate in that hall, including new neighbouring halls currently under construction, can be widely increased. As the final assembly lines do not need

Technical Data

PIRANHA V 8x8 – GDELS-Mowag

Total weight	max. 33 tons
Payload	13 tons
Length / width / height	8.00 m / 2.99 m / 2.34 m
Engine power	550 hp (430 kW)
Crew	3 + 8

special equipment they can be used to assemble other vehicles, such as, for example, the continued series production of EAGLE V.

Fielding

The 309 vehicles will be delivered to Denmark in a five-year period starting in 2018. In this period, the armed forces will adjust their structures and integrate the vehicles into the units to become combat ready with the new capabilities.

Mowag will manufacture the PIRANHA V in six variants: 79 armoured carriers for the infantry, 106 command-, 37 ambulance-(cabins with extended height) and 55 engineer-vehicles as well as 15 mortar carriers with direct fire capability and 17 vehicles for repair and recovery. The vehicles will replace the outdated M113 and will form the future core of land forces. As soon as the first units have been equipped with the PIRANHA V (company level about 2020, battalion level 2021) they will be deployed in peace-keeping missions, where the protection of soldiers is one of the highest priorities.

Major Orders

The delivery contract from December 2015 is one of the biggest orders both for the Danish contracting authority and GDELS-Mowag at present. Mowag is experiencing an upswing after a lean period in recent years which could be continued by new orders in the near future.. These include the Danish option for an additional 141 PIRANHA Vs (which could be drawn 2018), the order of 36 EAGLE Vs from Denmark and up to 1,000 PIRANHA V Mowag employees for Spain. The number of Mowag employees – currently 600 – could increase by 15 percent. ■

DSEI

12 – 15 September 2017

The World Leading
Defence & Security Event

ExCeL, London www.DSEI.co.uk

ACCESS THE GLOBAL MARKET AT THE WORLD LEADING DEFENCE & SECURITY EVENT

To enquire and reserve your exhibition space contact:

T: +44 (0)20 7384 7770 E: sales@dsei.co.uk

WWW.DSEI.CO.UK/ESD

REGISTER TO
ATTEND TODAY



34,038

VISITORS (6% UP
COMPARED TO 2013)
FROM 108 COUNTRIES

76%

OF ATTENDEES
DECISION MAKERS OR
SPECIFIERS (DSEI 2015)

1,683

EXHIBITORS
REPRESENTING THE
WHOLE SUPPLY CHAIN

42

INTERNATIONAL
PAVILIONS

Supported by

Award Winning

Organised by

“My objective is that OCCAR offers the best possible management services.”

Major General (ret'd) Arturo Alfonso-Meiriño (Spanish Air Force) has been appointed as new Director of the Organisation Conjointe de Coopération en matière d'Armement (OCCAR) effective 1 March 2017. ESD talked with him about the major programmes, plans and future trends OCCAR will address in the coming years.

Picture: OCCAR



ESD: What are the major milestones of your resume and what are the objectives that you have set for yourself in this new position?

Alfonso-Meiriño: In my previous position, I was Major General of the Spanish Air Force and the Deputy Spanish National Armaments Director for International Relations. In this role I was the Spanish representative on the OCCAR Board of Supervisors and on the Executive Committee of the Lol/Framework Agreement as well as the Central Point of Contact for the European Defence Agency (EDA). In the EDA in Brussels I worked as Director of Industry and Market from 2005 to 2011. Prior to that, I was involved in various aircraft programmes in the national system as well as working in the A400M Interim International Programme Office in Toulouse back in 2000, just before the programme was

assigned to OCCAR. I also worked in the NATO Eurofighter and Tornado Management Agency (NETMA) in Munich, and as a liaison officer with the US Navy in the United States for the EF-18 programme. So I can say that international armaments cooperation has been the core of my professional career during the last thirty years and I am a firm believer in this way of acquiring military capabilities for Europe.

In my new position as OCCAR Director I intend to further promote armament cooperation in Europe, with OCCAR as the key tool for its implementation. New threats to Europe like the developments in Eastern Europe, the war in Syria, global terrorism and potential new priorities in US foreign policy make clear that Europe needs to do more for its defence, nationally and multinationally. First actions, like a trend change in defence spending, have been taken but this will not be enough. A better European defence will depend on many kinds of efforts, not just on defence equipment. We all know that we must make more effective investments in defence equipment and use the multinational synergies that a Europe of more than 20 countries, all together with a remarkable economic power, can provide. This is not new but the pressure on us to cooperate more and better is still growing. I believe that with OCCAR we have in Europe an excellent instrument to execute cooperative armament programmes in an effective way, proven over the last 15 years. Therefore, my objective is that OCCAR offers the best possible management services for cooperative armament programmes to our member states and potential non-member programme participating states. The growth of OCCAR for the sake of growing is not my aim but OCCAR should be the default management organisation for the implementation of a growing number of complex cooperative armament programmes in Europe.

ESD: What have been OCCAR's major achievements over the last two years, which are OCCAR's current member states, and how do you share business responsibilities with other organisations like EDA or NSPA?

Alfonso-Meiriño: Our member states are Belgium, France, Germany, Italy, Spain and the United Kingdom. But we also have non-member states that participate in our programmes at equal rights. This is a great characteristic of OCCAR, which currently allows seven additional nations to be part of OCCAR programmes. These states are Finland, Lithuania, Luxembourg (represented by Belgium in the A400M programme), the Netherlands, Poland, Sweden and Turkey. OCCAR has grown remarkably over the last two years: The MMCM (Maritime Mine Counter Measures), PPA (Pattugliatori Po-

Photo: OCCAR



The seven frigate-sized PPA (Pattugliatori Polivalenti d'Altura – multi-purpose blue water OPVs) for the Italian Navy will be built in three different configurations, based on a common platform but with scaled combat systems.



Hull and superstructure of the 23,500 t Logistic Support Ship (LSS) of the Italian Navy are under construction in two sections at Fincantieri's Castellammare di Stabia (Naples) and Riva Trigoso shipyards.

livalenti d'Alta), LSS (Logistic Support Ship), MMF (Multinational Multi Role Tanker Transport Aircraft Fleet) and the MALE RPAS (Medium Altitude Long Endurance Remotely Piloted Air System) programmes have been assigned to OCCAR.

Furthermore, nearly 40 A400M aircraft have been delivered and the tactical flight capability has made significant progress. A second batch of BOXER vehicles was ordered for Germany, and Lithuania has joined the programme which incorporates the development of a new vehicle version. The COBRA in-service support was extended and the final SAMP/T surface-to-air missile system was delivered in the scope of the FSAF-PAAMS programme, while the mid-life upgrade (sustainment & enhancement) of FSAF-PAAMs was also launched. ESSOR Phase 1 was successfully concluded and the preparation of the Operational Capability 1 Phase is progressing. The FREMM programme has delivered the sixth Italian and the fourth French ship. TIGER deliveries are ongoing with more than 130 helicopters in service and the preparations for a mid-life upgrade have been started. All in all our existing programmes are in good shape and our programme portfolio is developing well.

Regarding our relationship with other organisations, EDA and the NATO Support and Procurement Agency (NSPA) are both partner organisations of OCCAR, as you can also read in the OCCAR Business Plan and on our website.

OCCAR and EDA have been in contact since the establishment of EDA in 2004, and the relationship has been formalised with an Administrative Arrangement signed in 2012. EDA and OCCAR consider each other as mutually reinforcing, privileged partners in the armament programme process. So

EDA can prepare programmes upstream while OCCAR, with its proven programme management framework and know how, is best placed to implement such cooperative armament programmes downstream, from the definition or development phase onward. But EDA can also support established OCCAR programmes within the wider European framework. Moreover, OCCAR and EDA have concluded a Security Arrangement.

Photo: Airbus Defence and Space



The A400M airlifter is to perform tactical, long-range and logistics missions directly to the point of need. It can also serve as an air-to-air refuelling tanker.

NSPA and OCCAR have cooperated since 2005, when both organisations (NSPA was at this time NAMS) signed an MoU. Under this MoU and respective Service Level Agreements, NSPA provides logistic services to the OCCAR A400M, COBRA and TIGER programmes. In 2014, OCCAR and NSPA signed a specific cooperation agreement for the MMF programme, according

to which OCCAR manages the acquisition and first two years of support of the MMF aircraft on behalf of NSPA.

So OCCAR and its partner organisations EDA and NSPA all work in their specific areas of expertise; OCCAR as the through-life management organisation for cooperative armaments procurement.

ESD: With OCCAR already involved in the multilateral FSAF-PAAMS programme, what are the chances for OCCAR to assume responsibility for a European ATBM capability as outlined in the United States' European Phased Adaptive Approach of the Obama administration?

Alfonso-Meiriño: The OCCAR FSAF-PAAMS Programme today includes the sea-based FSAF systems (SAAM) on each of the French and Italian aircraft carriers, PAAMS systems on French, Italian and UK frigates/destroyers and FSAF land-based systems (SAMP/T) in France and Italy.

The land-based SAMP/T used by France and Italy includes an ATBM capability. Sweden is a potential new participating state of the FSAF-PAAMS programme with the aim to procure SAMP/T. This means that OCCAR could soon manage the land-based ATBM systems of three important European states and therefore a significant missile defence capability. However, I assume that there will

be other ATBM systems in service in Europe beside SAMP/T. So SAMP/T will be a major pillar within a system of ATBM systems in Europe, and probably the only one of full European technological origin.

ESD: Which are the participating nations of the European MALE RPAS programme and what exactly is OCCAR's role in this



LIFETIME EXCELLENCE

At MTU Aero Engines, we always have your goals in mind. As a reliable partner for military engines, our expertise covers the entire engine lifecycle. And our tailored services guarantee the success of your missions. All systems go!

www.mtu.de

programme today? What is the projected further schedule?

Alfonso-Meiriño: The European MALE RPAS (Medium Altitude Long Endurance Remotely Piloted Aircraft System) will be designed to especially perform ISTAR (Intelligence, Surveillance, Target Acquisition

programme participating states, holds the contract with industry and manages all associated activities. Based on the successful completion of the Definition Study Phase, a Development Phase could be launched in the last quarter of 2018. The first systems could be delivered from 2025 onward.

Furthermore, MALE RPAS is of high importance for the European defence industrial and technological base as it enables the establishment of a new technological capability in Europe.

ESD: What is the status of the BOXER programme in Germany, The Netherlands and Lithuania? What are the chances that the UK might rejoin the programme in the scope of the British MIV requirement?

Alfonso-Meiriño: Delivery of the first batch of 272 German BOXER vehicles in armoured personnel carrier, command post, ambulance and driver training versions was completed in June 2016. The delivery of a second German batch of 131 vehicles in the armoured personnel carrier version was contracted at the end of 2015 with deliveries beginning this year and finishing in 2021. OCCAR is currently preparing a contract to upgrade all German first batch vehicles to the new A2 standard. The delivery of The Netherlands' 200 vehicles in command post, engineer vehicle, ambulance, cargo and driver training versions is ongoing and will be finished by the beginning of 2018. The 89 Lithuanian infantry fighting vehicles (in four versions for squad, platoon, company and battalion level) are currently being developed. First vehicle deliveries to Lithuania are planned for end of 2017. Over recent months, the UK has shown serious interest in the BOXER programme and is considering the BOXER within their current Preliminary Market Engagement exercise for an 8x8 Mecha-



Photo: ARTEC

Germany, The Netherlands and Lithuania have selected the BOXER wheeled armoured vehicle in different versions. The picture shows a German vehicle deployed to Afghanistan in a command post configuration.

and Reconnaissance) missions. The MALE RPAS programme was assigned to OCCAR in August 2016 with Germany, France, Italy and Spain as participating states. The first

Belgium became an observer to the MALE RPAS programme in early 2017. The EDA is supporting the programme in terms of air traffic insertion into the civil aerospace

Photo: MBDA



ASTER 30 SAMPIT is a mobile air defence weapon for theatre protection. It is to protect sensitive sites and deployed forces against missile threats (TBM, standoff, cruise missiles, ARM) and aircraft.

programme phase is a Definition Study Phase of two years to define the baseline design for the future MALE RPAS. Like all other programmes, OCCAR is acting as the contracting authority on behalf of the

and regarding the identification of further participating states for future phases. As far back as December 2013, the European Council identified RPAS as one of four major capability shortfalls in Europe.

nised Infantry Vehicle (MIV). A decision has not yet been made but from my, and the BOXER programme's, point of view the re-entry of the UK would be a major boost for the programme. It would provide the



Photo: Airbus Defence and Space

The approval of the Programme Management Authorisation (PMA) by the OCCAR Board of Supervisors in November 2015 authorised the assignment of the MALE RPAS programme to OCCAR for management purposes, with the initial participation of France, Germany, Italy and Spain.

UK, in a short timeframe, with a proven capability at minimum risk, would offer an easy procurement process through entry into an existing contract, would enable a further improved cost share within the programme and would make the BOXER vehicle in Europe a real market leader in its specific class. Other European and non-European countries are also showing interest in the BOXER vehicle.

ESD: What is the intention and the status of the ESSOR (European Secure Software defined Radio) programme? Who are the participants?

Alfonso-Meiriño: The ESSOR Operational Capability 1 (OC1) Phase is the next phase

of ESSOR and will transform the outcome of the previous phase into the first operational interoperable tactical communication system in Europe. The OC1 Phase will incorporate several technical enhancements to the ESSOR High Data Rate waveform such as push-to-talk CNR (Combat Net Radio) voice service, radio silence and spectrum cohabitation, an in-depth technical analysis of field tests performed in 2016 and a Through Life Management Study considering the evolution, operational use and maintenance of the waveform over the next 20 years.

The OC1 Phase will be launched in the second half of 2017. The participating states of ESSOR Phase 1 were Finland, France, Italy, Poland, Sweden and Spain. Sweden

will most probably not participate in OC1 phase although they will be involved in strategic decisions related to the ESSOR programme. Other countries are already investigating the possibility to apply for observer status in the near future.

ESD: What is the status of the A400M programme? How does OCCAR deal with technological problems and delays?

Alfonso-Meiriño: 39 out of 170 A400M aircraft have currently (status 2 May 2017) been delivered to the air forces of France, Turkey, the UK, Germany and Spain. Belgian deliveries are planned to start in 2019. Another four aircraft are in service in Malaysia which is an export customer and not



THE TEXTILE WAY

IN OCCUPANT SAFETY - AUTOFLUG landFLEX



- Shocksafe • Optimum weight
- Multi-directional passenger protection

www.autoflug.de/cs1704



- CBRN-Protection for the safety of flying personnel
- Parachute Systems for personnel & cargo



- Auxiliary fuel tank systems for range extension of helicopters
- Fuel measurement- and control systems



- Comprehensive Service Concepts
- MRO for mature military components

THINKING SAFETY

participating in the OCCAR programme. The aircraft have been delivered with initial capabilities for logistic and initial tactical flight. The qualification of outstanding required capabilities is ongoing while aircraft are being manufactured and delivered. In parallel to the deliveries, the in service aircraft delivered with an initial capability are being retrofitted to higher capability levels. There has been a delay on A400M qualification and delivery, but this is typical for such a complex programme and production has now stabilised. We must not forget that whilst delays are frustrating they are also a symptom of being at the edge of what is technically possible. The capability is therefore delivered in a stepped approach like in other major programmes. Although this is not ideal this is normal programme life. For the in-service support of the A400M, OCCAR has prepared a common support solution providing great cost savings and interoperability gains. This is split into airframe and engine. The airframe arrangement so far has been joined by France, the UK and Spain, whereas all nations except Belgium are already participating in the engine solution. We are looking forward to welcoming all programme participating states in both solutions in due time.

ESD: The European Commission has proposed a European Defence Action Plan to support the member states' more efficient spending in joint defence capabilities. Would OCCAR be a suitable organisation to manage these activities?

Alfonso-Meirino: As the EU High Representative for Foreign Affairs and Security Policy, Federica Mogherini, said at the last EDA annual conference, we do not need new tools, we need to better use them. I am following, with interest, the implementation of the Global Strategy for the European Union's Foreign and Security Policy of 2016 and the European Defence Action Plan, including the European Defence Fund (EDF), suggested by the European Commission in November 2016.

The EDAP includes the proposal to facilitate and finance European defence research and technology, as well as European defence capabilities, in terms of armament programmes. The latter area, called the "Capability Window", is to support the joint development of defence capabilities agreed by EU member states. This would be financed through the pooling of national contributions and, where possible, supported by the EU budget. The govern-

ance of the Capability Window is still under definition, but it will require an organisation to manage the programmes. I think that OCCAR, based on its over 15 years' experience in managing European armament programmes, could play an important role in this. How this role could look depends on the OCCAR member states and the EU member states but there are certainly synergies that can be exploited.

The OCCAR model is really flexible and allows the programme participation of non-member states on equal terms with full OCCAR member states. The common OCCAR rules provide an established and well-proven foundation for the management of cooperative armament programmes. Finally, according to its Convention, OCCAR was created to support the European security and defence identity and to strengthen the EDTIB. OCCAR therefore works fully in line with the aims of the EDAP. Although OCCAR is an independent organisation, it could also be used for the Union's purposes. So there will be interesting developments in the armaments domain in the near future and longer term.

The questions were asked by Jürgen Hensel.

© Fotolia



DIEHL
Aerosystems

HIGH TECH FOR EXCELLENT PERFORMANCE

As a partner to the A400M, Diehl Aerosystems provides cutting-edge technology.

- Control & Display System
- IMA Platform/AFDX
- Doors Control & Monitoring System
- Lavatory equipment

www.diehl-aerosystems.com

Rebooting the Austrian Armed Forces and Defence Industry

Wilhelm Theuretsbacher

In Austria, the last three decades have been characterised by the dismantling of the traditional armaments industry by policy makers and the radical reduction of the armed forces to the brink of paralysis. Against the backdrop of the dramatic geostrategic upheavals and their direct effects on Austria, the Austrian Armed Forces must now be rapidly restructured and re-equipped. Accommodating this goal is the fact that, through the initiative of private business people, the Austrian economy has managed to re-establish an outstanding security and defence sector despite all political constraints.

Close cooperation between the Austrian Armed Forces and the industry started shortly after the creation of the Army in 1955. Up to that point, weapons and equipment had been provided by the withdrawing allies. But the subsequent system had to be supplied to the greatest extent possible from Austria's own national production. This was not only for economic reasons, there were also strategic considerations. Austria was a small, neutral country between the NATO and Warsaw Pact military blocs. Those overseeing the effort saw that the necessary supply security in times of crisis could only be ensured by domestic production.

At the beginning of the 1960s, a highly successful collaboration began between the Austrian Armed Forces and armaments manufacturers, which at the time were mostly state-owned. The Steyr Group was a partner in the development of all-terrain vehicles and trucks (PINZGAUER), which were also used as fighting vehicles. In addition, the heavy trucks were used for transport tasks.

Other joint developments included the SAURER armoured personnel carrier, the KÜRASSIER anti-tank vehicle, the KÜRASSIER armoured recovery vehicle, the ULAN infantry fighting vehicle, and finally the PANDUR light armoured vehicle.

The Steyr Group also met the need for infantry arms. The FN assault rifle (STG 58) was produced under licence by Steyr-Mannlicher. The MG 74 was a modern machine gun developed jointly by Steyr-Mann-

Photo: MoD Austria



Embodiment of a new spirit: the Austrian Minister of Defence Hans Peter Doskozil (second from right) during a visit to the GDELS production site in Vienna

licher and the Italian manufacturer Beretta. The Steyr AUG (Armee-Universal-Gewehr - Universal Army Rifle) is another joint development. Even Glock pistols made by the private manufacturer Glock received initial assistance in the 1980s from an Austrian Armed Forces contract. At the time, grenade launchers were produced by a company then called Vereinigte Österreichische Eisen- und Stahlwerke (VOEST). The Hirtenberger ammunition plant covered a large part of the demand for ammunition.

It was a win-win situation for both sides. By the middle of the 1980s some 15,000 jobs were dependent on the defence industry. This enabled the Austrian Armed Forces to meet the demand for its main systems through domestic production. Only the small fleets of M60 main battle tanks and M109 self-propelled howitzers were pro-

cured in the United States, and a number of air defence systems were sourced from Switzerland.

It was a post-war success story. Soldiers in the chronically underfunded armed forces were proud – at least, in possessing what they saw as the “best assault rifle in the world,” and with their vehicles they could keep pace with those of the world's largest armies. As a result, these manufacturing segments enjoyed an excellent reputation among the public at large.

But then, a series of scandals in connection with arms exports rocked the republic. The very politicians who had forged the destiny of the state-owned defence industries and who had approved the controversial export permits suddenly wanted to be rid of the armaments industry, which had become undesirable overnight. Corporate structures

Author

As Editor of the Austrian daily “Kurier” **Wilhelm Theuretsbacher** specialises in security matters.

were dismantled. Some segments were outsourced, while others – such as cannon production – were eliminated completely. On top of that, policymakers passed restric-

55,000. With no justification, mandatory military service was reduced from eight months to six. 61% of armoured vehicles and non-armoured off-road vehicles, as

help of the Army because the Engineering Corps was no longer prepared for such missions due to shortages of vehicles, special equipment, and supplies.

Photo: BMLVS



With the order for 34 new PANDUR armoured personnel carriers for €105M, GDELS is executing the largest procurement contract of the Austrian Armed Forces in a decade.

tive export legislation, which even today makes military exports extremely difficult. That forced the individual companies that survived to shift production outside of the country. A well-known news magazine summed up the situation in 2004: "Austria's defence industry is on the brink of collapse. Whereas, defence companies like Noricum, Steyr, Hirtenberger, Assmann and Dynamit Nobel once employed more than 15,000 people, today this industry provides jobs to just a couple of hundred employees in Austria. Annual exports have fallen from the erstwhile level of €500 million to just a tenth of that volume today."

The Decline of the Armed Forces

Parallel to the decline of the defence industry, the dismantling of the Austrian Armed Forces had begun. During the Cold War, the Austrian defence budget comprised 1.186% of the Gross Domestic Product (GDP). In their desire to realise a "peace dividend" following the end of the Cold War, politicians reduced the defence budget continuously until 2015 to just 0.553% of GDP, or €1.9Bn. The troop strength of the military was slashed in half from 110,000 soldiers to

well as 41% of aircraft were decommissioned without replacements – and yet there was no change to mission requirements.

When the finance minister demanded further budget cuts to the tune of €205M a year, the general staff warned that the funds available made it impossible to ensure "preservation of a minimal capability or even an absolutely necessary extension of capabilities." Bases were closed. Training was limited due to ammunition and fuel shortfalls.

For Austria's economy, the military was largely lost as a potential customer. Out of necessity, the general staff resorted to a new procurement philosophy: domestic development was too expensive. When a system had to be procured, it was purchased on the world market at the lowest possible price. The estrangement between the military and the industry was so profound that recent defence ministers have doggedly refused to conduct company visits. Politicians sought to avoid being photographed together with the stigmatised "arms executives".

Yet the impending collapse of the military could no longer be hidden from the public. Mayors were put on notice that in the event of flooding they could no longer rely on the

This was all happening right at the high point of the migrant crisis in 2015. Nearly a million people transited the country largely uncontrolled. There were violent clashes at border crossings. And in the midst of this situation, a fearful public found out that the military was on the verge of collapse.

The Renaissance

In an unprecedented action, the country's parliament slammed on the brakes. On 26 November 2015, all of the factions of parliament came together and passed a resolution calling on the defence minister to present a new concept. A short time later, a new government was formed. The new concept was presented by then-serving Minister of Defence, Hans Peter Doskozil.

The plan represented a paradigm shift after decades of dismantling. Doskozil's threat assessment and the capabilities that it required of the Army included developments that were already well known: the destabilisation of states through hybrid warfare in Eastern Europe, increased military activities in northern Europe (e.g. the Baltic states), and the rise in transnational terrorism and extremism in the Middle East and North Africa and its effects on Europe and Austria. What was new was the recognition that

The Mortar Company.



hirtenberger
Defence Systems



DSEI,
ExCeL, LONDON
12 - 15 SEPT. 2017
BOOTH NO.
S2 - 240

THE COMPREHENSIVE 60 MM COMANDO MORTAR SYSTEMS.

The 60 mm Cdo system is the consequent realization of a highly mobile and effective fire support weapon system for infantry units, which can make a difference on the battlefield, by providing high angle 60 mm fire support from within. Operated, aligned and commanded by the group commander, the quick and easy usability of the weapon is combined with the high performance of the different types of the Commando mortar ammunition family like high explosives, smoke or illumination. Every element of the 60 mm Cdo system was designed to maintain the high mobility by lowering the man burden and accomplish supremacy in fire power.

With the 60 mm Cdo system every infantry group becomes one's own 60 mm fire support team.

these risks had now manifested themselves in practice and that international crises presented a clear and present danger to the domestic security of European states. The result of this assessment was that the likelihood of a mobilisation for domestic tasks – assigned a moderate readiness level in 2014 – had become more significant.

This requires additional capabilities for the military in domestic missions. In particular, there is a heightened need for counterterrorism capabilities and management of the migration situation. This also necessitates a broad-based restructuring of the entire armed forces – both in terms of personnel and materiel – and one which uses highly modern systems with which neither the

- Soldiers' personal equipment (tactical helmets, headsets, eye protection, hearing protection, body armour) will be upgraded and increased for €16M.

- In 2017, the first CREW systems (Countering Radio Controlled IEDs Electronic Warfare) will be delivered to counter the threat from radio controlled IEDs, primarily in international deployments.

In the longer term, but already initiated, are the modernisation of the air fleet and state-of-the-art reconnaissance and surveillance electronics for soldiers, as well as cyber warfare capabilities.

Along with the new concept is the realisation that without strong partners in the industry the procurement package cannot

out of the public view and without political interference. These are companies which, in the absence of national procurement programmes, have been forced to succeed on the global market.

Among those players are a number of firms salvaged by private investors from their state-owned antecedents, companies such as Steyr-Panzerwerk in Vienna-Simmering, formerly Steyr-Daimler-Puch Spezialfahrzeug GmbH (SSF). It was purchased in 1998 by a private consortium and subsequently sold to the American defence corporation General Dynamics. The new owner integrated the former Steyr plant into its European subsidiary, General Dynamics European Land Systems, which also includes the Swiss firm Mowag and the Spanish Santa Bárbara Sistemas. The facility in Vienna was competitive with the Swiss and Spanish competition within the corporate group, even though the US-based leadership of the group repeatedly expressed its lack of understanding for the Austrian Armed Forces' lack of procurement ambitions. The facility survived on its export successes in places like the Czech Republic and Portugal. But the technicians in Vienna consider it a special honour that the British Army decided to adopt its ULAN infantry fighting vehicle under the name AJAX.

Steyr-Mannlicher, the manufacturer of the Universal Army Rifle (AUG), was also saved by private investors and currently exports its products worldwide.

The new Austrian security and defence industry includes some 100 firms, has annual revenues of around €2.5Bn, and employs 11,000 people directly and a further 20,000 indirectly.

This is a real wonder for an industry that has to do almost entirely without domestic business and is also burdened by the most restrictive export regulations in Europe. The companies have banded together to form the Austrian Defence and Security Industry Association (ARGE Sicherheit und Wirtschaft, or ASW) to facilitate access to international expertise.

The organisation's stated goal is to bundle defence and security interests in Austrian industry and pursue the following goals:

- Identify synergies and collaboration potential;
- Strengthen competitiveness;
- Position Austria as a location for the supply of qualified systems;
- Lobby for stronger representation of the industry's interests;
- Promote export by offering assistance in establishing international contacts.

Among the organisation's latest activities is an information campaign about the



Photo: Achleitner

Protected military vehicles from Franz Achleitner Fahrzeugbau und Reifenzentrum GmbH.

Army nor the industry has been confronted up to this point. To meet this need, the finance minister has provided an additional procurement budget of €1.3Bn to 2020. Combined with funds from his regular budget, the minister of defence now has a total of €1.74Bn at his disposal for procurement.

A recruitment drive aims to attract 10,000 new soldiers, and the General Staff has developed a list of urgent procurement priorities.

Here is a brief excerpt of urgently required systems:

- To end the so-called "mobility crisis" investments in the amount of some €250M will be dedicated to armoured vehicles starting in 2016 and 2017.
- In the military fleet, 140 off-road trucks will be replaced from 2017 to 2019 at a cost of €25M.

be implemented. The problem is: where is the industry? Is it the remaining fragments of the state-owned defence companies? Moreover, the clock is ticking. The billion-plus budget has to be allocated by 2020. In view of tender deadlines and other procurement modalities, that will be no easy task.

Implications for the Industry

For the General Staff, these challenges mean that contacts to companies which have been on ice for decades must be re-established. An inventory of the capabilities of Austrian industry in the security sector have revealed an unexpectedly positive picture. Following the collapse of the state-owned defence companies, a cluster of highly innovative private companies capable of meeting the equipment needs of an army sprung up

so-called European Defence Action Plan (EDAP), EU defence research, and the European Defence Agency (EDA). There was also a joint workshop of the European Defence Agency (EDA), the Austrian Federal Ministry for National Defence and Sport (BMLVS), and the Austrian Research Promotion Agency (FFG).

ments, NBC protective gear, transport and vehicle chains, self-sufficient power generation systems, and a range of custom vehicle systems.

Reinhard Marak, the CEO of the Austrian Defence and Security Industry Association says: "With a few exceptions, we are far from the traditional armaments industry in

eration. The armed forces initiative comes at exactly the right time for companies. Austrian entrepreneurs have expressed a keen interest in the European Commission's recommendation to establish a European defence fund to increase the efficiency of member states' expenditures for common defence capabilities. Funds will be provided for the common development of technologies and equipment with strategic significance – from land, air, sea, and space capabilities to cyber security. The Austrian companies definitely want a share of this programme. And what is particularly attractive to the Austrians, given their corporate structures, is the stated intention to provide special support to SMEs (Small and Medium-sized Enterprises), start-ups, mid-cap corporations and other suppliers of the defence industry.

But this requires military expertise, which for the first time in a long time, the defence minister is offering.

Parallel to the research offensive, the defence minister is concluding a series of procurement contracts. On the way to the troops are protective equipment and tactical helmets. Troops standing by for foreign deployments will receive a new AUG with a variable optic and an integrated grenade launcher.

The armoured vehicle production facility of General Dynamics European Land Systems, Steyr GmbH in Vienna, has secured the biggest chunk of the funds so far. The Austrian Armed Forces have ordered 34 new PANDUR armoured personnel carriers for €105M, the largest procurement contract of the Austrian Armed Forces in a decade.

The Outlook

With the vehicle order, Doskozil not only wants to make a contribution toward rectifying the mobility crisis in the Austrian Armed Forces but also achieve economic policy effects. The minister has indicated that this contract has achieved 70% domestic value creation. The number of employees at the Vienna-Simmering facility will rise by 10%. Some 180 Austrian firms are taking part in the project, he said. "The large share of Austrian value creation benefits employees and the domestic economy. This strengthens the Simmering facility and jobs," said Doskozil. The staff of the company confirmed that this order would appear to secure the Vienna location within the company for a long time to come.

The unspoken motivation in the background is that the jobs argument seems to make it easier to garner public sympathy and consent for the defence expenditures. ■



Photo: Schiebel

Schiebel production facility based in Wiener Neustadt, 40 km south of Vienna, where the serial production of the successful VTOL Unmanned Air System, the CAMCOPTER S-100, started in 2006.

The Association's industry directory shows just how broadly based the Austrian defence sector is. It caters to every segment the Austrian Armed Forces' needs:

- Weapons and ammunition;
- Vehicles & accessories;
- Personal equipment;
- Communication equipment;
- Engineering equipment & tools;
- Optical equipment & optoelectronics;
- Testing equipment;
- Logistics, medical & humanitarian equipment;
- Engineering services, training, R & D;
- Demilitarisation, demining;
- Components, supplies;
- ICT, software;
- Various products & services.

For the Austrian Armed Forces this is a highly attractive diversification that goes far beyond the arms manufacturing industry of the past. After all, the range of products now available includes armoured vehicles, measuring systems, optical equipment, photonics, mechatronics, equipment for soldiers operating in alpine environ-

Austria. Because we are not a country that relies on cheap labour, we succeed by serving niches and special orders. High technology is the order of the day."

The Association is a much-needed partner for Defence Minister Doskozil, who has established a new "back-to-the-roots" procurement philosophy. The idea is that the Austrian Armed Forces will again enter into close collaboration with the industry as they did in the first decades of their history. Once again, custom-tailored solutions will be developed. To achieve this, the Austrian Armed Forces have an initial budget of €5M.

Unlike his predecessors, the Minister also pays visits to companies. These meetings have already yielded some ideas. For instance, together with an Austrian aircraft manufacturer, a slowly flying surveillance aircraft is being developed. There are also companies that are well-suited to the production of effective drone defence systems. The defence minister has made drone defence a special priority. Even the development of a self-driving car is under consid-

“Our aim is to be the pre-eminent transatlantic defence supplier in Europe”

As one of the defence industrial giants from the United States, Lockheed Martin Corp has strengthened the company's presence as a partner of European armed forces. In this interview, Jonathan Hoyle CBE, Lockheed Martin's Vice President Europe, speaks about industrial capabilities and details the company's perspectives and objectives in Europe. The interview was conducted by Jürgen Hensel and took place in Berlin.

ESD: Do you envision the European defence market as a growing one for LMCO? In which areas?

Hoyle: Europe did not seem to offer particularly strong opportunities for growth following the financial crisis, but we have recently seen an increasing interest in security and defence against a backdrop of highly complex geopolitical and economic challenges which have seen a wide range of security and terrorism threats emerging. Since the NATO Wales Summit and the pledge for the 2% GDP targets for defence spending we have seen an upturn in some countries' defence expenditures, for example in Germany and Poland, and a move to recapitalise on ageing equipment in other allied countries which is creating significant demand for our portfolio of proven products. So, for Lockheed Martin, the market is growing. Our product range suits. The portfolio that we have is unmatched – innovative and affordable solutions which deliver the capability, technology and security our customers require. Today, we have an ambitious growth plan here in Europe.

ESD: What are Lockheed Martin's current programmes of relevance in Europe?

Hoyle: We have a comprehensive portfolio present here in Europe with much of that growth fuelled by the F-35 LIGHTNING II, air and missile defence, BLACK HAWK helicopter and armament sales, but we are also looking to grow in adjacent areas such as energy and cyber security.

With Denmark, Italy, The Netherlands, Norway, Turkey and the UK all committed to purchasing F-35 in Europe, it is already clear the aircraft will be a cornerstone for European air defence for the next 30-40 years or more. In Europe, we see other potential opportunities for F-35 in Finland, Belgium, Switzerland and Spain, among others. Our acquisition of Sikorsky last November



added a significant international component with an installed base of over 1,000 aircraft internationally. We see increasing international opportunities for Sikorsky helicopters, including for the Polish Special Forces, the German Air Force's heavy-lift helicopter pursuit and the potential for increased opportunities for the BLACK HAWK in Saudi Arabia.

Germany's selection of MEADS is the first step on our path to provide that country with a modern missile defence system. And we have had discussions with the Polish Government on the security and industrial benefits our MEADS solution could provide to Poland.

So we have a comprehensive portfolio present here in Europe, a growth plan with the backbone of the F-35.

ESD: Apart from the ones that are already committed to the F-35 programme, do you envision more possible customers for the programme in Europe?

Hoyle: There is actually only one fifth-generation aircraft available on the international market and that is the F-35. From a NATO perspective, if you have got already half a dozen countries as partners in the programme plus you are deploying into Europe, the interoperability arguments for joining the F-35 programme become quite powerful.

In terms of cost, we have worked diligently to drive down the cost of the F-35A – the most popular model, in the US and internationally. By 2019 customers will be getting

an unparalleled fifth-generation fighter for the price of a fourth-generation, legacy aircraft (approx. US\$85M).

ESD: Is the F-35 the next generation Eurofighter?

Hoyle: I used to work on the Eurofighter TYPHOON programme when I was in the UK MoD back in the early 90s. I know both products well. The F-35 is a next-generation aircraft and the world's most advanced multi-role fighter. It has more lines of computer code than it took to launch the space shuttle and an ability to share what it sees with other platforms to expand situational awareness across the entire network of aircraft. The F-35 has the ability to support legacy aircraft to achieve mission success and survivability using a combination of stealth, electronic attack, information sharing, and other measures. In both the UK and Italy, it will operate seamlessly alongside Eurofighter TYPHOON.

ESD: Do you believe the programme could boost the business of individual companies to a similar extent that it has been able to boost the business of Kongsberg, for instance?

Hoyle: F-35 offers ongoing opportunities for companies to engage. In Denmark, for example, we hosted a business-to-business networking event in May, bringing together a cross-section of Danish industry.

The objectives were to explore opportunities for the integration of new Danish businesses into Lockheed Martin's global supply chain, share knowledge about how to win new business in the US and identify new opportunities for collaborative research, development and innovation with Danish industry and universities.

The energy sector was a particular focus as we are keen to share our own expertise and knowledge and identify how we can work in partnership with Danish businesses to develop future energy solutions that are clean, renewable, reliable, efficient and affordable.

Denmark's selection of F-35 was the catalyst for this innovative business event, which brought together senior representatives from our Space Systems, Rotary & Mission Systems and Missiles & Fire Control business areas. The potential benefits will extend beyond companies in the security and aerospace sector.

ESD: Which country do you believe consti-

tutes the currently biggest European market for Lockheed Martin?

Hoyle: As a global technology leader, our approach is to put the needs of our customer at the centre of all that we do by thinking beyond tomorrow and producing innovative and affordable solutions that deliver the capability, technology and security our customers require.

Excluding F-35, there is a strong interest in our product portfolio across a number of countries with Poland, Central and Eastern Europe, Germany and Turkey being focus areas at the moment.

ESD: Is the C130J still the latest version of the aircraft? What will there be after the C130J?

Hoyle: There is no other aircraft in aviation history – either developed or in development – that can match the flexibility, versatility or relevance of the C-130 HERCULES. It is a true workhorse, ready for any mission, anytime. The C-130J SUPER HERCULES represents the current generation of the C-130



Future European F-35 users include Denmark, Italy, The Netherlands, Norway, Turkey and the UK. Besides, there is interest in Belgium, Finland, Spain and Switzerland. Shown here is an F-35A during weapons tests over the sea test range, Point Mugu, California.

Hoyle: Here in Germany we are offering the new-generation CH-53K to meet Germany's future heavy-lift helicopter requirement component but this process is at an early stage. We are currently in discussions with a number of German industries with a view to them being partners on the programme and await with interest the details of the RFI when it is issued.

does not necessarily end up with competing companies offering the same number of platforms.

ESD: The fact that you are speaking to a number of German companies, as you said, suggests that you are able to offer the CH-53K on commercial terms and not just based on a government-to-government MoU.

Hoyle: If we are selected to supply the CH-53K on a direct commercial sale basis (DCS) there will clearly need to be an industrial base in Germany capable of supporting the aircraft. For this reason, the discussions we are having with German industry are not only focused on what contributions can be made to the platform but also what contributions can be made to the long-term sustainment approach to maintain the CH-53K here in Germany.

ESD: So Poland is another major helicopter market for you in Europe?

Hoyle: The integration of Sikorsky has gone very well and we're excited about some of the revenue synergies that we are seeing. For example, last year at the Farnborough Air Show, we showcased an armed BLACK HAWK helicopter, which takes weapons systems and sensors from our Missiles and Fire Control business and combines them with the BLACK HAWK platform from our Sikorsky business. Our facility at PZL Mielec, in south east Poland directly employs more than 1,700 people and sustains employment for around 5,000 others in Poland's supply chain. It is our biggest manufacturing facility outside the US. I think there are potential benefits of this facility outside of the Sikorsky supply chain across the rest of Lockheed Martin. For this reason we are looking at ways in which we can make wider use of PZL Mielec internally. We are enthusiastic about the opportunities we see for long-term value creation for PZL Mielec and seeing accelerated customer interest in both military and search



The CH-53K KING from Sikorsky, currently in production for the US Marine Corps, is a contender in the scope of Germany's STH requirement (Schwerer Transporthubschrauber - Heavy Transport Helicopter).

and has the distinction of having the longest, continuously running military production line in history.

With sixteen nations already flying the C-130J as their airlifter of choice, we have recently seen France confirm an order for four aircraft and Germany express an interest in procuring a similar number. Demand for the aircraft remains strong, with many current operators believing the only replacement for a HERCULES is a HERCULES. The C-130J will be one of our focus programmes at the Paris International Air Show.

ESD: From your point of view, what is the status of the Heavy Transport Helicopter programme/competition/requirement in this country, in Germany?

ESD: How many aircraft do you expect to become subject to the RFI as part of the requirement?

Hoyle: This is very much a matter for the German Ministry of Defence and much will depend on whether it adopts a capability based approach or some other measure.

ESD: The former would be your preference?

Hoyle: It is an approach increasingly being adopted by customers worldwide, whereby the customer specifies the capability required and leaves it to competing companies to propose options for delivering this capability and the number of platforms required to achieve that. It can often lead to an interesting analysis, one that



In December 2016, Lockheed Martin announced the sale of six Polish-built S-70i BLACK HAWK helicopters to the Chilean Air Force. The plant at PZL Mielec in south-east Poland is the company's biggest manufacturing facility outside the US.



At present, there are 16 nations operating the C130J SUPER HERCULES airlifter. Shown here are two F-35Bs refuelling from a KC-130J tanker of the USAF.

and rescue helicopter opportunities emerging in the Middle East, Asia, and Eastern Europe.

In December, we announced the sale of six Polish-built S-70i BLACK HAWK helicopters to the Chilean Air Force and we are in discussions with the Polish Government about the possible supply of Polish built BLACK HAWKs to the Special Forces.

In addition to Poland, we see BLACK HAWK interest from Hungary, Lithuania and Romania, giving us an opportunity to grow Poland as an international provider of BLACK HAWK helicopters in the region.

ESD: How do you assess Poland as a missile defence market at the moment?

Hoyle: Our MEADS team has provided an updated cost briefing for Poland's Wisla programme to Poland's Ministry of National Defence. The presentation followed a year of active discussions with the Polish Government regarding the security and

industrial benefits of our MEADS solution that provides advanced capabilities, partnership and a proven technology transfer

ESD: Where do you see Lockheed Martin's role in the German TLVS programme?

Hoyle: The Lockheed Martin-MBDA proposal for TLVS is with the German Ministry of Defence and we are in discussions over the details. This is a large and complex programme of great importance. We all agree that a thorough review of the details is appropriate and we continue to receive support for our solution and the path we are on to a TLVS contract. Lockheed Martin and MBDA's partnership on MEADS spans decades and we look forward to working together to deliver this important capability. We are currently in negotiations with MBDA about turning the current arrangement into a joint venture. The principles have been agreed on and we are in detailed discussions about the implementation.

Photo: U.S. Missile Defense Agency



In Europe, the Norwegian and Spanish navies operate surface combatants with Lockheed Martin's AEGIS combat system. Pictured here is a Standard Missile-3 (SM-3) at launch from the AEGIS destroyer USS DECATUR (DDG 73).

ESD: What is the perspective for Lockheed Martin in the European naval based missile defence programmes?

Hoyle: We are following the programmes closely. Lockheed Martin is the provider of the vertical launch system as well as the radars on AEGIS ships. We believe we have a radar capability that could meet a number of European requirements and see the potential to have a primary role as a system integrator.

ESD: Where do you see Lockheed Martin's position in Europe 20 years from now?

Hoyle: In 20 years time, I will be long since retired! I would hope that within the next five years we will have firmly established Lockheed Martin as the pre-eminent transatlantic defence supplier in Europe and still occupy that position 20 years from now. In this timeframe, F-35 will have become a cornerstone for national and NATO defence in the region and I can see Polish built BLACK HAWK helicopters, as well as C-130J, providing a critical support role for special forces operations.

Our customers, whose needs are at the centre of everything we do, will continue to face complex, volatile and unpredictable geopolitical environments. To help address these concerns, we will redouble our efforts to think beyond tomorrow and produce innovative and affordable solutions, which deliver the capability, technology and security required to tackle these challenges together.

RUAG Looking at the Future

Paolo Valpolini

To underline its increasing involvement in simulation, RUAG organised its annual press day at the Swiss Army GAZ-West (GefechtsAusbildungsZentrum-West) in Bure, one of the two live simulation centres that the company manages together with the Swiss military, following its successful bid that gives it logistic and technical responsibilities for the coming five years, with an option for four more years. This allows the Swiss Army to maintain a very reduced number of personnel, mostly professional officers, who are responsible for tactics and training. "We support and coach militia units who come here for training," underlines one of the officers in charge.

The GAZ-West is only one part of the simulation available in Bure, along the Swiss-French border, the SIM KIUG (Simulation des Kampfes Im Überbauten Gebiet) being complemented by the SIMUG (Simulations-

Swiss Army with 500 kits of 10 sets each of the new SSim Stgw 90 NT (SchiessSimulator zum Sturmgewehr 90 Neue Technologie), simulation system for the assault rifle, which will be distributed at unit level. The

second, known as Cerbere, is intended to upgrade and update the two French Army live simulation centres at Sissonne (urban) and Mailly-le-camp (open field), in cooperation with Thales.

Simulation is part of RUAG Defence, which in 2016 generated a revenue of CHF388M, around one fifth of the overall group revenue. "Ensuring that the Swiss Armed Forces are properly equipped remains our corporate purpose," Urs Breitmeier, CEO RUAG Group said in this opening remarks. However, he also underlined that this role is at risk as national defence budgets are shrinking while Swiss stringent export laws on defence equipment make it difficult for RUAG

25%, followed by Defence and Ammotec with around 21% each, Space reaches nearly 19%, and Aerostructures increased its share considerably up to 13%. Diversification towards the civil market clear, with a new field of activities acquiring importance: "Beside space and aerostructures, in which we invested heavily, having i.e. extended our US-base in space-related activities, we are now moving into the cybersecurity field," Breitmeier explained, one of the group moves being the acquisition of Clearswift in the UK. With its around 100 employees, the company will bring for the first time the number of RUAG employees out of Switzerland to be greater than that of Swiss-based workers, a sign of the group's internationalisation.

The decision to acquire a cybersecurity company on the international market was also dictated by the reduced number of IT-qualified personnel in Switzerland, Breitmeier said. Of the 250 new graduates, only 50 remain on the market, with 200 already destined for Google. Without counting Clearswift, which will be fully integrated in late 2017, in 2016 RUAG increased its workforce by 571 units, mostly out of Switzerland, bringing the total number of employees to 8,734. Another developing business is MRO (Maintenance, Repair and Overhaul): "We adopted new procedures for maintenance and repair in order to provide better value for money to our customers, with what we call internally our MRO 4.0," the Group CEO said.

RUAG remains among the 10 more attractive employers in Switzerland, with further investments planned in digital sales channels for the hunting and sports ammunition business, in space, considering that in the future increasing internet bandwidth will be based also on space systems, and in cybersecurity, a dual-type investment as it concerns both the military and the civil market.



Photos: P. Valpolini

SCHÜTZENPANZER 2000 in action at Nalé during a company level exercise; from 2018, each combat battalion will undertake a refresher course in a GAZ every two years.

Unterstützung für Gefechtsübungen), the overall instrumented area being 3 x 7 km, simulation subsystems making Nalé, this is the name of the fake village, one of the best urban training facilities available in Europe. RUAG won two other major simulation contracts in 2016, one for providing the

to work in cooperation with international partners when this is needed to win competitive bids on the export and national market, with 80% of revenue coming from competitive tenders. The latter has considerably increased considering the five pillars of RUAG: space, aerostructures, aviation, ammunition and defence. When the group was created, in 1999, the share of revenues generated by contracts with the Departement für Verteidigung, Bevölkerungsschutz und Sport (VBS) was 86%, with exports accounting for only 7%, while foreign markets today account for 63%, and the VBS share is reduced to 31%.

Since its creation, the RUAG Group has doubled its revenues, from CHF931M to CHF1,858M. Aviation leads with over

Author

Paolo Valpolini is a freelance defence journalist who has reported for over 30 years for numerous defence magazines. Specialised in land warfare, he has been deployed many times downrange to report on multinational operations.

Royal Netherlands Navy to Get Early Warning Capability

Stefan Nitschke

There is one reason for a sea-based ballistic missile defence capability: Potentially hostile or ‘rogue’ states are continuing to develop medium-range and long-range missiles that can be launched from outside the Euro-Atlantic area, most notably, Iran. The SMART-L MM/N long-range radar indicates THALES Nederland’s efforts to overcome ballistic missile threats and to create a true European at-sea anti-ballistic missile defence capability.

Naval assets fitted with a Ballistic Missile Defence (BMD) capability are in strong demand to defend against the increasing threat posed by medium-range and long-range ballistic missiles. Technically very impressive, a shipborne BMD capability represents an issue that all major European navies should care about. Observers are sure a number of advanced navies in the region can build on their own BMD capability in a reliable manner in the upcoming years. Those will most likely be in a favourable condition since industry is developing advanced technologies for possible future use, including THALES Nederland. But what will be available in the short to mid term when European navies need to improve their existing AAW assets?

AESA for Early Detection of Ballistic Missiles

“Longest possible range” or “improved detection accuracy” or “faster response” are appropriate guidelines for some European NATO member states to incrementally establish a reliable at-sea BMD capability soon. Decision-making in three countries – Denmark, Germany and the Netherlands – will certainly have an impact on the future of a robust sea-based BMD capability in Europe. To accomplish this, a variety of “road blocks have to be avoided,” a government source in Berlin said. First is technology that must be reliable. Second is money. And, with regard to Germany, there is a third potential blockage: the lack of political willingness.

Author

Stefan Nitschke, Ph.D., is Editor Special Assignments, European Security & Defence



(Photo: THALES Nederland)

The first-of-class radar began testing at THALES Nederland’s Hengelo production facilities in late 2016 and is currently being used to support system qualification.

Despite the fact that the latter also requires full understanding of the BMD issue and its role for a future European missile defence system, industry already stepped ahead and spent a considerable amount of money for developing viable BMD technologies. Industry learned that it can efficiently deliver needed capabilities, some of which were fielded in an incredibly short time; remembering THALES Nederland’s SMART-L radar, which, at the time of market introduction, was a “truly superior technology for AAW (Anti-Air Warfare) purposes,” an industry source quoted. But times have changed dramatically since about the late 1990s or early 2000s, and there may be no rule that European NATO partners ignore the future imminent role of BMD. With qualification of its SMART-L MM/N (Multi-Mission/Naval) system finally in

sight, THALES Nederland is now embarking on the next step of its BMD journey. Formerly known as SMART-L EWC (Early Warning Capability), it will see the D-band radar installed on-board the first DE ZEVEN PROVINCIEËN class air defence and command frigate (LCF) of the Royal Netherlands Navy (RNLN) for further testing. EWC grew out of the SMART-L volume search radar functionalities, offering greater range and a faster response to high-speed, long-range missile threats. SMART-L MM/N can easily be applied to existing ship AAW architectures, like the RNLN’s LCF frigates or both Germany’s Type F124 (SACHSEN class) and Denmark’s IVER HUITFELDT class ships. If these platforms have their SMART-L radars modified with the new BMD processing functionality, there would be no need to seek alternatives.

New Technology

Perhaps the most significant element in the SMART-L MM/N is the new Active Electronically Scanned Array (AESA) radar based on Gallium Nitride (GaN) semiconductor technology. Addition of advanced GaN chip technology aims to improve the radar's output level, providing the radar with a longer range and a capability to detect and track high-speed, exo-atmospheric targets over distances of over 2,000 km. "One of our ambitions was to improve the radar's range." THALES Nederland said. According to product manager Marco Strijker, the detection of very small and fast airborne targets is primarily determined by the patented Extended Long-Range (ELR) waveform. This is the foundation of a commercial product that has to be commercially viable for an operator, so the manufacturer had to balance increasing performance with an affordable operating cost. When the RNLN's four LCF ships will all receive the new radar by the late 2010s, according to the manufacturer, it becomes clear that a viable BMD technology with European roots will be able to fill the existing BMD gap. "What we are doing here will support this and our future strategy for an own range of BMD products," the company added. According to Strijker, the RNLN plans to conduct a third test of the new BMD processing functionality during exercise FORMIDABLE SHIELD 2017, following the first test that was conducted in Hawaii and the second one, undertaken during the At-Sea Demonstration 2015 (ASD15) in the waters of northwest Scotland's Hebrides.

Also this year, THALES Nederland plans to perform factory acceptance testing (FAT) for the second production SMART-L MM/N radar. This will be accomplished prior to the expected delivery to the Netherlands Defence Materiel Organisation (DMO) and subsequent installation aboard the LCF frigate. According to the manufacturer, qualification is expected to be completed in 2018.

Core Element of Collective Defence

Europe has not been here before, however: Many odd-sounding acronyms and code names have popped up over the years from various studies into sea-based BMD and early missile detection. According to THALES Nederland, SMART-L MM/N benefits from 15-plus years of theoretical and practical research and know-how associated with SMART-L and SMART-L ELR. With SMART-L MM/N, the RNLN will be the first naval service in Europe to achieve an extended range surveillance and tracking capability, forming part of the Netherlands' national contribution to NATO's BMD capability. An initial operational capability (IOC) is planned for 2019.

Consideration is now being given to SMART-L MM/N's exploitation aboard air defence ships in service with Denmark and Germany. Similarly to the RNLN's LCF frigates, their AAW ships carry the proven SMART-L volume search radar. For them, it is important to get the long-awaited early detection capability, a programme, how-

ever, that needs further political support, especially in Germany.

But there is some light at the end of the tunnel. The German Parliament decided in December 2016 to retrofit three F124 frigates with the new radar. There is a "strong requirement for a ship-based early warning system" in the German Navy, according to sources in Berlin, to "complement planned capabilities of other NATO partners [e.g., the Netherlands]." The next two or three years will be most critical. Despite the fact that Berlin's intention is to continue talks with Moscow about the NATO missile shield agreed at the Alliance's summit in Lisbon in November 2010, it is clear that Germany needs to equip its three AAW ships with sensor capability for detecting and tracking missiles at high altitudes. On this naval aspect, Germany is collaborating closely with the Netherlands and Denmark, "with the objective to adapt existing sensors, so they would be able to detect incoming missiles within and above the atmosphere and to guide interceptors to their targets," an analysis recently published by the German Institute for International and Security Affairs reads. The paper continues, the German Navy Command in Rostock has been leading trilateral efforts since April 2015 to develop a capability to intercept missiles outside the atmosphere. Germany's leading role is particularly significant because these efforts are taking place in the context of the Framework Nation Concept, which is supported by Berlin. ■

New Brochure

MITTLER REPORT



Defence Technology for German Land Forces

Content:

- Armament Programmes and Equipment Planning
- Protected Mobility
- Logistic Vehicles
- Planning and Deployment of the Medical Service's Vehicles
- Communication and Information Network
- Weapons of the Army
- New Ammunition
- UH Tiger and NH90
- The Puma in Mission
- IdZ-ES – Status and Procurement Plans
- New Hand Weapon Concepts
- Modern Combat Clothing

Published in cooperation with the Association of the German Army



Defence Technology Review 2/2016

120 pages, English, **€14.80** (incl. VAT, plus shipping)

MITTLER REPORT VERLAG GMBH Baunscheidtstraße 11 · 53113 Bonn, Germany
Fax: +49 228 35 00 871 · info@mittler-report.de · www.mittler-report-shop.de

“We not only recognise the trend; we want to play a role in shaping it.”

Since 2008 Steiner Optik GmbH has been a part of the family-owned Beretta Group. In 2017, Steiner Optik celebrates its 70th anniversary. In this interview, Jörg Prediger, Managing Director of the Bayreuth-based company (Bavaria, Germany), discusses the company's expansion and innovation strategy with ESD's Waldemar Geiger.

ESD: What is your assignment at Steiner Optik?

Prediger: I have been with Steiner Optik for almost 17 years. Before, I was assigned the position of Managing Director, which I share with my colleague Robert Eckert, I was the Sales and Marketing Director.

ESD: This year, Steiner Optik celebrates its 70th anniversary. Can you elaborate on how the company has developed since its foundation?

Prediger: Steiner was founded by Karl Steiner in 1947 after the war and was later run with equal passion by his son Carl. The initial emphasis was on the production of binoculars for all kinds of special applications. In the mid-1960s, the Bundeswehr, or German Armed Forces, became our first important customer. Today, Steiner supplies robust binoculars and riflescopes for military use to every NATO nation. In 2008, Carl Steiner decided to look for a global investor to ensure growth and strategic alignment. The good economic health of the company attracted several interested parties. Ultimately, the property rights of Steiner Optik GmbH were acquired by Beretta, a group that has been family-owned for almost 500 years. This was stroke of good fortune for both companies.

ESD: Why is that?

Prediger: This was based on several factors. In comparison with private equity investors, Beretta as a family-owned company, does not expect only short-term achievements. The group follows a long-term strategy that involves all brands controlled by the

Photos: Steiner



company. As a result, our shares were only transferred from a small to a large family business.

Over the last ten years, Beretta recognised that hand weapons, particularly those in a military environment, have to be viewed as a system. As a result, several companies involved in the production of riflescopes were integrated with the group's structure, among them Steiner.

ESD: But at that point Steiner was not a manufacturer of riflescopes. How does that relate to the group's strategy?

Prediger: That is correct. At that time Steiner produced binoculars for several

different market segments (navy, military and law enforcement, outdoor and hunting). However, we had the expertise and technology to develop and produce similar optical products. After the change of ownership, we re-aligned Steiner Optik to explore new business segments. Within a few years, we developed and successfully marketed new product platforms. We had the advantage of being a member of the Beretta Group with access to weapon manufacturers (Beretta, Sako and Tikka) for long-term testing. For example, our optics are subjected to real test cycles of 100,000 shots and more.

ESD: Was all that achieved with in-house expertise?

Prediger: No, it was not. As I already mentioned, we had the knowledge and expertise to develop and produce optical equipment. Additional expertise was achieved through the acquisition and the integration of innovative technologies and companies with the Steiner Optik entities. We used these complementary technologies to develop new products and to produce high-performance riflescopes.

The goal of the new product development was to conquer this new market segment. After just two years, we have gained a significant market position, which we expect to grow year by year.

ESD: Which turnover figures can you report, particularly in the military market segment?

Prediger: In 2016, the Steiner brand generated a turnover of more than €60 million and the majority share came from military and law enforcement. 80% was exported as we deliver riflescopes and binoculars to 80 nations. Riflescopes already constitute 20% of the turnover. The rate of return was in the two-digit area. Steiner Optik's performance and business status are very good. We feel that the way we are going is the right one, and we will continue to grow.



Development of the ICS 6x40 was based on the objective to provide the soldiers with a state-of-the-art gunsight thus improving their capabilities by fast and effective target engagement.

ESD: Do military products enjoy special consideration in your company?

Prediger: There is no difference in terms of quality. We use the same components and production techniques. There are, however, significantly higher demands regarding the functionalities (e.g. laser protection) and robustness of military materials. It has to function reliably under all weather conditions. As a result, the production is more complex and sophisticated. These products are often technology drivers,



The M830r laser range finder is as compact as the 8x30 binoculars currently introduced by NATO forces. The integrated laser range finder has a detection range of 25 to 6,000 metres using a wavelength of 1,535 nm.

and this technology is frequently applied to our civilian products, too.

ESD: Are there examples that you are particularly proud of?

Prediger: The new M 830r laser range finder is certainly one. As compact as the

8x30 binoculars in service with the Bundeswehr, this device meets the latest demands for laser protection and robustness. The integrated laser range finder features a detection range between 25 and 6,000 metres at a wavelength of 1535 nm. That is important because it ensures that the laser beam cannot be detected by current night vision devices. The user's position is not compromised.

In addition, there is our M5Xi 5-25x56 sniper riflescope, which, in combination with the Haenel RS9, won the tender for the new G29 sniper rifle for the German Special Forces.

ESD: Which are the trends in the area of optics, and how can you make sure that you are not missing any of them?

Prediger: Those who still only invest in optics and precision mechanics will soon miss the boat.

Digitisation has also reached the optical industry and brings along new challenges. The electronics share of the optics is increas-

ing. Riflescopes are increasingly developed as integral parts of the respective weapon. And they continue to become smarter through the use of external data in combination with ballistic computers and fire control systems.

We recognised this trend early and decided to strengthen our position with external technology and capabilities. Together with our US subsidiary Steiner eOptics (a JV of former Laser Devices, Inc. (2012) and Sensor Technology Systems, Inc. (2015) we have a very good starting position that we have already taken advantage of.

With these acquisitions our goal is to extend our capabilities portfolio and to prepare for future challenges. I believe the products we will bring to the market in the next two to three years will clearly show that we not only recognise the trend; we want to play a role in shaping it.



The M5Xi 5-25x56 sniper sight is used with the KSK's (German Special Forces) new sniper rifles (G29).

European Security & Defence Now available in e-paper format!

MITTLER REPORT

Enjoy reading European Security & Defence as e-paper for your tablet computer or smartphone.



App available in Axel Springer AG's iKiosk

1. Install iKiosk app on your tablet device (available as freeware in Apple App Store and Google Play Store)

2. Select European Security & Defence in iKiosk and order!

European
Security
& Defence

ORDER



Single copy: 2.99 Euro
Subscription (8 issues/year) 10.99 Euro

MITTLER REPORT VERLAG GMBH · Baunscheidtstraße 11 · 53113 Bonn, Germany
Fax: +49 (0) 228 35 00 871 · info@mittler-report.de · www.mittler-report-shop.de

ASD with Eric Trappier and Håkan Buskhe



Håkan Buskhe



Eric Trappier

(gwh) The Aero-Space and Defence Industries Association of Europe (ASD) recently announced the appointment of Eric Trappier, the French Chairman and Chief Executive Officer (CEO) of Dassault Aviation, as President of the organisation. He succeeds Mauro Moretti (Leonardo) who left the company he represented. Trappier made his career with Dassault, mainly in the defence sector, and he was engaged in international activities in recent years. Prior to his appointment as ASD president he represented

his company as vice-president of the 16 person ASD board.

Håkan Buskhe, President and CEO of Saab, has been elected Vice-Chairman of the Board to succeed Eric Trappier in this position. ASD represents about 3,000 European aerospace and defence companies employing 847,700 people and generating a sales volume of €222Bn. billion per year.

Teaming for the MJÖLNER Mortar Programme

(df) BAE Systems has teamed with the Czech Republic's Ray Service to support the Swedish MJÖLNER mortar programme. The company announced that it was awarded a contract by the Swedish Defence Materiel Administration in December 2016 for the delivery of 40 of the mortar systems and has now enlisted Ray Service to develop and produce cabling assemblies.

"The agreement with Ray Service demonstrates our commitment to deliver a world-class CV90 offering through close cooperation with Czech industry in order to meet the Czech Army's IFV requirement," said Peter Nygren, Director of Business development at BAE Systems Hägglunds. "The design and production of the cable harnesses for the 40 mortar systems is a strong foundation for working together in the future. This collaborative effort ensures a role for local industry to produce one of the critical subsystems in the vehicle." The arrangement further strengthens BAE Systems' commitment to work with Czech

companies as it supports the government's effort to replace the legacy fleet of BMP-2 Infantry Fighting Vehicles (IFVs).

In 2016 BAE Systems teamed up with VOP CZ, a leading Czech defence company, to offer the CV90 IFV as the replacement vehicle, and subsequently contracted with that company to produce components for the BvS10 all-terrain vehicle, also produced by BAE Systems.

Frontex Conference on Biometrics on the Move

(df) The European Border and Coast Guard Agency Frontex will hold a conference and exhibition on biometrics on the move technology especially suited for border management in Warsaw, Poland, on 28-29 September 2017. The objective of the conference is to provide a platform for international dialogue on the feasibility and potential impact of "on the move technology" for border control with a view to enhancing security and facilitating travel at the borders. Biometrics on the move is understood as the acquisition of data (more in particular biometrics) at a distance for the purpose of identity verification of a traveller.

The conference will also include an academic session. Frontex therefore invites academic researchers and technology providers as well as consultants to submit an extended abstract of original work on research, innovations and future concepts in the field of biometrics on the move technology.

HENSOLDT Acquires EuroAvionics

(df) The German based sensor house HENSOLDT has signed a share purchase agreement with the European equity investor Equistone Partners Europe and management to acquire the German provider of avionics solutions EuroAvionics GmbH, Pforzheim. The transaction is subject to anti-trust approvals and closing is expected in the third quarter of 2017.

"EuroAvionics is highly successful in the civil avionics market while HENSOLDT has a strong position in the military avionics domain," said Thomas Müller, CEO of HENSOLDT. "Due to our complementary portfolio and market access, this transaction opens up mutual growth opportunities and is an important milestone in the implementation of our strategy to enhance our portfolio, enter adjacent markets and strengthen value creation." EuroAvionics Group, with approximately 110 employees, designs, produces and markets civil certified avionic equipment that provides interfaces to a wide range of third-party avionics and sensors. Among their products are situational awareness mission manage-

ment systems as well as enhanced reality computers and autopilots, particularly for unmanned aerial vehicles.



Photo: HENSOLDT

The company has generated annual revenues of more than €20M. Their products are installed in almost every type of civil rotary wing aircraft by various OEMs.

Partnership between Rheinmetall and Supashock

(df) Rheinmetall MAN Military Vehicles (RMMV) announced a partnership with Adelaide based suspension and technology company Supashock for the development and manufacture of military suspension and integrated intelligent load handling systems for its range of military trucks.



Photo: Rheinmetall

RMMV has funded Supashock to develop the system for the Australian and global markets. The system integrates Supashock's active suspension technology with an intelligent load handling system. "We are strong believers in the technology that Supashock has developed as it will provide a step change in the performance of both our tactical and logistic vehicles," said Ben Hudson, Head of Rheinmetall's Vehicle Systems Division. "This partnership will deliver real benefits for the Australian economy through the generation of local jobs, while creating substantial export opportunities for Supashock."

Rostec Increases Revenues

(df) Rostec's CEO Sergey Chemezov reported to Russian President Vladimir Putin on the state corporation's performance in 2016, announcing plans for the development of high-tech industries, presenting the results of the industrial digitisation and reflecting on personnel changes that occurred at the state corporation.

In 2016, Rostec's consolidated revenues increased by 11% from 2015, amounting to RUB 1,266Bn. (€20.3Bn.). Consolidated net income equaled RUB 88Bn., and the EBITDA was RUB 268Bn. In 2016, the Corporation average wage increased from RUB 41,000 in 2015 to RUB 44,000, while average wage in Russia was RUB 36,600. In 2016, the total volume of investments amounted to RUB 142Bn.. The total amount of social expenses for Rostec's employees exceeded RUB 7,700M.

Thales Acquires Guavus

(df) Thales announced the signing of a definitive agreement to acquire the US company Guavus, one of the pioneers in real-time big data analytics. Founded in 2006, Guavus has focused on the telecommunication and cable network operators' market, and analyses more than 5 petabytes –equal to 5,000 terabytes – of data for its customers every single day. This represents the equivalent of analysing around 3 million feature films every day or 500 times the entire print collections of the US Library of Congress.

Guavus supports more than 20 major operators around the world, including the 5 largest North-American mobile operators (AT&T, Rogers, Sprint, T-Mobile and Verizon), 4 out of the top 5 Internet backbone carriers, and 7 out of the top 8 cable operators. Headquartered in San Mateo in Silicon Valley, California, the company employs 250 people, of which 50 are based in Montreal (Canada) and 140 in Gurgaon (India). The acquisition of Guavus follows several acquisitions in the fields of connectivity, mobility and cyber security, and strengthens Thales's positioning in one of the key technologies at the heart of digital transformation, the processing and predictive analysis of "big data", an increasingly critical factor in real-time decision-making. Since airlines, satellite, air traffic control, metro

Photo: Exuita



or train operators, armed forces or security officials of large urban or energy infrastructures rely on real time analysis and decisions with a broad spectrum of connected sensors, the acquisition opens broad opportu-

25th MSPO International Defence Industry Exhibition

Photo: xxx



For 25 years, the world's defence industry has demonstrated the ever-growing interest in Poland's International Defence Industry Exhibition. The upcoming MSPO is held from 5 to 8 September 2017 in Targi Kielce.

In continuation of a year-long tradition Kielce becomes the world's defence centre of attention during the first days of September. The International Defence Industry Exhibition forms part of Europe's largest military showcases. Numerous exhibits and conferences complemented with awards for the best products on show are some of the highlights of MSPO's rich and diversified programme.

MSPO is Europe's third largest military show, ranked just after Paris' EUROSA-TORY and London's DSEI and one of the world's most important defence industry events. MSPO's position has been demonstrated by its exhibitors - the presence of the world's leading defence industries as well as strategic contracts signed on the occasion of the event.



The upcoming MSPO is held under the auspices of the President of the Republic of Poland, Mr. Andrzej Duda. This year, the show promises to be a record-breaking event. Exhibitors from all over the world confirmed their presence; as a result MSPO will be a showcase for companies from Poland, Germany, France, Norway, Great Britain, the United States and many others. The exhibitors list of MSPO 2016 included the biggest international companies, the defence-industry key players such as Kongsberg Defence & Aerospace, Nammo, Bell Helicopter Textron, ThyssenKrupp Marine Systems, MBDA, Raytheon, Lockheed Martin Corporation and Saab Technologies Poland. The latest military developments were showcased by 614 companies from 30 countries. Almost 22,000 visitors attended the exhibition.

South Korea - the Guest of Honour at MSPO

For a number of years MSPO has been accompanied by lead-nation exhibitions. In previous years, the lead-nation exhibitions featured Norway, France, Italy, Turkey, Germany, Israel, the USA, Sweden, V4 Countries and the United Kingdom. In 2017 MSPO will be the showcase for South Korea's defence industry and capabilities.

nities for Thales in areas including predictive maintenance, cyber security, monitoring of critical infrastructures, network and telecommunication systems optimisation.

East Meets West

The year 2017 marks the 45th anniversary of diplomatic relations between the People's Republic of China and the Federal Republic of Germany. To mark the occasion, an extensive nationwide programme has been organised in Germany, which started on 20 February with the Great Chinese New Year Concert in Berlin.

The exhibition „East Meets West: The Maritime Silk Road during the 13th – 17th Centuries“ at the International Maritime Museum Hamburg is one part of this cultural programme and will be presented for the first time in Europe.

It focuses on the findings of the wrecks Nan Hai No.1 and Nan Ao No.1 which were recovered off the coast of Southern China. These findings are symbolic of a period in Chinese history that is little known in the Western hemisphere: the early maritime routes between China and the West. While in Europe the term Silk Road is recognised as the old trade routes by land, China today regards its early seaborne trade as a Maritime Silk Road by which Chinese luxury goods reached the orient, and from there they came by intermediary trade all the way to Europe.

The exhibition opened on 8 June 2017 and will run until 10 September on Decks 1 and 2 of the International Maritime Museum. „East meets West“ is included in the entrance fee to the museum.

www.immh-hamburg.de

IDEF Highlights

Paolo Valpolini

IDEF, the biennial Turkish defence industry exhibition in Istanbul, confirmed this May its leanings towards land defence, although the aviation and naval industries and programmes were well represented.

The lessons learned in operation EU-PHRATES SHIELD against Syria led to a first upgrade contract for M60T MBTs which was awarded to Aselsan. At their

dan programme, and the ARMA 8x8 IFV that was selected by the UAE last February. The 400-off IFV contract is only one part of the business, a further contract for around

300 specialised variants being expected in due time, in configurations currently being finalised. A first at Otokar was the latest version of the MIZRAK unmanned turret. Known as MIZRAK-S, the structure has been optimised while retaining the 30 mm gun and most of the performance. The commander's panoramic sight is here proposed as an option, and the "S" weighs over 800 kg less than its antecedent, which permits installation on 6x6 vehicles. As for the future Turkish tracked Infantry Fighting Vehicle (IFV), the programme slipped to the right, an RfP being expected now in late 2018, with a contract in 2020 at best. According to rumours the Turkish Army is looking at a 35mm weapon, and most proposed turrets



Photos: Paolo Valpolini

The prototype of the M60T upgraded by Aselsan; a contract was filed by SSM to the company for upgrading around 100 such tanks.

display the company showed a prototype of this tank with laser sensors, 360° situational awareness system, a SARP RCWS replacing the original cupola, improved air-conditioning, and spall liner. On armour a new ERA package developed by Roketsan is currently in qualification and will be installed at a later stage on the tank. A similar programme for the LEOPARD 2A4 might be launched later on.

The future Turkish MBT ALTAY has completed qualification and is awaiting the production contract. Otokar showed the new version, Altay AHT, customised for asymmetric warfare. This tank features improved armour, a 'dozer blade, an RCWS in place of the commander's periscope, and a mast-mounted optronic gimbal to contribute to improving situational awareness. Otokar also had on display an AL-JASOOR, the Tawazun-Otokar JV created for the Rab-



Otokar developed a light version of its MIZRAK turret named MIZRAK-S that can be installed also on 6x6 vehicles.



Aselsan exhibited the KORHAN turret armed with a 35 mm cannon, this calibre being apparently the one of choice for the future Turkish Army IFV.

are already compatible with that calibre.

A new turret appeared on the Aselsan stand, known as KORHAN, which exploits the same gun used in the KORKUT AD system, while Aselsan leveraged their R&D work on airburst munitions to develop rounds optimised against ground targets. Although the IFV programme is still far-off, FNSS unveiled its KAPLAN 30, a new member of the KAPLAN family, available in amphibious and non-amphibious configurations, and exhibited with the mock-up of the unmanned version of the new TEBER 30mm turret which can accept also a 35mm gun. The prototype of the two-man version of the TEBER was also exhibited. Most of the KAPLAN 30 automotive components - engine, transmission, suspension, are found also in the KAPLAN MT, (for Medium Tank), an international cooperation development between FNSS and Indonesia's PT PIN-DAD. The tank on display was the first to be produced; a second is being manufactured in Indonesia, and will soon be delivered in-country to begin trials with a view towards a potential contract for around 100 KAPLAN MTs.

FNSS also unveiled new versions of its wheeled vehicles. The latest iteration of its 8x8 and 6x6 is the PARS III, fitted with hydropneumatic suspension which not only improves mobility but also allow an increase in internal protected capacity. Heavily based on that solution is the PARS IZCI, tailored to Turkish requirements in the wheeled reconnaissance segment of vehicles, which will include both 6x6 and 8x8. According to FNSS, one of the main requirements will be optimised forward situational awareness, and thus the company added a 230° vision windscreen as well as



The prototype of the TEBER turret in the two-man version; armed with a 30 mm cannon, it can host also a bigger calibre weapon.

Local Situational Awareness System by KTK

(sb) "Situational Awareness" has become one of the key concepts in defence, particularly with land systems in recent years. It is literally the foundation (Observe and Orientate) of what Boyd described as the OODA loop: Observe, Orient, Decide, & Act.

The problem with the concept is that there are several technological options to solve a variety of situational awareness issues, including television, thermal, close range, long range, audio and CBRN sensors, as well as topographic and other databases. The focus of LSAS (Local Situational Awareness System) is on the visual, with sensor fusion prominently in mind.

The users of such a system will be both the driver and the crew of an LSAS-equipped vehicle, such as an APC or IFV, thus solving the local visual awareness issue operators face in current theatres, and with the ever-increasing trend towards urban operations knowledge, surveillance and awareness of the immediate vicinity (0 up to 100 meters) of the vehicle are essential.

Typical questions include: What is behind the hatch? What is left or right of the vehicle? What is above? Can we move with the vehicle across the obstacle? Can we enter the crossing? What's out there when we dismount? Is that a threat or not?

The answers to these questions can be complex, which is why KTK Kommunikationstechnik GmbH has developed the LSAS (Local Situational Awareness System). "LSAS is a virtual window in the vehicle armour" states Stephan Wirth, VP of Sales at KTK. The system consists of up to eight digital (2Mp) cameras, of which up to six are used to generate a seamlessly stitched panoramic vision. The two extra cameras can be used for special purposes such as underbelly or CBRN sensor observation.

Within the panoramic view custom views can be accessed by presets, either button- or touch-controlled on the display, or via the host vehicle's CAN-Bus.

Two independent user groups (crew and embarked personnel) can access the VPU (Video Processing Unit) independently. Digital (DVI) and legacy PAL/NTSC out-

puts are available. An open standard GVA/NGVA output via Ethernet will be introduced with a later software release.

"We put a lot of focus on Security Integrity," adds Stephan Wirth. "The crew needs to be able to rely absolutely on system functionality and system safety, both during peacetime usage, such as on-road and training, as well as in critical situations during battle."



A prototype of the system was shown at IDEF in Istanbul during May 2017, integrated into the new FNSS Pars 6x6 Scout vehicle. With the low silhouette of the PARS 6x6 Scout the LSAS can be directly used for reconnaissance missions. And although PARS 6x6 Scout offers a 230° field of view from the driving seat, LSAS enables the driver to look directly along, behind and in front of the vehicle using the camera system starting at 0 metres from the hull. The driver's ability to manoeuvre the vehicle in limited areas such as urban environments or while reversing is greatly improved.

range surface-to-surface missile, range for the Turkish version being estimated at some 360 km. One of these missiles was test-fired from the Sinop range, on

A joint development between FNSS and PT Pindad of Indonesia, the KAPLAN MT is optimised for asymmetric warfare.

the Black Sea, on Day 3 of the exhibition. According to local sources the Turkish Army might soon look for a wheeled self-propelled howitzer, hence the presence of two such indigenous systems at the exhibition. Both are based on a 6x6 truck chassis and feature the 155/52 mm ordnance used in the towed gun currently in service with the Turkish Land Forces. The YAVUZ is made by MKEK and Yol-Bak, the latter being responsible for the armoured superstructure: only the automotive components of the chassis remain original. The prototype shown by AFGM (the General Directorate of Military Factories) and Aselsan was mounted on a BMC 6x6 truck and was not protected.

Aselsan exhibited a new automated mortar system that can be fitted with 120mm rifled or smoothbore barrels, features a fully automatic loading system and obviously an automatic laying system. The AHS-120, as it is known, reduces recoil forces to allow the system to be installed on medium-size wheeled or tracked vehicles. But probably the most innovative system exhibited in the Aselsan stand was the TUFAN mock-up, which is a medium calibre rail gun currently in development. In conclusion, IDEF 2017 was a first-class



The KAPLAN 30 looks at the export market awaiting to know the exact requirements of the future Turkish Army IFV.

exhibition providing an interesting view of the power and innovation behind Turkey's

domestic defence and security industrial capabilities. ■

Preview

ESD 5/2017 · August 2017

- **Technology Focus: Air Lift – Fixed Wing and Helicopters**
- Defence Capabilities of the Baltic States
- Belarus on the Move from Russia to the West?
- Polish Armed Forces Modernisation
- The Royal Norwegian Navy
- Directed Energy Weapons
- Rocket Propulsion
- In-Theatre Water Management
- AFV Programmes in Poland
- Naval Sonar
- Mobile Air Defence
- Perspectives of European Submarine Cooperation
- **Country Focus: Czech Republic**



**MITTLER
REPORT**

Mittler Report Verlag GmbH

Baunscheidtstr. 11 · 53113 Bonn, Germany
Phone: +49 228 35008 70 · info@mittler-report.de
www.mittler-report.de · www.euro-sd.com



LAZAR
MULTI-ROLE ARMORED VEHICLE



MIŠOŠ
ARMOURED MULTI-PURPOSE
COMBAT VEHICLE 4x4 - BOV M16



NORA B52
155 mm SELF – PROPELLED
GUN HOWITZER



BRING A MISSILE TO A GUNFIGHT

With long-range, high definition imagery and class-leading precision laser designation in a compact package, the Star SAFIRE 380-HLDc can turn almost any light attack helo into a stand-off shooter.

Visit us at the Paris Air Show Chalet Row B / Chalet # 381
www.flir.com/380HLDc

