

ES&D



# European Security & Defence

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PROFESSIONALS

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at hall 5 stand No. 521**



# CZ – a partner for professionals

Interview with Lubomir Kovarik,  
CEO of the company

**CZ is celebrating its 80th anniversary and you are celebrating ten years as the head of the company. What direction has the company taken under your leadership, what have been its greatest successes and what are the plans for the future?**

The company's 80th anniversary is a great opportunity not only to celebrate but also to look back. After all, how many major firearms manufacturers have such a long continuous tradition? The company's history is certainly interesting. Over the years, we have made many popular small arms, from air-guns, pistols, rifles to assault rifles, submachine or machine guns.

My main goal as the new leader of the company was to get CZ back into the spotlight for the armed forces. After 1989, many people thought that the period of major conflicts had ended. The company dropped automatic weapons from its portfolio resulting in the armed forces being interested only in our pistols. Instead, focus was placed on the civilian market. With that move we lost one of the traditional pillars of our production programme.

Nevertheless, CZ has the advantage of a developmental, manufacturing and commercial independence. After my appointment as the CEO we decided to re-introduce weapons for the armed forces. Over a relatively short time, we managed to design, manufacture and launch a completely new assault rifle, submachine gun and grenade launcher. In addition, new models of modern pistols were introduced.

We have also significantly modernized the production facilities at our main factory in Uherský Brod and increased the number of product lines from 8 to 12.

Today, CZ ranks among the top ten world producers of small arms. Our products are exported to nearly one hundred countries worldwide (before it was 69). In the last ten years, we have increased our sales threefold. Today, we have approximately 1800 employees compared to the original 1200, making us the largest employer in the region. We offer salaries about 15% higher than is customary here, plus an extensive social programme. Our daughter companies, CZ-USA and Zbrojovka Brno, have been joined by a new "daughter" in Slovakia. Regarding the service sector, I want to fulfil the vision of the future: We are the partner of professionals and fulfil their expectations.

**In line with new trends, you have recently begun offering comprehensive solutions to customers from the ranks of the armed forces. What does your portfolio currently include?**

Yes, we strive to provide our customers with maximum service. Therefore our portfolio offers not only the weapons, but also all the necessary accessories and other related products and servi-

ces. Apart from the traditional holsters and magazines or slings, we also offer optical sights, ballistic protection and ammunition. We also train armourers and provide expert presentations and training according to the needs of each particular customer. Basically, we are able to meet any requirements.

**What have you prepared for Eurosatory 2016?**

At Paris, we shall present a representative selection from our current portfolio. So at the CZ's stand, K521 in Hall 5, you will be able to see our latest versions of the service and defence polymer pistols CZ P-09 and CZ P-07, including the version for the attachment of a silencer or one for realistic training using marking cartridges. There will also be the CZ Scorpion EVO 3 submachine guns and carbines, the CZ 805 G1 grenade launcher and the CZ 805 BREN assault rifles, including the completely new CZ BREN 2. This is a new model with a number of technical advantages that has already been introduced in France, but the Eurosatory fair will be its official premiere for the wider public.



# CZ P-07 and CZ P-09

## – more than modern service pistols

Česká zbrojovka Uherský Brod has been one of the world's leading manufacturers of service and defence pistols for nearly six decades. In 2013 a new generation of short arms appeared – a closely related pair, the CZ P-07 and CZ P-09.

The CZ P-07 is a highly modern compact, developed primarily for the needs of the security forces. The slightly larger CZ P-09 is the ideal sidearm for soldiers and security forces anywhere in today's turbulent world. These models have everything that demanding customers from the ranks of the armed forces currently require from a service pistol – plus a few extras, with which they outperform rival products with ease.

The design of the new CZ pistols is the same for both models. The steel slide with two pairs of gripping grooves and distinctive chamfered sides for easy holstering is locked by an angular rear of the barrel in the large ejection port. The tilt of the barrel is mainly controlled by a simple open link at the bottom of the barrel. The control element consists of the traditional slide stop axis which also serves as the connecting part of the slide assembly and the body.

The original design of the frame made of durable glass fibre reinforced polymer with excellent mechanical and heat resistant properties is equipped with a MIL-STD-1913 mounting rail with five transversal grooves. The spacious trigger guard with a roughened front edge allows for comfortable shooting in gloves. The convenient shape of the trigger



blade enables good reach of the finger in the DA mode. The exposed places on the pistol frame have been rounded to ensure the weapon is drawn reliably and to eliminate risk of damage to the holster.

Both models boast superior ergonomics, which make aiming natural and quick as well as enabling effective rapid fire. The size of the grip is partially adjustable by three interchangeable backstraps, supplied as a standard accessory. At the bottom of the grip there is an eyelet for the attachment of a lanyard, which is located on the main-spring cap behind the magazine well. Reloading is faster thanks to the funnel shaped magazine well mouth.

The CZ P-07 and the CZ P-09 pistols are equipped with the SA/DA Omega trigger and striking mechanism, which is extremely simple, reliable and provides excellent travel in both modes. What is more, it offers the user a unique option of a safety or a decocking configuration. The transition from one configuration to another is a simple matter of exchanging a few components.

The controls consist of an ambidextrous plastic manual safety, or to be more precise, the decocking lever, a metal slide stop located on the left and a magazine catch at the base of the trigger guard, which can be easily transferred from the left to the right side. The external hammer has a roughened surface to

allow easy and safe manipulation. The automatic firing pin block safety provides reliable protection against unintentional discharge if dropped.

The extremely easy to read steel sights are highlighted by three white luminescent dots; fibre optic or tritium sights are also available.

The user value of the CZ P-07 and CZ P-09 is significantly increased by the extremely durable Tenifer finish of the metal parts (salt bath nitriding). This procedure treats not only the slide and the barrel, but also some internal metal components.

The compact CZ P-07 is available in 9 mm Browning Short calibre (.380 ACP), 9x19 (9 mm Luger), 9x21 and .40 S&W. The first three versions have magazines with a capacity of 15 cartridges, the more powerful 40 holds an impressive 12 cartridges. The CZ P-09 in standard size is manufactured in 9x19 (9 mm Luger), 9x21 and .40 S&W calibres. The first two versions have magazines with a capacity of 19 cartridges, the 40 model holds 15 cartridges while maintaining the weapon height.

The pistols' sophisticated design, top quality manufacture, high accuracy, convenient user parameters and their superior reliability in all climatic conditions rank them among the absolute elite in its category. The best evidence is the growing number of armed forces that have started using these excellent weapons.



# CZ SCORPION EVO 3 A1

– a modern submachine gun for a safer world

The CZ Scorpion EVO 3 A1 submachine gun, developed and manufactured by Česká zbrojovka a.s., is a modern light automatic firearm in 9x19 calibre with a robust dynamic slide. Its design is based on a patented system of a sliding placement of the slide on the removable trigger mechanism housing. This solution offers an added bonus of easy disassembly and an extensive use of durable polymer.

To achieve a high firing accuracy, the weapon has a hammer striking mechanism and firing is designed to occur with the slide in the forward position. The firing mode can be set at single shot, limited three-round burst and full automatic. The fire mode selector, serving also as the manual safety, is ambidextrous. Another safety feature is the automatic firing pin block safety. The adjustable cocking lever is not connected with the slide, therefore

there is no danger of it colliding with the shooter's hand. After firing the last cartridge, the slide remains caught in the rear position and may be released by the control on the left side of the trigger mechanism housing or by briefly pulling it backwards with the cocking lever. The magazine catch is easily accessible from both sides and the funnel shaped mouth of the magazine well enables extremely fast reloading. The CZ SCORPION EVO 3 A1 submachine gun is characterized by excellent ergonomics, including the option of partial horizontal movement of

the pistol grip and a number of MIL-STD-1913 mounting rails. The gun is equipped as standard with adjustable mechanical sights with a dioptre rear sight, in practice, it is most often used with optical sights that enable efficient and accurate shooting at distances up to 250 m.

The length of the folding shoulder stock can be adjusted with an extendable buttplate. The overall dimensions of the weapon can be quickly reduced by removing the shoulder stock completely.

The CZ Scorpion EVO 3 A1 stands out due to its great shooting comfort, high accuracy in all modes of fire and its absolute reliability, confirmed by extensive experience in the field from elite units all over the world.

Česká zbrojovka offers an extensive range of accessories for this weapon: transparent plastic magazines with a capacity of 10, 20 or 30 cartridges, several types of torches with quick-release mounts, laser sights, tactical grips, collimators, etc. For carry, there is an option of a standardized three-point, two-point or single-point harness. Also available for the CZ SCORPION EVO 3 A1 is an effective silencer and an adapter for shooting with FX Simunition/CQT marking cartridges used for training.



# CZ BREN

## – individual cutting-edge basic weapons

Česká zbrojovka a.s. has developed the CZ BREN weapon system on the basis of an extensive analysis of the real needs from the current armed forces. Currently, there are two models on offer, the 5.56mm CZ 805 BREN assault rifle and the multi-calibre version CZ BREN 2.

The CZ 805 BREN assault rifle is an automatic weapon in 5.56 x 45 mm NATO calibre and may be customized during production and partly by the user. It is supplied in two basic configurations: a rifle (A1 version with a 360 mm barrel) and a carbine (A2 with a 277 mm barrel).

The CZ 805 BREN breech is locked by a rotating breech block with six locking lugs located in the extended rear end of the barrel behind the chamber. The gas collection for the automatic mode of fire can be regulated in two stages.

The hammer striking mechanism has an automatic firing pin block. The CZ 805 BREN assault rifles have the option to fire single shots, limited two-round burst and full automatic. After firing the last cartridge, the breechblock carrier remains caught in the rear position.

Available as standard is the MIL-STD-1913 mounting interface. Both current serial versions of the CZ 805 BREN are equipped with an ergonomic shoulder stock folding to the right side of the receiver. The shoulder stocks are available in a telescopic and non-telescopic design with a double-sided cheekpie-



ce. All can be completely removed with ease.

The CZ 805 BREN rifles and carbines in 5.56 x 45 mm NATO calibre have interchangeable magazine wells with various types of catches that allow the use of all standardized NATO magazines, as well as the original transparent plastic magazines made by Česká zbrojovka.

The muzzles of the CZ 805 BREN weapons are threaded, allowing the attachment of a flash hider or a blank firing adapter. Other variable features include the extended fire mode selector/manual safety levers or a different

design of the cocking handle. The basic accessories of each weapon include the new assault/combat knife UN/BN CZ 805 which can also act as a bayonet and has a plastic scabbard and a fabric carrier system. Also available are the carry sling, magazine pouches made from impregnated fabric for two or three magazines with the option of variable interconnection, and an extensive range of optical sights.

In addition, Česká zbrojovka a.s. has developed an underslung grenade launcher, the CZ 805 G1 in 40x46 mm calibre.

The CZ BREN 2 offers a new concept of a multi-calibre assault rifle that has been developed for users from the ranks of special units and armed forces who demand the best, regardless of the area of operations. The weapon system is based on the tried and tested collection of gases from the bore with the option to regulate the piston mechanism in three stages. The breech is locked by a rotating breech block. The key advantages of the CZ BREN 2 are its extreme reliability and durability in all conditions, high accuracy and long service life, low weight and compact dimensions for fast and comfortable handling, ambidextrous controls or controls accessible from both sides, as well as sophisticated ergonomics.





# Equipment and Services

## By Professionals, For Professionals

**At the 2016 EUROSATORY exhibition the renowned Czech gun manufacturer CZ will continue to enhance its range of both hardware and support services that were introduced to acclaim and attention at DSEi in London last year.**

In particular, building on the presentation of the new CZ ballistic vests (see EUROPEAN SECURITY & DEFENCE issue 5/16) the company takes the EUROSATORY opportunity to engage with the first responder community, offering a level of protection that is not only the lightest in its class, but is also buoyant in water, making it ideally suited to counter-terror and homeland defence missions – including first responder, police and customs officers – on or near water.

Specialist training is a new component in CZ's inventory, and includes training in the uses and applications of the vests.

This new string to CZ's bow – specialist training and support – is enhanced even further in respect of the company's traditional activities.

In addition to being able to set up at a customer's own facilities, CZ now has a complex of ranges throughout the Czech Republic with which customized training programmes for the entire shooting community can be created and conducted: from basic shooting to highly-demanding Gunsmith and Armourer training, from static to mobile training, from open area to built-up (FIBUA) training – and even indoor / outdoor training: all are available. Beneficiaries of CZ's in-house expertise (most instructors are former military with recent, extensive combat experience) range from gun designers and builders right up to Grand Masters in the art of the most complex repairs – and this expertise is now being offered



to CZ's partners and customers.

As a company CZ has a very significant number of specialists who are actively looking to engage with the customer and to accompany them in the journey of CZ product ownership; and the combat experience and lessons learned that these veterans are able to pass on will directly impact not only the customer's organisation-wide selection and use of the weapons available, but also down at the individual level both tactics and survivability in-theatre – wherever that theatre may be..

In offering a complete through-life support solution to its customers CZ

will be able to track, measure and ultimately improve the long-term performance of its weapons, while the owners, be they military, police or first responder, will have the full-spectrum benefit of the most expert, knowledgeable people in the world – the manufacturers – supporting them. Closer engagement of the company with the owners of its products, from initial acquisition, through training and in-service support, to final disposal, will enhance the complete ownership experience and reinforce the true through-life engagement and partnerships that the company is now offering.



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## Tactical Mobility



### Big Guns for Dangerous Times

SP field artillery will continue to play an essential and unquestionable role on the battlefields of tomorrow.



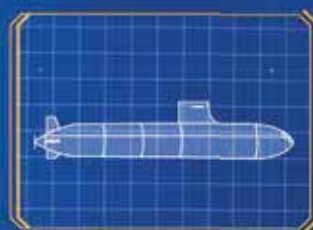
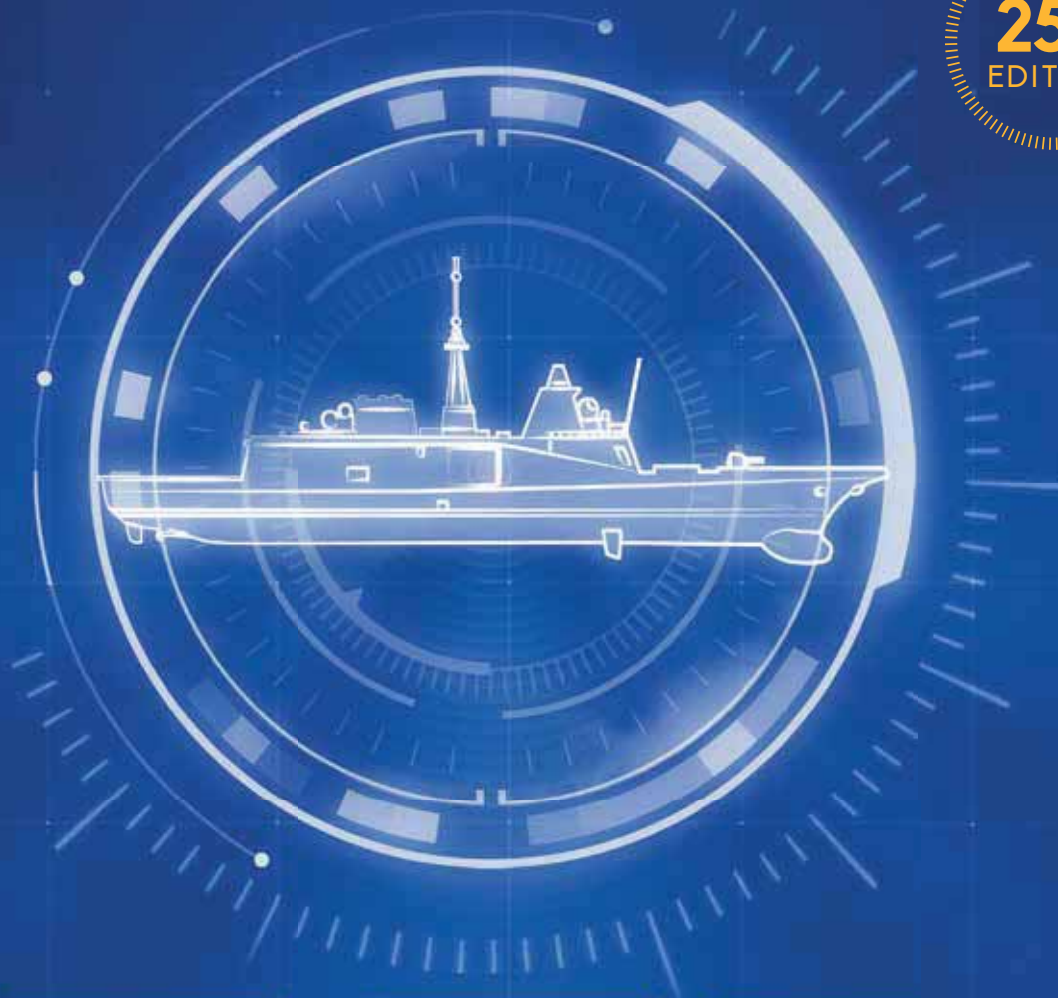
### Defending against CBRN Threats

Future challenges to NATO will include both conventional and asymmetric threats, hybrid warfare, and non-state actors.



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# Playing for Time



Fears that the Ukraine crisis which escalated in late 2013 might turn into another “frozen conflict” in the post-Soviet area have materialised. The Minsk agreements merely aimed at a ceasefire without the fighting being actually stopped. At best, the agreements marked a starting point, not a solution to the problem. With the annexation of Crimea and ongoing hybrid warfare in East Ukraine, Russia committed violations and breaches of trust after which the West (and not least the concerned country itself) cannot just carry on with the agenda. In other locations, like Moldova and Georgia, Moscow has been pursuing – not just since 2013 - a policy that is not compatible with international law and which is in contradiction with the spirit of the NATO-Russia Founding Act of 1997. It is solely and exclusively in Moscow's hands to de-escalate and overcome of a confrontation, which from the perspective of common security political challenges is both anachronistic and economically fatal. However, there are no signs that Moscow will change its attitude.. Instead, Moscow seems to be playing for time, speculating that “the West” will make the best of the situation and that over time more and more European countries, on economic grounds alone, will insist on “normalising” relationships. The two summits in the months ahead will show to what extent this strategy is already successful. At the end of June, the European Council will meet in Brussels to debate on whether and to what extent sanctions should be renewed. Should the “Brexit” referendum a few days earlier, against all odds, turn out to be in favour of a British farewell to the EU, Russia and the Ukraine will only play a minor role on the agenda. But even if this were not the case, there are plenty of other fundamental problems, like the frozen Euro crisis and the looming failure of the Schengen systems, which might capture the attention of the summit participants. Moscow will rather focus its attention on Warsaw, where a few days later NATO will have to assess and report to what extent the measures initiated in Wales two

years ago have been implemented and what else needs to be done to credibly guarantee the protection of Alliance territory. Russia obviously underestimated what the Alliance is capable of, 25 years after the end of the Cold War and a long period of exclusively focusing on theatres like Afghanistan or Libya. The dismissive attitude towards NATO in the West's own security policy debates has fuelled this misconception. In those debates, the Alliance seemed to have degenerated into an institution in which only security policy interests are balanced, the organisation of collective defence no longer plays a role, and the European members treat themselves to such a generous peace dividend that military capabilities gradually run out. The turnaround ushered in in Wales made possible what for a long time seemed not to be possible: NATO once again reflected on its core mission - Alliance defence. Several states not only stopped the dwindling of their defence budgets, which already seemed a law of nature, but started to invest more in their armed forces.

Warsaw will also have to up the ante. The forces which can be mobilised for the protection of the eastern flank of the Alliance are still insufficient and their response times far too long. And, as regrettable as this may be, the question of the nuclear component of a credible deterrence will have to be raised.

It goes without saying that military deterrence is only one side of the coin, the other must be the striving for political agreement. This necessarily presupposes that Moscow complies with international law. The security and integrity of the Alliance members is non-negotiable. Russia must respect the sovereignty of its neighbour states. NATO will need a great deal of staying power to bring the other side to this understanding, thus, will itself have to play for time. This cannot succeed without strengthening its military capabilities and the willingness to forego those economic advantages which would result from renewed cooperation with Russia.

**Peter Bossdorf**

## Leading Lights



The primary driver for Lead-in Fighter Trainers (LIFT) and Light Combat Aircraft (LCA) is the increasing cost and sophistication of advanced combat aircraft. [Page 78](#)

## Bringing Real Capability to the Fleet



Unmanned Maritime Systems for Naval Applications - new programmes, new contracts, and new platforms combine to mark a "step change" in the sector. [Page 85](#)

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## ■ Tactical Mobility – from FAUN Trackway

(sb) In tactical and operational military scenarios heavy vehicles need to be able to reliably cross difficult terrain, such as snow, marsh, mud and sand. FAUN Trackway® has manufactured expedient roadway solutions for more than 60 years, enabling armed forces globally to execute their mission despite adverse landscapes. The company assesses global defence trends and what advanced solutions can be offered to meet emerging requirements in both conflict zones and disaster relief scenarios. One such solution is the Heavy Ground Mobility System (HGMS), developed by FAUN over

Photo: Irish Army



**Irish Army Iveco Astra M 320E D Trackway Variant**

Photo: FAUN Trackway



200 metres long. This permits vehicular access into areas without roads, or where infrastructure has been damaged, and enabling boggy or marshy ground to be traversed by heavy tracked or wheeled vehicles. A trained two-man team can deploy 50 metres of Trackway in less than 10 minutes. The Medium Ground Mobility System (MGMS) was developed to aid lighter vehicles up to 30 tonnes to navigate undulating ground and beach landings. For beach landings in particular, MGMS enables both wheeled and tracked vehicles to cross the soft, sandy ground. MGMS is made up of a roll of MLC30 Trackway and a hydraulic dispenser powered by the host vehicle's engine and rolled out by driving forwards. Two trained people can deploy a whole length of Trackway, mechanically, in under six minutes. MGMS can be adapted and mounted on any medium wheeled vehicle; a dedicated vehicle is not required. The unit can be easily transported by train, ship or aircraft, hence its popularity with armed forces operating light units. A further development, the MGMS - Beam Dispenser (MGMS-BD) – a lighter weight, portable, 30-tonne roadway system – was made for the Danish Armed Forces. It has a rotating head allowing the MGMS-BD to turn 180°. It can be deployed from a variety of front-end loaders and is ideal for forces operating in constricted spaces. FAUN Trackway also offers temporary mobility and landing solutions for aircrafts. Helicopter Landing Mats (HLM), developed for the UK Royal Engineers, provide solid foundations for helicopter landing and forward operations, particularly for expeditionary forces. Aircraft Landing Mats (ALM) create runways and temporary airfields. Also developed for the UK Royal Engineers, ALM are palletised, modular and quickly deployable: depending on an aircraft's Load Classification Number a complete contingency airstrip can be laid by an experienced team in less than 24 hours.

15 years ago for the Norwegian Army and now in the inventory of nearly 40 armed forces worldwide. HGMS creates a temporary modular roadway that can withstand trucks and tanks weighing up to 70 tonnes. Comprising interlocking aluminium Trackway® panels structured as needed, HGMS can create routes up to

## ■ DARPA's Ground X-Vehicle Technology

(df) The race continues between the vehicle protection and development of penetrating weapon. Adding more armour not only increases development and deployment costs, it also reduces speed and mobility, therefore increasing the vehicle's exposure to greater threats. DARPA aims to reverse

(Graphic: DARPA)



this trend in starting the Ground X-Vehicle Technology (GXV-T) programme, and recently awarded contracts to eight organisations: Carnegie Mellon University, Honeywell International Inc., Leidos, Pratt & Miller, QinetiQ Inc., Raytheon BBN, Southwest Research Institute and SRI International. "We're exploring a variety of potentially groundbreaking technologies, all of which are designed to improve vehicle mobility, vehicle survivability and crew safety and performance without piling on armour," said Maj. Christopher Orlowski, DARPA programme manager. "DARPA's performers for GXV-T are helping defy the 'more armour equals better protection' axiom that has constrained armoured ground vehicle design for the past 100 years, and are paving the way toward innovative, disruptive vehicles for the 21st century and beyond."

## ■ Successful Tests of the BRIMSTONE

(df) MBDA's BRIMSTONE air-to-surface missile has successfully undertaken several operational evaluation trials by the Royal

(Photo: MBDA)



Air Force (RAF) that confirm the performance of the missile's latest technical enhancements. The trials involved 11 missile firings and were conducted against a variety of operational scenarios with precise hits on very small, fast moving vehicles and against complex static targets. Also included were single and salvo firings, whilst la-

ser, millimetric radar and dual-mode guidance modes were used, as was ground-based, third party laser designation. These tests also successfully demonstrated the new Insensitive Munition (IM) warhead, against armoured and non-armoured targets whilst bringing additional deployment benefits. The RAF's Eurofighter TYPHOONS will be the first to carry BRIMSTONES with the integration programme underway for 2018.

## ■ Detecting Chemical and Biological Warfare Agents

(jh) At the recent IDEB exhibition in Bratislava, Slovakia, the Slovenian company SEC presented their FALCON 4G series of standoff detectors for chemical and biological



(Photo: SEC)

warfare agents. Both FALCON 4G-S (B and C agents) and FALCON 4G-B (C agents) are the only standoff detectors of their kind. The systems take advantage of active laser technology, absorbing the radiation of C agent molecules. The S-version identifies biological warfare agents by evaluating particle size using DISC technology. The company says that the FALCON systems do not require any sort of calibration, are proven in military service and feature an unsurpassed detection range of up to 5,000 metres.

## ■ GRIPEN E Unveiled

(df) At a ceremony with more than 500 guests Saab unveiled the GRIPEN E last week. "Over previous versions of the GRIPEN, GRIPEN E has a significantly improved avionics system," the company said. "The capability to carry more weapons and the improved range performance, are made possible by a more powerful engine and the ability to carry more fuel. GRIPEN E is equipped with a highly integrated and sophisticated sensor suite including an Active Electronically Scanned Array (AESA) radar, Infra Red Search and Track (IRST), Electronic Warfare (EW) suite, and datalink technology, which when combined give



(Photo: Saab)

the pilot, and co-operating forces, exactly the information needed at all times." GRIPEN E builds on the design of earlier versions and is therefore a modern fighter with a balanced design that fits multirole fighter needs for future warfare environments.

In 2019, deliveries of the next generation GRIPEN for Sweden and Brazil will begin. Currently five nations operate GRIPEN: Sweden, South Africa, the Czech Republic, Hungary and Thailand. Brazil has ordered GRIPEN, and GRIPEN has also been down-selected in Slovakia. Besides that, Empire Test Pilots' School (ETPS) uses GRIPEN as a platform for test pilot training. "Nations need modern air defences to uphold national sovereignty. Meanwhile, the cost in relation to other investments in society needs to be reasonable. Therefore, Saab has developed design and production methods for the GRIPEN E to both increase capability and to reduce costs", says Håkan Buskhe, President and CEO Saab, at the ceremony. Among the guests were Sweden's Minister of Defence Peter Hultqvist, Sweden's Air Force Chief of Staff Mats Helgesson, Commander of the Brazilian Air Force Nivaldo Luiz Rossato, and, representing Saab, Chairman of the Board Marcus Wallenberg, CEO Håkan Buskhe and the Head of business area Aeronautics, Ulf Nilsson.

## ■ Out-of-the-Box Rack Cases

(df) Peli Products has introduced its new Peli-Hardigg V-Series Rack Cases. This case line is designed for light commercial and consumer

usage and will be sold out-of-the-box ready for immediate use. The Peli-Hardigg V-Series Cases are built utilising a full-boxed 19" (482 mm) steel rack with an industry-standard square hole pattern, so hanging electronics with tab mounts can easily be done. These cases also include



(Photo: Peli Products)

clip nuts – so one only has to attach the clip nut onto a square hole to get a secure, threaded mount. Peli-Hardigg even ships the case with the customer's choice of 10-32 Imperial or M6 Metric clipnuts. The Cases are available in two models: The Classic-V and the Super-V. The Peli-Hardigg Classic-V case comes in black and is available in 3U, 4U, 5U, 7U and 9U with a 83.8 cm (33") rack depth. It includes one 6.4 cm and one 13.3 cm lid, four removable

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## ■ Switzerland Upgrades Air Defence System

(df) Rheinmetall Air Defence AG of Zürich has won an important modernisation order from the Swiss armed forces. Within

(Photo: Rheinmetall)



the contract Rheinmetall will upgrade the fire control units and guns of the 35mm medium-calibre Oerlikon SKYGUARD air defence system through to 2019. The contract also includes an overhaul of the associated command and control systems in the operations centre as well as additional spare parts, therefore extending the system lifetime until at least 2025. The Swiss

air force's ground-based short-range air defence systems include the lightweight STINGER guided missile, the mobile RAPIER surface-to-air missile and the 35mm medium-calibre Oerlikon SKYGUARD. These systems are used for defending assets and infrastructure from aerial attack. All three would have reached the end of their service lives in the next few years. In order to avoid a capability gap prior to the introduction of a successor system for short-range air defence of ground assets, the 35mm medium-calibre air defence system will undergo this major service life extension programme.

## ■ Autonomous Undersea IED Hunting

(df) Saab presented its new remotely operated vehicle (ROV), SEA WASP, at the Navy League's Sea-Air-Space Exposition in National Harbor, Maryland, in late May 2016. SEA WASP locates, identifies and neutralises underwater improvised explosive devices (IEDs). Today, most underwater IED threats are disposed of manually by trained EOD divers: SEA WASP is operated remotely by two-person teams at a safe distance. "SEA WASP is a hybrid of pre-existing Saab technologies that can now be applied to an urgent worldwide need," said Bert Johansson, Sales Director Underwater Systems within Saab business area Dynam-

(Photo: Saab)



ics. "Underwater EOD is a rapidly growing niche around the world, and SEA WASP's capabilities correspond to that niche." To test SEA WASP, Saab has partnered with the Combating Terrorism Technical Support Office (CTTSO) in providing SEA WASP prototypes to three EOD agencies: the U.S. Navy EOD Group 2, the FBI Counter-IED Unit, and the South Carolina Law Enforcement Division's Counter-Terrorist Operations Maritime Response Unit.

## ■ Fourth Generation Pneumatic Launcher for UAVs

Robonic Ltd Oy of Finland has delivered its fourth generation OHTO pneumatic launcher to Lockheed Martin, broadening Robonic's portfolio of highly efficient pneumatic zero-point launchers for tactical unmanned aerial vehicles (UAV) as well as aerial targets. This launcher is smaller, more efficient and more transportable than previous Robonic launchers. The OHTO





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launcher is the outcome of a design concept long matured by Robonic, of which the development was bolstered by a 2015 contract with Lockheed Martin. "As a major highlight to introducing our new OHTO worldwide, we are very pleased to be working alongside Lockheed Martin in bringing OHTO into the US market as a fully integrated part of the FURY system, and look forward to delivering continued support to Lockheed Martin for its UAV activities," said Juha Moisio, Robonic CEO.

(Photo: Ltd Oy of Finland)



Advances in technology improve launch and re-launch management of the Robonic OHTO. An operator can, from a safe distance, enable the launcher to be ready for launch in minutes. The OHTO is a fourth generation zero-point pneumatic launcher whose design, aerospace-standard mechanical structure, maintainability, tactical mobility and transportability (it can be towed by an SUV or sling-loaded under an NH-90 helicopter) are only a few of the outstanding features of this launcher. Additionally, software-based monitoring of OHTO operations allows users to obtain more information on launch statistics as well as taking operator safety to new levels.

#### ■ New UAS Starts Underwater

(df) The United States Navy plans to deploy the BLACKWING, a small, tube-launched unmanned aircraft system that is launched from submerged platforms, both manned submarines and un-

manned underwater vehicles. BLACKWING employs an advanced, miniature electro-optical and infrared (EO/IR) payload, Selective Availability Anti-Spoofing Module (SASSM), GPS and AeroVironment's secure



(Graphic: AeroVironment)

Digital Data Link (DDL). The BLACKWING system was developed by AeroVironment as part of a 2013 Navy and United States Special Operations Command (USSOCOM) sponsored JCTD called Advanced Weapons Enhanced by Submarine UAS against Mobile targets (AWESUM - [L! - SB.J]) This JCTD was completed in September 2015 with a strong recommendation to transition the capability into the fleet.

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# NATO's Warsaw Summit

## Prospects of the Alliance in a Dynamic Security Environment

Klaus Olshausen

With the World Economic Forum in Davos including sessions on the global security context one must assume that geopolitics and geo-economics are interdependent – not by chance but by necessity. This can be identified from Asia through the wider Middle East and Africa as well as in Europe from the Mediterranean shore to the Northeastern boundaries.

This relationship has an influence on today's and tomorrow's shape of the North Atlantic Alliance, a political and military heavy weight for a comprehensively understood security and defence policy. Over the past years one could observe how often political adversaries used economic means to exert influence, to intimidate other countries with non-military means and often backed up by impressive show effects and, if required, the threat of force. Since Russia's well-orchestrated aggressive actions against Ukraine in spring 2014 the term of "hybrid warfare"<sup>1</sup> has been used to characterise offensive and aggressive actions composed of many diverse instruments and practices. Two years later the international community in general and the North Atlantic Alliance and the European Union in particular are facing an even more complicated, more complex, more violent security environment marked by conflicts and wars with regional and geopolitical power games.

### Achievements and Challenges after the Wales Summit in 2014

The summit in Wales consolidated a frightened, shocked NATO after Russia's aggression in Winter 2014 against Ukraine, an aggression that is still continuing in parts of the Donetsk and Luhansk oblasts.

### Author

Prior to his resignation from military service **LtGen (ret.) Dr Klaus Olshausen** was the German Military Representative in the Military Committees of NATO and the EU. From 2006 to 2013 he was the President of the German Clausewitz Society.

The immediate actions and strong declarations of the Alliance and individual NATO nations of their unwavering commitment to the collective defence of each allied country were consolidated in the Readiness Action Plan (RAP) with the two parts of assurance and adaptation. Equally important was the budget pledge, first to immediately stop any further decline in the national defence budgets, second to commit themselves to increase the budgets up to 2% of the GDP within ten years, and third a defence investment pledge of 20% of the defence budget.

### Evolving Directions within the Frame of the Strategic Concept of 2010

After an initial debate on changes of NATO's SC 2010 following the shake-up of the European security order through Russia's actions the Wales summit reached consensus that the three core tasks – collective defence, crisis management and cooperative security – remained fully valid, although the focus was redirected to the requirements of collective defence.

### Collective Defence and Deterrence under Hybrid and Cyber Conditions

Since Russia had returned as a potential adversary and the requirements for the full range of missions did not match the actual availability of capacities, the Political Guidance 2015 for the next NATO Defence Planning Process (NDPP) was based not only on the budget pledge of the na-



*The World Economic Forum 2016 in Davos included sessions on global security matters.*

NATO's Annual Reports 2014 and 2015<sup>2</sup> describe considerable achievements reached on implementing the RAP, and they also list some challenges that followed the war and destabilisation in Ukraine, the wars in Syria and Iraq and the crises in the wider Middle East and North Africa (MENA).

tions, but concentrated the build-up efforts for the "single set of forces" of the Member States on developing force and command structures for immediate, rapid and follow-on force requirements that would enable the Alliance to face risks, threats and dangers arising in the East



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Photo: dpa

**Destroyed buildings in Eastern Ukraine: Russian aggression in parts of the Donetsk and Luhansk oblasts continues.**

as well as in the South-East or South – or wherever needed.

This involves three areas: first an essential increase in force and command structures of conventional forces, second a creative approach to rapid but well-informed decision-making, and third additional considerations for the nuclear component as well as methods to counter hybrid warfare and - in this respect - comprehensive consideration of requirements in the cyber domain.

## Armed Forces and Command & Control Requirements

The political guidance process 2015 then clearly states the requirement for NATO to be capable of conducting a “Major Joint Operation plus” (MJO +), including high-intensity armed conflicts. On the land side, this comprises three complete land corps with at least two structurally fully equipped divisions and a variety of air, maritime and special force elements. The allies agreed to re-establish a certain number of mechanised and armoured divisions in Europe at various readiness levels, but fully manned, equipped with combat support and combat service support forces and fully trained and exercised, including high-intensity operations in particular. This requires an appropriate number of air and naval forces with capabilities to cover the full spectrum under high intensity combat conditions. But beyond these requirements NATO nations will have to develop a new total defence concept for this century to include all non-military elements not only in the front states (East, North or South) but common and individualised protective and support functions for each region. This tremendous effort requires continuous measures to combine abundant financial, personnel and industrial resources. It remains to be seen whether at the Warsaw Summit NATO nations will underline the perseverance necessary to establish a credible deterrence and defence for all 28 members against any threats, be they conventional, hybrid, cyber or all together.

In the area of command & control one needs to mention the buildup of the Multinational Corps Northeast in Szczecin, Poland, to a high readiness HQ for collective defence in the region connected with six to eight NFIUs in all eastern countries that will support planning, exercises and potential reinforcement.



Photo: NATO

**The Multinational Corps Northeast in Szczecin, Poland, has become a high readiness HQ for collective defence in the region.**

Considering buildup and reinforcements over large distances for collective defence either in the East or South, it was critical to decide in favour of a standing joint logistics HQ as integral part of the NATO Command Structure (NCS). This is indispensable if fast movements on short notice across the territory of the Alliance shall be accomplished with adequate transportation and all supplies, equipment and personnel for the respective mission.

## Cultural Change in Decision Making

The events in and around Ukraine created awareness that deployable forces on short notice need a very different approach to decision-making, a sort of cultural change, a change of mindset at all levels including, of course, allied governments and parliaments. If speed is to be achieved for

forces and HQs including the 48 hrs plus responses with a “Spearhead Force”, then the decision-making process has to meet this standard, too. Despite the best of long-term and actual intelligence, crisis or conflict might arise with little or no warning. Therefore, besides common intelligence efforts and the best of reconnaissance, the NAC and national authorities will have to be prepared to identify, recognise, analyse and assess the crisis situation immediately and to decide to take appropriate action - in as little time as one day, perhaps. Taking decisions in less than 48 hours in time-critical situations requires an increase of SACEUR’s responsibilities. Therefore, in the context of the changes to the military posture, allies agreed to enhance the information and early warning system to completely review the NATO crisis response system and to give SACEUR the authority to alert, prepare and stage the VJTF and

additional forces. Based on a new granular concept of detailed advance planning he will prepare “Graduated Response Plans” for deterrence, rapid reinforcement and collective defence. The summit might send signals whether and to what degree allies will be ready to commit forces and other capabilities to these plans, be it in the East, South or North of the Alliance.

## Nuclear Component Revisited

The SC 2010 states<sup>3</sup>: “As long as nuclear weapons exist, NATO will remain a nuclear alliance”. While the “supreme guarantee of the security of the allies by the strategic nuclear forces of the Alliance, particularly those of the United States...” is clearly described, there was no follow-up regarding the future composition. But SecGen Jens Stoltenberg explicitly mentioned this issue at the Munich Security Conference to



**Russian troops were deployed to Crimea in February 2014.**

underline that "Russia's rhetoric, posture and exercises of its nuclear forces aimed at intimidating its neighbours"<sup>4</sup> cannot go unanswered. He referred to the continued reduction of nuclear weapons "that were kept safe, secure and effective. For deterrence and to preserve peace. Not for coercion or intimidation." It remains to be seen whether the summit will give guidance on the future development of this essential nuclear part of deterrence.

### Hybrid Warfare as an Additional Challenge in the Cyber Age

Warfare has always made use of many instruments an adversary saw fit to reach his political objective. The specific and effective use of non-military and military means and capabilities by Russia for its aggressive actions against Ukraine, especially in Crimea, brought this reality back to every country and "hybrid warfare"<sup>5</sup> (hybrid = composed of different elements) became the term most commonly used to cover all those different elements, measures and instruments.

At the Wales Summit NATO was tasked to review the work on hybrid warfare as part of the RAP. This led to an overarching "strategy on NATO's role in countering hybrid warfare". The final document was agreed by NATO foreign ministers in December last year. NATO sees hybrid warfare based on a combination of unconventional and conventional means used to achieve geopolitical or other power-driven objectives in the twilight of ambiguity. Adversaries use all kinds of non-military assets against weaknesses and vulnerabilities while military instruments are always available and introduced when it is required to succeed; they will convey their actions as legitimate. This creates specific requirements for three interrelated functions known from conventional threats: prevent, deter, defend.

To prevent hybrid attacks, NATO and the MS need the best of intelligence to identify developing hybrid threats. Equally important is the effort to mitigate vulnerabilities

and building resilience across all institutions and functions of state and governance as well as stable social conditions.

Deterrence will be supported by the whole of the governments' preparedness, strong political will and Alliance solidarity including visible, credible, highly ready military forces; this being underlined by taking effective and timely decisions.

In addition, defence against a hybrid attack requires adequate military support of the Alliance by many instruments involving civil agencies and non-military actions like strategic communication or economic sanctions.

The reports to the Warsaw Summit will have to present valid progress in implementing this strategy by many internal measures as well as the increase of co-operation with partners and international organisations. The internal measures of implementation concentrate on the preparation for and prevention of hybrid attacks. For deterrence and defence, NATO relies on its efforts under the RAP at this stage. Regarding the inclusion of partners, NATO has made clear that a much closer cooperation between EU and NATO will not only be desirable but indispensable. It remains to be seen whether the preparation of the respective staffs will result in clear messages and tasks for this common effort from both the NATO Summit in Warsaw in July and the European Council Meeting prior to it in June.

### Cyber Defence - an Essential Element

The relevance of the cyber era for the security policy in its broadest understanding has been recognised by NATO at least since the Rome Summit in 2002.<sup>6</sup> Today cyber defence is part of NATO's core task of collective defence. And almost every day the NATO network, just like national networks, has to cope with a wide range of cyber threats engaging its network structure on a daily basis. This makes the protection of the communication systems owned and operated by the Alliance a top priority. But

NATO reaches beyond this task in supporting nations, work for common standards and equal safety and security of networks especially in view of cyber threats against critical infrastructure as well as armed forces on missions.

In preparation of the Warsaw summit allies are to prepare - in connection with a progress report - an "enhanced NATO policy on Cyber defence". Integral part of this approach is a "cyber defence pledge" of all governments to commit sufficient resources for national cyber defence. Allies will also have to decide whether or not to accept - as many allies have already - cyber as another operational domain alongside land, sea, air, and space. If this is to be common understanding it will stipulate own operations, doctrine, training and exercises and management - plus funding. The urgency is underpinned by the first U.S. offensive cyber action against ISIS.<sup>7</sup> Whatever the outcome, it has to be underlined that besides creating this cyber domain many cyber elements permeate all other domains. Thus, comprehensiveness of all concepts, including military and civilian institutions and functions, must determine future engagements.

### Strength and Determination as Prerequisite for Openness and Dialogue

All measures for modern deterrence and capable defence send two messages. First, it remains a valid conviction that "vigilia est pretium libertatis" (vigilance is the price of liberty). Second, this can create the plausible foundation for dialogue with adversarial governments.

The (re-)building of a strong Alliance emphasises the political clout required to undertake all three core tasks with achievable objectives. Thus, it is also a prerequisite for any substantial dialogue as an Alliance with present-day Russia. Russia will remain the largest geographical neighbour to NATO and EU countries. It remains a nuclear world power and a member of the UNSC with veto power. But one should be careful to make a mantra of the saying that crisis resolutions will per se not be possible without or against Russia. It fully depends on the country's behaviour.

While under the present contentious circumstances NATO's and Russia's interest could be served by agreeing on measures for avoiding incidents and misreadings of activities, any sensible dialogue with Russia cannot raise without including the specific conflicts on which positions are opposite and controversial in substance. The Russian position in Crimea and Eastern

Ukraine and the measures against Turkey as a NATO member that protected its air space will need to be clarified under the rules of the European security order that Russia has clearly violated. Any wrongly adopted compromise on those principles might only backfire against the Alliance and individual Member States. It will be important how the political leadership of NATO addresses the development of this relationship. Two points should be clear: stick to the condemnation of the illegal annexation of Crimea, expect a clear attitude of Russia in closing the border to Ukraine for military equipment and "vacationing" Russian soldiers; or at least its agreement that OSCE will take control of the whole border area under control of the separatists as long as there is no return of Ukraine border troops.

Clear positions are equally required that the harsh Russian treatment of Turkey is a critical concern of NATO as a whole.

### Crisis Management, how to Shape it with an Unstable Periphery

Today, with its inevitably renewed emphasis on collective defence capabilities, NATO wants to retain its ability to respond to crises beyond its borders where "they have the potential to affect Alliance security". But in view of NATO's circumspect, for some even reluctant attitude towards the wars in the South of Turkey, especially in Syria, it seems that "to stop ongoing conflicts where they affect Alliance security" is no longer valid as a strong political and military commitment. Instead of expeditionary operations the preparation for the Warsaw Summit tries to define NATO's "role in projecting stability" by other means. In newly written statements or speeches, one will not find references to "peace enforcement" operations. Even the earlier term of "crisis response operations" seems to have disappeared. Obviously, NATO tries to concentrate on crisis prevention and post-conflict stabilisation. If and when a more solid understanding and situational awareness of security issues in NATO's neighbourhood and beyond leads to more timely and targeted support through the "Defence Capability Building" (DCB) initiative in countries at risk, this may help to avoid open conflict. For the case in Iraq as well as Libya any activity belongs to necessary efforts of post-conflict stabilisation. Whether and to what extent the summit will agree and launch concrete NATO efforts, like known training missions and additional DCB activities, will also depend on the dynamic developments in the conflict region.

In a wider sense, an energised programme of stability projection can be an effort that will be supported through credible and modern deterrence and defence and even more by expanding and enhancing the partnerships with countries in NATO's neighbourhood and worldwide where appropriate.

### Cooperative Security

In its SC 2010 NATO wants to engage to enhance international security through partnerships with countries and organisations, by contributions to arms control, non-proliferation and disarmament and by keeping an open door to membership of all European democracies that meet NATO standards.

### Open Door

Regarding this challenge, the summit in Warsaw will be very clear on the principle of open door, but rather without any concrete declaration for specific countries, especially in Eastern Europe.

### Arms Control, Non-Proliferation and Disarmament

This year, NATO hosted the 12th annual conference on these topics on 9 and 10 May in Ljubljana. While it took place after the nuclear deal with Iran that might bring about a break in proliferation of nuclear

able to set new and ambitious targets. One might expect that the Alliance will support efforts of the OSCE under the German chairmanship to (re-)gain momentum at least in certain fields of confidence building. Of course, all concerns on the proliferation of WMD/CBRN and activities to at least curtail the threat will be in the centre of NATO's contribution to global arms control.

### Partnerships with Countries and Organisations

The impressive history of NATO partnerships since the early 1990s began with a "hand of friendship" at the London Summit in 1990 proposing a new cooperative relationship with all countries in Central and Eastern Europe in the wake of the end of the Cold War. As a result from many adaptations and new efforts NATO today works with groupings of partnerships and many bilateral partnerships with so-called individual partnership programmes<sup>8</sup>. In the scope of the policy of stability projection (see above) all those partnerships will gain new importance. Partners in the North and East will be seen and will see themselves in the framework of modern deterrence and dialogue. The partners in the Middle East, the Mediterranean and North Africa will be approached and might seek support for crisis management, risk reducing measures, domestically and regionally. The impetus and objective will distinguish between individual countries and international organi-

Photo: NATO



**The relevance of the cyber era for security policy has been recognised by NATO since the Rome Summit in 2002.**

weapons programmes in the region if implemented, many other arms control and disarmament issues are interrupted or have even broken down. Under present circumstances, the Warsaw Summit will not be

sations like the Arab League, the Gulf Cooperation Council and the African Union. All agreed programmes, be they military or civilian or conceptual, create contacts and information that might be useful to

anticipate crisis potential – a prerequisite to develop successful crisis response options. In view of the Warsaw summit the attention and recommendations for action will focus on recipients that are at risk or countries affected by instability. Thus, in the East, NATO could reinforce the engagement with Georgia, Moldavia, but also Ukraine under special circumstances. In the South, NATO will have to develop options of intensified support for Iraq beyond a training mission, but also prepare activities with Libya, first out of the country and then - within a broader international effort – strengthening force protection, enabling counter terrorist action through i.e. intelligence or air support. An indispensable prerequisite for action is a strong commitment of all MS to allocate additional resources, ensure sufficient funding and provide the military and civilian experts required.

### Expectations from the Summit in Warsaw in July 2016

The elements that are driving the developments in all three core tasks of the Alliance show how many topics and issues the heads of states and governments will not only have to face but to tackle.



Photo: aljazeera

***Soldiers of the Libyan National Army combatting IS terrorists: NATO will have to prepare to support the stabilisation of the country.***

So far, situational awareness, national interests of countries in the North, East, South-East, South and the centre and expectations show divergent views on summit outcomes. Nevertheless, whatever those differences are, all 28 have to work together to build and reach a forward-looking consensus and to ensure the political and military cohesion of the Alliance. Therefore, the summit has to emphasise

a decision on the future NATO posture, both conventional and nuclear. Of similar or even greater importance will be the commitment to prepare, deter and defend against any kind of hybrid war. That includes great intelligence improvements, building of resilience in all nations and then achieving proper results by finally creating a complementary strategic, operational and tactical cooperation with the EU. Here,

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Photo US DoD

**Georgian troops in Afghanistan: Georgia requires a strong signal that NATO's attention to its development continues.**

deeds are required, not further wording. The fundamental message of a credible deterrence and defence lies in the political intent to prevent war, but to fight successfully if one is attacked by any means. Only from this base and with a clear position on Russia's past aggression and continual offensive actions against and in the Ukraine can the leaders formulate a path for a reasonable and realistic relationship with the Eurasian neighbour Russia without rewarding illegal annexation and unlawful offensive action against another country. But, of course, deterrence and defence follows a 360° radar. And with the wars in Syria and Iraq, the turmoil and transnational Islamist terrorists i.e. in Libya and the terrorist outreach to NATO countries, crisis management and counter-terrorist requirements have to be tackled at the summit, too. The consensus on counter-terrorist activities relies still on the concept of Combatting Terrorism in the NATO Document MC 472 from 2002. Like in dealing with hybrid warfare, the individual nation is the first responder, as we have seen in Paris in November 2015 and in Brussels on 22 March this year. But all the support asked for should be orchestrated together - including invoking Article 5 of the Washington Treaty, if so required. The look at crisis management tasks seems somewhat different from the early 2000s. With the strong impetus on its "role in projecting stability" the aspects of how to prevent crisis and how to support post-conflict stabilisation and reconstruction have moved into the focus of thoughts about peace-enforcing and crisis-response operations. But as one can witness in Syria, non-action at an early stage can lead to more difficult and dangerous situations affecting direct interests of NATO countries beyond any responsibility to protect. As regards the core task of cooperative security the summit will not deliver anything more forthcoming on "open door" than is already mentioned in Wales.

In view of all three core tasks NATO is analysing its widely spread and very diverse relationships with a great many partner countries. Many options are assessed and envisioned under its own role and specific contribution to stability projection. The obvious closeness of Sweden and Finland to NATO in most practical terms does not require an additional summit decision. Georgia requires a strong signal that NATO's attention for its development continues. And Ukraine needs concrete help to make progress in necessary reforms – while at war and still heavily enshrined in "old thinking" and patronage. The fragile Moldova must not be abandoned – against whatever warnings from Medvedev at the Munich Security Conference 2016. Beyond all assurance signals for Turkey, Iraq and Jordan are in need of intensified support which is still controversially debated in NATO countries. Here the summit can send a clear message of how much the Alliance will engage in capability build-up etc. in a semi-permissive, even conflict environment. Many proposals are weighed as to whether, when and how to start activities in Libya – if not under crisis response/counterterrorism operations against ISIS in that country. Partnership within NATO's neighbourhood today is somehow closer to crisis management (even is crisis management) than to crisis prevention.

### **Beyond the Warsaw Summit – Towards a Compact for Comprehensive Security?**

Warsaw must solidify the approach and the activities decided in Wales in 2014. It has to show that the road it has embarked on is irreversible. But in addition, it also provides the opportunity and the need to further develop the political strength of the Alliance. It needs to keep or re-establish the transatlantic bond not only in the security and military arena, but also in economics with global outreach. The present contro-

versies in the EU and between Europe and America and the many diverse views and perspectives of European members in the East and the West, in the South and the North must not detract from NATO efforts. Powerful capabilities in all areas of security policy can only be achieved in cooperation of our community of allied nations. Thus, while Warsaw can and has to corroborate the determination to effectively face the present threats in the East and the South, it also needs to set a clear path, focusing on common interests and developing the commitment to effectively and efficiently prepare political, military, civil instruments as an indispensable basis for the common willingness and political preparedness to act in collective defence and crisis response engagements when and where required. The best way to achieve this is a compact on comprehensive security and economic togetherness between North America, the European Union and the Alliance as the only organisation where the transatlantic partner on both sides of the Atlantic are to discuss, decide and act under one roof and on equal footing. If those organisations and individual countries are not willing or able to build this compact for comprehensive security, they will all face a geo-political and geo-economic environment where other forces determine the direction and most likely not in favour of the "Western community of nations". ■

1 Marine Corps officers developed this view just combining conventional war, counter-terrorism and counter-insurgency; see Frank Hoffmann, *Hybrid Warfare and Challenges*, JFQ, issue 52, 1st Qu 2009; Michael Kofman and Matthew Rojansky, *A Closer look at Russia's "Hybrid War"*, Kennan cable, No 7, April 2015, 8 p.

2 The Secretary General's Annual Report 2014, [http://www.nato.int/nato\\_static\\_fl2014/assets/pdf/pdf\\_2015\\_01/20150130\\_SG\\_AnnualReport\\_2014\\_en.pdf](http://www.nato.int/nato_static_fl2014/assets/pdf/pdf_2015_01/20150130_SG_AnnualReport_2014_en.pdf); The Secretary General's Annual Report 2015, [http://www.nato.int/nato\\_static\\_fl2014/assets/pdf/pdf\\_2016\\_01/20160128\\_SG\\_AnnualReport\\_2015\\_en.pdf](http://www.nato.int/nato_static_fl2014/assets/pdf/pdf_2016_01/20160128_SG_AnnualReport_2015_en.pdf)

3 Strategic Concept 2010, para 17 and 18, p.14

4 See Thomas Gutschker, *Atomwaffen wieder im Spiel*, FAS v. 25.01.15; Michael Stabenow, *Hoffnung in Zeiten des Säbelrasselns*, FAZ v. 25.06.15; Michael Rühle, *The Comeback of Nuclear Deterrence*, <http://berlinpolicyjournal.com/the-comeback-of-nuclear-deterrence>; Michael Rühle, *Die nukleare Wirklichkeit*, NZZ Nr 154, v. 07.07.2015, S.17

5 Early 2000 hybrid warfare was introduced in documents of the U.S. Marine Corps trying to analyse the recent wars composed at the same time of conventional operational art, counter-terrorism tactics and the counter-insurgency propositions. See: Frank Hoffmann, *Hybrid Warfare and Challenges*, JFQ 1st Qu 2009, 6 p.; Michael Kofman et al., *A closer look at Russia's 'Hybrid War'*, Kennan Cable No 7, April 2015, 8 p

6 Details on the evolution of cyber defence within NATO see at [www.nato.int/cps/en/natohq/topics\\_78170.htm?selectedLocale=en](http://www.nato.int/cps/en/natohq/topics_78170.htm?selectedLocale=en)

7 see: <http://www.washingtontimes.com/news/2016/feb/29/us-launches-cyber-attacks-islamic-state/?page=all>

8 Details of the different groupings like EAPC, PfP/IPAP, MD, ICI, global partners can be found at: [http://www.nato.int/cps/en/natohq/topics\\_80925.htm?selectedLocale=en](http://www.nato.int/cps/en/natohq/topics_80925.htm?selectedLocale=en)

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# Ireland's White Paper on Defence 2015

**Conrad Waters**

Ireland issued a new Defence White Paper on 26 August 2015. Only the second such document in the Irish history, it provides a much-needed update to the first defence white paper published fifteen years previously. Aiming to set a direction of travel for the Irish Defence Forces over the next decade, it assesses a much-changed security environment and highlights future procurement priorities.

The backdrop to the first defence white paper – published in 2000 in the aftermath of the 1998 Good Friday Agreement and the steady implementation of

territorial interests, the Irish Naval Service continued to be accorded a “lower priority than land-based defence”. Similarly, the Irish Air Corps remained structured around

the requirements and functions of an army air corps rather than those of a broadly-based air force.

These ambitions were seen as modest at the time given the Irish economy's strength in the early 2000s. However, the economic collapse from 2008 onwards meant that even they were unachievable. The onset of financial austerity resulted in fast declining budgets, a further fall in personnel to 9,500 and a revised army structure focused on two brigades. However, the demands on the Irish Naval Service arising from a near doubling of claimed sovereign maritime rights since 2000 meant that it escaped the worst of the cutbacks. Indeed, the need to replace life-expired ships allowed orders for two new offshore patrol vessels in 2010. The resulting SAMUEL BECKETT class was extended to a third ship after the exercise of a contract option in 2014. This enabled the fleet to maintain eight patrol vessels, as mandated by the 2000 white paper.

In the meantime, the atrocities of “9/11” and the rise of Islamic extremism, not to mention greater instability in many states bordering the European Union, resulted



(Photos: Irish Defence Forces)

**Ireland's White Paper on Defence 2015 was published on 26 August 2015. This picture shows (from left to right) Chief of Staff (designate) Vice-Admiral Mark Mellett; Chief of Staff Lt. General Conor O'Boyle, Defence Minister Simon Coveney TD; and Secretary General of the Department of Defence Maurice Quinn on publication day.**

the Northern Ireland peace process – was largely benign. Aiming to modernise the Irish Defence Forces within the constraints of a stable budget, it mandated a reduction of 1,000 service personnel to a new total of 10,500 regulars. Savings were to be reinvested in improved equipment and infrastructure. The deployment of ground-based peace-keeping forces within a UN context was the primary operational commitment, for which a three brigade light-infantry orientated structure was to be maintained. In spite of growing maritime

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(Photo: Author)

**The Irish Armed Forces have suffered during Ireland's economic troubles but sufficient money has been found to replace life-expired patrol vessels. This image depicts SAMUEL BECKETT, the first of three ships, on 28 April 2014, the day she was handed over by her builders.**



***Irish forces deployed with the UNIFIL force in Lebanon undergoing crowd control training. Providing effective support for UN peace keeping missions remains a key Irish security objective.***

in a security situation that is now far less positive than in 2000. This – combined with the emergence of new threats from developments such as migration, climate change and cyber-attack – has produced a more complex security environment. The Irish government readily appreciated that even a small, neutral country is not immune from these changes. Accordingly, preparations for an updated white paper to set out a new defence policy framework commenced some time in advance.

## Preparation & Debate

A major step in this process was the release of a Defence “Green Paper” in July 2013. This was intended to encourage discussion on future Irish defence and contribute to subsequent decision-making by setting out a number of key policy questions. It formed part of a programme of broader engagement that concluded with a symposium hosted by Defence Minister Simon Coveney in May 2015.

An important question posed was the extent to which Ireland’s historic policy of defence neutrality needed to be adjusted to take account of the increasing need for collective security cooperation. This has already seen Ireland’s traditional peacekeeping work for the UN expand to involvement in a wider range of collaborative activity, for example under the auspices of the European Union and NATO’s Partnership for Peace. There has been particular debate about the so-called “triple lock”. This requires participation in peacekeeping missions to be supported by the government, the Irish Dáil (lower house) and the UN. It

has been criticised by some as effectively giving China or Russia a veto over Irish participation in international peacekeeping through their status on the UN’s Security Council.

## Defence White Paper Overview

The white paper that has emerged from these deliberations acknowledges the changed security environment, particularly the rise of non-conventional threats. However, it largely maintains the status quo on many key issues. There are no major revisions to neutrality or the triple lock, reflecting the political problems that any attempt to change the existing consensus would create. Cooperation with like-minded countries – particularly in a European Union context – will continue to develop. However, this will happen under the existing framework.

The white paper is also conservative in so far as it maintains existing manning at 9,500 regulars and about 4,000 reservists. This reflects the reality that pay already takes up a disproportionate part of the approximately €680m (excluding pensions) defence budget. The future ambition is to maintain stability in the pay element whilst simultaneously increasing the non-pay element – currently less than 30% of the whole – as Ireland’s public finances improve.

In spite of this ambition, the essence of the white paper involves the renewal and upgrade of existing capabilities and equipment rather than any immediate uplift in capacity. In practice, funding is unlikely to be available to support growth in the near term. Within this context, there does appear to be greater acknowledgement of the importance of maritime security. This is no longer so explicitly seen as a secondary consideration. The recent promotion of Vice Admiral Mark Mellett to Chief of Staff of the Irish Defence Forces, the first time a naval officer has held the post, is another indication of this new equality.

In line with decisions taken by many elsewhere, the small Special Forces Army Ranger Wing will benefit from an increase in size and funding. The potential establishment of an Institute for Peace Support and Leadership reflects the continued high priority given to the military’s involvement in this work.

## Procurement Priorities

The white paper provides only headline details on future procurement. The aim is to produce a detailed capability development plan alongside work on identifying and agreeing funding. In the near term, it appears that the needs of the Irish Air Corps are the most pressing. Plans include replacing its two CASA 235 maritime patrol aircraft and five smaller Cessna aircraft



***The Irish Naval Service’s flagship EITHNE undertaking humanitarian operations in the Mediterranean. Instability on the EU’s borders is just one factor presenting Ireland with a more complex security environment.***



***Renewal of Irish Air Corps equipment is an immediate priority under the new white paper. The two existing CASA CN235 maritime patrol aircraft will be replaced before the end of the decade.***

current funding is insufficient even to sustain existing equipment. Meanwhile, the Irish Budget of October 2015 proposes an increase in annual capital expenditure from €66m in 2015 to €81m in 2021. This seems inadequate to fund the equipment needed.

## Conclusions

The Irish Defence White Paper provides a balanced assessment of a changing security environment and strives to respond to this in a pragmatic way. Whilst broadly maintaining the status quo, it subtly ad-

in the near future. The former will take place on a like-for-like basis – although perhaps with larger, more capable aircraft – and the latter by acquiring three larger planes equipped for ISTAR tasking. Developing a radar surveillance capability is a key priority should more funds become available. As yet, there is no appetite for establishing a costly combat air capability. This will be re-examined as existing Pilatus PC-9 turboprop trainers fall due for replacement. Meanwhile, neutral Ireland is left in the unusual position of effectively relying on Britain's RAF to defend its skies should the need arise.

The Irish Naval Service is set to be the beneficiary of further investment in the medium term given confirmation that the current eight-ship flotilla is seen as a minimum requirement. The current flagship EITHNE and two coastal patrol ships will therefore be replaced as they retire, the first by a new multi-role vessel that will not carry a helicopter but will be “enabled for helicopter operations”. Additional vessels are the naval service's priority if the funding outlook improves.

Meanwhile the army is considering whether it would be more effective to modernise or replace its outfit of armoured personnel carriers (APCs). A small number of armoured logistics vehicles will also be purchased. If more money became available, additional APCs, light tactical armoured vehicles and better air defences would be acquired.

## Implementation

Like its predecessor, the Defence White Paper 2015 has a ten year horizon. However, this is now bolstered by a fixed cycle of defence reviews that will see an update every three years. Each alternate review will involve a more comprehensive assessment and be titled a strategic defence review. The white paper dodges the issue of how capability requirements are to be funded beyond a vague commitment to place de-



***Irish Air Corps PC-9 trainers provide Ireland's extremely limited combat air capability. As yet, there is no appetite to establish a more potent force.***



***Irish Army MOWAG armoured personnel carriers on a live fire exercise. Studies are underway to determine whether it would be more cost-effective to replace or refurbish these vehicles.***

fence funding on “a sustainable footing”. Instead, a defence funding study is promised to establish a framework under which expected long-term costs can be managed. This may involve new models such as public-private partnerships or recourse to the European Investment Bank. The resolution of this issue will be key to the successful implementation of the white paper given

justs priorities to reflect an evolving situation. The new cycle of reviews should also ensure these priorities are kept up to date. More negatively, funding remains largely inadequate to develop new capabilities. Whilst these are identified, they will only be achieved should an improving economy deliver more money for defence. This remains an open question. ■

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# Viewpoint from Tbilisi



**Beka Kiria**

## Waiting on the 2016 NATO Warsaw Summit

Certain repercussions in Georgian-Russian relations are obvious. In 2008, Georgian aspirations towards the Euro-Atlantic institutions triggered the full-scale ground invasion of Georgian sovereign territories. Ultimately, Russia recognized the independence of Abkhazia and South Ossetia, and built military bases and stationed a large number of troops in occupied regions.

Russia moved ahead by applying “creeping annexation” as a tool against the Georgian government and the breakaway regions became the spear of Russian aggressive strategy.

On top of that, South Ossetian separatists along with Russian troops initiated a process of illegal border ‘demarcation’ in the villages of Orchosani and Khurvaleti. As result, about 2 kilometres of the Western Route Export oil Pipeline (WREP) fell within occupied territory. There are projections that 1800 metres of oil pipeline passing through Karapila near the city of Kaspi could share the same fate...

The 2016 Warsaw Summit should be an immense step forward for NATO. Members of the Alliance are required to respond to the threats and challenges accumulated after the 2008 Bucharest Summit, and almost eight years have passed since that summit, at which Georgia and the Ukraine were on the edge of NATO membership.

However, from a Russian perspective, the war against Georgia was a waking point for Russia on the global political stage – the first since the collapse of the Soviet Union. The international response to the Georgian situation was simply an early part of the chain of political reactions accompanied with an annexation of Crimean peninsula and further invasion of other regions of Ukraine.

The West’s slow reaction to Ukraine - likewise the aftermath of the Russo-Georgian war – led to many missed opportunities and possibilities. Meanwhile, Russian political self-esteem increased, leading to the same approach towards the Ukraine. As a result, the outcome of these two cases from Georgia and Ukraine created the Syrian scenario. Consequently, Russia has turned refugee crises into a weapon di-

rected against Western capitals. Deliberately exacerbated migration crises to increase the flow of hundreds of thousands of Syrian migrants to Europe serve to destabilise and undermine European structures.

Turning back to the point above, the current security concerns and challenges could generally have been avoided if the West had consolidated in 2008 and expressed the firm willingness to grant the membership to Ukraine and Georgia. The Bucharest Summit was the first strong attempt to integrate Georgia and Ukraine in the North Atlantic Security framework, but bilateral Russia / NATO talks delayed it.

In spite of that, there have been the huge security dilemmas regarding Georgia. On the one hand, Georgia is the biggest contributor country to global security country outside of the Alliance. On the other hand, it would be a colossal security consumer within NATO, and troublemaker with Russia.

Georgia has a number of expectations regarding outcomes from the next summit.

According to various analysts and politicians, the 2016 NATO Warsaw Summit is perceived as the peak of integration in NATO. It is widely envisaged as the concluding step towards the Membership Action Plan (MAP), so stressing a country’s important contribution to international missions and numerous achievements on the pathway to NATO is important.

For instance, Georgia has been assisting and contributing to the NATO-led International Security Assistance Force (ISAF) in Afghanistan since 2004 and it was the largest non-NATO troop contributor. Nevertheless, according to the Defence Minister of Georgia “MAP is the past for Georgia”, stressing that Georgia has all the necessary tools for the further integration to NATO. The country fulfilled all criteria given from Brussels, and now NATO membership of Georgia seems politically halted, rather than any other reason.

NATO’s decision to invite Montenegro confirms the open-door policy towards newcomers, but could raise certain expectations in Tbilisi about the formalisation of Georgian membership.

Admitting Montenegro to NATO – in comparison with Georgia a highly corrupt country with a weak rule of law, poor governance, increasing attacks on media and the lower support in population to join the club - generates big confusion.

In contrast, Georgia has been waiting to join the NATO for many years, with massive popular support. Besides, Georgia modernised its defence infrastructure, implemented transparent civilian control on the military and essentially defeated corruption. To be specific, the country meets all NATO criteria, but there are heated debates that Georgian accession to NATO is more a political process than the issue of NATO interoperability or standards. From Tbilisi's viewpoint, NATO membership is aligned with a Russian factor.

In fact, Russia's aggressive stance and opposition to NATO's further eastwards extension shaped an informal Veto against Ukraine and Georgia. There are arguments that Russia is acting as a NATO member state, having "Veto" right over the membership of Georgia. Despite denials from NATO chiefs and assertions that no country outside NATO has a veto over the membership, in reality, Georgia is still beyond NATO.

Seen from the United States, NATO enlargement is the fundamental strategy for dealing with Russia. Unfortunately, from the perspective of Europe, Moscow is a partner in energy security and a country holding the advantage in creating the mass outflow of refugees to Europe from Syria. Meanwhile, from the Russian viewpoint, expanding the Alliance ever closer to Russia's borders creates a direct threat to Moscow's national security.

Inviting Georgia into NATO will have a number of positive implications. The West's position in South Caucasus will be strengthened: France and Germany, as opponents of Georgia's accession to NATO, will be guaranteed their energy security through the Georgian energy corridor; and the conflict between Azerbaijan and Armenia has a chance of peaceful resolution.

It will also have long-term positive implications for Europe. In order to avoid energy supply manipulation by Russia for its own geopolitical and economic purposes as an economic tool the West very clearly must support Georgia, especially in terms of energy diversification. The planned Southern Gas corridor will cross Georgia en route to Turkey and Europe, so Georgia is critically important in providing Europe with alternative energy supplies. This corridor has been endorsed by the EU and US to reduce Europe's reliance on Gazprom.

France is one of the strongest opponents to Georgia's membership of NATO, but Georgia has forged closer ties through military contracts with French companies. Rumours about a Georgian arms embargo have been disproved, and the decision to send Georgian troops with an EU peacekeeping mission in the Central African Republic was critical.

As a result, Moscow is anxious. France and Germany opposed Tbilisi's desire for membership, but deeper cooperation between Georgia and France could indicate a possible change in Paris's attitude regarding the Membership Action Plan (MAP) for the upcoming Summit.

There are positive steps towards closer cooperation in NATO-Georgian relations. For instance, after the Wales Summit Allied Heads of State and Governments named Georgia as one of five countries eligible for enhanced cooperation and dialogue opportunities: endorsement of a substantial NATO-Georgia Package raised hopes in Tbilisi. As key aspects the package set the country as a primary beneficiary of NATO's Defence Capacity Building Initiative. Additionally, the establishment of the NATO-Georgia Joint Training and Evaluation Centre (JTEC) enhance and strengthen defence and security capabilities.

Georgia became the fourth non-member State to join the NRF, encompassing a deeper engagement and cooperation between Georgia's Armed Forces and the Alliance.

As part of US-Georgian defence cooperation the Georgian Armed Forces (GAF) and their US Army partners are conducting the next joint military exercise, Noble Partner 2016 to enhance NRF interoperability and strengthen US-Georgian defence cooperation. The GAF achieved significant NATO interoperability.

## Georgia Must Push Further Towards NATO

Referring to the escalation of tension between the West and Russia, the Alliance may decide to bolster its ties through a special partnership agreement with Georgia and Ukraine. There are discussions within the Alliance about offering an association agreement under a 28 + 2 arrangement allowing Georgian and Ukrainian military to intensify cooperation with NATO.

Officially, Tbilisi perceived the NATO Warsaw Summit as an opportunity to receive a MAP. However, given the existing regional reality the next step towards NATO in a 28 + 2 format would be a huge improvement, taking into account a genuine threat from Russia.

Russian President Vladimir Putin threatened the use of force to counter efforts to integrate ex-Soviet countries with NATO: an impulsive, harsh decision from Russia regarding any attempt to welcome Georgia and Ukraine into NATO is to be expected. But an Association Agreement will lift the formal requirement of integration into the NATO Command Structure and avoid the membership question – but one question remains.

Association will significantly change the balance of power in the Black Sea region. The military friction between the West and Russia may increase, although it is widely held that the recently established NATO Black Sea Fleet will balance and isolate Russian naval forces in the region.

But in spite of dramatic improvements and forging closer ties with NATO, if Georgia will adopt a 28+2 Association with NATO that final question remains: whether Article 5 security guarantees will apply to Georgia in case of war, and if the provision of military armaments and equipment will be supported by NATO.

The opinions expressed in this article are the author's own and do not reflect the view of the Ministry of Defence of Georgia.

# The Iran Nuclear Deal

## Is It Good Enough? And Will It Survive?

**Sven-Eric Fikenscher and Jonas Schneider**

On 14 July 2015 Iran and the five permanent members of the UN Security Council - the United States, Russia, China, Great Britain, and France plus Germany - concluded the Joint Comprehensive Plan of Action (JCPOA), commonly referred to as the Iran Nuclear Deal.



Photo: Austrian Ministry of Foreign Affairs

**The Joint Comprehensive Plan of Action (JCPOA) was adopted by the P5+1 (United States, UK, China, France, Germany, and Russia) and Iran in Vienna, Austria, on 14 July 2015.**

The accord was the result of intense negotiations and marked the end of a twelve-year contest of will over Iran's nuclear programme that sometimes seemed poised to escalate into a full-blown military confrontation. Although reaching the JCPOA was a landmark achievement, the

accord constituted only the prologue to the process of implementing the deal.

In accordance with its obligations under the JCPOA, Iran has reduced its number of centrifuges from close to 20,000 to a little over 6,000 (all of them being older IR-1 centrifuges) and cut back its stockpile of low-enriched uranium from more than 10 tonnes to 300 kg. Iran also started to convert its planned heavy water reactor in Arak into a light water reactor, which will produce much less plutonium, and accepted tight verification standards that allow inspectors from the International Atomic Energy Agency (IAEA) far-reaching access to nuclear facilities. Besides, the IAEA delivered its final assessment of the nuclear programme's "possible military dimension," concluding that Iran's systematic nuclear weapons programme was largely halted in 2003, with a few activities continuing until 2009.

On 16 January 2016 - the accord's official "Implementation Day" - the IAEA certified that Iran was in full compliance with its obligations under the JCPOA. Immediately thereafter, the nuclear-related sanctions against Iran were removed. In its

subsequent February 2016 report the IAEA again stated that Iran's nuclear activities were in compliance with the JCPOA. This encouraging record of compliance leaves two questions open: Does the JCPOA keep Iran far away from the nuclear weapons option? And will the nuclear deal survive?

### Authors

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### The Significance of the JCPOA's Restrictions on Iran's Nuclear Activities

Estimates indicate that the implementation of the JCPOA will increase "break-out" time - the time that would be required to produce enough fissile material for a single nuclear warhead in the event of an all-out dash for the bomb - from approximately two or three months to about one year. Any such break-out attempt would involve major activities at Iran's declared nuclear facilities that would be detected immediately. As a result, there would be enough time to issue a stark warning to Tehran backed up by the threat of military action if Iran continued to race for the bomb. If Tehran ignored such a warning, the United States would be very likely to use military force be-



Photo: dpa

**The Natanz uranium enrichment facility is located 250 km south of Tehran.**

fore Iran could break out. And even if it did not, Israel would almost be guaranteed to do so. To put it in a nutshell, the entire idea of a break-out is a non-starter. There is no way of concealing it and once Iran comes close to enriching enough uranium for a nuclear device, it will come under attack. Against this backdrop, Iran should be disinclined to attempt such a break-out. This holds all the more true if one keeps in mind that such a move, even in the extremely unlikely event that it succeeded, would only provide Iran with the material for a single bomb. Moreover, that material would still have to be turned into a functioning weapon. One such bomb would need to be deployed without prior tests of nuclear devices and would hardly constitute a powerful deterrent since it might be taken out in a quick conventional strike. The production of the fissile material for several nuclear warheads, not to mention turning the material into actual weapons, would take many years. Admittedly, break-out time will not be the same throughout the JCPOA's duration. It will gradually decrease once Iran installs more advanced centrifuges at its enrichment facility in Natanz after ten years. The folly of a break-out endeavour, however, will not change, as there will still be enough time for a military strike. Unlike a break-out, a "sneak-out" - a clandestine effort to produce the fissile material necessary for a nuclear device - is a less risky attempt to cross the nuclear threshold. Fortunately, the JCPOA's verification-related provisions are comprehensive and enable IAEA inspectors to detect sneak-out attempts before it is too late. Under the JCPOA, inspectors have first class access

to Tehran's stockpile of centrifuges and all related components. Iran's entire amounts of uranium ore concentrate and of the feed material for uranium enrichment also need to be completely disclosed and inspected constantly. Furthermore, Iran is obliged to comply with the Additional Protocol, an enhanced verification protocol giving IAEA inspectors access to all remaining elements of the nuclear fuel cycle.

As a result, it would be practically impossible to secretly use currently existing centrifuges for illicit activities. Moreover, the risk that any uranium can be diverted is greatly reduced, let alone a significant

amount. Regarding the possible diversion of plutonium, Iran's hands are also closely tied. In theory, the Arak reactor could be remodelled to produce higher amounts of plutonium. However, such a step would be time-consuming and tip off international observers instantaneously since the Arak reactor can be easily monitored. Most importantly, the separation of plutonium is achieved through so-called reprocessing; yet Iran is prohibited from building a reprocessing plant in the next fifteen years. Against this backdrop, Iran would not get anywhere close to crossing the nuclear threshold without alerting the international community, even if it tried to get there incrementally and in secret. These are very powerful disincentives that should dissuade Iran from a break-out or an ambitious sneak-out attempt. Iran might, however, get increasingly interested in smaller-scale cheating. Such cheating could lay the ground for building the bomb in the long run, especially once Iran can install more advanced centrifuges at the Natanz facility as we approach the 15-year deadline, when the restrictions on its nuclear activities will come off.

### **The Road Ahead: Non-nuclear Challenges to the Sustainability of the Iran Deal**

Even before the restrictions on Iran's nuclear programme vanish, the JCPOA is bound to come under pressure on several fronts. The intrusive verification system can only serve as a powerful deterrent

Photo: MoD Iran



**Tehran's pursuit of advanced ballistic missile capabilities is undiminished.**



Photo: Picture Alliance/AP

***Tehran supports the Houthi rebels fighting in the ongoing Yemeni civil war***

against cheating - including smaller-scale violations that would not trigger military action - if Iran sees the threat of renewed sanctions as severe. The more Iran benefits from sanctions relief and its economy grows, the more inclined could Tehran become to violate the agreement. The present scope of sanctions relief has already become one of several non-nuclear bones of contention between Iran and the United States that cast doubt over the JCPOA's sustainability. Iran has accused the United States of secretly blocking its access to the international banking system. The issue is highly complex, since the non-nuclear sanctions are still in place. The bulk of the sanctions, however, was related to Iran's nuclear activities and those punitive measures are no longer enforced. To ease Iranian concerns, the Obama administration has even gone the extra mile by reassuring international banks that they can (re-) enter the Iranian market without fearing repercussions. Against this backdrop, differences over the scope of sanctions relief are unlikely to put the accord at serious risk for the time being.

Another challenge is Tehran's undiminished pursuit of advanced ballistic missile capabilities. Since signing the nuclear deal, Iran has tested medium-range ballistic missiles in October, November, and March. To be fair, the JCPOA does not address Iran's missile development. Hence, the test launches did not violate Iran's obligations under the accord. Yet, last year's tests did

violate UN Security Council Resolution 1929, which was in force until "Implementation Day" and prohibited any tests of nuclear-capable missiles. In contrast, Security Council Resolution 2231, which entered into force on "Implementation Day" and terminated Resolution 1929, merely "calls upon" Iran to refrain from testing its missiles. Thus, Iran's missile tests in March did not necessarily violate the letter of Resolution 2231, although they ran contrary to its spirit. The altered legal context has delinked the missile and nuclear issues. Such flexibility was much needed, as it would truly be unfortunate if the nuclear deal collapsed over a few tests of Iranian missiles. After all, an Iran equipped with advanced ballistic missiles but lacking a nuclear arsenal represents much less of a threat than an Iran with an advanced nuclear programme. However, Iran's missile tests could poison its relations with the United States - which has already reacted by sanctioning several companies and individuals that are involved in Iran's missile activities - and further destabilise the Middle East.

In this respect, Tehran's unrestrained missile development is compounded by Iran's assertive behaviour in the region. Tehran has traditionally supported terrorist groups, most notably Hezbollah, and has thrown its weight behind several insurgent movements, including the Houthi rebels fighting in the ongoing Yemeni civil war. Also, Iranian forces are buttressing the Syr-

ian military, and Tehran's insistence that Assad must remain in power has bedevilled attempts to find a regional solution to the war in Syria. It is true that Iran and the United States have become strange bedfellows in the fight against the Islamic State in Iraq, but overall US and Iranian designs for Iraq differ sharply. Moreover, Israel and Washington's Arab allies strongly oppose Iranian meddling in other Middle Eastern countries. The ensuing complaints that Obama is turning a blind eye to Tehran's hegemonic ambitions, in turn, are straining US relationships in the region and limit Obama's domestic breathing space vis-à-vis Iran. However, the Obama administration has resisted calls for imposing additional sanctions to rein in Tehran's expansive regional behaviour.

It goes without saying that future presidents might be more inclined to increase American pressure on Iran. The upcoming US presidential election is already casting a shadow over Washington's willingness to fulfil its obligations under the JCPOA. In particular, boasts from all the Republican presidential candidates that they would walk away from the Iran deal on their first day in office are hardly reassuring. However, an unprovoked, unilateral withdrawal from the accord would place all the blame for the escalation of tensions that would surely follow squarely on the United States. Thus, such a drastic step is unlikely regardless of who is sworn in as president in January 2017. Even a Republican successor to Obama would probably just adopt a tougher stance on implementation issues, which, however, could still imperil the nuclear accord in light of the above-mentioned challenges. The same assessment presumably holds true if power changes hands in Iran later in the game.

## Conclusion

To conclude, if Iran tried to cross the nuclear threshold, the West would find out about it soon enough to take counter-measures. While the threat of military action will likely remain a powerful deterrent, the long-term effectiveness of re-imposing sanctions is much harder to predict, a fact that might represent a future challenge. For the time being, US-Iranian differences over the scope of sanctions relief, Iran's missile programme and regional activities, and uncertainties about the future political course of both countries appear to constitute the biggest speed bumps. However, as the benefits of the JCPOA seem to outweigh the costs for both Tehran and Washington, the accord is unlikely to fall apart in the foreseeable future. ■

# Viewpoint from Tallinn



Liivi Reinhold

## Estonia Seeking Signals of Solidarity - Preferably in Boots

**T**he Estonian nation of 1.3 million neighbouring Finland in the North and Russia in the East is seeking to reassure that NATO's solidarity comes unconditional. The latest survey states that 72% of the Estonian population consider NATO to be the most important warranty of security.

"From the Estonian perspective, the key outcome of the Warsaw Summit should be the strengthening of NATO's deterrence and defence posture, both in our region and in every other corner of the Alliance," said the Estonian Minister of Defence Hannes Hanso. "The Warsaw Summit must send a strong signal of solidarity within the Alliance and demonstrate that NATO has a credible response to any threat to the allies," Mr. Hanso declared.

Currently the US Army has deployed a company size unit in a garrison in Tapa in the North-Eastern part of Estonia. The troops in Estonia are part of Operation Atlantic Resolve, "a demonstration of continued US commitment to collective security through a series of actions designed to reassure NATO allies and partners of America's dedication to enduring peace and stability in the region in light of the Russian intervention in Ukraine", as stated on the website of the US Army in Europe.

### Commitment With the Wallet

Since April 2014 Army Europe has been taking part in multinational training and security cooperation activities in all three Baltic states as well as Poland, Romania, Bulgaria and Hungary and has continued to rotate troops located in Estonia. Only on 18 May NATO's Military Committee agreed to advise the defence ministers of NATO to deploy battalion size units (approximately 1,000 troops) in all Baltic states and Poland.

In Warsaw, Estonia is hoping to hear of the implementation of the project. "The key component of the new posture in the Baltic is enhanced forward presence," stated the Estonian defence minister, naming three goals for the Warsaw Summit: "First, at least a battalion-sized land force unit of allied troops training here on persistent and rotational bases. Second, establishing a prepositioned stock of equipment - ammunition and other materials - for additional allied forces here. Third, consideration of the security solutions for our area as part of NATO's long-term planning process as there is no indication of this security situation changing in the near future."

Estonia is well prepared to accept its share, being one of few NATO members actually contributing 2% of GDP on defence - a requirement stated again by the NATO defence ministers in 2011. The reality is that Estonia is one of only four NATO members to comply with the obligation. In 2016 the Estonian defence budget has increased by €37 million to €451 million and the politicians have declared that they are prepared to add the costs of the presence of allied troops on top of these 2%.

### Keep the Doors Open, Please!

The new kind of security situation is also subject to considerations of the Estonian foreign minister and former Estonian ambassador to Moscow, Mrs Marina Kaljurand. "At the heart of the Warsaw Summit is NATO's adaptation to the new security environment around us," she stated, talking not only of Estonia or the Baltic states, but a much wider spectrum of countries in a difficult geopolitical status.

"Certainly the most important for Estonia and our other allies in the region is the expression of strong support by adopting practical decisions on defence requirements," said the Estonian Foreign Minister. "No less important is moving forward with the so-called NATO political adaption - the fact that NATO's open door policy is continuing as well as the confirmation of continued support, both political and practical, for Georgia and Ukraine, as NATO's very close partners."

Mrs Kaljurand is hoping for long-term activities to continue to be on the agenda not only in Warsaw but also in the months and years to come. "Developing relations with NATO and the EU and a broader intensification of cooperation with all NATO partners remains important," she stated.

After regaining independence from the Soviet Union in the early autumn of 1991, the membership status in NATO and the European Union became the ultimate goal for the young democracy and an essential part of the country's success-story. Estonia became a member of the Alliance in 2004 along with Latvia, Lithuania, Bulgaria, Romania, Slovakia and Slovenia.

Estonia has remained true to the reserve army concept with compulsory conscription enjoying the support of more than 90% of the population.

# Proliferation of WMD and Defending Against CBRN Threats

## NATO's Achievements and Ongoing Challenges

**Wolfgang Rudischhauser**

**Despite some positive developments in the past one or two years, weapons of mass destruction (WMD) remain a serious and growing threat. In particular, the nexus between chemical, biological and radiological agents and terrorism poses one of the gravest potential risks to our security.**

NATO's strategic foresight analysis identifies a complex future for the Alliance with increasing instability, including large scale disasters, non-state actor activity and WMD threats, which the Alliance may face in the coming two decades. Recent cases of non-adherence to international arms control, disarmament and non-proliferation commitments have shown that nuclear, biological and chemical weapons, including their means of delivery, remain in the possession of some states that cannot maintain security and are therefore vulnerable to exploitation. According to the analysis, a greater number of state and non-state actors are expected to obtain, or seek to obtain, access to WMD and CBRN material. Easier access to such material and loopholes in regulatory mechanisms, especially for biological agents, is likely to impact the global security environment.

Over the past 15 years, NATO has taken numerous steps to improve its preparedness and response to WMD and CBRN threats, and continues to improve its efforts to counter this dynamic threat. The new Euro-Atlantic security environment has engendered

a paradigm shift, which requires looking beyond deterrence and defence, and embracing resilience and consequence management as a new parameter of security. On the road to NATO's Warsaw Summit, Allies reiterate their common understanding that the future security environment will demand a broad capability profile – beyond what one nation can achieve alone – therefore increasing the importance of capability pooling and sharing to ensure Euro-Atlantic security and stability.

### An Evolving Threat

The historic agreement on Iran's nuclear programme in Vienna on 14 July 2015, with the strong involvement of four key NATO Allies, appears to have reduced the risk that Iran will acquire a nuclear weapon. But there are still other serious risks and challenges to international security.

North Korea has shown with its nuclear and ballistic missiles tests, condemned by the United Nations Security Council (UNSC), that it could well acquire WMD and ballistic missile capabilities that could potentially reach Allied or NATO partners' territory. These provocative activities continue unabated, in clear defiance of UNSC resolutions.

The situation in Syria also remains unstable. While most of the chemical weapons from Syria were removed and destroyed by the international community,<sup>1</sup> and in particular with the assistance of NATO countries' military and private industry, there remain concerns about gaps and inconsistencies in Syria's declaration, and the widespread availability and use of less toxic, but highly dangerous, chemical materials. According to a report<sup>2</sup> from the Organization for the Prohibition of Chemical Weapons (OPCW) sarin was used in an attack in the Damascus suburb of Ghouta on 21 August 2013 against civilians, including children, and there is a "high degree of confidence" that chlorine<sup>3</sup> - a chemical product often used for bleaching and water treatment – was used in the villages of Talmenes, Al Tamarah, and Kafr Zita from April to August 2014. These attacks occurred after

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Photo: NATO



**NATO has the responsibility to protect its European populations, territory and forces in light of the increasing proliferation of ballistic missiles.**



Photo: NATO

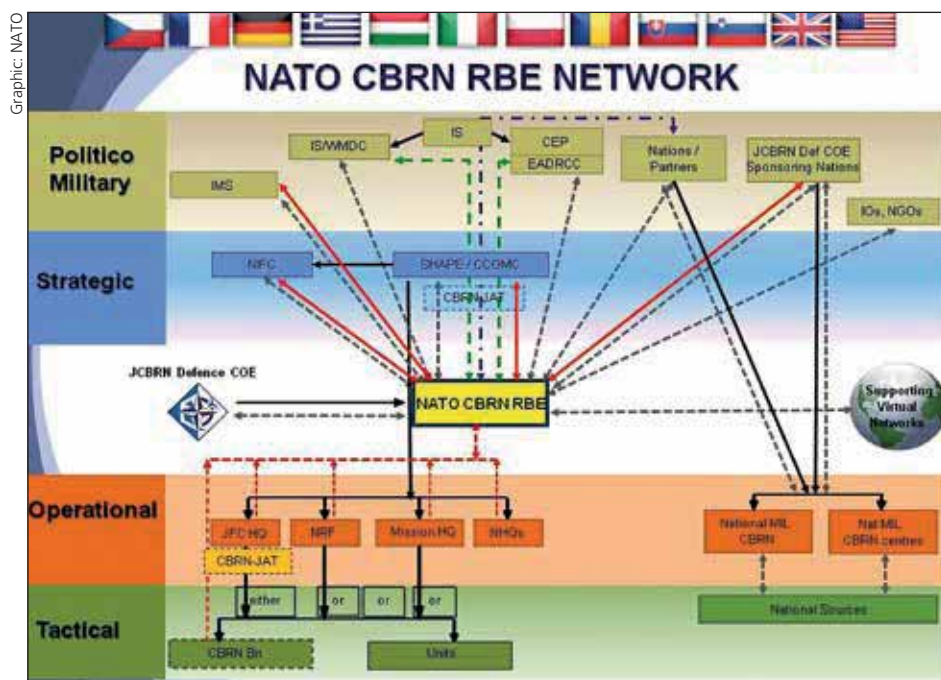
**The threat of uncontrolled proliferation of weapon technology to non-state actors will increase as innovation, research and development, production, and distribution become more open and globalised.**

the Syrian regime acceded to the Chemical Weapons Convention (CWC) in 2013. Nonstate actors in the region are also using chemicals as a means of warfare. The Islamic State in the Levant (ISIL) has been accused of using chlorine and other chemicals as crude weapons in its fight against the Syrian regime and the Kurds in Iraq. The OPCW investigation into an alleged ISIL attack in Syria in August led it to conclude that at least two people were exposed to sulfur mustard. ISIL is also reportedly interested in acquiring chemical weapons or related components from old Iraqi sites - two bunkers that still contain an old weapons stockpile - that were once Saddam Hussein's premier chemical weapons production facility. The OPCW and Allies continue to track numerous allegations of ISIL's use of chemicals in attacks in Iraq and Syria, suggesting that these attacks might be widespread. Finally, non-state actors also pose a threat in North Africa. In Libya, chemical warfare agent stockpiles of sulphur mustard were destroyed in 2014. However, more than 800 tons of mostly chemical weapons precursors remain in a storage depot in Libya whose destruction is planned to be completed by December 2016<sup>4</sup>.

In 2015, terrorist attacks on foreigners in Tunisia and on a gas producing factory in France, as well as the horrible attacks in March 2016 in Belgium, have shown how close our populations are to such threats. They are by far not confined to the Middle East region. Attackers could potentially use readily available CBRN material, such as chlorine, radioactive sources from x-ray machines in hospitals, or dispersing highly transmittable viruses such as Ebola and MERS, rather than just using guns, when

launching attacks, in an effort to provoke greater media attention. Often this would not lead to a high number of casualties. However, such types of attacks, due to their unknown consequences and necessary decontamination, could lead to panic or significant economic consequences. Attacks on poorly protected industrial facilities working with hazardous chemical or

to space and its associated technologies) provide significant social and economic opportunities, but are complicated by their dual-use nature and potential application for weapons development. The growth of complex, transnational interactions and networks among a myriad of actors, including large multinational corporations, may increasingly overwhelm the capacity of individual states to control access to potentially dangerous technology. In the evolving globalised market place, innovation, research and development, production, and distribution are more open and distributed than ever before, increasing non-state actor access to weapons technology. Concurrently, the effectiveness of regulatory conventions intended to prevent the spread of potentially dangerous technologies will be reduced. NATO's strategic foresight analysis indicates that access to future technologies might enable some actors to even achieve technological parity with NATO in some fields in the not too distant future. Nations will need to ensure a heightened awareness of technological innovations, changes to existing control mechanisms, and potential transfers of dual-use commodities or knowledge to non-state actors or potential adversaries. Moreover, non-state adversaries seeking



**NATO's CBRN Reachback Capability is able to operate 24/7 and provides scientific and operational advice before, during and after CBRN incidents. It comprises a huge permanent and virtual network of CBRN and other subject matter experts.**

biological materials also present a real risk. Advances in goods, materials and technologies intended for civilian use (e.g. nuclear energy, biochemical medicine, or access

to acquire nuclear, biological or chemical weapons for the express purpose of terrorism or threatening regional and international organisations and states will be more dif-

Photo: Bundeswehr



***NATO's Combined Joint CBRN Defence Task Force is a unique asset specifically trained to deal with CBRN events and/or attacks against NATO's populations, territory or forces***

difficult to deter. The increasing diffusion and accessibility of technology has empowered traditionally weaker nations and non-state actors at a level previously achieved only by a few highly developed nations. In the past, it was exactly the difficulty of access and handling of this material that limited terrorist groups' desire, including Al Qaida, to use CBRN material for actual attacks. Nations must now undertake a comprehensive and dynamic threat analysis to look specifically at how and where state actors and terrorists could actually acquire CBRN material.

## NATO's Response

NATO has not remained idle in the wake of these emerging threats. A decision taken by Allied leaders in April 1999 in Washington led to the establishment of the WMD Non-Proliferation Centre and the formation of a multinational NATO CBRN Defence Battalion. The WMD initiative was assigned to integrate the political and military aspects of Alliance work in responding to the proliferation of WMD.

During the 2002 Prague Summit, Heads of State and Government endorsed the implementation of five CBRN initiatives: It was the birth of NATO's Combined Joint CBRN Defence Task Force (CJ-CBRND-TF), NATO's Joint CBRN Defence Centre of Excellence (JCBRND CoE) and the initiative of supporting partner nations in capacity building in response to WMD threats. In 2009, NATO published its strategic-level WMD/CBRN Policy. This document is significant for two reasons: First, it not only describes necessary measures for protection before and after possible use of WMD,

but also addresses proliferation as a whole. Second, it calls for a holistic – so called comprehensive – approach, combining political, military and civilian stakeholders and partners to cooperatively address the challenges.

NATO's Strategic Concept and the 2010 Lisbon Summit Declaration confirmed the Alliance's commitment to develop further its capacity to defend against the threat of

Photo: NATO



***Outreach to partners, international and regional organisations will also help to develop a common understanding of the CBRN threat***

CBRN and weapons of mass destruction and protect its populations, territory and forces. NATO has a long-standing commitment to an active policy in arms control, disarmament and non-proliferation. NATO itself does not belong to any treaty as an entity but it continues to encourage its

members, Partners and other countries to implement their international obligations. Addressing serious proliferation challenges remains a task for NATO and an urgent international priority.

## NATO's Capabilities in Countering Weapons of Mass Destruction

The Combined Joint CBRN Defence Task Force (CJ-CBRND-TF) is a NATO military body specifically trained and equipped to deal with CBRN events and/or attacks against NATO's populations, territory or forces. This high-readiness asset is part of NATO Response Force (NRF) and can also be deployed to assist Allies in coping with crisis situations, such as large scale natural disasters and industrial incidents. It provides all required capabilities, starting from CBRN reconnaissance, including sampling and identification of CBRN warfare agents, as well as industrial toxic material and CBRN Decontamination. It also includes a deployable analytical CBRN laboratory that can be transported rapidly into theatre to investigate, collect and analyse samples for identification of all types of agents.

NATO's Centres of Excellence, NATO's agencies and individual Allies are continually investing resources in warning and preparedness, individual protection and CBRN hazard management capabilities to

be ready to respond in the event of an attack. NATO also has a disease-surveillance system to facilitate the collection of information on any outbreak of disease, fuse data and other information sources and alert NATO commanders of unusual biological outbreaks.

Defence against terrorist threats is a key priority area under NATO's Science for Peace and Security (SPS) Programme, and involves in a wide range of CBRN related projects, workshops and training courses. Scientists from NATO and Partner countries are developing areas of research which affect nuclear, chemical and biological security, including the decommissioning and disposal of WMD and its components, the safe handling of materials, techniques for arms control implementation, and the detection of CBRN agents.

## International Outreach and Partner Activities

During the 2008 Bucharest Summit, the Alliance acknowledged that the international community needs to work more closely together through a "comprehensive approach" to address successfully the security challenges of today and tomorrow. This approach has grown in scope and importance over the years. Today's concept of international outreach and partner activities derives from the challenges posed by the changing security environment and the increased likelihood for NATO to be involved in out-of-area operations, where NATO forces have to cooperate with and consequently rely on host nations and civilian partner capabilities and capacities. Recognising that CBRN threats may undermine a host nation's response ability or support to deployed NATO forces, Allies concluded that NATO should promote the response capability of potential non-NATO host nation countries. The implementation of a "Comprehensive Approach Action Plan" (CAAP) starting in 2009 has helped to lay the foundation for a more effective contribution by NATO to future international crisis management efforts.

In the meanwhile, there is a growing understanding that security today is far more than a military matter, requiring regular coordination, consultation and interaction among all actors involved, including civilians. Particularly in the field of CBRN, NATO's broad approach to security recognises that countries can no longer rely on purely national solutions for such emergencies bearing in mind that CBRN crises often do not respect national borders.

When engaging, NATO takes full account of all military and non-military aspects and is working to improve practical cooperation at all levels with relevant organisations and actors in the planning and conduct of operations. Especially in the field of training and exercises progress has been made through offering joint training of civilian and military personnel. This promotes the sharing

of lessons learned and also helps build trust and confidence within NATO and among its partners and other international and local actors, which has encouraged better coordination.

During NATO's Wales Summit in 2014 heads of state and government reaffirmed that the Alliance has to foster a comprehensive political, civilian, and military approach and a broad cooperative security network in order to build defence and related security capacity as well as interoperability between Allies and their partners, but also between military and non-military forces. A so-called "Defence and Related Security Capacity Building Initiative" was launched to reinforce NATO's commitment to partner nations. It helps the Alliance to project stability without deploying large combat forces, as part of the Alliance's overall contribution to international security and stability and conflict prevention. NATO has a set of different partnership programmes and military cooperation tools for assisting partners in developing their own defence capabilities and interoperability with NATO. Outreach to partners and international and regional organisations also helps to develop a common understanding of the WMD threat and encourage participation by states in and compliance with international arms control, disarmament and non-proliferation efforts to which they are party. It enhances global efforts to protect and defend against CBRN threats and improve crisis management and recovery if WMD are employed against the Alliance or its interests. On the practical side, NATO organises a large annual non-proliferation conference involving a significant number of non-member countries. This event provides a forum for informal discussions on all types of WMD threats as well as the political and diplomatic responses to them. Relationships should be also forged with

a wide range of experts from across academia, industry, international aid, law enforcement and others. To this end, the Alliance has stepped up its interaction with the United Nations (UN), the European Union (EU) and other international organisations to enable Allies to take practical steps to address CBRN terrorism and WMD proliferation, including implementation of UN Resolutions. The EU is an important strategic partner of NATO and it must be ensured that NATO Smart Defence and the EU's Pooling and Sharing initiatives are complementary and mutually reinforcing, to support capability development and interoperability with a view to avoiding unnecessary duplication and maximising cost-effectiveness. NATO will continue to seek dialogue with several other stakeholders (OPCW, IAEA, WHO, OSCE etc.) through seminars, workshops, conferences, and technical cooperation in order to exchange views, share their relevant experience, and disseminate best practices.

## Civil-Military Cooperation in the Field of CBRN Defence

Natural disasters (e.g. as experienced by Japan in 2011, which brought about the Fukushima nuclear plant accident), or man-made actions (e.g. the Chernobyl nuclear plant meltdown) often require significant international aid and assistance in post-event recovery.

The aim of NATO's Civil Emergency Planning (CEP) is to collect, analyse and share information on national planning activity to ensure the most effective use of civil resources for use during emergency situations, all in accordance with alliance objectives. It enables Allies and Partner Nations to assist each other in preparing for and dealing with the consequences of crisis, disaster or conflict. NATO plays its part by

(Photo: Bundeswehr)



**CBRN experts from Germany and the United States practise decontamination procedures during the 2014 GOLDEN MASK exercise using highly mobile decontamination systems.**

serving as a forum for comparing and analysing national programmes to ensure that plans and procedures are operational and that the necessary assets are available for addressing emergency situations jointly if necessary.

Civil Emergency Planning supports NATO's crisis management process and organisation through specific crisis management arrangements. The backbone of these arrangements is the use of some 390 civil experts, including CBRN experts, from industry, business, government and other public administrations to advise on the effective use of civil resources during a crisis. Civilian capabilities constitute some of the tools in a military planners "toolkit" for use as and when appropriate. Use of civilian assets in support of, or as part of, military operations, primarily in the area of deployability and sustainability of forces, is an important Civil Emergency Planning function. NATO military planners routinely and consistently seek the expert advice of these civilian experts as they plan and execute NATO operations.

### Intelligence and Information Sharing, and CBRN Reachback

Information and intelligence sharing on weapons of mass destruction and terrorism are important in order to identify potential threats and sources of financing, track potential attackers and support networks, weapons-manufacturing sites, and intended transport routes for chemical or biological agents. The NATO Intelligence Fusion Centre (NIFC) in the United Kingdom plays an important role in this area. Under the authority of Supreme Allied Command Europe (SACEUR), it provides intelligence to warn of potential crises and to support the planning and execution of NATO operations. In addition, NATO's WMD Non-Proliferation Centre also regularly analyses and reports on WMD threats and risks. NATO's 2009 WMD/CBRN Policy stated that "CBRN Reachback" capabilities as well as intelligence and information sharing are strategic enablers to facilitate the Alliance's efforts to combat WMD and CBRN threats. To enable operational commanders to make accurate decisions to protect their forces and to fulfil their tasks in a CBRN environment, it is essential that they are provided with the best possible analytical and scientific advice on CBRN issues. The provision of such expertise from all available sources to support situational awareness, intelligence analysis, operational planning and operations is called "CBRN Reachback". WMD intelligence and CBRN



(Photo: NATO)

**NATO Allies frequently train their proficiencies during live agent exercises comprising disabling operations of improvised explosive devices with radiological payloads.**

Reachback together encompass operational or tactical detection and characterisation of a CBRN threat, characterisation of WMD facilities and forensic attribution. The Alliance's JCBRND CoE in the Czech Republic provides training and expertise to military personnel in Allied and Partner countries. It integrates a "CBRN Reachback Capability" – at full operational capability since the beginning of 2016 – able to react and provide scientific and operational advice in the event of an attack on military forces and to help protect civilian populations against the consequences of an attack. A key part of this dedicated capability is a secondary network of partners that supports the Centre with various civilian and military expertise.

### More Security for Less Money

In May 2012, NATO introduced a new culture of cooperation with its "Smart Defence Initiative" in order to ensure that the Alliance can develop, acquire, and maintain the capabilities required to achieve the goals of "NATO Forces 2020". At that time, it was a complementary effort to the EU's Pooling and Sharing Initiative, and also aimed at encouraging multinational cooperation in the area of capabilities. While Smart Defence has concentrated on groupings of nations coming together for individual projects, the Framework Nations Concept sees groupings that normally address multiple capabilities, both their development and operation, within a multinational environment that also encompasses organisational and operational issues. The changing security environment and the reality of on-going operations require more multifunctional, more mobile, and more rapidly deployable and robust forces by the

Alliance, that can be tailored to missions. Interoperability, facilitated by the evolution of NATO joint doctrine and standardisation, will be crucial for Alliance forces in the future. The new Framework Nation Initiative, introduced in 2013 by Germany, seems to provide a good answer. It also responds to the financial restrictions and the respective need for a better burden-sharing among Allies. It provides the conceptual foundation for a new attempt of an increased and more extensive bilateral and multilateral cooperation. Its underlying idea is to bring nations that have a comparatively broad military capability spectrum or outstanding proficiency in a specific capability area, as it is the case with Germany in the field of CBRN defence, together with nations that could plug in their smaller capabilities into an organisational and conceptual backbone provided by the larger "framework" nation.

The concept is not new as such. The CBRN community has experienced such an approach since the creation of the CJ-CBRND-TF in 2003. What is new is the extent, intensity and range of application. The development of multinational units will increase sustainability and help preserve military key capabilities. Politically, the concept represents a further step towards transatlantic burden sharing. From a military perspective, it will help nations to meet NATO's Level of Ambition as agreed by the Allied Heads of States, while providing more security for less money.

### NATO's Future Challenges

Future challenges to NATO will include both conventional and asymmetric threats, hybrid warfare methods, and influential non-state actors, all striving to shape the information sphere, influencing public per-

ception, slowing and disrupting political decision-making and seeking to undermine the credibility of the Alliance. A recent NATO report<sup>5</sup> states that “NATO’s future is a future with risk and uncertainty, threats and opportunities, which will be fueled by rapid social, scientific, technological and environmental change, and exacerbated by the pervasive effects of globalisation.” It indicates “access to the global commons

incidents in the past, most of them were simply not spectacular enough to keep the broader public interest at the necessary level. While this may change if ISIL activities increase, many countries may still feel satisfied with the improvements in their homeland defence after 9/11. The absence of a fully shared WMD threat perception amongst nations may complicate defence planning and investment within

WMD crises involving the theft or loss of control of weapons or material of concern is growing.

International outreach and cooperation with partners will help to develop a common understanding of the CBRN and WMD threat and project stability through capacity building as part of the Alliance’s overall contribution to international security and stability and conflict prevention. For NATO, cooperation has become a necessity, not a luxury.

As terrorism is again coming closer to Europe, more attention needs to be paid to the developments on NATO’s southern and eastern borders and the possible use of CBRN material in terrorist attacks or hybrid warfare scenarios. The technical sophistication, innovative nature, and significant financial assets commanded by groups of terrorists add to the risk. NATO and its Allies and Partners need to step up their preparedness and be ready to act jointly, including by ensuring that necessary military and civil prevention and response capabilities remain adequately funded.

The “Framework Nation Concept” offers a promising approach for a more intensified cooperation among Allies. It builds on the targets as agreed through NATO’s Defence Planning Process, connect existing concepts such as Smart Defence and should ensure that NATO will continue to have in the future the required full capability spectrum.

Enhanced resilience at all levels is the call of the day. This means having sufficient capacity across the entire defence and security community to provide a shared ability to endure adversity over time and to recover quickly from CBRN incidents. This level of resilience will require the Alliance to connect with a range of different actors across the military and civil security spectrum. A certain degree of trust, facilitated by a common understanding of shared risk among Alliance members and their partners, will be important to achieving this coordinated effort. ■



Photo: NATO

**Chemical Warfare Agent Destruction in Libya – Sampling of the effluent after successful HD hydrolysis (2012)**

and to areas of operations will be contested by anti-access and area denial methods, CBRN threats, and new technological advancements. The Alliance will need to develop abilities to gain and maintain access, and counter a wide range of proliferating threats posed by the rising capabilities of potential adversaries.”

NATO’s adversaries may seek to increase the lethality and diversity of threats in the area of operations to step up Alliance dependency on force protection and affect Nations’ perceptions of risk and therefore our public opinion and political will to intervene. Therefore, strategic communications will be central to sustaining and as necessary improving Alliance cohesion and its ability to assure Member and Partner Nations, other coalition partners, and other audiences, while likewise deterring threats and warning adversaries, especially in the context of hybrid warfare.

However, awareness of WMD threats by nations and their decision makers is still uneven. Despite significant CBRN in-

the Alliance, since diverse and often financially-driven national priorities persist. As a result of often declining defence expenditures, individual nations may not adhere to previously planned, or pursue different priorities in new defence spending, which may result in shortfalls of the Alliance’s full spectrum military capabilities and capability portfolio, in particular when it comes to low-likelihood, high-impact events, such as CBRN incidents.

## Conclusion

The pursuit of WMD and potential use by state or non-state actors pose a persistent threat to peace and stability worldwide. Increased access to expertise, materials, and technologies heightens the risk that state and non-state actors will seek, acquire, proliferate, and employ WMD. Additionally, the need to conduct predictive threat analysis will place ever-growing demands on intelligence and other capabilities. The risk of dangerous

1 <https://www.opcw.org/news/article/disposal-of-effluents-from-neutralised-syrian-chemical-weapons-completed/>

2 [http://www.opcw.org/index.php?elID=dam\\_frontend\\_push&docID=18118](http://www.opcw.org/index.php?elID=dam_frontend_push&docID=18118)

3 <http://photos.state.gov/libraries/netherlands/328666/pdfs/THIRDREPORTOFTHOPCW-FACTFINDINGMISSIONINSYRIA.pdf> and <https://www.opcw.org/news/article/opcw-adopts-a-decision-on-reports-of-the-fact-finding-mission/>

4 <https://www.opcw.org/news/article/libya-completes-destruction-of-its-category-1-chemical-weapons/>

5 Report of NATO’s Supreme Allied Command Transformation (SACT) to nations as the final output of the Framework for Future Alliance Operations (FFAO) project, dated 25 Aug 2015.

# Critical Trends in NATO Battlefield Intelligence

## Three Trends Industry Must Know About

**Koen Gijsbers and Matt Roper**

The current geo-political landscape is a dynamic, complex and challenging environment. Intelligence estimates indicate this is set to continue as evidenced from recent global events.

Photos: NCI Agency



*Major General (ret.) Koen Gijsbers, General Manager of the NATO Communications and Information Agency (left)*

*Matt Roper, chief of the NCI Agency's Joint Intelligence, Surveillance and Reconnaissance Service Line (right)*

These include Russia's hybrid and asymmetric stratagems in Crimea and Eastern Ukraine, the multifaceted Syrian conflict and radical terrorist attacks such as those in Paris and Brussels. In order to pre-empt and manage such events and scenarios, battlefield intelligence needs to adapt to this evolving landscape and provide key decision makers with relevant and timely information necessary to take appropriate action.

Today's complex and asymmetric "battlefield" demands rapid, accurate and high-quality information to be provided to political decision makers, intelligence services and military commanders across all domains including Space, Air, Maritime, Land and Cyberspace. In the murky world of hybrid warfare, a particularly high premium is placed on timely, accurate information – "so, what is happening on that border?" As NATO prepares for the Warsaw Summit, Industry must be aware of three important

trends that are fundamentally re-shaping NATO battlefield intelligence.

### Federated Mission Networking

The first is Federated Mission Networking (FMN). The concept outlines how NATO and Nations will connect on the battlefield. It leverages lessons learned from the Af-

cluding for certification exercises.

Any Industry seeking to deliver C4ISR capabilities to either NATO or NATO Nations must be familiar with the Federated Mission Networking concept, and the standards it sets for NATO and national connectivity on the battlefield.

The FMN concept addresses one of the key premises of today's uncertain security situation – we cannot be certain with whom

Photo: US Army



*The Federated Mission Networking (FMN) concept leverages lessons learned from the Afghanistan Mission Network*

ghanistan Mission Network. And it is not a theoretical exercise; in 2016 the Federated Mission Networking implementation plan will govern how Nations forming the NATO Response Force connect their networks, in-

and when we'll have to connect, but we will certainly be operating in a scenario of shared information between federated NATO and national networks. We will also have to establish those connections rapidly.

### Authors

**Major General (ret.) Koen Gijsbers** is General Manager of the NATO Communications and Information Agency and **Mr Matt Roper** is chief of the Agency's Joint Intelligence, Surveillance and Reconnaissance Service Line. The Agency is responsible for developing, operating and defending NATO's networks, a 24/7. 80% of the Agency's work is done through contracts with Industry. The Agency anticipates some €3 billion worth of business opportunities in NATO IT in the next years. See [www.ncia.nato.int](http://www.ncia.nato.int) for more.

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Photo: USAF



**NATO is acquiring a NATO Alliance Ground Surveillance (AGS) capability, which includes five GLOBAL HAWK Block-40 remotely piloted aircraft.**

The Federated Mission Networking Implementation Plan, as approved by NATO's top military body, the Military Committee, lays out the blueprint for achieving "day 0" connectivity, a key premise for success in today's uncertain world.

### JISR: Overcoming Critical Shortfalls

NATO and nations have identified shortfalls and capability gaps in battlefield intelligence from previous and current Alliance missions that reflect the World's unpredictable geo-political environment. Amongst these deficits, the primary challenges include the lack of available Intelligence, Surveillance and Reconnaissance (ISR) capabilities; problems with timely sharing of intelligence and a lack of commonly agreed working practices amongst Coalition forces. To address these shortfalls, a number of NATO programmes were established, chief amongst these is the "Joint ISR Initiative". This endeavour aims to improve training and education of Joint ISR personnel; develop robust doctrine and procedures to better enable interoperability and help establish secure networked environments to share ISR information and data amongst Alliance nations and Coalition partners - at all levels of command. Key to these efforts is an acceptance that the former "Need to Know" culture has evolved into one of a "Commitment to Share" intelligence amongst the Alliance and Coalition partners.

Embedded within the Joint ISR Initiative is an ISR process defined in NATO doctrine as "TCPED"-Task, Collect, Process, Exploit and Disseminate. This enables nations within

a coalition to work effectively together through a common understanding of processes and procedures. This is essential in order to request and task ISR capabilities, manage and monitor the execution of ISR tasks, exploit collected ISR data to meet the request and ultimately, to swiftly disseminate battlefield intelligence to those that need to make decisions.

Photo: AJFC



**NATO Secretary General Jens Stoltenberg met with the troops participating at TRIDENT JUNCTURE 2015, NATO's largest exercise in over a decade, at the San Gregorio Training Area in Spain on 4 November 2015.**

A lesson identified from recent Coalition operations is a shortfall in the right numbers and mix of ISR capabilities across many of the intelligence disciplines in support of Alliance missions. Conducting operations without adequate battlefield intelligence is one of the major risks that Politicians and

Military Commanders need to manage. To help alleviate the shortfall in ISR capabilities, NATO is in the process of acquiring a NATO Alliance Ground Surveillance (AGS) capability, which is to be NATO "owned and operated". This capability includes five GLOBAL HAWK Block-40 remotely piloted aircraft with a ground surveillance radar payload, static and deployable ground and exploitation systems and secure communications infrastructure. The NATO AGS Force will be part of the NATO Command Structure and will be located at a Main Operating Base in Sigonella, Italy. The AGS capability will help generate essential battlefield intelligence for NATO and nations using agreed standardised messages and data formats to support technical and operational interoperability. This interoperability is key to exchanging ISR information with other systems and capabilities - such as the NATO Airborne Early Warning & Control aircraft. Providing interoperable, accurate and timely battlefield intelligence to key decision makers, C2 nodes and operational units is now more critical than ever in bringing about desired mission effects in a dynamic and rapidly changing battlespace. In order to synchronise disparate ISR collection and exploitation efforts across the battlefield, it is now necessary to employ TCPED support tools to help support ef-

pabilities. These are systems whose primary role is not ISR, but are capable of collecting and disseminating ISR data - such as strike aircraft with targeting pods and a video data downlink capability. However, tasking and integrating NTISR capabilities into the TCPED process remains technically and operationally challenging and requires careful de-confliction against their primary mission. Open source intelligence (OSINT) is another developing area that can also provide a significant contribution to battlefield intelligence production. The sources of information available to the OSINT analyst, especially within the context of Cyberspace, are rapidly expanding. The complexity and volume of OSINT data being collected today means analysts now require sophisticated support aids to help manage the collected material and to rapidly exploit this information into actionable battlefield intelligence. This also applies to analysts of other intelligence disciplines, where vast amounts of data are routinely left unexploited due to limited numbers of analysts and insufficient support aids. There is now an increasing need for "smart" support aids to assist intelligence specialists to rapidly and accurately analyse the vast amounts of information from a multitude of sources. This may be achieved through machine-learning techniques currently in use by commercial businesses such as Google and Facebook. Such techniques can enable the intelligence analyst to infer patterns and trends including relationships between entities and thus improving threat indicators and alerting. NATO and Nations are now addressing the limited number of intelligence analysts and a lack of exploitation capabilities by offering more formal analyst training in a number of intelligence disciplines. In addition, nations are investigating mechanisms to better share battlefield intelligence processing and exploitation capabilities under a process known as Federated Process, Exploit and Disseminate (Fed PED). This protocol aims to distribute PED amongst the Coalition to effectively utilise available PED capabilities and thus optimise the amount of battlefield intelligence that can be developed. Essentially, this means that data collected by one ISR system, unit or nation may be analysed and exploited by another interoperable system, unit or nation - likely as not, in another geographic location. The fundamental concept of Fed PED is that collected ISR data and information are actively shared amongst the coalition. However, this brings other significant challenges such as storing and sharing intelligence information between different classified and national domains. NATO and nations are

addressing the sharing of ISR data, information and intelligence between different security domains as part of the Federated Mission Network and Mission Partner Environment and Information Exchange Gateway (IEG) programmes. This concept allows NATO and nations to connect their classified enclaves to a mission-classified domain enabling appropriately marked ISR data and intelligence to be shared between different security environments through an IEG.

### The NATO Cloud Is Real

The third and final trend that Industry must be aware of is NATO's transition to cloud-based operations. The Agency first used cloud computing in support of operations when NATO PATRIOT batteries were deployed to Turkey; a secure private cloud allowed to cut down the number of servers (and the related logistics tail) that had to be deployed. In 2015, the "Mission Information Room" (MIR) concept took this further by creating a fully cloud-based, virtual environment for exercises that can be accessed from both static and deployed locations. The benefits are not just in the reduction of hardware and servers necessary to support the exercise (including the necessary logistics and support). The MIR allowed staff involved in the exercise to access the environment from their regular workstations on the NATO Secret network. Prior to the MIR, a dedicated network with new accounts would be created and huge amounts of data migrated just before the start of the exercise. The use of this approach was a key component in the success of the 2015 Trident Juncture exercise, NATO's largest in over a decade. Finally, in 2016 cloud computing principles were used to connect NATO's six new headquarters in Eastern Europe in

record time. For NATO embracing the cloud means speed, reduced costs and logistics in establishing battlefield connectivity. What does this mean for Industry? As you design your capabilities for sale to NATO and Nations, they must be designed in the context of operating in cloud-based, virtualised environments.

### An Essential Framework for NATO-Industry Cooperation in C4ISR

We live in an age of unprecedented unpredictability and dynamic security challenges. The stability and prosperity of the Alliance depends upon timely and relevant battlefield intelligence now more than ever. This has highlighted the importance of intelligence and ISR as key strategic enablers. We need to keep pace with advancements in technology to ensure battlefield intelligence has sufficient capacity, capability and architectural flexibility to support future operations.

Industry is a key player in this equation. For a successful partnership Industry must be familiar and understand these three fundamental developments that are reshaping NATO's digital battlefield. ■

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# Understanding Data and Buying Capability

**Interview with Terry Halvorsen, Chief Information Officer,  
US Department of Defense**



Photo: ESD

**Prior to his appointment as US DoD CIO Terry Halvorsen (right) was the Department of Navy CIO, following on from a position as Deputy Commander for the Naval Network Warfare Command. His military career was with US Army Intelligence. This photo shows him during the interview conducted by Stephen Barnard (left), managing editor of ESD.**

**ESD:** People understand what the Chief Technical Officer does, but what does the CIO do?

**Halvorsen:** The CTO is more focused on the technology itself. The CIO manages money, and thereby sets the directions for CIO's "issues" - more engagement with industry and a higher emphasis on risk and security analysis. I set the directions we're going in the US DoD. I prefer the term "Cyber risk analysis" over "Cyber security" because there is risk in everything, and it depends on the mission, the data, and the timelines what level of risk to take. In general, we want more involvement with industry, a higher emphasis on security, and a better partnership environment with our allies. We have traditional allies, and we want to align clearly with them; but we also have allies that are moving in and out

of the network, and we need information systems that exchange data between our traditional and non-traditional allies. These are the things I'm thinking about.

**ESD:** How do you get more involvement with industry?

**Halvorsen:** We're directly exchanging with industry. We are a big player in Cyber IT, and we want to bring industry in from the beginning - and we're trying to put out our policy in conjunction with industry. For this purpose, we need to re-assess policy guidelines and accreditation to make the process serve our needs.

**ESD:** How do US export restrictions on defence technology affect you?

**Halvorsen:** From a CIO perspective, I haven't had a problem with the rules about

technology export. There may be some restrictions on who from the foreign side can apply. But those restrictions are not causing any lack of competition. Most projects are handled by the main IT corporations, and they comply with ITAR. In the past, the government has been over-prescriptive, and we were buying the solutions, not putting requirements out for capabilities. But if you buy solutions you get known answers, whereas if you buy capabilities that lets innovation play better.

**ESD:** How much interface do you have with foreign industry?

**Halvorsen:** Directly with foreign industry not as much, but most of the big companies are multi-national, and they have enough of a presence in the US to be considered a US company. There is one area we take more carefully than others, and that is Security. And obviously there are some places where I won't buy products.

**ESD:** Would you say that a specific expertise can be associated with specific countries?

**Halvorsen:** I don't think it can. It doesn't work that way with Cyber / IT because the pace of change is so fast. We're more interested in getting the right community involved, which could be from all over the globe, to solve a capability requirement. We try to make IT and Cyber less restrictive. The other thing is that generally there's only one supplying company where you can buy a specific weapon system. In that case government and a few companies drive the market. But in IT and cyber for government we are less able to drive the market or innovation. In the past, government was the main driver for innovation in IT and Cyber, while today it is the commercial and consumer sectors. The same applies to the military simulation world compared with the computer gaming world. Today, defence IT or Cyber is a much smaller percentage of the market - and it is shrinking. The global market in cyber has reached the point where you can do better at less cost if you adopt commercial products, designs and architecture.

**ESD:** Small and Medium Enterprises can be innovation drivers; how do you integrate them into the processes?

**Halvorsen:** I reach out to industry and academia. We talk a lot about Silicon Valley,

but Silicon Valley is a state of mind, as much as a place: innovation can be found in London, or in Berlin. The key is getting the innovative community together and the institutions involved in the business – the universities and the professional associations. It is sometimes hard to work with the DoD. If you want to get in touch with my organisation, a professional body can help guide you through the process of “how to do business with the government”.

**ESD:** You said you look forward and determine what is needed. How far forward?

**Halvorsen:** We look 20 to 30 years ahead but more often than not I’m looking 1-3 years for immediate buys. The speed of change has driven that. The challenge is to be proactive instead of just reactive, and



**Telehouse Docklands, home of the London Internet Exchange (LINX) since 1994: The “discussion about data – where it exists and how to protect it – can only be conducted globally, by defining global standards.”**

**ESD:** Do you believe that warfare concepts, like Network-Centric Warfare, have become more relevant to modern operations?

**Halvorsen:** The term “Network-Centric”

“Systems intelligence” is going to see more things connected, and it has to be automated. And then there is the Internet of Things: We need to understand a) what data we’re putting into the internet, b) the timeline value of that data, and c) that we will have to make both personal and enterprise decisions about the relative value of the Internet of Things. Individuals and corporations need to think about what data they want to share, and applications need to get better at defining what data they need and why. As both corporations and individuals get more mature, they’ll have a different perception of privacy. In Europe there is a greater interest today in privacy of data from individuals, and governments want to keep data in their sovereign nations. That’s an interesting discussion, because most data exists as an e-file in several different places at the same time. This discussion about data – where it exists and how to protect it – can only be conducted globally, by defining global standards. After all, we benefit from sharing data - the medical community has made great advances by sharing medical data. Everybody is wrestling with the boundary between individual privacy and state enterprise. Technology forces us to consider data rules: we might need different data rules for when you’re in a combat environment and when you’re not.

**ESD:** As CIO, what would your core message be?

**Halvorsen:** Today’s technology can make the world a better place, but we need to understand data better – in a business or security or private sense. The other message is that we have to figure out how like-minded nations, individuals and corporations can share data faster, in a way that allows data analytics to be faster, while still protecting individual privacy: and that’s going to be hard.

**ESD:** Mr Halvorsen, thank you.

**The interview was conducted by Stephen Barnard.**



**“Silicon Valley is a state of mind, as much as a place.”**

how you get major institutions – both government and industry – to move fast. We are all facing a battle to keep up with the times.

**ESD:** Will the differentiation between industry and defence IT / cyber go away?

**Halvorsen:** I don’t think so but industry IT and the government side will blend more. IT and cyber are basically the same environment. Cyber may focus more on security and on direct action, but IT has moved on from the desk-top environment. We will have an integrated IT system, and it is important to balance our IT environment with the necessity of sharing. Both government and personal business will use commercial equipment without much adaptation: we’ll be using the same software but potentially with different security solutions.

still has much relevance today. Some people thought that the speed of technology development would plateau, but it hasn’t. Understanding the data is the most important thing. We tend to think of data almost as being relevant forever: it’s not! Most data has an immediate time value and then loses its value quickly. The problem is that we don’t know which data is valuable now, and which isn’t. Both industry and the government have to work at knowing when the data is relevant. Then, it’s important to be able to share data rapidly, and deciding with whom to share data is a complex issue. Also, lower-level cyber needs to become completely automated. The speed of machines is the only hope you have to stay secure, and decision-aiding programmes or battle management systems are necessary.

# 8<sup>th</sup> Annual Warrior Competition

**Bob Morrison**

Following the 2001 terrorism attacks on the United States, His Majesty King Abdullah II of the Hashemite Kingdom of Jordan had the vision to create a centre of excellence for Counter-Terrorism and Special Operations tactical training. By the spring of 2004 plans had been drawn up for what would become KASOTC (the King Abdullah II Special Operations Training Centre) and a scale model was exhibited at that year's Special Operations Forces Expo (SOFEX) in Amman.

By 2009, on land donated by His Majesty, the KASOTC complex had been built inside a giant quarry by a US contractor with funding from the US Department of Defense Foreign Military Sales programme, under the management of US Army engineers. To mark the opening of the facility, an arduous competition was organised between a small number of Special Operations Teams and WARRIOR COMPETITION was born.

This May 27 teams from eleven nations registered to compete in the 8th Annual WARRIOR COMPETITION, though only 24 made it through the entire five days of competitive events, and compared to the 6th WARRIOR COMPETITION (which this author also covered) the broad range of tasks the teams had to complete were even more onerous and demanding. By the end of the final event on Day 5, The King's Challenge, which was restricted to the top-scoring 15 teams as of the end of Day 4, even the elite of the elite were close to exhaustion under the hot desert sun.

Each of the competing teams consisted of seven members, of which five were necessary for every event, plus a non-competing team support member / translator who was able to follow behind the five as they progressed through each individual event. Teams were able to bring their own weapons and optics, or to borrow weapons from KASOTC, but only ammunition supplied by the organisers could be shot.

## Author

**Bob Morrison** is a professional photo-journalist with over 30 years of top-level experience. Extremely well-known in his field, he is granted access and reporting rights at many otherwise "closed" events. He specialises in exotic and special-applications military equipment, and this is his first report for ESD.

Photos: Bob Morrison



**Lebanon's Black Panthers Team 2 won the 8<sup>th</sup> Annual WARRIOR COMPETITION.**

A list of equipment which the team had to provide, ranging from ballistic helmets and Level III body armour with trauma plates (20lb minimum vest weight, which was checked daily) to respirators, eye & ear protection, and assault boots high enough to give ankle protection, plus a minimum of six rifle and four pistol magazines with pistol belts, was issued prior to the competition. Many of the event stages required the team to split into a sniper & spotter pair for longer range shots and a three-man assault team for taking out medium and close range targets, with combat shotguns, assault rifles and pistols all being extensively used in addition to a sniper rifle for the longest shots.

The competition commenced with an Opening Ceremony, during which Jordan's elite - the 71st Counter Terrorist Battalion - mounted a heliborne and vehicle-borne live fire assault on an urban complex, then after a luncheon reception for the teams the first trophy was contested by one operative from each team. The COLT Top Shop 2.0 Trophy was a knock-out shoot-out, with two operatives competing side-by-side to be the first to drop the last target, using shotgun, assault rifle and pistol from different firing positions; the shooters who finished on the podium had to endure no less than five shoot-outs apiece, taking down twenty-one targets each time against a competitor who was trying to out-shoot them on the same range.

The COLT Top Shot event was effectively a gentle introduction to the competition which gave team members a chance to cheer on their compatriot and watch how other teams performed. As a senior instructor at a previous WARRIOR COMPETITION explained to this author: "On Day One of the competition there is a mountain of testosterone blowing around as the cream of many nations' Special Operations units strut their stuff, but by the end of the day a grudging respect starts building and by the end of the week many international friendships will have been born as the Warriors bond ever closer".

That first competition event concluded, just as the light started dropping off, with a win for the Jordanian Royal Guards Team 2 and second place going to the Chinese People's Armed Police Force Yanshan Mountain Commando Team. The big surprise of the day, however, was that Lebanon's Black Panther 2 Team came in a very close third and observers started to keep an eye on them.

together at a number of shooting events, including from the back of camels and from replica Rolls-Royce armoured cars, using historic rifles and pistols. Although marking a serious period in Arab history, the event was run in a light-hearted manner with SpecOps personnel from a wide variety of nations first organising themselves into three sub-units and then working as a four-man unit; for the record, the team led by the Canadian Special Operations Regiment team leader won the event by a considerable margin.

The organising team and range staff for the 2016 competition were drawn from KASOTC instructors and the US GovSource organisation, operating under the auspices of the Jordanian Armed Forces, with all of the Red Shirts being former Special Forces or Special Operations soldiers with operational experience. English and Arabic were the languages of the competition, and although most range staff spoke both languages KASOTC also provided interpreters at all event stages to ensure everyone was



***The Palestinians were followed closely by the Canadian Special Operations Regiment team in third place.***

team sniper took out long range targets, before racing back down into the heart of the KASOTC complex to record as fast a time as possible.

Throughout the Challenge minutes were added for missed targets, meaning those who thought tactically, took it steady and shared the loads to ensure steady breathing and heartbeat on the ranges, actually ended up with the fastest total times. To complicate matters, the tasks for the entire event were only revealed ten minutes before the start, and although notes could be taken no pictures of the briefing board was allowed; those who made good use of that ten minute window found it later paid dividends.

In the end Lebanon's Black Panthers Team 2 won the competition, with the Chinese and Jordanian favourites not even making it onto the podium. Palestine's National Security Force 101 team came almost out of nowhere to take second place overall, followed closely by the Canadian Special Operations Regiment team. When the top two teams were announced, down beside the Dead Sea on the last night, it is fair to say that the atmosphere was, to coin a phrase, emotional! ■



***Unexpectedly Palestine's National Security Force 101 team took the second place overall.***

Over the next three days all teams competed in three different event stages each day, each one with a different skills set required and details of the actual event only being released to the teams the night before when it was too late for them to practise. On Days Two and Four all three events took place simultaneously, with teams split into Rotations by ballot, but the third event on Day 3 was special and commenced in mid afternoon once the other events had been completed.

This year marks the centenary of the Great Arab Revolt against the Ottoman Empire, and to commemorate the occasion the teams were pooled and split into a number of 12-man international teams to compete

briefed on a level playing field.

At the start of Day Five, with just the King's Challenge event to be run, in theory any one of the final top fifteen teams could have amassed sufficient points to win the competition. The morning commenced with a cliff climb, after which team members had to pick up one of their number and race with him several hundred metres to the first firing position of several. In between each shooting event the team had to carry a heavy and awkward load or loads over distance before taking out the next batch of targets with shotguns, rifles or pistols. On the way they had to negotiate obstacle courses and ascend to the highest level of the quarry complex, where the

# Getting There First, With the Most....

**Tim Mahon**

Tactical mobility is king. Most often defined as the ability to move under fire, as opposed to operational (moving assets to the combat zone) or strategic mobility (moving assets to the operational theatre), tactical mobility has risen to the top of the hierarchy of needs for twenty-first century warfare. Lessons learned in expeditionary warfare and counter-insurgency operations over the last decade have driven a re-evaluation of the tactical benefits that improved mobility brings to the battlefield commander.

The result is a resurgence of interest – and a re-focussing of development and capability insertion efforts – in enhanced mobility throughout the spectrum of battlefield operations. Armoured vehicles such

becoming more and more important to armed forces around the world.

General Nathan Bedford Forrest is often cited as an early adopter of the concept of mobile warfare during the American Civil

## Ultra-Light Tactical Mobility

Leaving aside the tactical mobility ambitions of special operations forces (which have their own unique requirements and, indeed, a unique mindset) the starkest example of the changes in thinking that have taken place in the last two decades may arguably be seen in developments at the lighter end of the scale. In the United States there have been significant developments in what is now termed Ultra-Light Tactical Mobility, or UTM. Defined as vehicles intended for tactical functions, weighing under 4,500 lbs (2,045 kg) in combat mode and internally transportable by utility helicopters such as the CH-47F, the development and operational deployment of UTM has been greatly influenced by US experience in Iraq and Afghanistan.

The Army's Asymmetric Warfare Group commissioned RAND Corporation to examine the way in which these influences and experiences might best be addressed and developed into a cohesive UTM strategy. In its 2015 report, RAND concluded that there was a significant demand for such capabilities, driven by three interlinked factors: "traditional" light tactical vehicles have grown steadily in weight and complexity; the threat envelope has expanded exponentially, with increasing antiaccess/area denial (A2AD) threats making the entry of initial forces into the operational theatre problematic; and dismounted soldiers now carry a greatly increased equipment load, emphasising the need for a solution such as a UTM to bring tactical mobility back to former levels then increase it. The report concluded, however, that although the demand is a recurring one, it is neither consistent nor continuous: a conclusion that offers challenges to those who seek a simple, effective solution for tactical mobility needs.

The issue of dismounted soldiers carrying increased loads, whilst not exerting a direct influence on the demand for tacti-



Photo: Nexter

**Nexter's VBCI Armoured Infantry Combat Vehicle provides a good example of the manner in which manufacturers are addressing the need for enhanced mobility.**

as Nexter's VBCI place increased emphasis on the mobility aspect of the firepower/protection/mobility triangle of needs, while not compromising the other two to too great a degree; the wider spread use of helicopters to provide tactical commanders with flexibility and agility reflects the desire to optimise the deployment of combat assets quickly and efficiently; comprehensive training in exploiting the tactical mobility that new technologies are enabling is

War. Although he is often quoted as having said his objective was "to get there the firstest with the mostest," (a quotation invented by the New York Times), the spirit of those words certainly captures the thrust of his innovative approach to tactical mobility – and the same spirit imbues the objectives and aspirations of battlefield commanders to this day.

Mobility is not simply about leveraging and optimising the capabilities that modern mechanical and engineering solutions unlock; it is as much a mindset as it is a collection of separate components. "Doing the right thing right, and right now," for tactical commanders, requires an integrated and holistic approach to manoeuvre warfare: and it's happening.

## Author

**Tim Mahon** is defence and security specialist and author of many expert articles based in London.



Photo: Lockheed Martin

**The Lockheed Martin HULC exoskeleton was tested at the US Army Natick Soldier Research, Development and Engineering Center in Massachusetts in 2011.**

cal mobility, is nevertheless an important consideration planners are currently considering. Notwithstanding the tremendous advantages that "future soldier" mission equipment provides for individuals and small tactical units, there is no gainsaying human nature. The inevitable consequence of the individual soldier feeling encumbered – even put at risk – by having to carry the plethora of interconnected equipment that characterise these systems is that the equipment runs the very real risk of being jettisoned or even entirely abandoned in stressful operational conditions. Experience in this regard with small infantry unit operations in Afghanistan over the last decade or more provides compelling testimony that a

better solution has to be found. At the very least, these units have an urgent need for a mobility adjunct that can, quite literally, "carry some of the load."

### Unmanned Ground Vehicles

UTMs, All Terrain Vehicles (ATV) and light tactical vehicles (LTV) all provide such relief, and each solution has its own benefits and disadvantages. Some planners have turned to the robotics domain to find solutions, although there is still a long way to go before unmanned ground vehicles (UGV) are routinely inserted into tactical operations. One solution that neatly addresses the dilemma is the exoskeleton, a solution

that provides an individual soldier with artificially enhanced lifting and carrying power and promises huge potential increases in human endurance. The Lockheed Martin HULC is an untethered, battery powered, hydraulically actuated anthropomorphic exoskeleton, tested at the US Army Natick Soldier Research, Development and Engineering Center in Massachusetts in 2011. Providing an individual with the ability to carry a load of up to 200 lbs for up to 20 km on a single battery charge, HULC has made significant strides in enabling soldiers to conduct most types of tactical operations with greatly reduced risk of musculoskeletal injury – the root cause of more casualties and enduring disabilities than "enemy fire". Its widespread issue as a viable solution, however, does not appear to be in immediate prospect.

### Helicopters

Demands for tactical mobility are not restricted to the ground environment. Helicopters have been a valuable tool in this respect since they first appeared on the battlefield in the aftermath of World War Two. The almost ubiquitous Boeing CH-47 CHINOOK – some 900 of which have been delivered to the armed forces of 19 nations since 1962 – provides exactly the sort of flexible, agile support that tactical commanders demand. One of the most significant lessons learned from Afghan operations has been the importance of adequate medium lift helicopter support at all levels in the operational theatre – coupled

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Photo: US Army



Photo: USMC

**Boeing's CH-47F CHINOOK (left) and Sikorsky's MH-53K KING STALLION (right) are the Bundeswehr's alternatives to replace its ageing fleet of 81 Sikorsky MH-53 rotorcraft.**

with the fact that, however many are available, the number is never quite sufficient. In Germany, the Bundeswehr is seeking to enhance tactical mobility with the procurement of new support helicopters to replace its aging fleet of 81 Sikorsky MH-53 rotorcraft. The requirement has become urgent, with delivery of the first new aircraft required no later than 2022, which has reduced the real contenders to two – the CH-47F and the MH-53K KING STALLION. Although the roles for the new helicopter encompass almost every aspect of combined operations from air assault to combat search and rescue, it is in the provision of agile, on demand tactical mobility that the winning aircraft will offer Bundeswehr commanders the greatest immediate relief from the capability gap they confront. The foregoing issues highlight the fact that – like every other aspect of military operations in the current and evolving threat environment – the solution to the tactical mobility conundrum is multi-faceted, complex and heavily influenced by the fact that ALL future operations will be joint in one form or another. Some may argue that mobility is no longer a one dimensional issue, but is merely one aspect of the drive to find enhanced tactical agility. There is something to be said for that point of view. What remains true, however, is that, at least for the immediate future, solutions for tactical mobility will be sought in providing better, more effective capability for more traditional tactical vehicles.

Napoleon's maxim that "an army marches on its stomach" is often quoted as an illustration of the critical importance of logistics to successful military operations. Again, recent experience in Afghanistan proves beyond a shadow of a doubt that the gap between strategic and tactical mobility continues to widen and cause challenges at the operational unit level. Solutions for logistic support vehicle survivability have centred on "up armoured" vehicles, which is all well and good: but increasing vehi-

lar weight, even when accompanied by increased motive power (which it often is not,) militates against agility and thus enhanced mobility at the tactical level.

### Tactical Mobility Enhancement

Without delving into the long standing debate as to whether tracked or wheeled vehicles offer the greatest flexibility (the only valid answer, of course, is that it depends on operational circumstances,) some of the most graceful solutions to tactical mobility enhancement have been in the tracked ATV field. The BAE Systems BvS10 (a thoroughly modernised and enhanced development of the company's venerable Bv-206) has proven its flexibility and made significant contributions to effective tactical mobility in operations over the last decade. A combination of its ability to traverse even the most treacherous terrain with a significantly increased useful payload means that troops, equipment and essential supplies (ammunition, food, water, and almost as important in the modern combat

environment, batteries) can be delivered to the point of need, in a realistically short timescale under the toughest of conditions and under fire.

Nexter's Véhicule Blindé de Combat d'Infanterie (VBCI – Armoured Infantry Combat Vehicle) provides a good example of the manner in which manufacturers are addressing the need for enhanced mobility. Originally designed to be transportable in the Airbus A400M tactical airlifter, the company unveiled improvements to the original vehicle at Eurosatory 2014 aimed at improving the handling and operational characteristics. Principal among the improvements was additional steering for the rear wheels, reducing the vehicle's turning radius to less than 20 metres and thus vastly improving agility and flexibility in tightly constrained environments.

European armed forces have their own doctrines and their own approaches to force modernisation and transformation, of course. That does not mean that careful attention is not paid to developments and doctrinal change taking place within major forces such as the US Army. That service is

Photo: BAE Systems



**BAE Systems BvS10 is a thoroughly modernised and enhanced development of the company's venerable Bv-206.**

currently re-evaluating the tactical mobility needs of its principal unit of manoeuvre, the Infantry Brigade Combat Team (IBCT) as part of its ongoing transformation process. As consideration is given to the "greatest organisational change in the Army in half a century", the issue of tactical mobility has risen to the top of the challenges requiring swift resolution. What the US Army does today, European forces are certain to take into account and incorporate the most effective aspects of its action into their own forward looking solutions.

An examination of ongoing improvements to tactical mobility, then, requires a broader and more all-encompassing look at the entire bandwidth of ground operations. "It's not just about armoured vehicles, more powerful engines or whether to use tracked or wheeled vehicles: it is just as much about helicopters, about individual soldiers' equipment and about leveraging every component of the force mix, from logistics to tactical communications," said one senior European commander recently interviewed.

That highlights the interconnection between all aspects of the current processes of transformation being pursued – in Europe as much (if not more so) than elsewhere – as the armed forces struggle to provide enhanced mobility alongside all the other improvements that need to be made if operational requirements are to be met in a financially austere environment.

Does tactical mobility hinge on more power, lighter, more agile vehicles or innovative load carrying solutions? In part, yes – but not to the exclusion of so many of the aspects of current and future operations alluded to above. In the final analysis, improvements in vehicle handling, performance and sustainability have a big role to play in improving existing capabilities. Suspension systems, drivelines, running gear, power packs – all these areas of development are constantly being improved with the aim of providing the agility required by tactical commanders (see Issue 1/2016). They cannot be examined in isolation, however. Better tactical mobility needs a "whole force" approach to be ultimately successful. Training, for example, is becoming more and more important to the ability to react and respond to tactical demands – as witness the PUMA helicopter ingress/egress trainer recently brought into service by the United Kingdom's Royal Marine Commandos.

Tactical mobility is, indeed, about "getting there first with the most...", and visitors to Eurosatory 2016 can expect it to be high on the agenda for exhibitors and attendees alike. ■

## Marketing Report: Bren-Tronics, Inc.

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*The BREENERGY™ High Energy 24V 6T Lithium-Ion Battery Series power version (left) and energy version (right)*

why at Bren-Tronics, we worked hard to design and manufacture innovative, high energy, light-weight Lithium-Ion 6T 24V batteries.

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# International Cooperation Pays off

## Arie Jan De Waard

The Dutch Ministry of Defence (MoD) has a great amount of armament programmes. Three eye-catching programmes comprise the F-35 procurement, the Multi-Role Tanker and Transport Aircraft and the research for the possible replacement of the present WALRUS Class submarines.

## F-35 Procurement Programme

The F-35 procurement programme aims at replacing the ageing Dutch F-16 fleet. It is so far the biggest investment programme of the NL Defence Forces. This international programme is led by the US Government. The Netherlands participates - alongside

Photo: Dutch MoD



pilots saves money as well. And providing sustainment through a global support solution will drive sustainment costs down as well. All these factors are very important for air forces like the RNLAf. In all phases of the F-35 programme the principles of Smart Defence and Pooling & Sharing are applied. One of the most important lessons learned

sharing of this MRTT-fleet. The first aircraft delivery is expected in 2019 and will provide an Initial Operational Capability. Full Operational Capability will be achieved in 2021. In addition to added capabilities, affordability is one of the main principles of this project. The foreseen off-the-shelf solution provided by Airbus will increase interoperability and will decrease the AAR shortfall in Europe.

The lessons learned so far in the MRTT project point to the fact that it is crucial to do things in the right order. First the nations involved confirmed the need for a certain capability at political levels, too. Then the nations together established the operational requirement and developed a concept of operations. All nations involved have worked closely together for the last five years to implement the political initiative as a procurement project.

## Submarine Replacement Programme

Another eye-catching project is the submarine replacement programme. We are currently examining the need and possibilities for replacing our present WALRUS Class submarines. The parliamentary debate on the proposal for the study phase is expected later in 2016. When the Dutch Parliament approves the first phase of this replacement programme, it will constitute one of the more challenging projects for the Dutch MoD in the next decade. It will be the first time since the WALRUS Class submarines were built (30 years ago) that such a complex naval platform must be acquired. Although there is still a wide range of knowledge and skill within the Dutch MoD it is a total different situation to obtain new submarines given the fact that there is no national submarine building shipyard in existence anymore. Building the new submarines should now take place in cooperation with international partners. The Netherlands focus on countries that have similar requirements for the same timeframe. Currently both Australia and Norway have identified their operational requirements for a future-generation submarine capacity which should be in service in the next decade and beyond. For the submarine programme, identifying opportunities and possibilities for Smart Defence and Pooling & Sharing is one of the focus points in the study phase.

Photo: airheadsfly.com



**The Dutch Parliament approved an order for eight Lockheed Martin F-35As in March 2015, confirming the aircraft as the official replacement for the F-16s currently in use by the Royal Netherlands Air Force. This lot of eight F-35s is scheduled for delivery in 2019. The current programme of record for the Netherlands is the procurement of up to 37 F-35A aircraft.**

several countries like the UK, Italy, Denmark, Norway, Turkey, Canada and Australia - in the development, production, sustainment and follow-on development of the F-35. By partnering, the development cost of the F-35 can be shared. Ordering larger numbers together will reduce the price per aircraft. Combining training with partners and sharing aircraft for training of

of this programme is that it is beneficial to have one large partner in the programme, who 'leads the way'.

## Multi-Role Tanker and Transport Aircraft (MRTT) Programme

Over the last four years Belgium, Luxembourg, Poland, Norway and The Netherlands as the lead nation, have been developing the MRTT-project with the assistance of EDA. The objective is to acquire, operate and sustain a fleet of multi-role tanker and transport aircraft together. All participating countries will benefit from the coordinated acquisition and subsequent pooling and

## Author

**Vice-Admiral Arie Jan De Waard** is the National Armaments Director & Director of the Defence Materiel Organisation of The Netherlands.

# Asymmetric Response: New Portable Technology Enables Better Prevention of Terrorism

No terrorist event occurs in a vacuum. When explosives are used, planning, procuring, and assembling events require quantities of explosives to be transported and complied. The individuals transporting and handling explosives become contami-

personal belongings at checkpoints, special events and critical infrastructure can stop bomb-makers in their tracks and prevent major catastrophes. Routine trace explosive detection also forces bomb makers to take an extraordinary amount of care to

sensory signals when a trace explosive particle is present. This allows invisible or trace quantities of explosives to be detected. Each TrueTrace sensor interacts with specific classes of explosives to provide sensitivity and selectivity detecting most common explosive threats.

FIDO® X2 uses TrueTrace technology and is a handheld ETD that weighs less than 1.5 lbs (680 g). This new level of portability enables randomised and widespread deployment that makes security operations harder to defeat. Rather than depending on fixed security sites for prevention, lightweight systems can be randomly deployed in a broader range of locales, increasing the likelihood of catching individuals of malintent before an event occurs. The system also combines sensitivity, speed, and ease of use to aid law enforcement, first responders, and private security teams with an enhanced security capability. On-device video training provides real-time help and reduces the cost and logistical burden of recurrent training. At an industry-low price point, FIDO X2 can put the most modern explosive detection technology into the

hands of the brave men and women protecting the public from explosive threats.

With the escalation of world conflicts after 11 September 2001 improvised explosive devices (IEDs) became a weapon of choice. This asymmetric tactic has found its way into domestic terror plots, as witnessed in current events. Creating a homeland infrastructure that routinely uses ETDs for security screening can affect a similar level of protection as achieved in aviation security. However, traditionally three major factors have prevented the wide-scale implementation of ETDs for public protection: portability, ease of use and cost. New technologies have recently been introduced which address these challenges, while providing the levels of sensitivity required to detect concealed explosive devices at large public gatherings, critical infrastructures, public transportation infrastructures and prominent political events.



Photos: FLIR Systems

**As a handheld device FIDO® X2 enables randomised and flexible deployment.**

nated with discernible chemical signatures. These plumes, or traces, could announce to the world that their bearers are up to no good if devices with enough sensitivity are in place to detect the distinct signatures. Recent terrorist events in Belgium, Paris and San Bernardino underscore the importance of improved vigilance to disrupt the threat from homemade explosive devices before an event, or "left of boom."

Following the devastation over Lockerbie, Scotland in 1988, aviation security infrastructure adapted to include routine trace explosive screening in order to prevent future bombings. Explosives trace detectors (ETDs) based on ion-mobility spectrometry (IMS) are currently used in airports worldwide. They have been an effective tool at limiting aviation bombings. Unfortunately, the size, weight and power requirements of traditional desktop IMS-based ETDs typically confine them to established, indoor checkpoints with a continuous power supply. This type of fixed site security allows terrorists to probe security repeatedly to determine vulnerabilities.

Implementing pervasive screening for explosive residues on vehicles, packages, and

minimise their chemical signatures. These measures significantly increase the cost, time and expertise involved in building a bomb and therefore reduce the number of threats that are deployed. Such measures also require more people to be involved in the bomb-making process and thereby improve the chance of plot disruption through intelligence activities. In order to achieve these enhancements to public security, ETDs must be more widely deployed, and portability is key.

TrueTrace™ is a multiplexed detection approach advanced and commercialised by FLIR, using technology first developed at MIT. TrueTrace combines fluorescence and chemiluminescence techniques, and includes a proprietary detection material called amplified fluorescent polymer (AFP). Class-leading sensitivity is achieved by exploiting nanoscale effects that impart the sensing materials with the ability to self-amplify



# Utility Helicopters – Pickup Trucks of the Sky

Doug Richardson

There is no formal definition of what constitutes a utility helicopter, but in simple terms it can be thought of as the airborne equivalent of the small vans and light pickup trucks seen on city and country roads around the world. Their most common task is that of carrying personnel and equipment, but they can also handle a wider range of roles, including patrol and reconnaissance, search and rescue.

A scan through news reports published over the last six months shows export deals, deliveries, and other news involving almost 20 types of utility helicopter, so to keep the size of this article within a realistic limit, we will focus on some of the types

probably the two most widely-deployed examples fall in the middle and top of this range respectively.

The Bell UH-1 – nicknamed the “Huey” – is probably the best-known utility helicopter. Ordered into production in March 1960,

common operational military aircraft in the world.

Military customers include the US government, which has spent more than \$800 million on purchasing new Mi-17s for Afghanistan and Iraq. The US Department of Defense has responded to congressional criticism of the procurement by stating that purchase had been made “after considering [their] proven operational capabilities in the extreme environments of Afghanistan.” A small number are in service with the US Army’s Aviation Center of Excellence, where they are used to train pilots and crew chiefs.

India is a major user of the type, with a total of around 300 Mi-8 and Mi-17 currently in service with the IAF. This fleet includes around 120 Mi-17V-5, and a follow-on order for a further 48 is anticipated. The Indian Air Force uses its Mi-17s for border surveillance and in support of anti-terrorist operations, so plans to fit these aircraft with detection systems able to warn pilots of the range, angle, and direction of incoming hostile ground fire.

In a combat environment, utility helicopters can be armed and used in the attack role. For example, the Mi-8 and -17 can be fitted with stub wings whose six hardpoints are able to carry a combined total of up to 1,500 kg of weapons such as unguided rockets, bombs, or even antitank guided missiles. The Mi-8AMTSh helicopters that form part of the recent Russian deployment to Syria have been seen carrying not only weapons, but also electro-optical turrets for the PRESIDENT-S DIRCM (directed energy infrared countermeasures) system.

A less ambitious form of utility helicopter armament is the installation of one or more door-mounted machine guns that can be used to suppress enemy anti-aircraft fire when troops or equipment must be flown into or out of a combat area. This is a relatively simple modification to implement, but is best suited to the heavier helicopters since it reduces the number of soldiers or amount of cargo that can be carried.



Photo: Bundeswehr

***At present the UH-1 – shown here is a German Army variant – is operated by 36 countries; more than 20 further nations used the aircraft in the past but have now retired it.***

that have achieved significant sales or deliveries over the last year, and the factors that may influence future sales.

In terms of maximum takeoff weight, utility helicopters range from under three tonnes to more than 12 tonnes, and what are

it played a major role during the Vietnam War. Around 7,000 of the more than 16,000 that have been built saw service in Southeast Asia. Currently the UH-1 is operated by 36 countries, while more than 20 others used the aircraft in the past but have now retired it. The most common variant is the UH-1H, but the type remains in production in its UH-1Y VENOM form.

With a maximum takeoff weight of 12 tonnes, Russian Helicopters’ Mi-8 and its Mi-17 export derivative are probably the heaviest rotary-winged aircraft to be considered as utility types. They currently serve in 78 countries, making this the third most

## Author

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



Photo: MoD Poland

**A Mi-8 operated by the Polish Armed Forces****2.5 – 4 Tonne Class**

In this category, the payload is typically around eight or nine personnel or 1 to 1.5 tonnes of cargo. 2016 will see the formal debut of the Airbus Helicopters Inc (formerly known as American Eurocopter) UH-72A LAKOTA 3.5-ton twin-engine helicopter in the training role with the US Army. A militarised version of the Eurocopter EC145, the LAKOTA also serves as a training aircraft

with the US Navy, but the only export contract to date has been for six aircraft to the Royal Thai Army.

A planned Saudi Arabian order for 23 Airbus H145 (formerly known as the EC145T2) 3.5-ton helicopters was announced in June 2015 during an official visit to France by Saudi Arabia's deputy crown prince and defence minister Prince Muhammad bin Salman. These are probably intended for the Royal Saudi Army.

In December 2015 Russia and India signed an agreement for the co-production of at least 200 Ka-226T 3.5 ton light utility helicopters for the Indian Air Force. The deal also covers maintenance, repair, and technical support.

**6 – 8 Tonne Class**

The six-to-eight ton class consists of aircraft able to carry more than a dozen passengers. More than 900 of the 6-7 ton Finmeccanica (formerly AgustaWestland) AW139 have been ordered, and the company regards the type as the best-selling helicopter in its category. The most recent reported order was from Thailand, which will operate 10 in the transport and general utility roles.

In 2006 Airbus Helicopters and Korean Aerospace Industries (KAI) have teamed to develop the 8.7 ton SURION helicopter for the South Korean armed forces. Production began in 2012 and the new helicopter is slowly replacing South Korea's UH-1 and MD 500 DEFENDER. The two companies expect to deliver 245 aircraft to the home customer. They plan to begin international marketing of the type this year, and hope to sell a further 300 or more.

The Airbus Helicopters H215 (formerly the Eurocopter AS332 SUPER PUMA) attracted

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Photo: Finmeccanica

**Until today more than 900 of the 6-7 ton Finmeccanica (formerly AgustaWestland) AW139, here a version for the Dutch police, have been ordered.**



Photo: Airbus Helicopters

**The Airbus Helicopters H215 has received orders from more than 30 armed forces.**



Photo: Sikorsky

**Current production version of the Sikorsky BLACK HAWK is the UH-60M.**

orders from more than 30 armed forces. Production is currently handled by the company's plant at Marignane in southern France, but a second line will be opened at a newly-built facility near Brasov in Romania. Deliveries are expected to begin in 2017.

## 10+ Tonne Class

Current production version of the Sikorsky BLACK HAWK is the UH-60M. Developed for the US Army, this has uprated T700-GE-701D engines, enhanced rotor blades, and a fully digital 'glass' cockpit.

In May 2015, Taiwan took delivery of a second batch of UH-60M helicopters. On arrival, these were assembled and tested at the port of Kaohsiung by personnel from the Army Airborne Special Forces Command, then flown to their operational base. Tunisia originally requested eight UH-60M, and expected to receive these by the end of 2016. In June 2015, the US DoD announced that Tunisia would receive a further four aircraft by mid-2019. All 12 will probably be operated in an armed role, equipped with machine guns and 70 mm HYDRA rockets. Slovakia has four UH-60M on order, with delivery expected in 2017.

France has successfully operated the NHIndustries NH90 troop transport helicopter in Mali, and in January 2016 ordered a further six. These will bring to total in French service to 74. In December 2015, NHI delivered the second of an eventual 22 NH90 troop transport helicopters to the Spanish army. It was the 28th NH90 delivery to be made last year, and the 260th since the programme began.

Four examples of the NH90 Tactical Transport Helicopter (TTH) variant entered service with the B Land Component of the Belgian Armed Forces in May 2015, and early 2016 should see the delivery to the

Naval Component of its fourth and final NH90. These will be used for search and rescue, and to operate from the Belgium's KAREL DOORMAN class frigates.

The Airbus Helicopters H225M CARACAL (formerly the Eurocopter EC725) continues to attract export orders. In May 2015, Mexico was reported to be discussing a further batch of 50, while a Kuwaiti requirement for 24 was reported in June 2015.

Poland had planned to order 50 H225M CARACAL to replace ageing Mil Mi-8, Mi-14 and Mi-17 helicopters. This project was to have involved the creation of a local final assembly line in Łódź for the CARACAL, as well as a new maintenance facilities in Dęblin for the aircraft and its Turbomeca MAKILA 1A1 engines. However, following a change of government, in late December, Poland announced that the CARACAL order would be cut back, allowing separate orders to be placed for aircraft such as the BLACK HAWK and AW149 that might be better suited to some aspects of Poland's requirements. This sharp reduction in the CARACAL order might make the planned local production line unviable.

Photo: Airbus Helicopters



**France ordered a further six NH90 troop transport helicopters in January 2016.**

## The Future Market

For users of ageing UH-1 and Mi-8 helicopters, the best replacement will probably be a new aircraft of the same type. The current production model of the "Huey" is the UH-1Y VENOM. Based on the late-model UH-1N, this is powered by two General Electric T700-GE-401C turboshafts, and has a maximum payload of three tons, and a maximum takeoff weight of 8.4 tons. The availability of the Mi-17 also seen assured. Five Mi-171Sh were delivered to the

Bangladesh Defence Ministry last year. They will be used for cargo delivery, border patrol, and to support UN humanitarian operations. Another recent order was for 12 Mi-8MTV-5 for the Belarusian Defence Ministry. A study published in 2015 by RAND on the cost-effectiveness of various helicopters for the likely missions required by US partner nations used the Mi-17 as a baseline design, but concluded that the Russian helicopter was "unable to complete all of the mission tasks on all the routes evaluated.

In some cases, limitations were imposed by range; in others, by required altitude or hover capability. We note also that the Mi-17v5 generally declined in cost-effectiveness relative to the alternatives as climate conditions increased in temperature."

The report singled out designs such as the Sikorsky S-61T, Airbus Helicopters H215 (formerly the AS-332L1 SUPER PUMA), and the Finmeccanica AW139 as being "consistently more cost-effective" than the Russian helicopter. Several small utility helicopters,

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including the Airbus Helicopters H145 (LUH-72A LAKOTA) and the Finmeccanica AW109 were also seen as having good cost-effectiveness, but the study noted that in its analysis, "these aircraft did not carry two loadmaster/gunner personnel, or a door-gun and ammunition. Thus, these platforms lack the defensive capability needed to suppress enemy action in the landing zone." Looking to the future, we can see early signs of a US plan to begin replacing the "Huey". An industry day was held at Wright Patterson Air Force Base, Ohio, on 26 August 2015 to brief industry on a US Air Force plan to acquire up to 72 helicopters to replace the current USAF UH-1N fleet. Companies were briefed on the content of a planned Capabilities Request for Information (CRFI), and potential prime contractors were given

Photo: Airbus Helicopters



**Following a change of government in late December 2015 Poland announced that plans to order 50 H225M CARACAL would be cut back.**

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opportunities on the following day for one-on-one discussion sessions.

In the summer of 2015, Daniele Romiti, Chief Executive of what was then AgustaWestland, called for the governments of the UK and Italy to consider the development of a next-generation military helicopter that could meet the future requirements of both countries. According to Romiti, the most challenging technologies in a new helicopter are the drive system and the integration of the avionics. He envisaged the development of solutions that could be applied to both an attack and utility platform.

One the types that a new utility helicopter could replace would be the Royal Air Force's SA330 PUMA HC2 transport. These are currently due to retire in 2025, but the UK is considering a life-extension programme that could allow these ageing aircraft to remain in service until 2035.

Similar life-extension programmes could affect the future market for other utility helicopters. Under a recent agreement with Egypt, Russian Helicopters will support a retooling and upgrading of the Helwan Factory for Developed Industries (HFDI) aircraft repair plant in order to support the overhaul of the Egyptian Air Force's Mi-8Ts and Mi-17-1V helicopters. The modernised facility will also be able to provide after-sales technical support for all operators of Russian helicopters in the Middle East and North Africa.

Significant numbers of Mi-8s are reported to have been grounded in various countries in the developing world due to the operators' inability to carry out the technical work needed to restore the aircraft to flying condition. The renovated Egyptian repair facility might provide cost-effective rebuilds that could restore these helicopters to operational use.



# “We have to improve, be creative and think the impossible!”

**Interview with Lieutenant General Norbert Gehart, Director General and National Armaments Director, Directorate General III Assets Provision, Ministry of Defence, Austria**



Photo: MoD Austria

**ESD:** What are the most important armament programmes in your country, both current and forthcoming?

**LtGen Gehart:** The main armament procurement activities that my Directorate General is dealing with are the procurement of the German DINGO all-protected transport vehicle, some additional PANDUR APCs, soldier protective equipment and special equipment like drones, night vision devices, mine detection sensors, NBC decontamination equipment and robots for EOD and CIED. Another major programme is the midlife update of our AB 212 helicopter which is close to completion.

As far as future planning is concerned the Austrian Armed Forces will acquire tracked all-terrain carriers, ambulances, simulators for the air force, medical containers and weapon stations.

**ESD:** Which of these programmes are carried out in international partnerships, and who are your partners?

**LtGen Gehart:** None of these programmes are carried out in international partnerships in the deeper sense of armaments cooperation. However, bilateral cooperation has led to resource-saving solutions like government-to-government deals of used equipment or the procurement of vehicles

together with a partner in order to get an economy of scale. But in armaments, at least to my opinion, not only procurement but also training and maintenance cooperation can provide excellent opportunities to work towards cost-effective solutions, in particular for small countries operating small numbers of equipment. Austria's cooperation with Belgium in order to improve the performance of the APC PANDUR may serve as a successful example. Another example for a strong cooperation is the collaboration of Austria and Germany in the operation of the EUROFIGHTER jet aircraft.

**ESD:** To what extent have / can principles like “Smart Defence” and “Pooling & Sharing” been / be applied to one or more of these efforts?

**LtGen Gehart:** In the field of spare parts supply we face a different situation. In many multilateral armament cooperation efforts (user clubs) the common acquisition of spares and/or maintenance has been a standard procedure for years. In many cases a lead nation (mainly the producer nation



Photo: Jarisch

**The “Mid Life Update” of the 23 remaining AB212 comprises new cockpit electronics.**

of a system) is responsible for the procurement. The EU procurement rules are always considered. I think that for instance the utilisation of NSPA (e.g. COMMIT) to get spare parts for a reasonable price is a kind of pooling and sharing.

For four years Austria has been organizing the ESDC European Armament Cooperation Course with EDA and other partner na-

Photo: ESD archives



**The EUROFIGHTER programme constitutes a very successful example of European armament cooperation.**

tions to “pool & share” armament cooperation education.

**ESD:** Have these principles been applied to previous procurement efforts? If so, which are the lessons learned?

**LtGen Gehart:** SD or P&S were not used in the past for activities which aimed at common endeavours to equip our forces with major systems. In the framework of user clubs, Pooling & Sharing is a common practice!

Lessons learned from this over 60 different armament cooperation activities are positive. As I am not only responsible for armament but also for logistics and infrastructure of the Austria armed forces I have to say that we are far more ahead in logistics cooperation. As examples I would like to mention the cooperation in the framework of the EMCC ATARES or the OLSF activities in the NATO framework or similar activities supported by the EDA.

The common planning and acquisition of systems is a different story, hard to put into realisation. But we never give up! Our LL were that we need a common education and an armament cooperation strategy. Both are now available. A couple of weeks ago I signed the “Armament Cooperation Guideline” for my Directorate General, which gives clear and structured guidance how to analyse armament cooperation opportunities. I am not sure if other nations have such a document, but it is the only proper way to consider armament cooperation in all phases of the life cycle. But cooperation is difficult when it comes to national and international rules and regulations as well as organisations way of working. We have to improve, be creative and think the impossible!

We should keep a quotation from the famous composer George Gershwin in mind: “Life is like Jazz, it becomes best when you improvise!”

**The questions were asked by Jürgen Hensel and Peter Bossdorf**

# Big Guns for Dangerous Times

## Today's Geo-political Need for Big Guns

Tim Guest

**With new strategic and tactical threats, as well as ever increasing battlefield connectivity for participating combatants of tomorrow, the role and tactics and size and shape and form that modern field artillery should take have been matters of keen debate. Whatever tomorrow's conflicts look like is anybody's guess, but at least among the armies of Western Europe and NATO are some of the latest and most effective self-propelled tube artillery systems in existence.**

Not since the theoretical end of the "first" Cold War have nations in Europe, mostly NATO members, seen as many deployments and training exercises involving heavy weapons as there have been since Russia decided on embarking on its Ukrainian odyssey. Artillery systems among them, materiel is being repositioned, redeployed and generally given a thorough work-out since it was first announced in June last year that the US would deploy heavy weapons, including tanks, armoured vehicles and artillery, to a number of European countries. This followed Russia's annexation of Crimea and its participation in aggression against Ukraine. At that time, and much to the chagrin of President Putin, US Defence Secretary, Ashton Carter, said Bulgaria, Estonia, Latvia, Lithuania, Poland and Romania would each see equipment, much of which was already in Europe, deployed within their borders. Germany, where US materiel has already been stationed for years, is also taking part in the increased level of NATO activity. The US military at the time stated the equipment that would be moved around these nations would include Bradley fighting vehicles, main battle tanks, as well as self-propelled howitzers. Then, in March this year, the US Army added further to last year's news, announcing that it would be building up its engineer, communications and artillery equipment sets in Europe following the earlier bolstering of its European Activity Set to brigade size. The funding for all this is coming from the US military's 2017 budget request for a US\$3.4-billion

European-Reassurance-Initiative chunk and will cover the back-to-back rotations of the US Army's armoured brigade combat teams in Europe beginning in 2017. Artillery involved will include the likes of the latest Paladin SP systems.

But while this geo-political chess game is set to play its part in reassuring European allies that we're all in it together, much internal military and defence industry debate has been ongoing as to the best kind of artillery system for use in the future. What might future conflicts look like? Will the

systems of yesterday suit the battlefields of tomorrow? And so on. That Russia has breathed fresh life into what had been seen as a long-gone adversarial dynamic, does mean big-battle tactics and equipments to deal with traditional "Orange" on "Blue" force conflicts will still likely be relevant for many years to come. That said, in the field of SP artillery in Europe and NATO, along with a stable of reliable existing systems, there are a few new kids and developments on the block that will make any sensible aggressor think at least twice.

### Guns, Guns, Guns

This being the 300th Anniversary year of the UK's Royal Artillery (RA), where best to start than with mention of the BAE Systems' AS90 155mm SP gun, which equips five field regiments of the Royal Horse Artillery and the RA. Fitted with a 155mm, 39-calibre gun barrel, the system has a range of 24.7km firing standard HE projectiles, can carry 48 rounds of 155mm

Photo: UK MoD



### Author

**Tim Guest** is ESD UK Correspondent and a former Royal Artillery Officer.

*The AS90 is expected to remain in service with the Royal Artillery until at least 2023.*



**The first M109A7 was delivered to the US Army in April 2015.**

ammunition and has a crew of five. With its automated loading system the gun has a sustained-rate-of-fire capability of two rounds a minute. However, it is able to fire three rounds "burst rate" in under 10 seconds and six rounds a minute, "intense rate", for three minutes before the barrel must be allowed to cool. Using extended range ammunition/rocket assisted projectiles, AS90 can fire to a range of 32km. Equipped with a recoil and hydrogas suspension system, the turret can traverse and fire through a full 360 degrees. The vehicle's armour protects against small arms and shell splinters/shrapnel, and its frontal armour is capable of withstanding a 14.5mm armour-piercing round. Its Cummins VTA903T turbocharged V8 660 bhp diesel enables the 45-ton chassis to reach road speeds of up to 55km/h with a driving range of potentially 371km by road. First deployed by the British Army in 1993, AS90 replaced the SP 105mm FV433 AB-BOT, the RA's M109 155mm SP fleet, as well as the towed FH-70 155mm howitzer in one fell swoop. The system is expected to remain in service with the RA until at least 2023.

### Still a Workhorse for Many

While the Brits may have replaced their M109s years ago, the US has reinvented the system time and again for reasons not discussed here. And while this author did not set out with the intention of focusing on just one company, as the manufacturer of a number of noteworthy SP/mobile artillery systems, including the next-generation M109A7, successor and major upgrade to the combat-proven M109A6 PALADIN, addressing BAE Systems is unavoidable. Having delivered the first M109A7 to the US Army in April last year, ESD magazine decided to connect with a spokesperson from the company to hear about some of the its latest and

relevant SP artillery developments and some of the thinking behind them.

"The M109A7," the BAE spokesperson began, "is currently in Low Rate Initial Production and will feature appliqué armour and provide an overall improved survivability



Photo: BAE Systems

**Twelve ARCHER systems have already been handed over to the Swedish Army**

over the M109A6. It will also feature greatly enhanced situational awareness than its predecessor.

"In addition, as a result of the introduction of a 600-volt electrical system, the A7 upgrade also eliminates 'active' hydraulics for cab traverse, tube elevation and projectile ramming found on older SP systems. The upgrade also addresses M109A6 obsolescence and provides substantial mechanical and electrical growth potential."

ESD understands that the M109A7's fire control system now includes technical solutions on the gun, including the ability of the gun to aim itself. The system also has a semi-autoloader, which replaces the all-manual, loader-rammer tray in the

M109A6; this significantly reduces crew fatigue during multiple-round fire missions and prolonged firing operations. In line with the main system upgrades, the capabilities of M109 munitions have also evolved, with the system capable of firing standard NATO projectiles, including tactical nuclear shells, Copperhead guided projectiles, rocket assisted projectiles (RAPs) and dual-purpose improved conventional munitions, to name but a few.

With new battlefield threats to consider in future designs and upgrades the BAE spokesperson added, "The nature of the asymmetric battlefield and associated increase in direct-fire and underbody threats have necessitated the development of a tailorable armour package for BAE Systems' SP systems, as well as improved suspension capable of hosting the additional weight of the armour." According to the spokesperson, the demands of modern battlefield operations are pushing technology to find improvements in the areas

of transportability and reduced logistics footprint, (lighter weight and smaller size), while at the same time increasing performance in terms of firepower (i.e. range and accuracy), improved ergonomics, compatibility with new ammunition developments, improved fire control and reduced through-life costs.

According to BAE Systems, the new M109A7 and its associated M992A3 Carrier, Ammunition, Tracked (CAT) vehicle, enhance their combat-proven predecessors, the M109A6 PALADIN and its M992A2 Field Artillery Ammunition Support Vehicle's (FAASV), with improved reliability, maintainability, performance, responsiveness, and lethality. The com-



**Dutch PANZERHAUBITZE 2000m, developed by Rheinmetall, firing in Afghanistan.**

pany states that: "From the move, the M109A7 can receive an order for a fire mission, compute firing data, select and occupy a firing position, transition from travelling configuration to firing configuration and point its cannon and fire within 60 seconds – all with first-round, fire-for-effect accuracy", and out to ranges in

excess of 30km. Another key factor with the M109A7 is its increased commonality with the BRADLEY Fighting Vehicle, sharing the same engine, transmission and tracks.

The unnamed BAE spokesperson suggested that the most crucial current and future field artillery performance requirements

moving forward will likely include: survivability (shoot-and-scoot), crew protection, platform responsiveness, ability to achieve maximum range on behalf of conventional munitions, reliability and maintainability. "All of the performance attributes stated are important for a complete system to be effective; BAE Systems is trying to ensure that any improvement in one area is not traded off to the detriment of another. In addition, long-range precision effects from conventional artillery are becoming more and more important.

"For the foreseeable future our combat vehicles are expected to grow in weight and demonstrate a greater electrical demand as we continue to add power-consuming systems and applications, external armour, etc. Acknowledging this fact has directly resulted in BAE Systems' active pursuit of platform growth potential."

## ARCHER Takes Aim

It would be remiss, in speaking of BAE Systems in relation to latest field and SP artillery innovations, if mention were not made of ARCHER. And while the company spokesperson emphasised that "tracked systems are generally more stable and have faster response times than wheeled solutions, which are not able to shoot on the move", they also emphasised ARCHER as a "novel system concept that focuses on mobility, speed of deployment, a high degree of crew protection, automation and cost effectiveness".

This state-of-the-art, next-generation SP artillery system has a fully automated, 155mm/L52 howitzer at its core, remotely controlled from the armoured crew compartment and is mounted on a Volvo 6x6 articulated hauler, which can reach a top speed of 70km/h. The system also comprises an ammunition re-supply vehicle, a support system and a portfolio of both conventional and advanced munitions. These include the "Bonus" sensor fused artillery shell and the Excalibur precision guided artillery projectile from Raytheon. Its magazine holds 21 rounds. The system weighs 35.3 tons and can fire three rounds in 15 seconds and 20 rounds in 2.5 minutes out to a maximum range of 50km. Its stabilizing legs can be extended and the gun readied for a first round shot in just 30 seconds.

ARCHER has been designed to operate in extreme conditions, such as harsh Swedish winters, but is equally capable of operating in high temperature desert conditions. The crew compartment offers protection against shrapnel, mines, as well as nuclear, biological and chemical threats.

## Denmark: Fire – Misfire – Fire – Misfire?

On 8 April 2016 the Danish Acquisition and Logistics Organization (DALO) "fired a second round" in an attempt to hit the right company from whom to procure 15 artillery systems with an option for 6 more systems. Following companies have been pre-qualified:

- BAE Systems Land & Armaments, USA
- Elbit Systems, Israel
- Hanwha Techwin, South Korea
- Huta Stalowa Wola, Poland
- Nexter Systems, France

Two observations might be of interest in this context. When the evaluation of the bids from the first procurement round was put forward to the Danish politicians, the procurement was cancelled with the explanation that before a contract could be signed there was a need to see the cost of repair for an EH101 helicopter crashed in Afghanistan. However, it was soon known that some politicians could not accept that Elbit Systems from Israel would win the competition. In other words, foreign policy, international law and procurement of weapons was once again high on the political agenda. Therefore, having Elbit pre-qualified again might indicate a political poker game or joker. If Elbit wins the procurement once again based on objective evidence will they get a contract or if Elbit loose will the case end up in the Danish Business Authority as a complain about the procurement process?

Secondly, after the "misfire" from the first round it was decided to explore the possibility to procure artillery systems together with Norway. This would serve two purposes. First, the Norwegian authorities are not allowed to buy weapons from Israel so this would leave Elbit out of the game. Second, it would show that NORDEFCO really is ensuring "a comprehensive approach to capability development and armaments acquisition and life cycle support". Nevertheless, the Norwegian option was cancelled because of differences in the operational requirements and Denmark might have been paying for items not needed.

Concluding, all are holding their breath to see the hit from the "second firing" and according to the Press Officer in DALO a bidder's conference was planned mid May 2016 before a date for the bids are fixed.

(Bo Leimand)

"An ARCHER gun with a crew of 3-4 is able to act independently with all the capability that normally is available at the FDC and battery level," the BAE spokesperson told ESD. "But the system can be used and acts in exactly the same manner as a traditional gun, just with fewer crew. The 52-Calibre tube and mobility allows for deep fire in an offensive context, or to be positioned further back in a more defensive scenario." BAE confirmed that as of May 2016, "The contract with FMV is for 48 ARCHER systems. So far, 12 systems have been handed over to the Swedish Army. Experience and feedback is unanimously positive. It is a technical and organizational leap in the sense that it in some aspects transforms the artillery individual into a systems operator." The first production series Archer was delivered to the Swedish Army last September.

### A German Behemoth

While the UK replaced its M109s with the AS90, a number of European armies have adopted the German PzH 2000 to replace their older systems including M109s. Developed by Rheinmetall, the PzH 2000 SPH has a 155mm L52 main armament and is one



Photo: U.S. Army

**French soldiers conduct a live-fire exercise, with their Nexter Systems CAESAR self-propelled wheeled armoured vehicles, outside of Bagram Airfield, Afghanistan in August 2009.**

of the most advanced and effective artillery systems in NATO's inventory. In addition to Germany, the system has been selected by Croatia, Greece, Italy, Lithuania and the Netherlands and is operational with at least five of them at this time. Capable of achiev-

ing ranges of 30km with standard munitions the gun can also fire ERPs/RAPs up to 40km and, benefiting from its automatic loading system, PzH 2000 can achieve rates of fire of three rounds in nine seconds, 10 rounds in 56 seconds, and between 10 and



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13 rounds per minute in a continuous-fire mode, depending on barrel heating. It can also fire in a Multiple Rounds Simultaneous Impact (MRSI) mode. With a crew of five and a combat load of 60 standard shells and 288 charges, PzH 2000 weighs some 57 tons and has a driving range of over 400km; the gun's main armament has also been designed so that it can be used in other towed and SP systems. The PzH 2000 has already seen action with the Dutch Army in Afghanistan.

Rheinmetall states that the company's main armaments, ammunition and other system developments are all "dedicated to keeping artillery the King of the Battle in



Photo: Yugoimport

**The NORA-B/52 SP Gun-Howitzer from Yugoimport**

### Joint Fires

#### Mobile, Accurate and Joint Targeting

(sb) Presented at Eurosatory 2016, the Rockwell Collins' FireStorm Integrated Targeting System has been benefiting JTACs and FACs for several years, and is now offered both as a wearable technology and with a true joint fires capability for artillery forward observers.

Photo: Rockwell Collins



Combining the critical necessity to be smaller, simpler and mobile, the FireStorm solution almost uniquely offers azimuth augmentation, and therefore the highest level of targeting accuracy which reduces ammunition needs and collateral damage, making it one of the most advanced Digital Joint Fires systems available today.

Rockwell Collins took its biggest step into the joint fires space in 2007 when the company satisfied a UOR for the British Forces in Afghanistan to provide a system for accurate targeting for close air support. "We provided a package of equipment based on two key elements: our software, which provides the communication interfaces and ability to absorb positional data and plot it on a digital map; and an augmentation unit for laser rangefinders which overcomes random azimuth errors induced in the internal digital magnetic compass, due to the proximity of ferrous objects or magnetic anomalies," explains Graham Davenport, Marketing Director for Global Joint Fires at Rockwell Collins. "This provides a level of precision needed in this space – for both CAS and artillery applications."

The company delivered that UOR, and saw it successfully rotated through Afghanistan from 2007 to 2014 when British combat forces finally withdrew from the conflict.

"The requirement changes over time," Davenport said. "The ability to have a much simpler and more mobile system has become a major driver now and that's due to operational changes – notably, the need to operate out of FOBs has given way to more mobile deployment. We have continued to develop along this track with our body-worn system, which can still be used in a static position if longer ranges are required. Alternatively, users can be mobile - targeting at a shorter range, either still with full accuracy augmentation or simply using the levels of accuracy offered by an effective laser rangefinder."

Germany adopted an enhanced version of the same system, along with new Link-16/VMF Gateway solutions that enabled an interface with the German Adler II artillery battle manager system. This software is at the heart of both the ESG MOBIFAST and multi-link system, and while Germany and the UK represent FiresStorm's two big European successes, Rockwell Collins' software and equipment is also integrated in other systems in Europe and elsewhere. Beyond the continent, the company has recently completed its work to entirely reconfigure the infrastructure for UAE joint fires and is providing ongoing support. Rockwell Collins was also selected as the prime contractor for the Australian Defence Force Land 17 Digital Terminal Control Systems (DTCS) programme, delivering systems to Special Forces and artillery forward observers. This represented the first 'formal iteration' of FireStorm in an artillery-led environment using Digitally Assisted Fires (DAFs), integrating with AFATDS using the Variable Message Format (VMF) standard.

the 21st Century". Certainly, the PzH 2000 is at the forefront and perhaps the most powerful system in the NATO arsenal.

Along with main systems like the PzH 2000, Rheinmetall Defence supplies an extensive array of 155mm ammunition for a wide variety of missions at long ranges of engagement, including HE shells, some featuring insensitive explosives, illumination rounds for visual and IR missions, multispectral smoke/obscurant projectiles and the sensor-fused SMart projectile. The latter is the SMart@155, (also known by the Bundeswehr as the DM702), and is a cost-effective, "intelligent" and highly effective sensor-fused, autonomous fire-and-forget artillery projectile. As well as being suited for use with the PzH 2000, this projectile can be fired from any 155mm artillery system. Using SMart155, the company states that lightly and heavily armoured vehicles can be engaged in top-attack mode with pinpoint accuracy in all weathers and in all types of terrain.

### A Varied and Precision-Guided Future

While space limitations preclude going into detail on all the SP artillery systems of note in Europe at this time, the 155mm DONAR Artillery Gun Module from Krauss-Maffei Wegmann, the CAESAR 155mm from Nexter Systems and the NORA-B/52 SP Gun-Howitzer from Yugoimport are all worthy of note and may form the basis of a future feature. In addition, ammunition developments both for standard projectiles and charge systems, but especially in the field of precision-guided munitions, including the likes of: BAe's SILVER BULLET, Diehl's VULCANO, Raytheon's EXCALIBUR and Rheinmetall's SMart155, all point to the continuing essential and unquestionable role SP field artillery will play on the battlefields of tomorrow – and for which further words are warranted. ■



# “Role-specialisation at the level of defence tasks or capabilities is not a strategy we will pursue.”

**Interview with Morten Tiller, Deputy Secretary General and National Armaments Director, MoD Norway**



Photo: MoD Norway

**ESD:** What are the most important armament programmes in your country, both current and forthcoming?

**Tiller:** The most important armament programmes for Norway include, among others, the F-35 combat aircraft programme and the NH90 maritime helicopters for the frigates and the Coast Guard. Both are ongoing programmes. Submarine capability post 2020 is another crucial project measured in both scope and future defence availability. The submarine project is in its definition phase.

**ESD:** Which of these programmes are carried out in international partnerships, and who are your partners?

**Tiller:** The ongoing NH90 maritime helicopter programme is carried out in cooperation with the partner nations Germany, Italy and France with NATO Helicopter Industries as the industrial prime contractor. The F35 project is carried out with nine partner nations, namely USA, UK, Italy, Turkey, Australia, The Netherlands, Canada, Denmark and Norway.

As far as the future submarine acquisition is concerned, international cooperation is considered a prerequisite for the project. Hence, the possibility of international partnership in this regard will most likely be the result.

**ESD:** To what extent have / can principles like “Smart Defence” and “Pooling & Sharing” been / be applied to one or more of these efforts?

**Tiller:** Multinational defence cooperation has been part of our daily business since the establishment of NATO. The established cooperation among European F-16 nations in EPAF (European Participating Air Forces), the Evolved Sea Sparrow Missile development, and the Norwegian-US cooperation on ground-based air defence (NASAMS) are examples highlighting the advantages of a comprehensive, integrated and long-term approach to cooperation.

NATO’s integrated defence planning, integrated command, force structure, commonly owned and operated operational capabilities like AWACS, ACCS and the developing AGS/JISR and BMD, are all examples that multinational defence cooperation can provide the most cost-efficient solutions to national as well as shared requirements. The SAC programme (C17) has

tasks or capabilities is not a strategy we will pursue. We certainly can achieve more for less through cooperation, and NATO and EU can play a key role in facilitating and supporting cooperation, but the choice of ways and means to do so will be for the nations involved to decide

**ESD:** Have these principles been applied to previous procurement efforts? If so, which are the lessons learned?

**Tiller:** A capability-based approach to cooperation is the best way to maximise benefits over the life cycle. Armaments cooperation is often a good starting point for capabilities cooperation, but ambitions should aim higher, and include, if possible, doctrine and tactics, education and training, operations and maintenance as well as system upgrades over the entire life span of a given capability.

Early and firm agreement on operational and financial requirements, cost shares, timelines, procurement strategy and industrial participation need to be established.



Photo: forsvarret.no

**Norway is to procure 14 NH90 of the NFH version maintaining an option for a further 10.**

also progressed to be an effective multinational programme covering operational needs for the strategic transport capability of each participating nation.

Norway aspires to be able to counter any military threat or challenge to our sovereignty and integrity. To do so, it is important to maintain a balanced toolbox across the whole spectrum of capabilities, alone or together with others. Consequently, role-specialisation at the level of defence

Clear and unambiguous top-down guidance is vital but needs to allow for, and interact with, bottom-up responses and initiatives.

Finally, strategic, geographical, structural and cultural proximity will generally work in favour of cooperation, as shared interests are factors benefiting multinational cooperation.

**Then questions were asked by Jürgen Hensel and Peter Bossdorf.**

# Spies in the Sky

Doug Richardson

Our author reports on the latest developments in the field of sensors and systems designed to keep military commanders aware of the tactical situation on the ground.

One little-noticed component of the recent Russian military buildup in Syria was a single example of the Tupolev Tu-214R electronic reconnaissance aircraft. This special-mission version of the Tu-214

sance sensor. The 1990-91 Gulf War was the last major conflict in which the military relied on conventional wet-film cameras, and faces the delays introduced by film processing and traditional methods of analysis-



Photo: US Air Force

**This MQ-9 REAPER UAV carries the two underwing pods that make up the Sierra Nevada GORGON STARE increment II system.**

airliner carries a complex avionics installation understood to combine side-looking synthetic aperture radar (SAR), electronic intelligence (ELINT), signals intelligence (SIGINT), and communications intelligence (COMINT) sensors. Its arrival in Syria showed the importance of airborne reconnaissance in even a small and limited military operation.

The platforms used for this role range from fixed and rotary wing aircraft to unmanned aerial vehicles (UAVs), or even aerostats, while commercial imaging satellites provide high-quality imagery that can be used to monitor military developments on the ground. Cameras designed to capture visual imagery remain the most basic reconnais-

ing the resulting imagery. In much the same way that digital consumer cameras were to sweep away their earlier film-based counterparts from the late 1990s onwards, digital cameras whose charge-coupled device

(CCD) sensors cover a wider spectral range than that of film have become the optical sensor of choice

The way ahead can be clear since USAF flight tests conducted around the world in the mid-1980s with a camera that took alternate frames using an electro-optical (EO) sensor and film at half-second intervals. Even though the resolution of the digital sensor was low by today's standards, and inferior to that of film, the EO image proved equal or better than the film equivalent for 99 per cent of the time.

Since the output from a digital camera is already in digital form, it can be transmitted from the aircraft to analysts on the ground, and can easily be subjected to processes such as image enhancement and data compression.

The wider the frequency range over which imagery is gathered, the greater the amount of information available to the analyst. For example, the additional longer-wavelength coverage available from a CCD sensor – typically some 200 nanometers beyond that from film – gives better penetration of haze. If the enemy has deployed SAM systems, reconnaissance assets need to have enough stand-off range to be able to remain outside of the missile engagement zones. At such ranges, the sensor must still be able to deliver the 30-40 cm resolution needed to identify enemy military hardware. The lower the frequency at which an EO sensor operates, the larger its aperture must be to achieve the desired resolution. But there is a limit to the degree to which aperture size can be increased. For



Photo: author

**Cameras aboard a Russian Tu-154M observe Canadian territory during a 28 May 2008 observation flight conducted under the Open Skies Treaty. (Organization for Security and Co-operation in Europe)**

## Author

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

Photo: author



**Modern electronic technology allows this Schiebel CAMCOPTER S-100 rotary-winged UAV to carry an EO/IR turret, a synthetic aperture radar, and an Electronic Support Measure (ESM) system.**

most real-world applications, a diameter of 30-40 cm is the practical limit.

The simultaneous use of multiple frequencies is taken to what is probably its practical limits in the UTC Aerospace Systems SYERS-2A carried by the US Air Force's U-2 high-altitude reconnaissance aircraft. This sensor operates in no less than seven bands – reported to be green, red, near infrared (NIR); two short-wave infrared (SWIR) channels; and two medium-wave infrared (MWIR) channels.

In practice, most air forces cannot afford such a complex sensor and its associated platform, but Rafael's RECCELITE XR offers four bands – optical, SWIR, MWIR, and long-wave infrared (LWIR). Based on the widely-used RECCELITE pod, which is in operational use worldwide, RECCELITE XR was launched at the 2015 Paris Air Show. It consists of an aircraft-mounted pod, a digital downlink, and a ground exploitation station. The payload is gimballed and stabilised, so can cope with the effects of aircraft manoeuvres during stand-off or overflight missions.

Exploiting the output from sensors simultaneously gathering imagery in different frequency bands is tackled at the ground station. At the simplest, two sources (such as IR and EO) are matched in terms of field of view, allowing the operator to select any combination from 100 per cent of one channel and 0 per cent of the other, to 0 per cent of the first and 100 per cent of the second, selecting the combination or combinations that give the best results. Adding more channels to the mix would require the visual equivalent of a graphics equaliser used in audio systems, and demand greater operator skill. The ultimate solution would be to use computer algorithms to perform data fusion, creating a composite image that contains the best information available from the different frequency bands.

Airborne reconnaissance often involves the use of specialised aircraft, or a standard aircraft carrying a heavy equipment pod, but technology is helping to shrink the size of airborne sensors, allowing a small UAV to carry the sort of multiple payload normally associated with larger aircraft. During a series of demonstration flights by the Schie-

bel CAMCOPTER S-100 rotary-winged UAV conducted at Nowra, on the south east coast of Australia between 2 and 12 June 2015 for the Royal Australian Navy (RAN) and other Australian Government Departments, the vehicle simultaneously carried a L-3 WESCAM MX-10 EO/IR turret, a Selex ES PicoSAR synthetic aperture radar, and the Selex ES SAGE Electronic Support Measure (ESM) system.

Cameras have traditionally provided either wide-angle coverage of large areas of terrain, or highly detailed images of specific targets. Modern counter-insurgency warfare has cre-

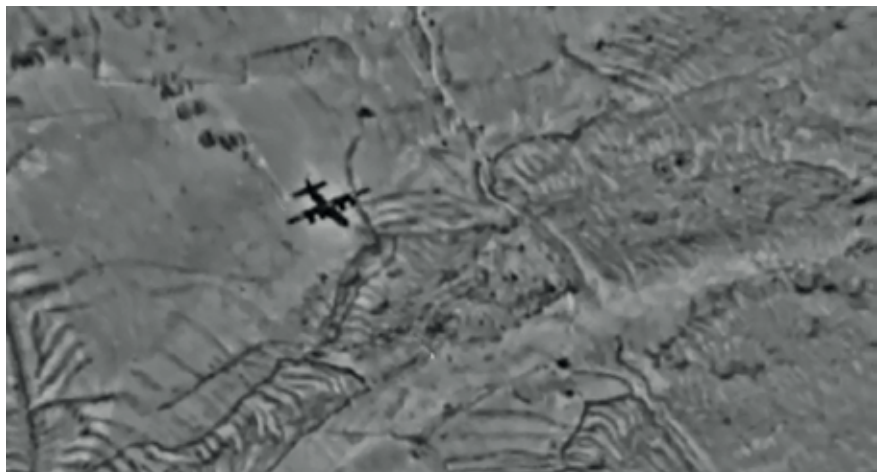


Photo: UK Crown Copyright

**A Royal Air Force TORNADO GR.4 fitted with a LITENING III reconnaissance pod captured this image of an RAF C-130 HERCULES conducting a humanitarian aid air drop over Iraq on 13 August 2014.**

ated the demand for sensor system that can continuously monitor a relatively large area, while simultaneously providing detailed images of multiple specific locations. The development of what have become known as wide area persistent surveillance (WAPS) has not been easy, but the demands created by the wars in Iraq and Afghanistan have spurred the development of several systems. One recent example is Sierra Nevada's GORGON STARE increment II. This takes the form of two large pods carried by the MQ-9 REAPER UAV. Both pods have a ventral gimballed housing. One pod contains an electro-optic (EO) camera, while the other has an infrared camera.

The system can monitor an area of terrain about 4 km in diameter, sending up to 12

different image streams simultaneously. This ability to handle a mixture of wide and narrow angle surveillance tasks will help the US military to keep track of what it terms 'squirters' – suspected insurgents running or vehicles departing – often in different directions – from buildings that are being kept under observation.

One area of airborne reconnaissance that until recently seemed "stuck in the past" involved the aircraft that the U.S., Russia and other nations use to fly reconnaissance missions of the other signatories' territory under the 2002 Treaty on Open Skies. These aircraft can carry optical panoramic and framing cameras for daylight photography, infrared line scanners, and synthetic aperture radar, but the imagery resolution is limited to 30 centimetres by the terms of the treaty. Up till now, Russia has used a customised Tu-154M LK-1 airliner for Open Skies missions. This originally had a payload that included AFA-41/10 vertical cameras and an AFA-41/20 panoramic camera, but digital cameras have recently been added. Russia has

also developed another customised airliner – the Tu-204ON. On this new platform, the main sensors will be one A-84ON panoramic camera, one AK-111 topographic camera, and two AK-112 digital aerial cameras, plus TV cameras for observation at low altitudes. Both types of aircraft also carry an infrared line-scanner and a side-looking synthetic aperture radar.

The planned use of digital cameras on these aircraft has attracted hostile comments from some US politicians. However, the maximum resolution of the Russian digital cameras is still constrained by the treaty, so is no better than that available from the best commercial imaging satellites. So perhaps the main role of the Open Skies aircraft is now more symbolic than real. ■



# “The BOXER programme serves as a good example of successful international armaments cooperation.”

Photo: MoD Germany



**Interview with Lieutenant General Benedikt Zimmer, Director-General of Equipment, Information Technology and In-Service Support, Federal Ministry of Defence Germany**

France, Italy and Spain in the European MALE RPAS (Remotely Piloted Aerial System) definition study in order to specify the requirements for a European medium-altitude RPAS and its design criteria. The results of the study provide the basis for the development of a MALE RPAS, which is scheduled for fielding in 2025. The MALE interim solution is to cover the period prior to the availability of a European MALE

Vehicle (MRAV) is a highly mobile and well-protected all-wheel drive vehicle (8x8) consisting of a basic drive module and a mission module laid out for dedicated operational purposes (personnel carrier for eight infantrymen, command vehicle, heavy armoured medical vehicle, and driver trainer vehicle). In this context I would also like to mention the “Mobile Tactical Communication” pro-

**ESD:** What are the most important armament programmes in your country, both current and forthcoming?

**LtGen Zimmer:** We are working intensively on a huge number of important armament programmes in order to provide our armed forces with equipment and systems required to meet current and future operational challenges. Let me refer you to a few highlights:

As examples of our current projects in the naval sector I would like to mention the Class F125 frigates programme and the MKS 180 Multirole Combat Ship. The Class F125 frigate has been designed for low to medium intensity global and prolonged operations. Innovative concepts such as intensive use, multiple crewing and crew reduction are being implemented for the first time. The concepts developed as part of the F125 project are consistently continued with the MKS 180 Multirole Combat Ship. It has the objective to enable the Navy to engage in three-dimensional naval warfare in up to high-intensity battles.

The EUROFIGHTER combat aircraft forms the backbone of our Air Force. We will keep the EUROFIGHTER in multi-/swing-role use as a core component of the Future Combat Air Systems (FCAS) until 2040 and beyond. In parallel we participate together with

Photo: ESD archives



**Supported by a total budget of some €4 billion the Class 180 Multi-Role Combat Ship (MKS 180) is expected to constitute the largest armament effort of the German Navy since WWII**

RPAS. For the air domain I would also like to highlight the “Tactical Air Defence System” programme which will be the core of the future German Ground Based Air Defence System architecture.

As far as programmes for the land forces are concerned I would like to mention the BOXER. The BOXER Multirole Armoured

programme. The purpose of this programme is to provide our land forces with suitable and ready-to-use command and control means. In the scope of this programme and commencing in 2018 we plan to equip the first PUMA armoured infantry fighting vehicles and BOXER MRAVs with the software defined future joint radio system.

**ESD:** Which of these programmes are carried out in international partnerships, and who are your partners?

**LtGen Zimmer:** The future European MALE RPAS programme will be managed by the international programme management agency OCCAR. The European MALE RPAS definition study is conducted jointly with our partner nations

**ESD:** To what extent have / can principles like “Smart Defence” and “Pooling & Sharing” been / be applied to one or more of these efforts?

**LtGen Zimmer:** Germany is a driving force of the “Smart Defence” initiative in the realm of NATO and “Pooling and Sharing” in the EU and has taken the lead of 16 capability clusters as part of the Framework

has made a name for itself as a reliable partner and leader in this regard, thus contributing with predictable expense to one of NATO’s core capabilities, of which all NATO members, particularly Germany itself, take advantage in a number of ways. Cooperation on the TIGER weapon system also entails common training for German and French aircraft technicians and pilots in

Photo: ESD archives



**The BOXER MRAP programme is being implemented in cooperation with the Netherlands.**

France, Italy and Spain. The MKS 180 is procured based on a Europe-wide tender. The goal is to award the contract by 2017 and to receive the first ship by 2023. The EUROFIGHTER is a four-nation project between the United Kingdom, Germany, Italy and Spain managed by the NATO armaments agency NETMA. The four partner nations plan to operate the weapon system in a common in-service phase following the completion of its development, production and delivery. The BOXER MRAP was developed in cooperation with the Netherlands and jointly procured via OCCAR. The Netherlands has procured a total of 200 vehicles. Currently negotiations are underway with Lithuania about this country’s participation in the OCCAR BOXER programme. And other nations are also interested in the BOXER MRAP. The BOXER programme serves as a good example for successful international armaments cooperation.

Nations Concept. In the medium and long term, multinational capabilities are to be developed in cooperation with the 16 participating nations.

**ESD:** Have these principles been applied to previous procurement efforts? If so, what are the lessons learned?

**LtGen Zimmer:** These principles were applied as part of bi-national and multinational procurements as well as in NATO/EU and OCCAR procurements:

In the bi-national BOXER MRAP project synergies are created through common training for maintenance and repair personnel at a single training facility as well as through the procurement of spare parts in larger lot sizes, which decreases life cycle costs.

A particularly positive example is the NATO Airborne Early Warning & Control Force as NATO’s flagship fleet which has been successful for more than 30 years. Germany

both nations. Spare parts are acquired according to the Pooling & Sharing principle. Based on a Mutual Supply Support agreement, both nations are given the option of acquiring spare parts from the other nation at short notice, subject to availability.

As part of the Evolved NATO Sea Sparrow Missile (ESSM) project requirements, timelines, cost and work shares are harmonised. These are important preconditions for making the development of such a complex missile system possible in the first place. Common logistic systems significantly reduce costs across the entire life cycle. Our experience shows that especially harmonising requirements, timelines, cost and industrial work shares is often difficult. Nevertheless, the principle of Pooling & Sharing has proven altogether successful during these projects. We will continue to pursue this course systematically.

**The questions were asked by Jürgen Hensel and Peter Bossdorf.**

# European Naval Aviation

Conrad Waters

European naval aviation is currently in the course of a period of renewal and modernisation. New fleets of helicopters and fast jets are either being introduced or are on the near horizon. They bring the prospect of significant enhancements to warfighting capabilities. There is also growing interest in unmanned aerial capabilities, not least for the improved situational awareness they can provide in the face of asymmetric threats. Increasing threats are also likely to drive further investment in land-based maritime patrol aircraft.

## Fast Jet Naval Aviation

France's Marine Nationale is currently the only European navy operating fixed wing aircraft at sea in CATOBAR (Catapult Assisted Take-Off But Arrested Recovery) mode. The venerable SUPER-ÉTENDARD strike fighter made its final launches from the carrier CHARLES DE GAULLE on 16 March

Active Electronically Scanned Array (AESA). Forty-two production series aircraft had been delivered to the navy by the end of 2015. They equip three naval air squadrons. Meanwhile, the United Kingdom is currently taking a holiday from maritime fast jet operations. This follows the withdrawal of its STOVL (Short Take-Off and Vertical Landing) HARRIERS as a result of the 2010 Strategic

mately total 138 aircraft. This will allow two front line squadrons to be formed by 2023. The jets will equip both Royal Air Force and Naval Air squadrons under a joint organisational structure. SDSR 2015 also confirmed that both new carriers would be manned and brought into service. This will avoid the gap in availability periodically faced by France when CHARLES DE GAULLE, its sole carrier, goes into refit.

The F-35B offers the prospect of continued fast jet deployment by other European fleets currently using the HARRIER. Of these, Italy has already made a major commitment to the overall LIGHTNING II programme. The Cameri final assembly and check-out line in Northern Italy is one of only two facilities of its kind outside the United States. It will also be the sole maintenance hub for European-based Joint Strike Fighters. Planned orders for ninety aircraft include thirty F-35B variants for both the air force and navy. The existing Italian aircraft carrier CAVOUR has been designed to facilitate transition from HARRIER to F-35B operations. The navy's new amphibious assault ship is also being laid-out to enable secondary use as a STOVL carrier in similar fashion to Spain's JUAN CARLOS I. Spain itself is another natural customer for F-35B variant Joint Strike Fighters in due course. However, financial considerations suggest its small force of EAV-8B+ HARRIERS will have to serve well into the next decade before replacement can be afforded.

## Helicopters

Indeed few European navies can justify the considerable capital and ongoing expense associated with fast jet operation. However, the majority own – or have access to – a variety of helicopter types, most commonly deployed on frigate-sized vessels. These helicopters are largely focused on 'sea control' anti-submarine and anti-surface vessel missions. However, transport, surveillance and general utility types are also common.

Photo: Dassault Aviation – S Randé



**Following retirement of its venerable SUPER ÉTENDARD strike fighters, the French Navy's fast jet force is now focused on Dassault's RAFALE M multi-role fighters.**

2016 at the end of the latter's deployment to the Eastern Mediterranean and Persian Gulf. Formal retirement is scheduled for July. This will leave fast jet naval aviation focused on the naval 'M' variant of the Dassault RAFALE multi-role fighter. The type has been progressively modernised since it made its operational debut in 2001. The latest aircraft incorporate the Thales RBE2

Security and Defence Review (SDSR). The first of two new QUEEN ELIZABETH class aircraft carriers is scheduled to commence trials of the F-35B STOVL variant of the Lockheed Martin LIGHTNING II Joint Strike Fighter off America's east coast in 2018. However, it will not be until 2020 that an operational sea-based capability is re-established.

The UK is the only Level 1 partner in the US-led F-35 programme. This will eventually see the procurement of over 3,000 aircraft in three different land-based, STOVL and CATOBAR versions. British industry accounts for around fifteen percent of each jet, whilst Rolls-Royce is sole supplier of the lift fan assembly for the F-35B variant. The SDSR 2015 review announced plans to accelerate British F-35 purchases that will ulti-

## Author

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The most significant European rotorcraft programme underway today is undoubtedly that for the NH90 medium-weight, multi-role helicopter. Developed by the NH Industries consortium of Airbus Helicopters, Finmeccanica Helicopters (the former AgustaWestland) and Fokker, the NH90 is a twin-engine, four-blade main rotor design. It utilises a carbon fibre fuselage and incorporates a full glass cockpit. The helicopter is being produced in both Tactical Transport Helicopter (TTH) and NATO Frigate Helicopter (NFH) variants. Around 270 helicopters from an order book of over 500 had been delivered to thirteen countries as of early 2016. The first NFH sea control version was handed over to the Royal Netherlands Navy in January 2010. It is progressively entering service with the armed forces of the six European countries that have collectively ordered nearly 130 of the type. In addition, Sweden is operating some of its TTH variants in anti-submarine configuration. Although the NH90 has suffered both from delays to production and some early teething troubles, these now appear to be on



Photo: NH Industries

**A Dutch NFH variant of the NH90 helicopter. The Royal Netherlands Navy was the first to take delivery of the type in 2010.**

ters. There are therefore variations in power plants, sensors and other equipment. However, a typical configuration includes a 360 degree radar, a forward looking infrared (FLIR) camera, dipping sonar and sonobuoy launchers, as well as lightweight torpedoes

Sikorsky SH-60 SEAHAWK series, in particular, remains popular with many European navies. Denmark became the first European customer for the latest MH-60R variant in 2012. Deliveries of nine helicopters are now underway. Orders from other legacy SEAHAWK operators seem likely in due course.

Meanwhile Finmeccanica also has a strong presence in market niches either side of the medium-weight NH90 through its AW101 and AW159 types. The former – known as the MERLIN in British Royal Navy service – is the result of an Anglo-Italian programme that originated in the 1980s. A three-engine, five-blade main rotor design, it is able to lift heavier weights than the NH90 and has greater endurance. Against this, it is more expensive to operate. Primarily conceived as a long-range anti-submarine helicopter, it has also been deployed as a troop transport and in a range of other roles by countries across the world. Britain's Royal Navy and Italy's Marina Militare are currently the principal European users of the AW101 at sea. Further afield, the Japanese Maritime Self Defence Force also operates licence-built versions as ship-based transports and mine-countermeasures aircraft. Elsewhere, the type's principal use is as a land-based search and rescue aircraft. The three-engine design provides an additional margin of safety for longer-range missions. The AW159 WILDCAT – the latest iteration of the British-designed LYNX – also fills an important niche as an economical, lighter-weight sea control helicopter. It is capable of operating from vessels too small to accommodate the NH90. Like the other helicopters already discussed, it is produced in both naval and military versions. The British Armed Forces, which started taking deliveries of 62 helicopters in 2012, are currently the only European operator of either type.

#### NH90 - NATO Frigate Helicopter (NFH) Orders (start 2016)

Country	Total	Belgium	France	Germany	Italy	Norway	The Netherlands
Number	129	4	27	18	46	14	20

Note: In addition, Sweden will operate 9 of its non-navalised Tactical Transport Helicopters in anti-submarine configuration

the way to resolution. Dutch NFH variants have already been deployed operationally off the Horn of Africa and other countries are achieving full operating capability. The various owners have typically specified bespoke configurations for their own helicop-

and air-to-surface missiles. In all cases, the range of capability provided far exceeds that of previous aircraft. Whilst the NFH is becoming the dominant European naval sea control helicopter, the market is contested by other types. The



Photo: US Navy

**The Italian Navy aircraft carrier CAVOUR operating with the US Navy's HARRY S. TRUMAN and French CHARLES DE GAULLE in the Gulf of Oman in January 2014. The Italian ship has been designed to operate the F35B Lightning II variant in due course.**



Photo: Crown Copyright 2013

**The Finmeccanica Helicopters AW159 WILDCAT – a derivative of the venerable LYNX – meets an important niche requirement as a well-equipped sea control helicopter able to operate from smaller ships.**

However, the WILDCAT has gained export success in Asia, where it has been selected by both the South Korean and Philippine navies.

Variants of other European helicopters remain in production across the world for a range of naval aviation missions. Notable examples are Airbus Helicopters' multi-role AS565 PANTHER variant of the DAUPHIN series and its heavier H215/H225 family of transports. Further developments of existing types can also be expected. For example, NH Industries has recently undertaken the first flight of a 'navalised' TTH variant of the NH90. This is equipped with enhancements such as navalised landing gear and an automatically folding main rotor.

## Unmanned Aerial Vehicles

Most European investment in naval aircraft is currently focused on manned rotorcraft. However, developments in the field of unmanned aerial vehicles (UAVs) are gaining increasing attention. To date, the US Navy has taken the lead in deploying UAVs at sea. It has already fielded unmanned aircraft ranging from 22kg (maximum take-off weight) Boeing INSITU SCANEAGLE to the 20.2 tonne Northrop Grumman X-47B unmanned carrier-based demonstrator. The most interesting development has been trial pairings of unmanned MQ-8B FIRE SCOUT UAVs with conventional MH-60R helicopters on US Navy Littoral Combat Ships. The aim has been to combine the best of unmanned and manned capabilities. Increasing pressures on Europe's borders arising from dangers such as mass migration and terrorism have, however, resulted in greater awareness of UAVs' potential. This is particularly the case with respect to the surveillance of maritime boundaries. Equally, the utility of improved intelligence-

gathering capabilities in the face of other types of asymmetric threat – for example piracy – has also been demonstrated during expeditionary missions such as the EU's Operation ATALANTA. To date, most UAV deployments on European warships have been as part of trials aimed at identifying the technology's potential. These have largely focused on smaller intelligence-gathering types, such as the SCANEAGLE. The SCANEAGLE itself has now been test-

Photo: Schiebel



**The Schiebel CAMCOPTER S-100's rotary design means that it is easier to operate and recover than many competing UAVs.**

ed by a number of European fleets. It is also now seeing operational use from British surface warships and auxiliaries under a £30 million contract agreed in 2013. In general terms, introduction of indigenous European UAVs have lagged behind those produced in the United States. This has included the naval sphere. One major exception has been the Austrian Schiebel CAMCOPTER S-100, which uses a rotorcraft design to facilitate launch and recov-

ery. The S-100 has been sold to a number of armed forces and trialled by many more. However, it was not until February 2014 – when the Italian Navy announced it would acquire the type – that the first European fleet selected the S-100 for operational use. The Airbus TANAN unmanned aircraft system appears broadly similar in concept but is larger and can carry a heavier payload. Development work has also been carried out on larger types. For example, Finmeccanica completed an initial capability demonstration of a rotary UAV for the UK Ministry of Defence using a modified PZL SW-4 light helicopter in mid-2015. At the other end of the scale, the British Royal Navy has also been trialling 3D-printed mini-aircraft developed by Southampton University. One use has been to assist navigation during Antarctic patrols.

## Maritime Patrol Aircraft

Another area of European naval aviation that looks set to benefit from increased instability is that for maritime patrol aircraft (MPAs). These can broadly be divided into 'high-end' types that are largely intended for hunting submarines at extended range and smaller, cheaper patrol aircraft more suited for constabulary surveillance mis-

sions. The popularity of the former type waned somewhat after the Cold War's end. As a result, some European countries have abandoned a high-end MPA capability altogether. Those remaining operate veteran Lockheed P-3 ORIONS and BREGUET ATLANTICs incorporating varying levels of modernisation. Both are aircraft that entered service over fifty years ago. However, the resurgence in Russian submarine activity may well trigger greater investment.



## A Norwegian P3 ORION MPA. Europe's high end maritime patrol aircraft are all comprised of relatively elderly designs

In 2015, the United Kingdom reversed a previous decision to abandon MPA operations. It has decided to purchase nine of the new Boeing P-8 POSEIDON design, which is based on the B737 jetliner.

There are greater numbers of smaller, less sophisticated MPAs in service with European armed forces and other government agencies. Typical of these aircraft is the MPA variant of the CN-235 transport aircraft. Although capable of being equipped with anti-submarine and anti-surface weaponry, its main value is in the intelligence gathering capacity of its sensors in roles such as EEZ monitoring or immigration control.

A notable trend, however, is the development of intermediate types such as the anti-submarine version of the larger Airbus C-295 and the similar ATR-72 ASW. These offer greater warfighting potential than the more basic types but can still suffer limitations in terms of speed, range or payload.

### Conclusion

European naval aviation is currently in relatively good health. A transition from legacy, Cold War equipment to more modern aircraft is well underway. Moreover, important indigenous programmes such as

the NH90 helicopter project appear to be overcoming earlier development problems and are starting to deliver a step change in capability. Looking forward, the potential of naval UAVs is only just beginning to be explored and Europe is somewhat behind the United States in this field. UAV technologies are likely to be an area of greater focus in years ahead. Elderly MPA fleets are also in increasing need of renewal. It will be particularly interesting to see whether European efforts to fill the gap between high end and more basic types will meet with success at a time when anti-submarine operations are gaining a renewed profile. ■

# ESD Spotlight

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# “Spain has a long tradition in international procurement programmes.”

**Interview with Lieutenant General (Army) Juan Manuel García Montaña, Director General de Armamento y Material, Ministry of Defence, Spain**

**ESD:** What are the most important armament programmes in your country, both current and forthcoming?

**LtGen Montaña:** During the last years, Spain has invested significant efforts to enhance the capabilities required by our Armed Forces to fulfil their missions both at national and international levels. Therefore, in the period from 1990 to 2012 significant means were invested in order to modernise the material and equipment in the inventories of the services and to upgrade their capabilities to match with those of our partners and allies in NATO and the European Union.

Among the most salient programmes, there are significant examples in the air domain.

The Eurofighter TYPHOON programme was launched to procure an advanced fighter aircraft with multirole combat capability. In the years to come, the TYPHOON will be the backbone of our Air Force's air superiority assets.

The transport capability will be significantly enhanced with the acquisition of the A400M. This aircraft will also enhance the Air-to-Air Refuelling (AAR) capability of the Air Force, so much needed in future operations where deployments to distant areas of operations and austere environments can be anticipated. This programme is particularly important for our country due to the fact that Sevilla hosts the Final Assembly Line (FAL) as well as training facilities.

In the rotary wing domain, the NH-90 programme was conceived to procure a joint medium-sized multipurpose helicopter. It is slated to replace a number of ageing helicopters in the inventories. The MoD recently issued a plan to reduce the number of models in operation and to look for common solutions for procurement, sustainment and operation costs. The NH-90 will probably be a test bed for many of those initiatives.

The TIGER programme was launched to provide the Spanish Army with a new generation helicopter with multipurpose capability able to comply with a wide array of missions. It can perform anti-tank missions,



air support to ground operations, has an air-to-air capability, etc. It is a very capable platform able to operate in all terrain and weather fitted with the most advanced technology.

In the naval domain, the most ambitious projects currently ongoing are the S-80 submarine, the Operational Patrol Vessel (OPV / BAM) and the F-110 frigate.

The S-80 programme's aim is to design a technologically advanced diesel-electric submarine with an indigenous Air Independent Propulsion system (AIP) that will augment significantly the time of operation and its furtiveness characteristics.

The Operational Patrol Vessel (OPV / BAM) programme's aim is to acquire a versatile medium size vessel equipped to perform a variety of functions to cover the Navy demands as well as of different other organisations, satisfying the state action demand in sovereign waters.

The F-110 frigate programme aims at replacing the ageing type F-80 ASW frigates with a more advanced and ambitious vessel suited also with air-to-air capabilities. So far only the contracts for the so called technology projects associated with this programme have been awarded or are expected to be.

As far as future programmes are concerned, there are many examples and in various domains.

In the scope of the so-called Strategic Force Projection (PEF) programme a number of aircraft with multirole tanker and transport capability are to be acquired for the Air Force in response to an imminent need for out-of-area deployments and sustainment in continuous operations.

There are also ongoing projects to acquire RPAS in two frameworks: an interim solution strategic – operational type like the REAPER, and an RPA class III under the EU-ROMALE 2025 initiative.

The first phase of the future VCR 8 x 8 wheeled infantry combat vehicle will cover the “technology projects” to study feasibility and provide risk reduction.

There are also projects to procure helicopters to satisfy the need of the Air Force for SAR / CSAR missions and to serve the transport and mobility requirements of the Navy.

**ESD:** Which of these programmes are carried out in international partnerships, and who are your partners?

**LtGen Montaña:** Spain has a long tradition in international procurement programmes, in particular in the air domain. The cost, time and resources needed are factors that incentivise cooperation among our partners and allies.

The programmes carried out in international partnership are the EUROFIGHTER, A400M, TIGER, NH90, and the METEOR missile. Depending on the programmes the partners are different:

EUROFIGHTER: Italy, United Kingdom, Germany and Spain. These countries have joined efforts and work together under the guise of the NETMA Agency to oversee the development of the programme for many years to come.

A400M: Belgium, the United Kingdom, Germany, France, Turkey and Spain. The programme is run by the OCCAR Agency with the aim of responding to the customers' demands and to serve as a platform for possible export possibilities.

METEOR: France, Sweden, Italy, United Kingdom, Germany and Spain.

TIGER: France, Germany and Spain. This partnership is as well under the OCCAR umbrella where the countries invest joint efforts to optimise common solutions for the programme needs.

NH90: Although it is a national programme contracted with AHE, Spain is a contributing participant to the NH90 community and NAHEMA.

existing NATO planning processes. This framework was adopted by the EU member states at the end of 2014.

These principles are particularly valid in the acquisition environment where resources are scarce, costs are always higher and international competition is very present. Nevertheless, there are other principles that need to be taken in consideration in the acquisition processes and that have to be balanced like having national strategic in-

ordination with its national industry, has begun a procedure for the renovation of the current Spanish SATCOM space capability (SPAINSAT, XTAR-EUR) in the 2020 time frame. Its technical specifications will take it to a highly competitive and state-of-the-art level which has only recently been implemented. Furthermore, Spain has shown its interest to participate in the SATCOM initiatives of NATO through NCIA and we are confident that we will play an important role in the NATO capability package, which will be complementary to the leading one that Spain has in the European Union.

The EU concept of Pooling & Sharing is complementary to NATO's Smart Defence. Smart Defence is a cooperative way of generating modern defence capabilities that the Alliance needs, in a more cost-efficient, effective and coherent manner.

Allies are encouraged to work together to develop, acquire, operate and maintain military capabilities to undertake the Alliance's core tasks.

Projects cover a wide range of efforts addressing the most critical capability requirements such as precision-guided munitions, cyber defence, ballistic missile defence, and joint intelligence, surveillance and reconnaissance, to name just a few.

Spain is involved in 18 out of 33 (level 1) Smart Defence projects.

Smart Defence and Pooling & Sharing principles might be applied to international programmes such as AGS, MALE2025, MRTT, SCAPA, A400M - but we are to reach even further.

International logistic cooperation is currently in need within the armed forces. As I said before, concepts such as Smart Defence and Pooling & Sharing are today addressed as an efficient way of sharing the burden of "more complex systems every day" maintenance. Initiatives like the Sharing of Spare Parts Project of the European Defence Agency will of course support facilitating the maintenance of systems and materiel. The establishment of a multinational framework for sharing spare parts in peacetime and during operations alone will reduce logistics costs and stocks.

In these times of austerity we are really aware that Smart Defence and Pooling & Sharing is the way to generate the modern defence capabilities for the future. This will imply harmonizing requirements, pooling and sharing capabilities, setting priorities and establishing better coordination of efforts.

**The questions were asked by Jürgen Hensel and Peter Bossdorf**



Photo: Nuria Fernández

**The PIRANHA 5 armoured infantry fighting vehicle developed by General Dynamics has been chosen by the Spanish Ministry of Defence as the base platform for the future VBR 8x8 of the Army.**

The MALE2025 (Medium Altitude Long Endurance) RPAS, government satellite communications (GOVSATCOM), the GALILEO GNSS programme, the Space Surveillance Tracking (SST) programme, the project of the future air traffic management of the Single European Sky (SESAR) or the use of structural funds for projects under the Common Security and Defence Policy (CSDP) are all flagship projects and part of the roadmap published by the EC in 2014. As regards the "space" domain, Spain has taken the lead for the GOVSATCOM capacity of the European Union and is ready to contribute to this capacity, together with other nations in the NATO context.

**ESD:** To what extent have/can principles like "Smart Defence" and "Pooling and Sharing" been / be applied to one or more of these efforts?

**LtGen Montaña:** In December 2013 the European Council put forward the development of an appropriate policy framework to foster more systematic and long-term defence cooperation, in full coherence with

dustrial capabilities, sovereignty, being able to operate and sustain autonomously, etc.. As a driver of this EU cooperation not only in important armament programmes but in initiatives on military capabilities, several Pooling & Sharing activities are being led by EU member states and international organisations such as the European Defence Agency (EDA).

There are several Pooling & Sharing projects in good progress, such as:

Air to Air Refuelling (AAR) programmes, in which Spain is interested as it will increase the A400M fleet AAR capability;

Training programmes for the European air transport fleet, in which we take very active part with the training programmes organized jointly with the EATC at the Spanish Air Force base of Zaragoza new Centre.

Sharing of spare parts projects that establish a legal mechanism allowing Armed Forces to share spare parts of commonly owned platforms in peacetime and during the execution of operations.

Concerning the SATCOM capabilities, the Spanish Ministry of Defence, in co-

# Class F-110 New Generation Frigates for the Spanish Navy

Nuria Fernández

The Spanish Government has made the first steps towards the construction of its new generation of frigates: the Class F-110. With the signing of three research and development (R&D) contracts at the end of 2015 the programme was given the green light with the objective for these ships to provide a multi-purpose capability for at least 35 years.

On 2 October 2015, the Council of Ministers approved the definition phase contract for the new frigates with an estimated value of €19.8 million. Scheduled to be completed on 15 December 2017, the proposed procedure for the contract will be an "Execution Order" under the convention between the state-owned company Navantia and the Ministry of Defence (MoD).

The maximum estimated value is distributed throughout seven annual instalments from 2015 to 2021. Funding as a "Special Weapons Programme" is provided through the Ministry of Industry. The MoD will return the credits in 2021.

As the Cabinet explained then, "the definition phase programme will allow the Government to provide all design and con-

most important, R&D contract has been to develop and integrate mast sensors, incorporate new capabilities in the SCOMBA combat system - developed by Navantia after the technology transfer agreements with Lockheed Martin during the F-100 frigates programme, and develop a missile actuation and control system to be installed in the future frigates. The temporary joint venture 'Protec 110', formed by Navantia and Indra, got this contract with an estimated value of €135.3 million in December 2015. Work is to be completed by 30 November 2020.

Prototypes of the new developments will be installed at the Centre for Land Systems Integration (CIST) located in Cadiz, where they will undergo final testing and integration before relocation and installation aboard the F-110 frigates.

At present work is carried out in the scope of a development and risk reduction programme, so the expected procurement contract is postponed until the completion of the project in 2020.

According to the Government, the implementation of this programme will enable the Spanish industries to deal with the future construction of the F-110 at a minimal risk. "The development of advanced technologies will consolidate the Spanish military naval sector and will maintain its competitiveness in the international market. In addition to that, the programme will encourage the creating and maintaining of employment in the sector and favour the auxiliary industry, subcontractors and suppliers", the Cabinet affirmed.

At a technology conference held in Madrid in September 2015, a representative of DGAM explained that the 13 technology projects associated with the F-110 programme had been structured into four main areas, namely:

- Sensors and combat system,
- Platform definition study,
- Infrared search and track (IRST) and
- Missile system.

The contracts for the first three areas have already been signed and are being execut-



Pictures: Navantia

**At a length of 140 metres and a displacement of some 5,000 t the CODELAG-configured propulsion system will give the new frigates a top speed in excess of 26 knots.**

The new development will allow Navantia to offer technical assistance in the preparation of the technical, management and economic documentation needed to define the ship. In addition, it will support the Directorate General of Armament and Material (Spanish abbreviation: DGAM) to draft the feasibility document and the design specifications.

## Author

**Nuria Fernández** is the editor of the Spanish edition of the online newsletter infodefensa and a regular contributor to ESD.

struction elements prior to the contract so that the frigates respond to the needs and missions required by the Spanish Armed Forces".

The second R&D contract related to these ships was signed in late November. The Ministry of Defence awarded a contract for the design and full-scale development of an Infrared Search and Track (IRST) system to a temporary joint venture composed of the Spanish companies Indra and TecnoBit. With an estimated value of €9.7 million, the contract must be executed before 30 October 2020, and the main requirement is that the IRST system can be installed on the integrated mast of the new frigate. The purpose of the third, and maybe the

ed, with the company (or JV) for the missile system yet to be selected.

## Main Features and Missions

According to military sources the plan is to build five new frigates that will replace the Spanish Navy's SANTA MARÍA Class frigates (F-80) between 2022 and 2030. Against that background, the design of new F-110 purposely responds to six dedicated requirements:

1. Designed for blue water and littoral operations;
2. Reduced complement of approximately 150 (the F-80 can accommodate a crew of up to 214, while the Class F-100 frigates are designed for a complement of 201);
3. Low operational and life cycle cost level (maintenance, logistics ...);
4. High level of survival: with low probability of detection and high capability to withstand damage and complete their mission;
5. A balanced combat system in all segments of naval warfare: air defence, complete antisubmarine suite, electronic warfare operations or asymmetric defence;
6. Modular capacity.

The new F-110 frigates will constitute the future surface force of the Spanish Navy. They will be able to operate in high-threat scenarios forming battle groups at sea or act alone in littoral environments.

They are intended to act in support of the Maritime Action Ship (BAM) when operating in conflict zones or in conjunction with the Class F-100 ÁLVARO DE BÁZAN frigates providing complementary capabilities. In fact, the ships will work as an intermediate solution between the BAM and the F-100 frigates, providing maritime security, mine countermeasures, escort duties and many other possibilities. The Navy already suggested features and a size midway between the current BAM, which is just over 93.9 meters in length and has a displacement of 2,670 tons, and the F-100, the displacement of which is 5,800 tons with a length of 147 metres.

In response to the entire range of objectives the Class F-110 frigates, which the Spanish Navy expects to operate beyond 2050, will have a multi-mission modular space. Although most of the F-110 capabilities will be permanent as "basic capabilities" of the ship, the new frigates will have a flexible multi-mission space dedicated to allocate modular capabilities, non-permanent, to increase the basic capabilities of the ship for specific mission profiles. Every modular capability is composed of a mis-

sion module, which comprises the mission systems and support equipment plus the personnel required to operate the module at sea. The multi-mission modular space can accommodate unmanned vehicles, special operations vessels or containers for different applications, depending on the nature and objective of the respective operation.

Some of these modular capabilities can e.g. support naval special warfare, unmanned vehicles operations, medical support, military-civilian cooperation and others. In accordance with the mission profile, different combinations of mission modules can be taken advantage of. Ongoing studies are intended to identify all requirements for

plant of the CODELAG (Combined Diesel-Electric And Gas) type with a gas turbine, diesel engine and two electric motors has been selected to power two-axis propellers with five blades and two rudders.

With regard to weapons fit, the F-110 frigates will have a 24-cell Mk 41 vertical launch system for SM2/3 and/or SEA SPARROW missiles and a 5-inch/62 calibre Mark 45 gun.

As far as the airborne elements are concerned, the frigates will have a large flight deck and hangar for two medium helicopters and Unmanned Aerial Systems (UAS). In fact, the F-110 frigates will be the first naval ships designed specifically to operate standalone VTOL (Vertical Take-off and



**Initial considerations for a 76mm main gun system have meanwhile been replaced by a design featuring a 5 inch gun.**

the frigates to respond to: those directly related to the ship as a naval platform and also those related to doctrine, organisation, infrastructure or facilities ashore.

## Integrated Mast

The main novelty of F-110 frigates will consist of an integrated mast accommodating the communication system, radar, electronic warfare and optronic systems without featuring any rotating elements.

This mast will incorporate S and X-band radars, the electro-optical system (IRST), the IFF and latest generation plane array antennas optimising communication capabilities and reducing the radar signature of the vessel.

The objective is to minimise mutual interferences, optimise the operational use of the electromagnetic spectrum and minimise failures and life cycle costs.

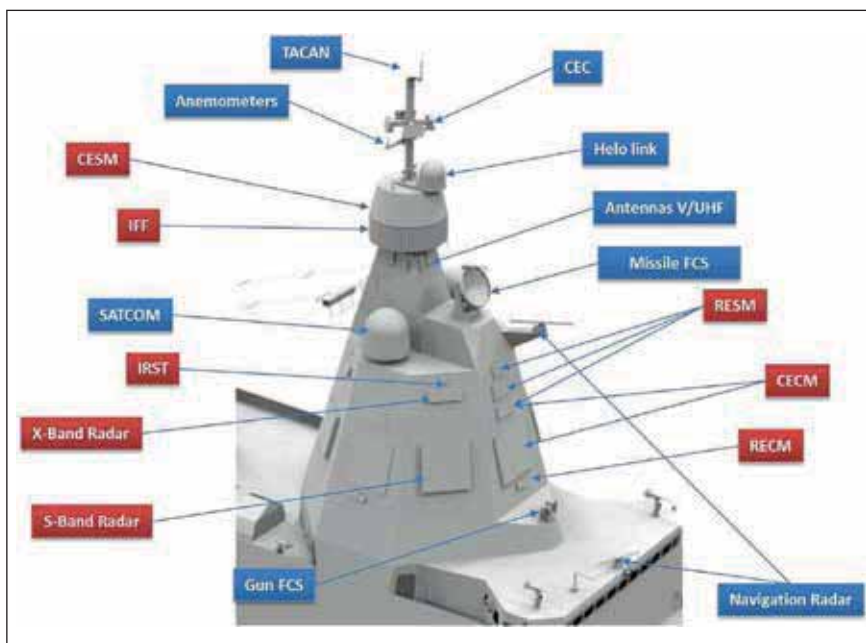
As far as the propulsion system is concerned different configurations involving gas turbines and diesel generators have been subject to studies. As a result, a hybrid

Landing) UAS for patrol tasks and combat, and AUV (Autonomous Underwater Vehicles) for mine warfare.

As already mentioned, the complement will only comprise about 150, although there will be capacity to increase number for personnel transport depending on the missions and specific equipment. This implies a design with a high degree of automation to carry out automated tasks formerly assigned to the crew.

## Export Possibilities

The F-110 frigates programme is considered vital for the future of the Spanish shipbuilding industry. According to defence industrial sources, it will have a great industrial and technological impact, not only because of the work share assigned to Navantia, its subcontractors and other suppliers, but also because of the very advanced technologies that will be developed and which will contribute to the consolidation of the Spanish leadership for this type of ships. In addition, the F-110 programme is also



**The integrated mast is to accommodate practically all sensor elements relevant for surface warfare.**

considered as a core element for Spanish military exports in the future. After exports to the Australian, Royal Norwegian and Venezuelan navies in the past decade, Navantia is now building two BAM offshore patrol vessels and the first S-80 Class submarine for the Spanish Navy.

According to an official Spanish government spokesperson "this type of frigate could be appropriate to replace about 65 frigates or corvettes in international naval markets in the decade between 2025 and 2035. And, of course, potential clients of Navantia will want a product proven by the Spanish Navy".

Spawning significant interest Navantia and the Spanish Navy have presented this ship design at different international forums. In the specialised media there are discussions of the interest shown by other naval forces. That is particularly notable in the case of Australia. On 18 April the Government of Australia announced that Navantia, in competition with Fincantieri and BAE Systems, had been shortlisted for the construction of nine frigates in the scope of the SEA 5000 programme. The contract signature is scheduled for 2018 and the ships would be built in Adelaide, where the Spanish company already has an important presence as a result from the AWD programme for three destroyers, supporting construction and tests.

Navantia was already contracted by Australia in 2014 to carry out design studies for the new frigates. The results, confirming the viability of the F-100 platform for the future Australian programme, have been very important for the selection of the company as potential designer.

"Navantia's bid constitutes a line of continuity with the AWD programme, both as

far as product commonality and the industrial processes introduced at the Adelaide shipyard are concerned", states the Spanish company in a press release.

## Shipyard 4.0

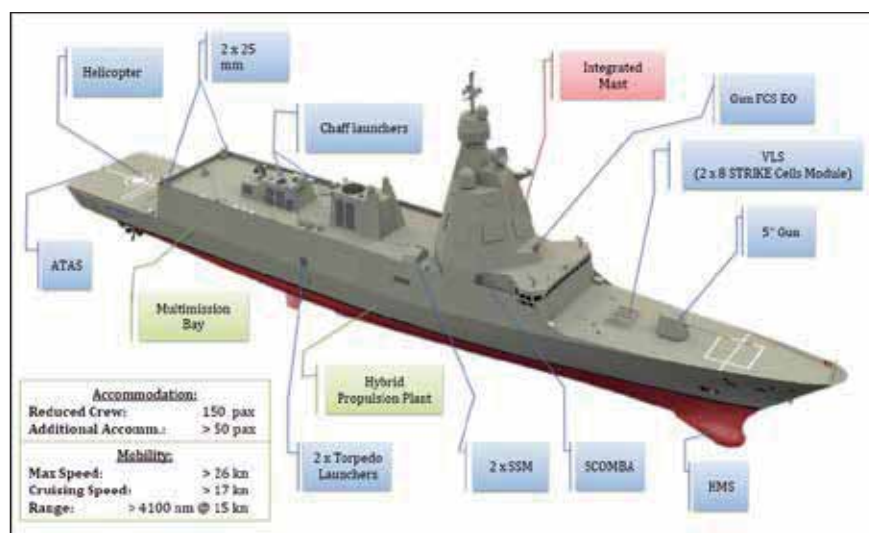
The F110 Programme will also be very relevant in terms of construction. Francisco Vílchez Navantia's F-110 Programme Director, said at a technical conference held in

such as the F-110 and an important process of transformation of the industry seldom coincided in time. He explained that they had defined the Shipyard 4.0 model of Navantia from the lessons learned from other national and international shipyards, and had based this model on five elements: advanced manufacturing processes; intelligent manufacturing resources; the worker in his digital workplace; analysis, modelling and simulation digital tools, and collaborative networks.

Recamán said that, so far, innovation in process had not been at the same level as the innovation in products, but stressed the importance of the agreement signed by the company and the University of A Coruña to establish a joint research unit aimed at developing aspects of the Shipyard 4.0 in the Ferrol facilities. "The F-110 is the ship of the future and we have to build it in the shipyard of the future," concluded the manager.

The launch of the F-110 programme, together with the VCR 8x8 Programme, has also meant the beginning of a new 'investment cycle' in Spain, as Secretary of State, Pedro Argüelles, stated vis-à-vis the Defence Commission in Congress during the latest budget discussions.

In addition, the Minister of Defence Pedro Morenés said that these two programmes are the basis for a restructuring of the de-



**Major sensor and weapon elements of the F-110 design. The multimission bay can accommodate unmanned vehicles, special operations vessels or containers for different use.**

November 2015 in Ferrol (Spain) that the programme was "a real challenge in terms of preparation and modernisation of the shipyard in Ferrol and a great opportunity to move towards the future Shipyard 4.0". In the same line, Angel Recamán, the Director of the 'Romero Landa' Technology Centre, stressed that a major programme

fence industrial sector because they promote partnerships in order to develop the technological projects launched by the Ministry.

"The aim is that, when the Common Security and Defence Policy arrives, we can put on the table a strong and competitive industry", noted the minister. ■



# “The possibility for partnerships is an essential requirement in selecting a new fighter aircraft.”

**Interview with Lieutenant-General Niels Bundsgaard, Commanding General, National Armaments Director, Danish Defence Acquisition and Logistics Organisation**



**ESD:** What are the most important armament programmes in your country, both current and forthcoming?

**LtGen Bundsgaard:** From a national point of view the upcoming new fighter acquisition would be considered the most important programme. Financially it is the largest of our current armament programmes and as such it has drawn huge attention from the press, our politicians and not the least the public. From a military point of view it is an essential investment in our future operational capabilities and a commitment to our allies.

In a multinational context, from our point of view the most important armaments programme must be the Danish lead NATO Smart Defence Project on availability of Precision Guided Munitions (PGM). The project will ensure both current and future cooperation possibilities in the area of armaments and in operations.

**ESD:** Which of these programmes are carried out in international partnerships, and who are your partners?

**LtGen Bundsgaard:** Both programmes are as such carried out in international partnerships, or looking for possibilities to partner up.

For our new fighter programme we are looking for logistical and operational partnerships similar to our existing F-16 partnerships as in European Participating Air Forces with Belgium, the Netherlands, Norway and Portugal. The possibility for partnerships is an essential requirement in selecting a new fighter Aircraft.

The PGM acquisition is done in a NATO context under Danish leadership, and with eight nations participating, namely Belgium, the Czech Republic, Denmark, Greece, the Netherlands, Norway, Portugal and Spain. Further, the acquisition is supported by the NATO Support and Procurement Agency (NSPA) and, for US-procured materiel, supported by the USA.

**ESD:** To what extent have / can principles like “Smart Defence” and “Pooling & Sharing” been / be applied to one or more of these efforts?

**LtGen Bundsgaard:** With regard to our new fighter programme we are looking for cooperative possibilities similar to our current successful partnership with the other F-16 nations. 35 years of experience suggest that the choice of an aircraft also used by many allied air forces enable multinational cooperation and the coordination of efforts to maintain and modernise aircraft at greatly reduced costs. The programme concerning Precision Guided Munitions actually stemmed from Smart Defence thoughts. The programme aims to increase alliance availability of Precision Guided Munitions through multinational cooperation by acquiring the munitions together to get better prices and in this way also ensure interoperability, standardisation and exchangeability.

**ESD:** Have these principles been applied to previous procurement efforts? If so, which are the lessons learned?

**LtGen Bundsgaard:** Looking a bit closer at lessons learned from multinational cooperation, including Smart Defence and Pooling

& Sharing, the following challenges can be deducted from multinational cooperation within the area of acquisition and logistics:

- There are some challenges in agreeing on requirements and approach to procurements;
- In some cases colliding legislation in relation to procurement processes appears (tender, EU membership, offset etc.)
- The coordination of budgets and delivery timelines for each participating country;
- Establishing a leading nation for somebody to take ownership for reaching the objectives;
- National considerations, including industrial interests are significant factors.

Generally, the processes and procedures for entering into and participate in multinational armaments cooperation generally suffer from lack of formalisation as well as standardisation. It is difficult to agree on requirements and a common approach to acquisition, and e.g. the ambitions, budgets as well and the timelines are often different and not the least the will to compromise is low.

Simultaneously, participating nations have to deal with different or maybe even colliding legislation and interpretation of EU directives as well as national provisions for industrial participation etc.

Additionally, the often prolonged staffing embedded in multinational projects will have impact on the participating nations' budgetary processes which might lead to prolonged payment and delivery timelines. This is particularly the case when no nations are willing to take lead in reaching the common goal. Finally, multinational cooperation is often sought on larger multi-faceted capabilities and components where the participating countries' industrial bases naturally are doing their utmost to influence the outcome from behind the scenes. However, successes have been achieved and in times of austerity, we must seek multinational solutions.

**The questions were asked by Jürgen Hensel and Peter Bossdorf.**

*The Smart Defence effort on the multinational provision of air-to-ground precision-guided munitions (PGMs) was launched during the NATO Wales Summit in September 2014. Shown here are (f.l.t.r.) the Danish, Belgian and Dutch defence ministers signing the letter of intent.*



# ROTTERDAM Class LPD

**Jaime Karremann**

**HNLMS ROTTERDAM (L800) is the Royal Netherlands Navy's first Landing Platform Dock (LPD). The 12,750 tonne vessel was built in The Netherlands, but designed in cooperation with Spain. Commissioned in 1998, the ship finished the first part of a refit in 2015, the second stage is scheduled for 2017.**

Changes in NATO strategy during the 1960s made the Royal Netherlands Marine Corps (RNLMC) focus on the Northern Flank in case of a Soviet invasion of Western Europe.

When budget cuts hit the RNLN, however, the number of large ships declined and the RNLMC had to rely more and more on their own navy. However, embarked forces experienced harsh conditions on board frig-

the platform. Earlier, The Netherlands and Spain had cooperated on the design of the replenishment vessels HNLMS AMSTERDAM and the PATINO class. Again both countries agreed cooperation would be limited to the design. Spain and The Netherlands would acquire sensors, weapons and computers separately.

Together with Spain changes to the original design were made and the ship's displacement increased to 11,00 tonnes. On 25 January 1996 work started at the Koninklijke Schelde Groep shipyard (currently Damen Schelde Naval Shipbuilding) in Flushing. The two Spanish ships, SPS GALICIA and CASTILLIA, were built by Bazan (now Navantia).

To lower costs the Rotterdam was designed and built according to commercial standards where possible.

## Dimensions

When HNLMS ROTTERDAM was commissioned in 1998 it became the third largest ship of the Royal Netherlands Navy, only a few metres shorter than the replenishment ships HNLMS POOLSTER and ZUIDERKRUIS.

The LPD's hull is 166 metres long, 27 metres wide and the draught is 6 metres. When the dock is flooded, the maximum draught is 10 metres.

## Transportation

HNLMS ROTTERDAM is designed to embark, transport and disembark one battalion of 611 marines, including their vehicles and equipment, and supplies for more than 10 days. From the outset the ROTTERDAM was meant to transport personnel and materiel from all branches of the armed forces, for example 32 main battle tanks. In case of a humanitarian disaster HNLMS ROTTERDAM is capable of carrying out evacuation of civilians.

## Dock and Decks

During the design phase engineers had to make sure the vessel's payload capacity was sufficient to transport a fully equipped battalion of marines, but they also had to design an efficient load space layout of these areas to ensure maximum operational flexibility.



Photo: NATO

*Enjoying quiet waters during NORTHERN LIGHT just off Great Britain*

The Dutch Marines had at that time several small boats, but the Royal Netherlands Navy (RNLN) lacked a ship capable of amphibious operations. At the beginning that did not appear as a big a problem. The Dutch Marines operated, as part of the UK/ NL Landing Force, together with the British Royal Marines, which of course made use of the Royal Navy's amphibious ships like HMS FEARLESS. When Dutch exercises were conducted, frigates and oilers were used to transport the marines.

ates and oilers, and the means to get the marines from ship to shore were limited. After a fierce lobby of more than 10 years by the Marines and the Navy, the Minister of Defence decided in 1986 the RNLN would finally get a LPD in the nineties.

## Different Designs

Two years earlier the Directorate of Materiel of the RNLN had already started with some preliminary designs of LPDs ranging from 4,000 to 12,000 tonnes. After the Minister's approval in 1986 feasibility studies started, which led to a ship of around 8,000 tonnes.

The end of the Cold War, however, led to changes in the requirements. Also the Spanish Navy was found interested in a cooperation during the design phase of

## Author

**Jaime Karremann** is the Editor-in-Chief of the Dutch naval website [marineschepen.nl](http://marineschepen.nl).

A lot of attention was paid to the accessibility of the dock, helicopter deck and vehicle deck by the embarked forces. Wide staircases –no ladders– and large passageways prevent marines and their gear getting stuck on their route along different way points to the landing craft, vehicles or helicopters.

On top of that, the dock, vehicle and helicopter decks are interconnected.

Vehicles can embark and disembark from a ramp located on the starboard side, which provides direct access to the vehicle deck. This 900 m<sup>2</sup> deck has been kept free of obstructions and corners to avoid time consuming manoeuvring.

The vehicle deck can be used by a large range of vehicles, including main battle tanks, due to the reinforced deck. Containers can also be stored on this deck. Both vehicles and containers can be fixed thanks to the trailer fittings integrated in the deck. Directly connected to the vehicle deck is the dock. Marines can access the landing craft in the dock via the vehicle deck, and vehicles can easily drive into the landing craft. A monorail lifting system is fitted to the deckhead of the vehicle deck and into the dock to speed up loading of landing craft. When the dock is empty, amphibious assault vehicles like AAVs can drive straight down the ramp into the sea.



Photo: MoD The Netherlands

**Bv206 multi-purpose vehicle leaving the vehicle deck**

two Landing Craft Air Cushion (LCAC) military hovercraft.

Dock operations, possible up to Sea State 4, are led by the dock control officer in the Dock Control. Video and infrared monitoring systems provide a view of what goes on inside as well as outside.

Apart from to the dock, vehicles and cargo can also be moved to the helicopter deck and hangar by the two elevators. The central elevator can support up to 25 ton and is strong enough to lift heavy armoured vehicles.

landing spots and is large enough for multiple helicopters to operate simultaneously. The deck is not strong enough for the heaviest of helicopters and aircraft like the MV-22 OSPREY. A heavier flight deck was one of the improvements for HNLMS JOHAN DE WITT.

On the port side, above the hangar door, a flyco, a dedicated flight deck control room overlooks the flight deck and is used when two or more helicopters operate from the flight deck at the same time. In total HNLMS ROTTERDAM has 564 m<sup>2</sup>



Photo: NATO

**Helicopter deployment during the NATO exercise NORTHERN LIGHT off Scotland in 2003**

The dock measures an area of 880 m<sup>2</sup>. The type of landing craft deployed depends on the operation. Most of the time, however, two Landing Craft Utility (LCU) and 3 Landing Craft Vehicle and Personnel (LCVP) Mk.5C or Mk.5D are used. Since the introduction of the Fast Raiding Interception Special Forces Craft (FRISC) a combination of 2 LCUs, 2 LCVPs and 2 FRISCs is quite common as well.

All landing craft are operated from the dock. In contrast to other LPDs HNLMS ROTTERDAM lacks davits.

The dock provides enough space to hold

The second vehicle/ cargo elevator has a capacity of 7,5 tons and is positioned more aft. This elevator runs from the helicopter hangar to different cargo spaces.

On both sides HNLMS ROTTERDAM has a jib door to embark and disembark personnel during smaller operations or boat transfers. Since airlift is important during amphibious operations, half of the LPD's superstructure is taken up by the helicopter deck and hangar.

The hangar provides space to 6 light weight or 4 medium weight helicopters. The helicopter deck measures 1340 m<sup>2</sup>, with two



Photo: MoD The Netherlands

**Two LCU and one LCVP accommodated in the dock**

stores for cargo and ammunition. The ship has three elevators in total. Apart from the two vehicle elevators a smaller third one runs to the provisions and refrigerator stores for the galley. No personnel elevators are installed.

## Crew and Embarked Forces

HNLMS ROTTERDAM has a complement of 143 men and women. On the more modern RNLN ships the ship's companies enjoy their meals in an all ranks mess, but aboard ROTTERDAM messing is still separate.



Photo: MoD The Netherlands

**Dutch Marines disembarking from an LCVP**

When embarked forces are on board they make use of the messing facilities next to the ship's company. The sleeping quarters however are more separated from those of the crew, although officers will find their cabins on the higher decks. The lower ranking marines have their racks in the lower decks in sleeping quarters with a maximum capacity of 24 people.

## Medical

The ship has a Role 2 hospital with a ten-bed intensive-care unit, medical treatment room, operating theatre with two spots and laboratory and an emergency sick bay. During emergency situations the ship's maximum capacity is 100 patients.

Together with a gearbox, propeller shaft and fixed propeller, each form a separate propulsion line.

An emergency backup generator provides further redundancy.

In the ASW-dominated navy of the nineties, bow thrusters were not very common. HNLMS ROTTERDAM was only the second Dutch naval vessel with such a propulsion device, but it is much needed to improve manoeuvrability especially during slow speed operations, such as docking.

## Sensors and Weaponry

HNLMS ROTTERDAM is equipped with point-defence weapon systems and medium range sensors, operated from a small

KEEPER CIWS, placed forward and aft to handle airborne attacks from every angle. Four .50 Browning machineguns can be used to protect the ship from nearby soft targets like FIAC threats (Fast Inshore Attack Craft).

## Missions

HNLMS ROTTERDAM has been deployed from the Caribbean Sea to the Indian Ocean since 1998. Most notable deployments were during NATO's first humanitarian operation Allied Harbour in Albania in 1999, United Nations Mission in Ethiopia and Eritrea (UNMEE) in 2000 and 2001, United Nations Mission in Liberia (UNMIL) in 2003.

In 2006 HNLMS ROTTERDAM was on its way to the (former) Dutch Antilles for the multinational (amphibious) exercise Joint Caribbean Lion, when former Dutch colony Surinam was hit by severe flooding. The ship provided aid with help of its four Westland LYNX helicopters.

Until now the LPD saw live action only once. On 24 October 2012 the ROTTERDAM was flagship of the NATO counter piracy operation Ocean Shield, when two of the ship's RHIBs were sent to a dhow for a 'friendly approach'. Suddenly, at a distance of 40 metres, the RHIBs were fired upon

Photo: MCD



**The Role 2 hospital has a ten-bed intensive-care unit, medical treatment room, operating theatre with two spots and laboratory and an emergency sick bay.**

The medical spaces are situated on the same level as the helicopter deck so patients can be on and off a helicopter quickly.

## Energy and Propulsion

The ship's power plant is built around four Wärtsilä diesel generators, which generate 6.6 Kv electricity to be used for propulsion, and –after transformation– by the rest of the ship. The electricity for propulsion is distributed to two Holec electric motors.

operations room –in contrast to the larger amphibious opsroom.

The most powerful sensor is the 30-year-old Thales (former Holland Signaal) DA05 air search radar, operating in E and F band. Two navigational radars and helicopter control and direction radars complete the set of active sensors.

Additionally the ROTTERDAM has the fast rotating Thales IRSCAN, a electro optical surveillance and tracking system. The LPD features two legacy Thales GOAL-



Photo: Thales

**Thales's GOALKEEPER system provides the close-in air defence capability for HNLMS ROTTERDAM.**

by pirates who apparently had hijacked the dhow. Assisted by a marksman from the ROTTERDAM, the boarding team (which comprised special forces of the marines), returned fire. It was done cautiously because of probable hostages on board the dhow, but nevertheless fuel tanks on board the dhow exploded quickly and a fire broke out.

The fight transformed in to an SAR operation, when people – who were not able to swim – jumped from the dhow into the



Photo: Thales

**In the scope of the refit programme the NS 100 radar from Thales – shown here on the test tower at the company's premises in Hengelo – will replace the DA05 sensor.**

sea. It changed again when pirates ashore started firing at the rescuers. The sailors and marines managed to rescue 19 crewmembers of the dhow and 5 pirates under fire. One pirate was killed by gunfire. In October 2015 two marines who were on board the RHIBs were decorated for their actions. This was the first time since World War Two that medals were awarded by The Netherlands for action at sea.

## Modernisation and Replacement

HNLMS ROTTERDAM returned to sea in 2015 after a long period of maintenance, which included a refit. Originally the ship was planned to undergo a midlife update in 2013, but that was delayed and changed after budget reductions in 2011. During the first part of the upkeep programme HNLMS ROTTERDAM received several modifications. The new Platform Management System (PMS) and computers for the ship's control centre are just two important improvements. Others are the Imtech Fire Fighting and Damage Control (FFDC) electronic incident boards and new navigational radars.



Photo: MoD The Netherlands

**HNLMS ROTTERDAM at sea in the Caribbean.**



Photo: MCD

**A lot of attention was paid to the accessibility of the helicopter deck and vehicle deck.**

One of the main changes during the second stage of the refit will be the new Thales NS100 radar, which will replace the DA05. The NS100 is a dual-axis multi-beam surveillance radar for air and surface, and is able to give a 3D cue to both the GOAL-KEEPERS. The S-band AESA radar is derived from the SEA MASTER 400 radar and SMART-S Mk2 radar.

The Thales IRSCAN will be replaced in favour of Elbit Systems DCOMPASS and Thales Gatekeeper.

Another main improvement will be a completely new, and integrated, opsroom and amphibious opsroom. Including an up-to-date Combat Management System (CMS). After the refit ROTTERDAM's communication suite shall be compatible with NIMCIS, the new com-

munication and information system of the RNLMC.

The ROTTERDAM was originally designed for a service life of about 25 years. This year the ship will be 18 years in service, but a replacement is not in sight. The Dutch fleet is ageing rapidly because many replacement programmes have been delayed. The Navy hopes to start in the coming years with the replacement of the two M-class frigates, four WALRUS class submarines and six ALKMAAR class minehunters. The new ships have to enter service in the mid 2020s. Submarine tender HNLMS MERCUUR has to be replaced sometime soon as well, and HNLMS ROTTERDAM probably has to stay in service until the 2030s. That is a long time for a much used ship, but obviously unavoidable in the current political climate. ■

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# Leading Lights

## The Relevance of Lead-In Fighter Trainers & Light Combat Aircraft

David Saw

**The primary driver for Lead-in Fighter Trainers (LIFT) and Light Combat Aircraft (LCA) is the increasing cost and sophistication of advanced combat aircraft.**

Put simply, the more sophisticated a combat aircraft the higher the quality of training necessary to operate it to maximum effectiveness hence the need for a LIFT capability. A more sophisticated combat aircraft is also inevitably more costly resulting in fewer aircraft being purchased. Quality cannot always count for more than quantity, thus an opportunity emerges for an affordable combat aircraft hence the LCA.

into context, at the end of December 1950 the US Navy was flying the F4U CORSAIR, a piston-engined aircraft, on combat missions over Korea, by the end of December 1960 it was taking the F-4 PHANTOM into service. In between, in terms of fighters, the US Navy had employed the Douglas F3D SKYKNIGHT and F4D SKYRAY, the Grumman F-9F PANTHER, F-9 COUGAR and F-11F TIGER, McDonnell F2H BANSHEE

describe as "Third World" air forces, had to hope for military assistance from the US, but did not have the ability to support a top of the range combat aircraft, they needed a less complex combat aircraft.

On the one hand then there was a growing requirement for a lighter and more affordable combat aircraft. Also developing was a need to have a training aircraft to prepare student pilots to operate new and future generation combat aircraft. As we will see there are many cases where these two seemingly very different aircraft requirements were covered by a single family of aircraft.

### First Steps

Work on advanced jet trainers and developing lightweight fighter aircraft got underway in the early 1950s. W.E.W 'Teddy' Petter, was an extremely important British aircraft designer, he was responsible for the first British jet bomber, the English Electric CANBERRA, and the English Electric LIGHTNING fighter. Petter then left English Electric and in September 1950 joined Folland Aircraft, where shortly afterwards he started work on a lightweight fighter, that eventually emerged as the Folland GNAT, to meet a British operational requirement. The Royal Air Force (RAF) did not pursue a lightweight fighter programme, but in 1957 it issued a requirement for an advanced jet trainer and the Gnat T.1 was selected for the programme in 1958. In total some 105 GNAT T.1 aircraft were acquired between 1962 and 1965, with the aircraft being retired from RAF service in 1978.

The Indian Air Force (IAF) decided that the fighter version of the GNAT was what it needed as a lightweight fighter, with the GNAT F.1 entering service in 1958. The first few aircraft for India were built at Folland. Afterwards production got underway at Hindustan Aeronautics Limited (HAL) and some 200 had been built in India by 1974. HAL developed an improved GNAT for the IAF in the form of the AJEET, some 79 of these were built, entering IAF service in 1977. The GNAT/AJEET were retired from IAF service in the early 1990s.

Another 1950s aircraft certainly covered all of the bases as far as the advanced jet trainer, LIFT and light fighter was concerned and



Photo: Lockheed Martin

**The Lockheed Martin bid for the US Air Force T-X programme, which calls for 350 aircraft and a ground-based training system, will be based on the Korea Aerospace Industries (KAI) T-50. A new version of the aircraft, the T-50A, has been developed to compete for T-X. Trainer and attack versions of the T-50 are in service or on order for Korea and four other countries.**

The ever increasing cost and sophistication of advanced combat aircraft is not a new phenomenon. It first became an issue during the 1950s as the pace of technological advancement saw a rapid turnover in combat aircraft generations. To put this

and F3H DEMON and the Vought F-8 CRUSADER amongst others.

It was an era where air forces transitioned from piston-engined fighters to jets, which improved dramatically in performance across the decade. Unfortunately for the operators, year-on-year the acquisition cost of combat aircraft kept on rising. Now while this might not have impacted the US military at the time, for others it was a major issue. They did not have the deep pockets of the US and found their combat aircraft numbers declining. Others, who one might

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this was the Northrop N-156 family of aircraft that spawned the T-38 TALON trainer which is still in US Air Force service today and the F-5A/B/E/F combat aircraft variants that remain in service around the world. Key aspects of the N-156 design was that it was to be low cost to acquire and low cost to maintain.

The N-156T trainer variant was the first of this aircraft family to be selected, with the US Air Force deciding to acquire it as the T-38 TALON in July 1956. First flight of the T-38 was in June 1959 and the aircraft remained in production until January 1972, by which point 1,158 aircraft had been built. It took longer for the lightweight fighter variant of the design to make its mark, it was only in 1962 that the N-156F was selected to meet a US requirement for a low-cost export fighter that could be supplied to US allies. The first order was placed in October 1962, with production ending in 1972 after 624 F-5A, 200 F-5B and 86 RF-5A reconnaissance variants had been built. Canadair built 240 F-5A/B aircraft under license in Canada, while CASA in Spain built some 70 aircraft under license.

The success of the F-5A/B saw the US look to develop a more advanced lightweight fighter to meet the needs of its allies and in 1970 another evolution of the N-156 was selected for the requirement and this resulted in the Northrop F-5E/F/RF-5E. The aircraft remained in production at Northrop through to 1987, by which time 792 F-5E, 146 F-5F and 12 RF-5E had been built. Switzerland built 91 F-5E/F aircraft under license, Korean Air built 68 F-5E/F



Photo: Swiss Air Force

**The Northrop Grumman F-5 family of combat aircraft met both advanced training and combat aircraft needs, this F-5E is in service with the Swiss Air Force. In total Northrop Grumman produced some 950 F-5E/FIRF-5E aircraft, with 467 more being produced under license in Korea, Switzerland and Taiwan.**

for Korea, while 242 F-5E and 66 F-5F were built in Taiwan. In total 3,795 N-156 family aircraft were built by Northrop or produced under license over some 37 years and the aircraft are still in service around the world in training and combat roles.

## A New Beginning

In the late 1960s, based on combat lessons in Korea (1950-1953) and the ongoing conflict in Vietnam, the US Air Force began to think seriously about lightweight fighters and out of this work the Lightweight Fighter (LWF) programme emerged in the early 1970s. Five companies responded to a January 1972 request for proposals and two companies were selected to go forward to compete for the LWF programme. The General Dynamics proposal would later

emerge as the winner of LWF in the shape of the F-16, while the Northrop Grumman proposal would find its own niche eventually emerging as the F/A-18.

The Lockheed Martin F-16 and the Boeing F/A-18 are still in production today, but they have grown far beyond the aircraft originally envisaged for the LWF programme. The success of the F-16 would also lead to the demise of the last descendent of the N-156 family in the shape of the Northrop F-20. As such it would appear that the LWF or LCA concept, as typified by the F-5, had run its course by the end of the 1980s. It would not disappear entirely though, primarily due to the fact that the cost escalation trend in combat aircraft would become even more pronounced.

Top of the range combat aircraft such as the Eurofighter TYPHOON and RAFALE are expensive to acquire and operate. Despite promises to the contrary it would appear that the F-35 JOINT STRIKE FIGHTER (JSF) is equally as expensive. This opens up a gap in the marketplace for aircraft such as the F/A-18E/F to exploit cost advantages and this is also an area that the Saab GRIPEN is working. If you are looking towards Russia to meet your combat aircraft needs you will also find yourself confronting the dilemma of how much you can afford, versus how much performance you need, Sukhoi and MiG solutions do not come cheap. Future combat aircraft such as the Korea Aerospace Industries (KAI) KF-X and Turkish Aerospace Industries (TAI) TFX intend to provide F-16 class capabilities putting them outside the classic LWF/LCA spectrum.

All of this would seem to leave only two true LWF/LCA that are available at this point in time, these being the Sino-Pakistani JF-17 THUNDER and the Indian TEJAS. The JF-17 is in Pakistan Air Force (PAF) service and Pakistan has stated that they already have an export customer. India's TEJAS continues to remain on the verge of entering Indian



Photo: US Air Force

**A US Air Force T-38 TALON from Whiteman Air Force Base (AFB), Missouri, on a refuelling stop at Scott AFB, Illinois, in April 2016. The US Air Force first ordered the T-38 in 1956, with 1,158 aircraft being built through to January 1972. Today there are still 431 T-38 aircraft in US Air Force service.**



Photo: BAE System

**The BAE Systems HAWK was initially developed in the late 1960s to meet a British advanced jet trainer requirement, consistently developed since that point, the current generation of HAWK aircraft can meet today's Lead-In Fighter Trainer (LIFT) requirements. India is said to be looking to develop a combat-capable version of its HAWK 132 aircraft.**

Air Force (IAF) service, while HAL continues to work on meeting actual IAF operational requirements.

## Intersections

Today though a new era for the LIFT and LCA marketplace is beckoning. What has happened is that there is an outgrowth from the current generation of advanced jet trainers that have expanded into the LIFT mission and then advanced their role further into the LCA sector. There is nothing new in this, the intersection of LIFT and LCA roles was happening as early as the 1960s with aircraft such as the Aermacchi MB-326. This was an advanced jet trainer that many customers used as a light attack aircraft, later on a single-seat attack variant arrived, the MB-326K, and that was used by a number of operators including South Africa. Its successor the MB-339 was also used in both training and light attack roles. The Franco-German ALPHA JET entered service in the 1970s, for France the primary role of the aircraft was training, but for Germany the ALPHA JET was a light attack aircraft.

The two Aermacchi aircraft and the ALPHA JET were usually in competition against the BAE HAWK, with the HAWK still being a



Photo: Textron AirLand

**The Textron AirLand SCORPION was developed as a private venture to meet requirements for an affordable light attack/surveillance aircraft. Up until now a demonstrator version of the aircraft has been shown to potential customers, but Textron is now on the verge of completing a full production-standard version of the SCORPION.**

competitive aircraft today. Design work started in 1968, with the aircraft being selected by the RAF in 1971, with a contract for 175 aircraft being signed in 1972. Like its competitors it met both training and light attack requirements, then in the 1980s BAE started working on the HAWK 100 variant that offered greater performance. In parallel they started working on a single-seat LCA version, the HAWK200, notably the aircraft had an AN/APG-66 radar (as fitted in the F-16A/B).

The HAWK would also make the transition from the old advanced jet trainer to the LIFT of today, through sales at the end of the 1990s to South Africa and Australia. The RAF is replacing its original HAWK aircraft with the HAWK 128, while India has acquired the HAWK 132 and appears interested in an armed variant, and the Royal Saudi Air Force (RSAF) has acquired the

HAWK 165 to add to its HAWK 60 series fleet.

Putting to one side the HAWK and the advanced jet trainers developed in Russia (Yak-130) and China (Hongdu L-15), two trainers have emerged in recent years as primary top-of-the-line training aircraft solutions. These are the Alenia Aermacchi M-346 and the KAI T-50. Both aircraft have achieved export success and both aircraft are contenders for the biggest prize currently on offer in the training aircraft category in the form of the US Air Force T-X trainer aircraft programme.

The Alenia Aermacchi M-346 has been selected by Italy (18 aircraft), with its first export customer being Singapore who ordered 12 aircraft in 2010. Israel then ordered 30 aircraft in 2012, with Poland ordering eight in 2013. The United Arab Emirates (UAE) had announced that it



Photo: Israel Air Force

**The Alenia Aermacchi M-346 is one of the most successful of the current generation of trainer aircraft. The aircraft shown here is one of the Israel Air Force fleet of 30 aircraft. Other customers include Italy, Poland and Singapore. The M-346 provides the basis for the Raytheon Integrated Air Training System proposal for the US T-X trainer programme.**

would order 48 aircraft, 20 for training, 20 for light attack and eight for an air display team, but this order never became a reality. The M-346 also provides the basis for the Raytheon bid for the US T-X competition, with the aircraft to be built in the US. The KAI T-50 started development in the early 1990s as the KTX-2 programme, then Lockheed Martin became involved as an offset for the Republic of Korea Air Force (ROKAF) acquisition of the F-16C/D. The resulting T-50 first flew in 2002 and entered ROKAF service in 2005. Current ROKAF fleet and orders consist of 49 T-50 trainers, nine T-50B aircraft for the Black Eagles aerobatic team, 22 TA-50 LIFT and 60 FA-50 attack aircraft. Export sales include: 16 T-50I for Indonesia, 24 T-50IQ for Iraq, 12 F-50PH for the Philippines and four T-50TH for Thailand.

Beyond the trainer, LIFT and LCA versions of the T-50 design, KAI also envisaged numerous other variants, these included: RA-50 reconnaissance aircraft, EA-50 electronic attack variant, A-50NCW (Network Centric Warfare) variant acts as a controller for UAVs, A-50UCAV (Unmanned Combat Aerial Vehicle) and A-50UCAV-LR long-range UCAV. As far as KAI were concerned they were confident of ongoing ROKAF orders and believed that they could continue to be competitive in export markets. The great prize though was the T-X programme in the US, the size of the programme and its economic impact are obvious, but there was another aspect as well, should a Korean design win the programme that would conclusively demonstrate that Korea has a world-class aerospace industry, something that would be very important in the context of Korean domestic opinion. Lockheed Martin had considered both the T-50 and an internally developed proposal for their T-X contender, in the end they chose to go with KAI and the T-50 as the basis of their offer, but in an evolved variant known as the T-50A.

Other T-X contenders are Boeing, who are working with Saab on a new aircraft design, and Northrop Grumman who have also generated a new aircraft design. In total T-X calls for 350 trainer aircraft and an accompanying ground-based training system, with the first aircraft to be in service by 2023. A victory in the T-X competition would also open the way to export sales and

the possibility of enhancing the design to have a full combat capability to meet LCA needs.

One authentic US design that does not appear destined to compete for T-X, at least at this point, is the Textron AirLand SCORPION. The SCORPION as currently envisaged is a light attack/surveillance aircraft that was self-funded by Textron, a demonstrator aircraft was built to aid in the marketing of the system. Soon a production standard version of the SCORPION will be available. Once the US Air Force releases a full set of T-X requirements it might be that there is scope for the SCORPION to compete. If not Textron will continue to market

the aircraft to customers with light attack requirements.

As long as air forces acquire advanced combat aircraft there will be a need to produce trained pilots to fly them, indicating a continuing need for advanced jet trainers and/or LIFT aircraft. Another certainty is that the cost of advanced combat aircraft is unlikely to decrease any time soon, opening up the marketplace for affordable alternatives such as an LCA or even for weapons-capable trainers at the lower end of the spectrum. All of would seem to indicate that interest in LIFT and LCA aircraft is likely to grow in intensity over the next few years. ■

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# Robust Smart Devices for Military Clients

## Market Overview of Existing Solutions

**Dorothee Frank**

Depending on the manufacturer, standard tablets are more or less robust; for military operations on the operational front, this is usually not sufficient, however. After all, you need to be able to rely on your device in all weather conditions, particularly also in the case of ice and rain. Everything can work when the sun is shining at 20 degrees Celsius – it is about the function at 50 degrees Celsius in a sand storm over several hours.

On the international market, the MIL-STD-810G, the US standard for robust military devices, has asserted itself as a key parameter. It defines the values to be achieved in rather inhospitable surroundings for computers. The standard is subdivided into functions to be achieved in spite of a low air pressure, high or low temperatures, strong temperature fluctuations, contamination by liquids, strong sun radiation, rain, high air humidity levels, fungal infection, salt spray, sand and dust, in the case of explosions, after diving, following strong acceleration and vibration, in the case of noise, mechanical shock, fire, in caustic atmospheres, in the case of shock by gunfire, in the case of freezing rain, frost, hostile wave forms, vibration such as on ships or tracks, as well as ballistic shock.

MIL-STD-810G defines 29 tests in total, but not all tests need to be conducted to obtain a certification according to MIL-STD-810G. For example, the test for reliability at low temperatures is sufficient to achieve one point in this standard. On the other hand, this does not say anything about the function when it is raining.

Meanwhile, various providers have ruggedised tablets in their portfolio which are especially suited for and sold to the military market. The vast majority of

them runs on Windows, so that the orientation of new military apps towards this operating system is recommended due to the high availability of devices.

### AMREL

The American company American Reliance Inc., better known as AMREL, has a large portfolio of ruggedised tablets for military clients. The new products in the rugged tablet segment include the ROCKY DK10. The large 12.1-inch display and the powerful i7 processor make it particularly suitable for resource-intensive applications. It is MIL-STD-810G-

### The T800 from Getac

certified against shock, vibration, rain, humidity, salt spray, high and low temperatures, temperature shock, as well as great heights.

### Getac

The Taiwanese company Getac Technology Corporation offers a three-year guarantee on all ruggedised tablets. With their first ultra-robust Notebook, the first product of the company was launched in the ruggedised – and for the military, interesting – sector in 2011. The portfolio currently includes a total of three ruggedised tablets.

### Tablets

The Z710 has an OMAP 4430 dual-core 1 GHz. The 7-inch display includes the proprietary LumiBond technology and is sunlight-readable. The battery life is 10 hours. The tablet is robust-tested in accordance with MIL-STD-810G for impact in the case of a height of fall of 1.8 metres. It weighs 0.8 kg.

The T800 has an Intel Pentium N3530 2.16 GHz quad-core. The particular feature of the 8.1-inch-display is the proprietary LumiBond technology for the achievement of an easy-to-read display with improved contrast and clear colours. The battery life is eight hours; through SnapBack battery extensions, it is possible to switch batteries during running operation. The tablet is robust-tested in accordance with MIL-STD-810G for operation at temperatures between -20 C° and up + 50 C° and for impact in the case of a height of fall of 1.8 metres. It weighs 0.9 kg.

The F110 has an Intel Core i7-5500U 2.4 GHz. The 11.6-inch display also includes the proprietary LumiBond technology and, with 800 nits, can be read by sunlight. The battery life is up to 12 hours. The tablet is robust-tested in accordance with MIL-STD-810G for operation at



Photo: Getac



Photo: roda

**Ruggedised tablets – like the SolidPad LR7 from roda – must function reliably also in the most adverse conditions for technical equipment to be of use for soldiers.**

temperatures between -20 C° and up + 60 C° and for an air humidity of 95 per cent. It weighs 1.4 kg.

## GRiD Defence System

GRiD Defence Systems is a British company with over 20 years of experience in the military market. Its main client are the British armed forces. The new ruggedised tablet from GRiD, the GRiDCASE 2530 10" tablet, has a few interesting functions that make it stand out from the other current products of the company. The tablet has a 10.1-inch wide screen with LED backlit display and is sunlight-readable. Particularly interesting features are the configurable Rear Connector Panel, the encryptable drives, the temperature resistance up to over 71 degrees Celsius, as well as the Hot Swap exchangeable battery. It was tested against EMC in accordance with MIL-STD-461 and against environmental influences in accordance with MIL-STD-810.

of 1,000 cd/m². The battery life is seven hours; an integrated battery enables exchange in running operation. The tablet is robust-tested in accordance with MIL-STD-810G for operation at temperatures between -20 C° and up + 50 C°, air humidity between five and 95 per cent, and for impact in the case of a height of fall of 1.8 metres. It weighs 1.2 kg. It can be ordered by German authorities via the BAAINBw skeleton agreement "Q\_IB1C\_R6645 Rugged Notebooks".

The more recent SolidPad LR11 has an Intel Core i5-4300U vPro 1.90 GHz (2.90 GHz in the 4th generation) with three MB cache, a memory of four or eight GB DDR3L and an mSATA SSD 120 GB or optionally 240 GB hard drive. The water-repellent display has a size of 10.1 inch with a LED background lighting of 1,000 cd/m². The battery life is six hours; an integrated battery enables exchange in running op-

## ARMAMENT & TECHNOLOGY ■

eration. The tablet is robust-tested in accordance with MIL-STD-810G for operation at temperatures between -20 C° and up + 50 C°, air humidity between five and 95 per cent, and for impact in the case of a drop of 1.5 metres. It weighs 1.2 kg.

### Panther

The Panther DT10-M has an Intel Core i7-2610UE 1.5 GHz, a memory of up to eight GB DDR3 1333 MHz SO-DIMM as well as an exchangeable 2.5" SATA HDD drive with up to 500 GB / hour or optionally a SATA SSD (MLC or SLC) drive. The display is nine inch, is polarised with anti-glare and anti-reflective, and a LED background lighting of 530 to 700 cd/m². The tablet is robust-tested in accordance with MIL-STD-810G for various ambient conditions or influences, inter alia density altitudes, temperature, rain, air humidity, salt mist, vibration, shock and strong temperature fluctuations. It weighs 1.9 kg.

The Panther DS11 has an Intel Core i7-3537U 2.0 GHz, a memory of up to eight GB DDR3 1600 MHz SO-DIMM as well as an mSATA III SSD Slot drive with 128 / 256 / 512 GB MLC. The display is 11.1 inch, equipped with LED lighting and is sunlight-readable with 1.000 cd/m². The tablet is robust-tested in accordance with MIL-STD-810G for various ambient conditions or influences, inter alia density altitudes, temperature, rain, air humidity, salt mist, vibration, shock and strong temperature fluctuations. It weighs 1.3 kg.

## Roda

The German manufacturer is a long-standing partner of the Bundeswehr. The company is characterised by its own test facilities as well as a comprehensive full-lifetime service which also reliably provides warranty services over long utilisation periods. In the rugged tablet sector, the company operates two lines: The SolidPads based on consumer tablets with robust plastic housing, as well as the Panther tablets with a housing made of aluminium alloy or rather milled from aluminium.

### SolidPads

The SolidPad LR7 is equipped with an Intel Bay Trail-I E3827 1.75 GHz with two MB L2 cache, a memory with four GB DDR3L mit 1.333 MHz as well as an mSATA SSD drive with 120 GB or optionally 240 GB. The water-repellent display Gorilla Glass 3 technology has a size of 10.1 inch with a LED background lighting



**The Panther DS11 from roda**

## Panasonic

The Japanese company Panasonic Corporation primarily supplies the American armed forces. For the Toughpad series with various ruggedised tablets, there are framework agreements with the American forces. With two seven-inch tablets, the company has comparatively small tablets in its portfolio.

## Join Our New LinkedIn Group!



As a source of information LinkedIn is of increasing importance. "European Security & Defence" has started a LinkedIn group to share information between industry and experts, to start discussions on security topics and to get in touch with global users in the military. Members of the group will also get the latest messages on the magazine's activities, upcoming events and on top of that a global exhibition schedule. Get in touch with the team of ESD and ESD Spotlight and meet partners in defence industry and military! This community is still growing and the team of ESD hopes to meet you there!

Photo: Panasonic



**The Toughpad FZ-B2 from Panasonic**

### Toughpad

The Toughpad FZ-M1 has an Intel Core i5-4302Y vPro 1.6 GHz as well as memory of eight GB DDR3L-1333MHz. The display is seven inch with LED background lighting and is sunlight-readable with 500 nits. The battery life is eight hours. The tablet is robust-tested in accordance with MIL-STD 810G for a total of twenty different ambient conditions or influences, inter alia temperature, rain, air humidity, frost, sand, vibration, and shock. It weighs 0.5 kg.

The Toughpad FZ-B2 as an Intel Celeron N2930 1.83 GHz and two GB DDR3L-1333MHz. The display is seven inch with LED background lighting and is sunlight-

readable with 500 nits. The battery life is seven hours. Because it is a new product, there are still no results available in accordance with MIL-STD-810G. It weighs 0.5 kg.

The Toughpad FZ-G1 has an Intel Core i5-4310U vPro 2.0 GHz as well as a memory of eight GB. The display is 10.1 inch with LED background lighting and is sunlight-readable with 800 nits. The tablet is robust-tested in accordance with MIL-STD-810G for impact in the case of a height of fall of 1.2 metres. It weighs 1 kg. The display is 10.4 inch with LED background lighting and is sunlight-readable with 1,300 nits. The battery life is 10 hours. The tablet is robust-tested in accordance with MIL-STD-810G for a total of twenty different ambient conditions or influences, inter alia temperature, rain, air humidity, frost, sand, vibration, and shock. It weighs 0.5 kg.

### Xplore Technologies

The American company Xplore Technologies offers a ruggedised tablet especially suited for military clients: the DMSR M2 tablet XC6 series.

It has an Intel Core i5-4300U (4th generation) 1.9 GHz and a memory of GB DDR3L 1600 MHz. The battery life is up to 8.5 hours. The tablet is robust-tested in accordance with MIL-STD-810G for a total of fourteen different ambient conditions or influences, inter alia temperature, rain, air humidity, salt mist, sand, vibration, and shock. It weighs 2.4 kg.

## Ruggedised Smartphones

In addition to the tablets, ruggedised smartphones also offer true added value to the military user. Even though the screen for the display of complex requirements barely exceeds five inches, the small relatives of the tablets can score due to significant weight reduction. In the ruggedised segment, primarily three products are currently interesting for use by soldiers. With the smartphones, contrary to tablets, Android as an operating system has established itself.

### EB Tough Mobile from Bittium

With the Bittium Tough Mobile, the Finnish manufacturer Bittium (formerly Elektrobit) has developed a five-inch (dis-

**The EB Tough Mobile from Bittium**



play) smartphone for military customers, which is equipped with a Quad Core Krait CPU 2.3 GHz and 2 GB LPDDR3 RAM. The smartphone is robust-tested for shock in accordance with MIL-STD-810G. It weighs 180 g.

### DF7A from roda

The DF7A from German manufacturer roda also has a five-inch display. It is equipped with a Qualcomm MSM8225Q Quad Core Cortex A5 1.2 GHz. Its particular feature, however, besides robustness, is the large number of possible interfaces with military connections. The DF7A is robust-tested in accordance with MIL-STD-810G for temperatures from -20° C to +55° C. It weighs 370 g.

### Panasonic Toughpad FZ-E1

In spite of its name, the Toughpad FZ-E1 of the Japanese manufacturer Panasonic is a smartphone with a 5-inch display, Qualcomm MSM8974AB 2.3 GHz Quad Core. It is tested in accordance with MIL-STD-810G for different conditions or influences, inter alia temperature, rain, air humidity, vibration, and shock. It weighs 430 g.



**The DMSR M2 tablet from Xplore.**

Photo: Xplore Technologies

# Unmanned Maritime Systems for Naval Applications

## Bringing Real Capability to the Fleet

Bob Nugent

**Unmanned maritime systems (UMS) have lagged behind their aerial counterparts over the past two decades.**

This lag can be measured in technological development, operational capability, spending, or numbers of platforms fielded. The very visibility of the unmanned

world" operations in Iraq and Afghanistan speeded the advancement of UAVs over the past 15 years. Spending on UAVs over the same period increased sharply, further accelerating technological development. Estimated military spending on UAVs worldwide reached \$6.5 billion in 2014, and is forecast to nearly double over the next ten years.<sup>1</sup> Yet as UAVs look set to remain the lead unmanned military platform, new develop-

At the same time, the increased cost and complexity of new naval systems are pushing legacy navies in the US and Europe with stagnant budgets to invest more actively in UMS.

This article will review some recent developments in unmanned maritime systems – particularly in the US. These new programmes, new contracts, and new platforms combine to mark a “step change” in the sector. For the first time, significant programmes and spending are moving UMS from an “interesting” adjunct to manned platforms to a vital capability in their own right. As recently observed by the US Navy Chief of Naval Operations: “As the size of the submarine fleet decreases, opportunities and requirements for smarter, more reliable and more compact UUV’s will increase”.

Admiral Greenert’s comments, and similar remarks from other naval leaders around the world suggest that – finally – navies and nations believe that unmanned maritime systems are ready to realise the operational and technological potentials of robotics so far seen mostly in the air.

### Defining Unmanned Maritime Systems – Types and Markets

A quick topology of the UMS sector divides vehicles by domain and autonomy. As noted in the chart below, only a small percentage of the UMS currently in service – in both commercial and military settings – operate on the surface. These Unmanned Surface Vessels (USV) have tended to be adapted from existing manned



Photo: Raytheon/PR Newswire/U.S. Navy

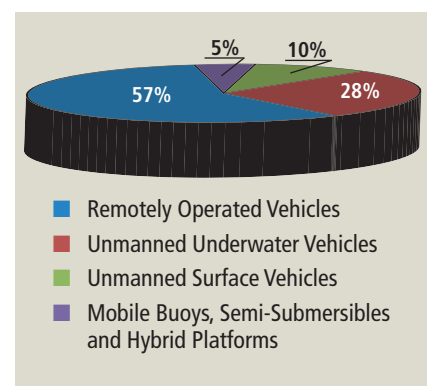
**Raytheon’s Remote Minehunting System and AN/AQS-20A Minehunting Sonar on USS INDEPENDENCE (LCS-2)**

aerial vehicle (UAV) has helped it capture the attention of informed observers and the broader public thinking about the future of military drones and robots. As robotics continues to reshape the military art, UAVs remain thus far the “leading edge” in unmanned systems and operations development.

That this should be so is no surprise given recent history. Urgent calls to increase the variety, number and capability of unmanned vehicles to support “real

ments in the maritime domain are worth a closer look. Increasing globalisation in maritime interests is driving sustained growth in new naval platforms and systems.

And many countries are confronting the reality of high costs for new construction of manned ships and submarines well beyond the budgets available for fleet expansion and modernisation. These countries will be especially interested in quicker and/or lower cost options to fill naval capability gaps as they pursue their own offset strategies against larger or more modern naval rivals. Here UMS could be a good fit for quickly and cheaply acquiring capability in lieu of more expensive manned platforms. This appears to be happening now in the Mine Countermeasure Vessel (MCMV) market.



Source: [www.auvsi.org](http://www.auvsi.org)

### Author

**Bob Nugent** is a Virginia-based Affiliate Consultant for AMI International in Bremerton, WA, USA.



Photo: U.S. Naval Institute

**In the scope of the U.S. Navy's LCS programme AAI was awarded the contract for the Unmanned Influence Sweep System (UISS) in September 2014.**

hulls such as Rigid Hull Inflatable Boats (RHIBs) and tend to be small – from 3-10 metres in length. And the great majority of existing USVs are controlled remotely (wireless communication). Many have autonomous control systems that enable operation at greater distances from launch points without continual active control from a manned control station.

The majority of UMS operate in the sub-surface domain as submersible or semi-submersible vehicles. Remotely Operated Vehicle (ROV) describe usually very small (man portable) systems continuously powered and controlled through surface tethers such as cables to the host platform. The great majority of ROV designs now in service are in the commercial sector used in ship repair, port and harbour survey, offshore oil and gas, and related applications. A subset of the submersible UMS is the Unmanned Underwater Vehicle (UUV). In contrast to ROVs, UUVs are designed for autonomous operation, without the constant power and control provided by ROV tethers. Many UUVs are built with autonomous control capabilities that enable them to conduct sustained independent missions such as ocean bottom surveys, mine countermeasures and intelligence, surveillance and reconnaissance. Most existing UUV designs are in service with navies and related sea services. As remarked above, the UMS market has tended to grow at a slower pace than the UAV market over the past decade. This has proved especially true of the military UMS sector, in which predictions of rapid growth from a variety of observers has consistently overestimated future demand.

This is explained by the absence of a motive force such as active military operations that drive demand for more and better vehicles. Another factor at work in the slow development of the UMS market has been the arguably more complex maritime environment of the UMS. Designing unmanned platforms and systems to be effective at and under the sea – with the additional complexities of water and near-water environmental factors – challenges technological development in UMS platforms, propulsion, sensors and control.

So, looking back at the past decade, the naval UMS market could accurately be described as “niche” segment heavily reliant on adapted manned platforms and systems. A closer look at the USV market in particular shows how adaptation of existing manned hull forms tended to shape the distribution of USV designs – with the majority being in the 7-11 metre segment for RHIBs and adaptations of conventional small patrol boat designs 10-25 metres in length.

## Unmanned Maritime Systems – Roles and Missions

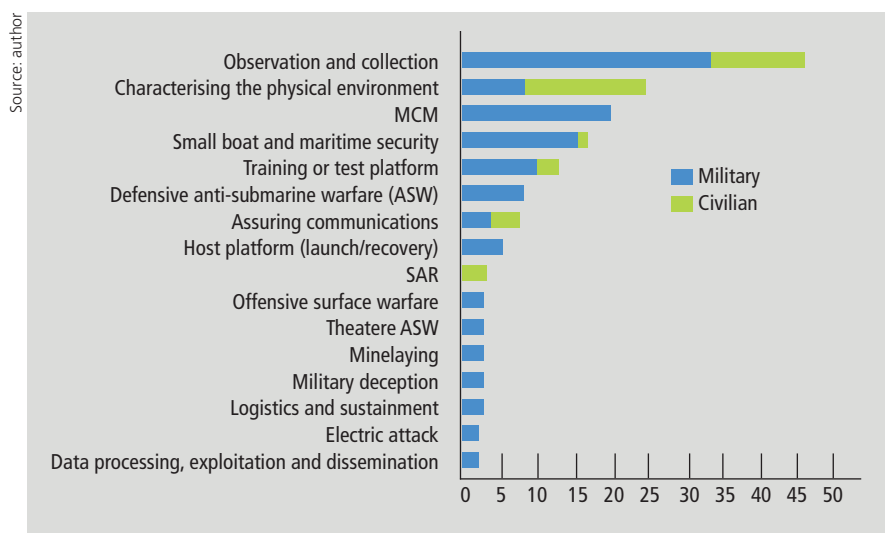
Continuing customer concerns with UMS safety, C<sup>2</sup> and collision avoidance have also worked to constrain UMS growth, and concentrate UMS development in specific mission areas such as mine countermeasures, hydrographic survey and intelligence collection. These missions tend to be characterised by high risk to manned platforms and/or are carried out in isolated maritime areas with lower levels of maritime traffic.

In the case of civilian and military UMS, missions and applications concentrate on survey (sensing and measuring oceanographic data) and mine warfare. Another mission area where USVs (and to a lesser extent UUVs) provide unique value is in maritime patrol and early warning. Training and testing – and especially the use of USVs as target drones for naval live fire weapons – is another mission segment where UMS are uniquely suitable. All of these missions reflect the current focus on applying UMS to missions that are “dull, dirty and dangerous” and traditionally pose very high risks to highly trained naval specialists involved. Explosive Ordnance Disposal for example is a one area that has seen extensive use of UMS to reduce risk to personnel.

As UMS platforms grow larger, improve endurance and power available, and address communications and autonomy limitations, one would expect to see growth in UMS mission areas now exclusively the province of manned platforms. Among those now being looked at for future UUV designs are anti-submarine warfare, offensive mining and offensive electronic warfare.

## UMS Programmes and Investments

Amidst a globalising naval market, the US is expected to continue to spend most on UMS over the next 10 years. As will be detailed below, the sizable growth in U.S. Navy investments in UMS has been



**Distribution of USV applications in the current marketplace**

These missions maximise the strengths of the UMS while minimising the risks of collision, compromise or damage from inadequate autonomous control systems. A look at the chart below on USV designs and missions (RAND) reinforces this point.

led by the Littoral Combat Ship (LCS) programme. Specifically, the LCS Mission Packages (MP) are designed to rely heavily on unmanned platforms to enable capability despite the smaller size and reduced numbers of crew compared to conven-

Marine Systems

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tional naval ships of similar size and mission (frigate, MCMV).

The LCS Mine Countermeasures Mission Package is the centre of the U.S. Navy's current UMS investment. An especially noteworthy milestone in the development in the LCS MCM package was the September 2014 award of a \$34 million contract to Textron Systems' business unit AAI for the "Unmanned Influence Sweep System" (UISS). The UISS award – which could total up to \$118 million in total, will see development and series production of the "Common Unmanned Surface Vessel" a 34 metre USV with a reconfigurable payload space. Series production of the UISS could see 50 or more CUSVs built over the next five years and provide the U.S. Navy with its first experience in integrating and operating USVs into fleet operations on a large scale.

Similarly, Lockheed Martin's Remote Mine-hunting System (RMS) programme is another key element in the LCS MCM mission package. The entire RMS programme represents some \$1.5 billion in spending. RMS is centred on an unmanned and semi-autonomous "Remote Multi Mission Vehicle" (RMMV), with total production of 54






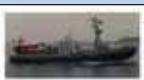


Photo: U.S. Naval Institute

**Lockheed Martin's Remote Multi-Mission Vehicle in 2010**

ed for "clandestine mine detection capability against volume and bottom mines." Beyond the LCS, the U.S. Navy has requested \$25 million in the current defence budget for the Large Displacement UUV (LDUUV). The LDUUV is especially noteworthy as a UMS intended to be more "ship like" than current generation UUVs dependent on host platform like LCS for launch, operation, recovery and maintenance.

marks of traditional sea power exerted by manned naval platforms. The modular design of the LDUUV will enable it to carry payloads and operate with the stealth of crewed submarines. This makes it especially suitable for intelligence and surveillance missions as well as mine countermeasures (including detection and neutralisation). Large enough to transport and launch weapons, the LDUUV could be also be

Source: author

	FY14	FY15	FY16	FY17	FY18	FY19
<b>UUVs</b>						
<b>KNIFEFISH</b> 	E&MD Phase	CT/DT/OA		MS C	FRP DR	FRP
<b>LDUUV</b> 	MSA Phase	MS A	Source Sel	Design	MS B	Fab EDM(s)
<b>PLUS</b> 		Deliver				
<b>USVs</b>						
<b>MHUs</b> 	Deploy	Deploy	Deploy			
<b>Minesweeping (UISS)</b> 	MS B			MS C		
<b>Future Flights</b> 	Source Sel	E&MD Phase		DT/OA	LRIPs & IOT & E	
		Concept Development		ECP/Integration/Testing		

**Multiple unmanned maritime systems spanning across every phase of the acquisition life cycle**

RMMV planned if the programme is fully executed.

Other significant U.S. Navy RMS spending in the most recent defence budget includes \$17.4 million for the KNIFEFISH Surface Mine Countermeasure (SMCM) UUV programme. SMCM is another component of the LCS MCM mission package Unmanned Undersea Vehicle and is specifically intend-

In contrast, the LDUUV is described as having the size, range, endurance and autonomy to operate without support for days and weeks at a time. It will be launched from a variety of platforms – including surface ships – as well as deploying independently from shore bases.

And the LDUUV mission set also highlights the flexibility and endurance that are hall-

tasked for anti-submarine and anti-surface missions.

Published information on the LDUUV indicates the U.S. Navy plans to acquire up to 40 of the LDUUV platforms. This force would represent a significant "force multiplier" for a U.S. submarine fleet set to decrease to 40 attack submarines (from the current 55) by 2028. Further, a large

autonomous UMS like LDUUV would offer more flexibility in operating in denied or geographically constrained waters compared to manned hulls.

UMS market become substantially larger. A key question is whether the current round of new naval UMS spending represents a new stage of sustainable demand. The

First, programmes like UISS and RMS are programmes of record tied to a long-term plan for the LCS and follow-on classes of ships. While the money being spent is still categorised as research and development, acquisition strategies clearly anticipate funding future large-scale production. Secondly, that series production will bring UMS into naval operation service in significant numbers for the first time. This will make the UMS a real part of the fleets, not just oddities. And one lesson for the new UMS can be taken from the recent expansion in military UAV fleets. That is, when new platforms and technologies join the force in numbers, they become part of the system of training, maintenance, repair and operations. In other words, they come to stay.

So in sum, it would appear the latest round of new programmes and awards for naval UMS do signal a significant change in the role and stature of UMS within naval forces. And this change represents an opportunity for new growth in global naval market over the coming two decades. ■

1 <http://www.tealgroup.com/index.php/about-teal-group-corporation/press-releases/118-2014-uav-press-release>

### Unmanned Maritime Systems (UMS)

2009 start, 11 participating nations: Belgium, Finland, France, Germany, Italy, Netherlands, Norway, Poland, Portugal, Spain, Sweden; €53 million

Goal: improve UMS capabilities based on system construct for interoperability, modularity, & inter-changeability of modules/standardisation.

Projects focus mainly on MCM

- Influence minesweeping
- Drifting mines detection
- Buried mines detection and neutralisation

Study also addresses

- Harbour protection
- Anti-Submarine Warfare (ASW)

Significant UMS investments are also underway in Europe. Under the European Defence Agency, the EU Unmanned Maritime System Programme has looked at applying UMS to mine countermeasure missions among European navies.

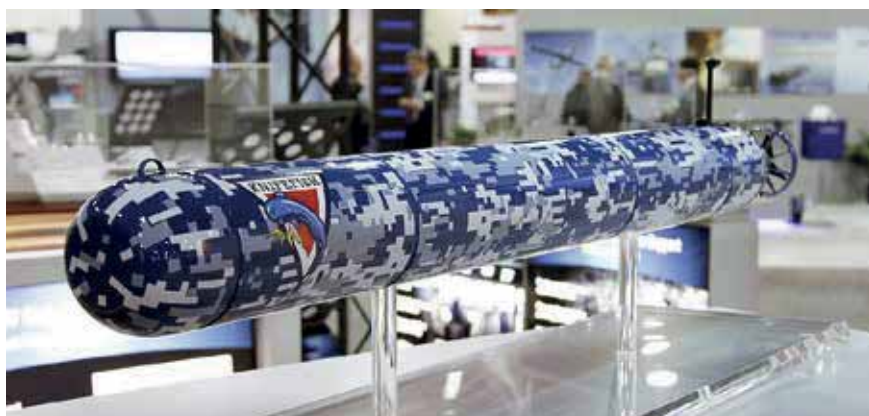
The United Kingdom and France are also executing mine warfare programmes that will include significant investment in UMS. The UK's current Sweep Capability Project (previously the Fast Agile Sweeping Technology – "FAST") is evaluating several USVs for minesweeping missions. France's "SLAMF" mine warfare improvement programme has seen building and testing of a large (17 metres, 25 tonnes) USV STERENN DU as a host platform for MCM UUVs. Similar in concept to the US CUSV, the STERENN DU would combine the range and mission payload of a larger USV with the specialised task ability of small UUVs.

### On the Horizon: The Future of UMS Sector 2015-2035

As shown above, spending on UMS has seen significant increases in the past two years, especially in the US. At the same time, total investment in naval UMS worldwide still represents a very small percentage of total expenditures on new naval platforms and systems.

For example, AMI's current market forecast for the MCMV segment projects US\$13.8 billion to be spent on 131 new hulls globally over the next 20 years – a rough average of about \$100 million per new ship built. If even a small portion of that planned investment in MCMV – say 5% – was redirected at UMS investment, that would represent a substantial increase in naval UMS spending in just one mission area. The expansion in anti-surface and anti-submarine capable platforms like the LDUUV would see the

technology obstacles to a fully implementing UMS potential for naval work remain considerable, and past predictions of UMS market opportunity have not come true. Still, new spending on the US' LCS-related MCM and the large UUV programmes appear to mark a turning point in development of viable and sustainable UMS capability for several reasons.



*Model of the SMCM KNIFEFISH UUV*



*The STERENN DU USV has been built and tested as a host platform for MCM UUV in the scope of France's SLAMF programme.*

# Combat Edge

## Eurofighter TYPHOON's Capability Journey Hits Full Throttle

**Volker Paltzo**

Destined to form the backbone of many air force fleets well into the next decade and beyond, Eurofighter TYPHOON is currently going through one of the busiest flight test periods in the programme's history. It's all part of a well-planned Capability Road Map that will see the aircraft continue to evolve.

Photo: Eurofighter



**Volker Paltzo has been the CEO of Eurofighter since 1 January 2016.**

In headline terms it will see the arrival of STORM SHADOW, a deep strike cruise missile, METEOR, a beyond visual range air-to-air missile, and BRIMSTONE, a precision attack missile, as well as the cutting-edge new Electronically Scanned Array radar (E-Scan radar) over the next few years. This trio of weapons, along with a number of sensor upgrades, and E-Scan will introduce a range of new and improved long-range capabilities to Eurofighter TYPHOON. The E-Scan contract, worth approximately €1bn, was signed in November 2014 to enable the development, by the Euroradar Consortium, of the CAPTOR E-Scan radar

### Author

**Volker Paltzo** is the Chief Executive Officer (CEO) Eurofighter Jagdflugzeug GmbH

as well as its full integration into the weapon system.

The fighter's large nose aperture, combined with the ability to move the antenna, will give the Eurofighter TYPHOON greater 'vision' than its competitors, delivering better operational performance to the aircraft and to its weapon system.

The new radar retains the key features of the existing CAPTOR radar architecture in order to exploit the maturity of the current much acclaimed system and will use latest generation technology to execute a full complement of air-to-air and air-to-surface tasks concurrently.

ment activity represents a dynamically challenging and complex journey. It's worth rewinding a couple of years to understand the full context.

Good progress has already been made on the roadmap, with Eurofighter having achieved all its major milestones in recent years. In June 2014 the complete Phase 1 Enhancement (P1E) package was delivered, providing a full swing-role capability onto the Eurofighter TYPHOON.

The next stage, Phase 2 Enhancement (P2E), brings STORM SHADOW and METEOR capability to the aircraft. P2E will also deliver a range of enhancements through

Photo: Eurofighter



**The CAPTOR E-Scan radar will significantly enhance the aircraft's multi-role capability.**

In parallel with this intense integration programme there are a series of other enhancements going on under the skin of the aircraft – within the Phased Enhancement software packages. In summary, Eurofighter TYPHOON's multi-role capability will be taken to a whole new level.

Of course, with a platform as technically advanced as Eurofighter, all this develop-

ment the HMI (Human Machine Interface), MIDS (Multiple Information Distribution System) and DASS (Defensive Aids Sub-System) and other avionics systems, which will further enhance the aircraft's lethality and survivability across all roles.

Not surprisingly the testing regime over the last few months has been rapid and relentless. Still ongoing, operational releases of

the STORM SHADOW deep strike cruise missile have already been carried out in the UK Ministry of Defence's Hebrides range in Scotland. The most recent release — from the Italian Instrumented Production Aircraft (IPA) 2 — is part of work conducted to expand the safe weapon trajectory data envelope of the missile.

The test, which was led by Leonardo-Finmeccanica Aircraft Division, with the support of Eurofighter, BAE Systems, Airbus Defence and Space, and MBDA, follows the completion of ground trials on the weapon and a successful release of STORM SHADOW in November 2015. A further firing of a METEOR beyond visual range air-to-air



Photo: Jamie Hunter

**PAVEWAY IV is a dual mode GPS/INS and laser-guided bomb manufactured by Raytheon UK. It is the latest iteration of the PAVEWAY series.**

Photo: Eurofighter



**The STORM SHADOW cruise missile was first deployed by the Royal Air Force during operation IRAQI FREEDOM in 2003 and will provide the Eurofighter TYPHOON fleet with a long-range strike capability.**

Photo: Dr. Stefan Petersen



**Eurofighter TYPHOON is in service with the air forces of six countries and has recently been ordered by two more, namely Oman and Kuwait. Shown here are two aircraft of the German Tactical Air Force Wing 73 "Steinhoff".**

missile has also recently taken place, using UK TYPHOON aircraft IPA6, at the Hebrides range. Led by BAE Systems (with support from MBDA, Selex, QinetiQ, the UK Ministry of Defence and Eurofighter teams), the firing follows trials held in late 2015, which saw the TYPHOON aircraft conduct guided METEOR firings against real air targets in pre-planned scenarios.

The effects deliverable by both METEOR and STORM SHADOW will be enhanced by the high-kinetic characteristics and highly integrated sensors of the Eurofighter TYPHOON. This improves the weapons' range and gives the pilot the situational awareness to employ them most effectively.

Meanwhile, there have been a number of flight tests for enhancements to the integration and functionality of the Laser Designator Pods (LDP). This work has primarily been carried out by flight test engineers and aircrew from Airbus Defence and Space in Germany. These enhancements together give pilots more options for mixed configurations.

The Phase 3 Enhancements package (P3E) will focus on the delivery of the BRIM-

STONE weapon system and a range of other enhancements. BRIMSTONE is a precision attack missile with proven capabilities against both static and moving or manoeuvring targets.

The contract for P3E was signed in February 2015 and centres around a scheduled programme of weapon testing, the development and testing of flight control system upgrades, and finally store clearing and store release testing.

The initial fit for the BRIMSTONE weapon system on the Eurofighter will see two launchers fitted to the outboard pylons of the Eurofighter each carrying three BRIMSTONE 2 missiles. The full swing-role, multi-role weapons complement on the Eurofighter will then include a mixed configuration consisting of six BRIMSTONE 2 missiles; two PAVEWAY IV bombs, two underwing 1000l drop tanks, an LDP, four METEOR beyond visual range air-to-air missiles and either two IRIS-T or two ASRAAM heat-seeking missiles. This weapons package, combined with the performance and super cruise capability of the platform, confirms Eu-

rofighter as the world's most advanced swing-role combat aircraft available on the market today.

The Capability Road Map was further expanded in April this year with the announcement from the Kuwait Ministry of Defence and Leonardo-Finmeccanica (which leads commercial activities in Kuwait on behalf of the Eurofighter consortium) of a contract for the supply of 28 Eurofighter TYPHOON aircraft, to be produced in the four core nations and finally assembled in Italy. The Eurofighter TYPHOON for Kuwait will be equipped with the cutting-edge new E-Scan radar.

Further capabilities are planned to be integrated in future releases currently under definition with our customers, ensuring Eurofighter TYPHOON is kept at the highest level of operational capability through its entire life. All these enhancements together will give Eurofighter TYPHOON a significant 'Combat Edge' – enhanced situational awareness combined with a suite of flexible weapons options — and offer pilots a real advantage in the battle space for decades to come. ■

# Viewpoint from Nicosia



**Dimitrios Angelopoulos M.Sc.**  
**Advisor on Defence and Security issues**

## Cyprus Moves Towards Financial Stability and Reunification

Cyprus regained access to international financial markets barely three years after the crisis and has successfully issued debt three times since then, putting the country in a good position. Nonetheless, Cyprus is a small, open economy, and is therefore dependent on external demand and capital inflows from abroad. The message is very clear: the country should work to build more resilience and flexibility. According to a recent IMF Survey Cyprus has gone from the acute care stage and is now well into the recovery phase. The recovery programme gave it the tools which now must be vigorously applied to reform the economy and build resilience. In the banking sector, the ratio of non-performing loans (NPLs) remains very high at 60%, equivalent to 150% of GDP. Public debt, at just over 100% of GDP, is also a vulnerability.

An important task for Cyprus is to continue its privatisation strategy. The Greek- and Turkish-Cypriot communities are negotiating to find a solution to "the Cyprus issue". The IMF is providing technical advice on the economic and financial aspects of the process, having been asked to assist the two communities. Work is underway in several areas that are core competencies for the Fund, including developing macroeconomic and fiscal frameworks for a united Cyprus.

The European Commission has said that Cyprus's economy continues to face challenges after completing the adjustment programme which helped it stabilise its banking sector and consolidate its budget; two symptoms of the crisis which forced it into a bailout in 2013 and "left legacy issues". Reforms implemented in exchange for loans "have started to bear fruit" allowing the economy to grow 1.6% in 2015 - for the first time in more than two years- and employment to increase 0.9%, although long term unemployment and youth unemployment rates remain high.

On 22 May 2016, Cypriots went to the polls to elect the 56 members of the new House of Representatives for a five-year term. Cyprus's ruling conservatives took the lead, while a far-right party won a seat in the legislature for the first time. The right-wing Democratic Rally party was ahead with 31% of the vote, followed by Communist AKEL with 25.6%. Although Cyprus has an executive system of government and the President is elected separately, the vote on Sunday is a popularity gauge for President Nicos Anastasiades, whose term expires in 2018. As far as progress of the unification talks is concerned, President Anastasiades and Turkish Cypriot leader Mustafa Akinci recently stated that they are committed to stepping up talks in hopes of reaching a reunification deal by the end of 2016. They released a joint statement on 15 May, the first anniversary of their talks, saying that they are "pleased" with the progress made. They said they are determined to

show the "necessary will and courage" to overcome the differences they acknowledged still remain, and that any deal must take into account the concerns of both communities; and that reunification would not only bring peace and prosperity to Cyprus, it would also contribute to stability and cooperation in the region. Cyprus has been divided since 1974, when Turkish troops invaded and occupied 37% of its territory.

In the defence sector 3,000 professional soldiers will be recruited as part of National Guard restructuring. They will have opportunities for studying, training, future employment and access to scholarships, Defence Minister Christoforos Fokaides said. The professional soldiers will receive an annual net income of €13,000 plus health care benefits. There are plans to give soldiers the opportunity to study while they are serving, with fees in private universities reduced by up to 50%. "We want a modern army, more battle-ready, with modern operational means to harness new technologies and at the same time we will enable the young people of our country to start their studies earlier and also have employment and educational opportunities," Fokaides said. A reduction in military service was decided in February 2016: the 2015 intake is serving 18 months and conscripts starting from 2016 will spend 14 months in the army.

In terms of military personnel, in 2015 the National Guard numbered between 8,500 and 12,500 with 50,000 reservists. The entire human military resource of the Republic of Cyprus, including the Greek contingent, ELDYK (950), is estimated to number 63,450. The number of Turkish troops in Cyprus is about 43,000, with about 3,500 serving Turkish Cypriots and 26,000 reservists. The total number of Turkish military personnel in Cyprus stands at some 72,500.

The U.S Coast Guard plans to donate two patrol vessels to the Cypriot Coast Guard. The vessels will be delivered by the end 2016 and will enhance the capabilities of the Cypriot Coast Guard to police and protect the coastline of the Republic of Cyprus, as well as to conduct Search and Rescue operations within the Nicosia FIR area. The new naval procurement programme of Cyprus includes the procurement of an Offshore Patrol Vessel from Israel, the future procurement of three more vessels from a European country and the acceptance of the U.S. Coast Guard donation of their two Patrol Vessels. In addition, there is an ongoing upgrade project in Russia of Mi-35 helicopters, valued at €28 million, which is to be completed by the end 2016.

The Republic's defence budget has declined from €345.4m in 2010 to €318.9m in 2015 - a decrease of 7.7% - while armaments and maintenance have been reduced from €105.4m to €68.7m during the same period, a decrease of 35%.

## ALA acquires STAG

(df) The Italian company for distribution, logistics and service provision for the aerospace industry, ALA, announced it has signed a definitive agreement to acquire the UK based STAG Group, and its controlled companies: Spectech UK, Spectech France, Spectech US and Aircraft Components & Equipment Supplies. STAG is an international distributor and supply chain services provider for the aerospace industry, with core presence in France and in the UK. The transaction is subject to customary closing conditions which are expected to be completed by the end of May. The agreement combines the strengths of ALA and STAG and will leverage both companies' industry expertise and geographical footprint. The STAG Group acquisition strategically fits with ALA's priorities of European expansion and development of the market in the US, climbing the worldwide ranks up to the top five players. Roberto Scaramella, CEO of ALA, pointed out: "We are working hard on building a truly successful multinational company to better serve our global customers. The STAG Group acquisition represents a key step along this path, giving us the opportunity to accelerate our growth and establish our leadership in the distribution and supply chain services sector." Colin Davis, outgoing STAG chairman, endorsed this statement by adding: "We are delighted to close this transaction with ALA and offer an even brighter future to all our stakeholders. I will personally continue to cooperate with ALA throughout the transition phase to ensure business continuity."

## Joint Venture Between Airbus Defence and Space and OneWeb

(df) OneWeb Satellites, a joint venture between Airbus Defence and Space and OneWeb, has chosen Florida in the US as the site for its final assembly line, completing the last step in its industrial organisation. This facility, located at Florida's Exploration Park near the Kennedy Space Center, will carry out the series production of nearly 900 satellites for the OneWeb constellation. "In June 2015, we started from scratch to create a new satellite design and manufacturing company," stated François Auque, Head of Space Systems. "In both Florida and Europe, we are now embarking on the next stage of an unprecedented venture in the space industry: a site that can mass-produce dozens of satellites every month. All this, of course, without affecting the levels of quality and technology that are essential when it comes to spacecraft – complex machines that need to operate

for several years in space." A prototype production line at Airbus Defence and Space in Toulouse (France) will assemble and test the first ten satellites, and check and validate industrial solutions for the series production. The design of the satellites is currently underway in the company's design offices in Toulouse. The space segment of OneWeb will comprise initially a constellation of 648 operational satellites and replacement satellites, all of which will be identical. Each satellite will weigh approximately 150 kg and will operate in low Earth orbit. Arianespace and Virgin Galactic will begin launching the spacecraft in 2018 and the satellites will be placed in orbit using electrical propulsion. This joint venture is equally owned by Airbus Defence and Space and OneWeb.

## EDA Ammunition Safety Workshop

(df) Twenty-three experts from nine countries recently gathered in Bern, Switzerland, for the fourth edition of the Ammunition Safety Workshop organised by the European Defence Agency (EDA). The primary objective of the event, which took place at the Armasuisse Test Centre in Thun, was to give Ammunition safety experts the floor to discuss results from a European ammunition safety test (Round Robin Test) and to provide an overview of the military test centre capabilities. The European Network of National Authorities on Ammunition (ENNSA) started in November 2014. The member states are: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Poland, Romania, Spain, The Netherlands, Slovakia, Slovenia, Sweden, UK and Switzerland as partner nation. The aim of ENNSA is to harmonise munitions qualification. "European harmonisation of ammunition qualification would contribute to the successful implementation of the Common Security and Defence Policy," EDA stated. "Thanks to the fruitful expert discussions at the laboratories and test ranges, the workshop delivered tangible results to participants and contributed to the further harmonisation of ammunition safety test procedures. Furthermore, even the first test results of the Round Robin test demonstrated the importance of EU T&E networking, since all tests could only be performed in a collaborative approach."

## Funding for Dual-Use Research

(ck) The European Defence Agency is launching a new request for projects on dual-use technologies which could be supported by EDA to benefit from European

(Photo: EDA)



Structural and Investment Funds (ESIF). The initiative aims at identifying innovative dual-use research and technology projects which could be funded by ESIF. These projects, to be submitted to the national ministries of defence, will be selected by MoDs and EDA based on eligibility and performance criteria. Small and medium-sized enterprises, large companies, research centres, academia as well as public offices can assume the role of a project holder. Selected projects will benefit from free assistance provided by an international consulting firm. This technical support aims at fully developing the project folder (to be ultimately submitted to ESIF) and, therefore, maximise its chance to access ESIF co-funding. Dual-use research aims at developing technologies that both the civil and the defence sectors could take advantage of, for instance in the field of electronics, nanotechnologies, materials, sensors, or propulsion.

## Helgesen Andersen New Executive Vice President of Kongsberg

(df) Wenche Helgesen Andersen is appointed Executive Vice President and Chief Administration Officer of Kongsberg. She assumed the position on May 18 2016 and will be part of the corporate manage-



(Photo: Kongsberg)

ment team. She succeeds Hege Skryseth, who assumes the position as President of Kongsberg Digital. Helgesen Andersen has long international management experience and comes from a management position in FMC Technologies, responsible for a global product line. She has an engineering background and has more than 26 years of international experience in the oil and gas industry.

## Finmeccanica Rebranded as Leonardo

(gwh) Finmeccanica, the Italian defence group, has changed its name to "Leonardo – Finmeccanica – Società per azioni",

# Firms & Faces

abbreviated form "Leonardo S.p.a." This move reflects CEO Mauro Moretti's radical restructuring of the company. Out of a financial holding company arose an integrated industrial entity at the forefront of technology, said the new Leonardo company. Leonardo operates in four sectors – Helicopters; Aeronautics; Space; and Electronics, Defence & Security Systems – and is organised into seven divisions. For its subsidiaries and joint ventures Leonardo maintains parent company and corporate centre functions: DRS Technologies, a US subsidiary; MBDA, a joint venture with BAE Systems and Airbus Group; Telespazio and Thales Alenia Space, two joint ventures with Thales and ATR, a joint venture with the Airbus Group.

## Saab and ERA Cooperate on Radar Technologies

(gwh) Defence and security company Saab and the Czech producer of surveillance systems ERA signed an agreement on future cooperation in research and development of air surveillance and air defence technologies during the IDEB 2016 exhibition in Bratislava. This agreement involves a strategic partnership between Saab and ERA Pardubice regarding the research and development of active and passive air surveillance systems to be used in air defence solutions, which would have significant export potential. "We view ERA as a high-tech company with unique experience in passive surveillance and system integration. We believe that our close cooperation will significantly

enhance the surveillance and air defence capabilities of our potential customers," said Krasimira Stoyanova, head of Saab in Central Europe. "We recognise Saab as strong player in the field of development and production of advanced defence technologies. From the cooperation with Saab we expect further extension of our activities in supplying comprehensive radar solutions," said Viktor Sotona, CEO of ERA. GAA-ASI RPA Training Academy Augmented With Simulator, Instructors

## GA-ASI Collaborates with UND Aerospace Foundation and Expands Partnership with CAE

(sb) General Atomics Aeronautical Systems, Inc. (GA ASI), a leading manufacturer of Remotely Piloted Aircraft (RPA) systems, radars, and electro-optic and related mission systems solutions, recently announced two contracts in support of GA-ASI's new RPA Training Academy in Grand Forks, North Dakota.

GA-ASI will collaborate with the UND Aerospace Foundation in expanding the use of RPA for commercial applications. This collaboration is expected to create high-technology jobs and establish North Dakota as a leader in the RPA industry. As part of this collaboration, GA-ASI also will expand its current worldwide partnership with CAE, a global leader in the delivery of training for the defence and civil aviation markets.

"GA-ASI is pleased to align with UND Aerospace and CAE to augment our RPA Training Academy's curriculum with comprehensive training solutions for our international and domestic customers," said Linden Blue, CEO, GA-ASI. "We look forward to working with UND Aerospace and CAE to meet the growing global demand for RPA instruction."

UND Aerospace will provide its existing PREDATOR Mission Aircrew Training System (PMATS), a flight simulator that accurately reproduces PREDATOR® and REAPER® pilot and sensor operator aircrew stations, allowing students to master the art of flying and operating a GA-ASI RPA system. In March 2011, UND Aerospace became the first non-military educational institution in the U.S. to provide initial qualification and continuation training simulation support for operators of PREDATOR and REAPER aircraft.

CAE will grow its existing partnership with GA-ASI through simulator development efforts and by contributing a portion of the Academy's instructor cadre. CAE plans to leverage its experience and expertise in providing the U.S. Air Force with MQ-1 PREDATOR and MQ-9 REAPER classroom, simulator, and live flying instruction. CAE



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## Thales Project Leader in French PMR Project

(Graphic: Thales)

An aerial photograph of the London skyline featuring the proposed Olympic Stadium (a large circular stadium with a retractable roof) in the foreground, the London Eye, the Shard, and other skyscrapers in the background. The image is credited to Thales.

As project leader, Thales is in charge of integrating the various technologies to create a resilient and secure solution. It is also providing the multimedia-enabled PMR services to meet the requirements of mission-critical applications, such as group call and push-to-talk functionality. The SMEs in the consortium are an integral part of the LTE ecosystem.

in difficult situations. The Fed4PMR project is part of the telecom sovereignty component of France's new industrial regeneration policy. It is partly funded by the French authorities through the Public Investment Bank (BPI) and the PIA investments for the future programme.

## Sustained and Precise Firepower

AC-208B ARMED CARAVAN that provides a strike capability using HELLFIRE missiles, complemented with a robust suite of sensors and communications equipment for intelligence, surveillance and reconnaissance missions. Orbital ATK also displayed precision guidance technologies for indirect and direct fire weapons, including the HATCHET miniature precision glide weapon, the BUSHMASTER line of chain guns and automatic cannons that support 7.62mm, 25mm, 30mm and 40mm applications for air, land and sea weapons station platform integration. The XM25 Individual Semi-Automatic Airburst System was also showcased, along with integrated logistics and training packages for medium-calibre cannons.

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## Meggitt Training Systems Awarded \$15.6 M 2nd Delivery Order for US Army EST Contract

(sb) Meggitt Training Systems recently received a \$15.6 million second delivery order from the US Army Program Executive Office for Simulation and Training (PEO STRI) to deliver the Engagement Skills Trainer (EST) II system to both international and domestic locations. "The US Army and National Guard are upgrading their existing EST systems to the highly advanced EST II, and they've long recognized Meggitt as the strategic partner to help them with their training goals," said Jeff Murphy, President, Meggitt Training Systems. "The decision was made to modernise the inventory of small-arms trainers to integrate additional training capabilities as future requirements evolve." Meggitt was originally awarded the \$99 million, five-year Indefinite Delivery/Indefinite Quantity (IDIQ) contract in 2014. The programme, which covers 1,000-plus new and upgraded systems and simulated weapons for US Army facilities worldwide, will train new and experienced soldiers in marksmanship, collective CGI scenarios and judgmental video scenarios. "Meggitt was selected based on 'Best Value' and our performance since the award has confirmed the Army's choice" said Mark Parr, EST programme manager. "With the distributed architecture, integra-

tion of the EST II with other training systems is more readily adapted. Tablet access by operators and soldiers, coupled with automatic coaching capabilities, provides a force multiplier for trainers. The EST II offers the US Army the means to provide a more consistent and efficient way to train their soldiers for challenges today and in the future." Meggitt's scaleable and robust open architecture system allows ready integration of Meggitt and/or third-party training modules and will accommodate evolutions in fidelity and graphic complexity for greater realism. Current Meggitt modules cover enhanced 3-D marksmanship, and an intelligent coaching application on a wireless tablet enabling trainers to change scenarios quickly within a single training session. Deliveries connected to this order are expected to begin in August 2016 and continue through 2017.

## Kongsberg Defence Systems Enters Into Agreement With PGZ (Polish Armaments Group)

(sb) Kongsberg Defence Systems has entered into an agreement with PGZ (Polish Armaments Group) to develop business opportunities across the two organizations. KONGSBERG with its 7,500 employees and PGZ with 17,500 are both significant European defence industries. KONGSBERG and PGZ have a history of long, successful

cooperation in Poland delivering the NSM (Naval Strike Missile) based Coastal Missile System for the Polish Navy. With this new agreement, the two companies extend the cooperation, pursuing new opportunities across air defence, naval programmes and space activities with the aim of building a long-term partnership for the Polish and international markets.

Signing of the agreement was witnessed by His Majesty King Harald V of Norway and the President of Poland His Excellency Mr Andrzej Duda, during the President's State Visit to Norway.

"I am very proud to sign this agreement with PGZ on behalf of KONGSBERG. KONGSBERG is developed through international cooperation and we understand the principles of PGZ to grow with international partners. We see interesting opportunities working together and are ready to enter into a long-term partnership with PGZ", said Harald Annestad, President, Kongsberg Defence Systems.

"The Letter which is signed is only a starting point for long-term cooperation between PGZ and KONGSBERG. Our goals are ambitious. PGZ and KONGSBERG decided to join industrial potentials in order to increase defence capabilities of both countries as well as support the economic development of our countries", said Arkadiusz Siwko President of PGZ SA.

## Preview

**ESD 4/2016 · August 2016**

- **Country Focus: Poland**
- Warsaw NATO Summit
- ATGW Market Survey
- Turnet Systems for Armoured Vehicles
- Protected Logistical Vehicles
- 8x8 Market Survey
- Type 26 Frigates for the Royal Navy
- Propulsion Systems for Naval Surface Ships
- Air & Missile Defence Alternatives
- CBRN Detection and Decontamination
- Air-to-Air Missiles
- Helicopter Propulsion
- Pan-Continental Defence and Security Requirements in Africa



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# Exhibitions Schedule 2016

JUNE	
<b>NITEC</b> - Tallin, Estonia <a href="http://www.nitec.nato.int/">www.nitec.nato.int/</a>	6-8 June 2016
<b>CBW</b> - Stockholm, Sweden <a href="http://www.foi.se">www.foi.se</a>	8-10 June 2016
<b>EUROSATORY 2016</b> - Paris, France <a href="http://www.eurosatory.com">www.eurosatory.com</a>	13-17 June 2016
<b>Balt Military Expo</b> - Gdansk, Poland <a href="http://www.baltmilitary.pl">www.baltmilitary.pl</a>	20-22 June 2016
<b>MAST Europe</b> - Amsterdam, The Netherlands <a href="http://www.mastconfexpo.com">www.mastconfexpo.com</a>	21-23 June 2016
<b>IFSEC</b> - Birmingham, England <a href="http://www.ifsec.co.uk">www.ifsec.co.uk</a>	21-23 June 2016
JULY	
<b>RIAT</b> - Fairford, England, <a href="http://www.airtattoo.com">www.airtattoo.com</a>	8-10 July 2016
<b>Farnborough Air Show 2016</b> - Farnborough, England <a href="http://www.farnborough.com">www.farnborough.com</a>	11-15 July 2016
<b>Close Combat Symposium</b> - Shrivenham, England <a href="http://www.cranfield.ac.uk">www.cranfield.ac.uk</a>	19-21 July 2016
AUGUST	
<b>SMDC</b> - Huntsville, Alabama, USA <a href="http://www.smdsymposium.org">www.smdsymposium.org</a>	16-18 August 2016
SEPTEMBER	
<b>MSPO 2016</b> - Kielce, Poland <a href="http://www.targikielce.pl">www.targikielce.pl</a>	6-9 September 2016
<b>MS&amp;D / SMM</b> - Hamburg, Germany <a href="http://www.smm-hamburg.com">www.smm-hamburg.com</a>	7-9 September 2016
<b>DVD</b> - Millbrook, England <a href="http://www.theevent.co.uk">www.theevent.co.uk</a>	7-8 September 2016
<b>DX Korea</b> - Pusan, ROK <a href="http://www.dxkorea.com">www.dxkorea.com</a>	7-10 September 2016
<b>AAD</b> - Waterkloof, South Africa <a href="http://www.aadexpo.co.za">www.aadexpo.co.za</a>	14-18 September 2016
<b>SOBRA</b> - Gornja Radgona, Slovenia <a href="http://www.pomurski-sejem.si/index.php/sl/sobra/sobra">www.pomurski-sejem.si/index.php/sl/sobra/sobra</a>	22-24 September 2016
<b>Modern Day Marine</b> - Quantico, Virginia, USA <a href="http://www.marinemilitaryexpos.com">www.marinemilitaryexpos.com</a>	22-24 September 2016
<b>ADEX</b> - Baku, Azerbaijan <a href="http://www.adex.az">www.adex.az</a>	27-30 September 2016
<b>Security Essen</b> - Essen, Germany <a href="http://www.security-essen.de">www.security-essen.de</a>	27-30 September 2016
<b>ADAS</b> - Manila, Philippines <a href="http://www.adas.ph">www.adas.ph</a>	28-30 September 2016
OCTOBER	
<b>AUSA 2016</b> - Washington, D.C., USA <a href="http://www.ausa.org">www.ausa.org</a>	3-5 October 2016
<b>EURONAVAL 2016</b> - Paris, France <a href="http://www.euronaal.fr">www.euronaal.fr</a>	17-21 October 2016
<b>Future Forces Forum</b> - Prague, Czech Republic <a href="http://www.future-forces.org">www.future-forces.org</a>	19-21 October 2016
NOVEMBER/DECEMBER	
<b>INDODEFENCE</b> - Jakarta, Indonesia <a href="http://www.indodefence.com">www.indodefence.com</a>	2-5 November 2016
<b>IDEAS</b> - Karachi, Pakistan <a href="http://www.ideaspakistan.com">www.ideaspakistan.com</a>	22-25 November 2016
<b>I/ITSEC 2016</b> - Orlando, Florida <a href="http://www.itsec.org">www.itsec.org</a>	28 November – 1 December 2016
<b>Exponaval</b> - Valparaíso, Chile <a href="http://www.exponaval.cl">www.exponaval.cl</a>	29 November – 2 December 2016

## View From the Back

**Stephen Barnard, Managing Editor**

In the fair city of Bonn in the late 18th century – 1789 to be exact – there is a reasonable chance that a teenager by the name of Ludwig van Beethoven was aware of the opening of a printer's shop in the city. Mittler & Sohn had come to Bonn. Fast forward 200 years and the consequences of the post-Cold War era, combined with unparalleled global financial crises and the emergence of "free information for all" via the internet led to significant changes in the publishing scene in Bonn: many mergers later only a small handful of publishers remain within the city, and only one of them is active in the global security and defence markets – Mittler Report Verlag (MRV).

Among the numerous titles published by MRV, primarily in German and English, one in particular points to the future thinking and planning of the group: **EUROPEAN SECURITY & DEFENCE (ESD)**.

ESD was founded in 2002, launched as a quarterly translation of "the best bits" of its big-sister magazine, **Europäische Sicherheit & Technik**, which continues to this day to dominate the German-speaking specialist defence and security media scene. Establishing itself through the global network of Defence Counsellors and Defence and Military Attachés in and from Germany, and the broader networks served by and associated with the defence and security professionals of these communities, ESD established itself firmly but not spectacularly in a European niche during the next 12 years.

In January 2014 ESD was repositioned in the market as a stand-alone publication, with its frequency increased to bi-monthly, reinforced by a fortnightly on-line-only newsletter, **ESD SPOTLIGHT**, with its own website ([www.euro-sd.com](http://www.euro-sd.com)) and a new mission. Over the last 18 months, leading up to Eurosatory 2016, ESD has seen its on-line presence increase by some 30,000 copies per month, it's print subscriptions grow to very close to a self-imposed limit of 15,000 printed copies, and it's global manpower expand by almost double. And the magazine reflects another significant shift in its audience, away from the "old" magazines and concurrently away from generalist electronic media and messaging. The metrics are available, and the bottom line is that while information is conveyed reasonably well by electronic media, to reach and influence as well as informing requires an entirely new appreciation of traditional means of communication!

At the same time the mission of the magazine has crystallised into two clear parts:

- ESD is for European security and defence specialists (including, of course, companies) to reach out to the world;
- ESD is for similar specialists to reach into Europe.

In so doing we focus on key attributes of European industry in terms of technology, quality, price and reliability, and we concentrate on the European (and associated) defence and security markets. Certainly, in both security and defence there are more exciting regions; but when "excitement" means cycling through boom and bust, or meeting legislative challenges specifically designed to tilt the playing field, that is something we can do without. In this sense Europe is a stable, gently growing market looking for and offering the best of high technology at sensible prices, supported by reliable business practises and underpinned by top quality...

This, then, is ESD's mission, and these are its markets: it's time for reassessment of the platforms available, and to **Move!**



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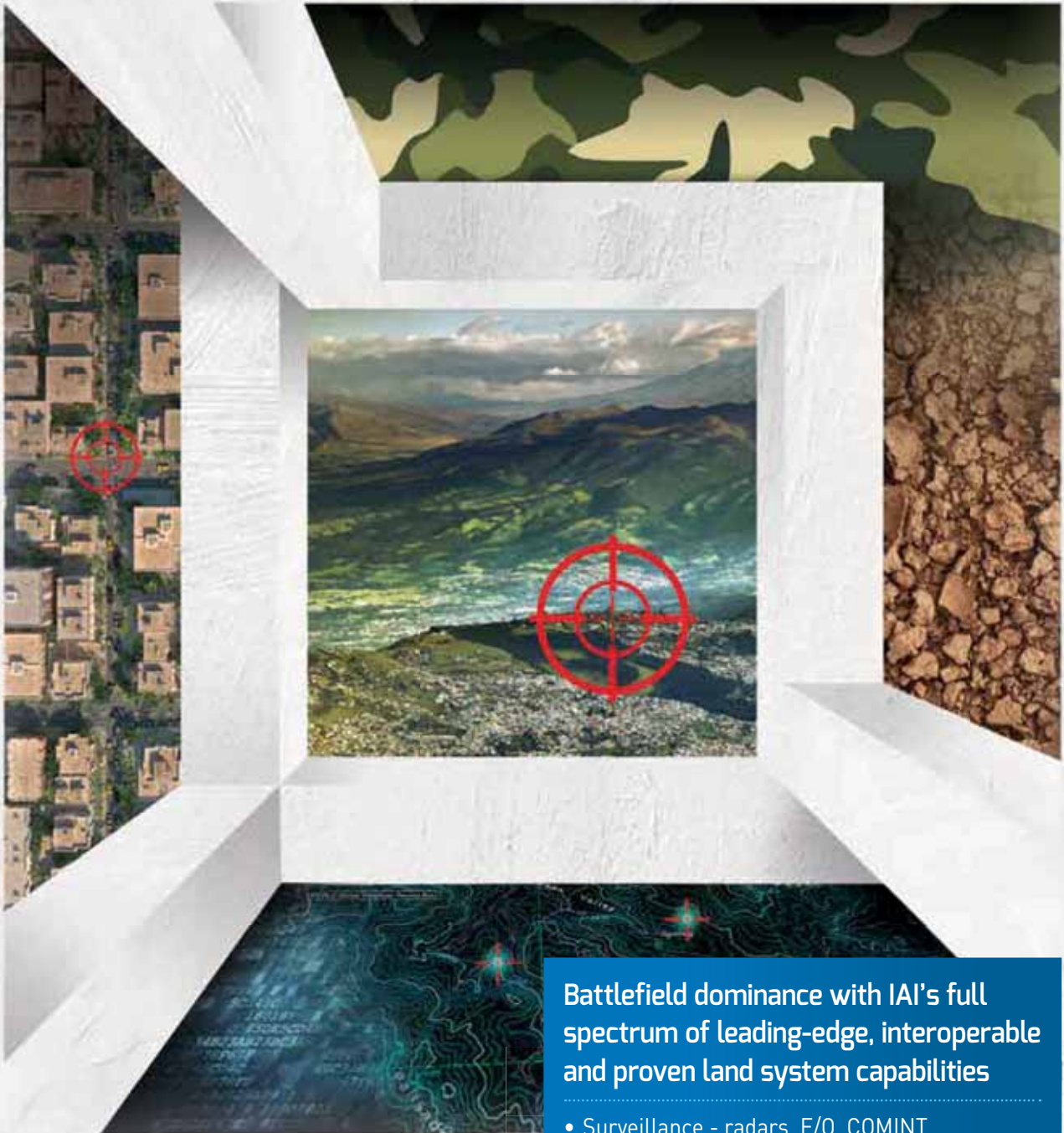
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