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ARMADA INTERNATIONAL

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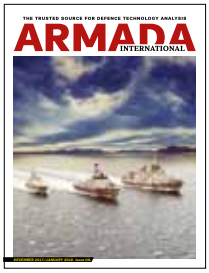

ON THE COVER:
Saab Kockums has designed a range of stealthy surface warfare ships to offer the Swedish Navy including a Fast Attack Craft (FAC 55), Mine Counter Measure vessel (MCMV 80) and larger Corvette (FlexPatrol 98).

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THIS MONTH ON ARMADAINTERNATIONAL.COM

■ MORE RBS-70S STIFFEN BRAZIL'S AIR DEFENCE

With short range air defense a renewed concern by leading armies it is interesting the Exército Brasileiro (Brazilian Army) has, despite tight budgets, received additional RBS-70s.

■ CLOAK OF INVISIBILITY

Protecting aircraft from Radio Frequency (RF) and infrared threats remains paramount for air forces around the world, as illustrated by the high levels of activity in this regard which has occurred in this domain over the previous year.

■ OVER THE TOP

Mortars are a class of artillery. They differ from guns which have a low, flat trajectory best suited for engaging targets by direct fire and howitzers which typically engage targets not seen from the gun position with an arching trajectory.

■ TURKEY FINALIZES S-400 DEAL

Turkey's Minister of Defense announced on 12 November that it has completed the purchase of the Russian S-400 air defense system.

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Editorial

Strategic complexity

It is my great pleasure to take over as editor of *Armada International* from my good friend and colleague Thomas Withington who is, as the say in show business, a very hard act to follow.

I was born in the early 60s and have clear early memories of growing up during the Cold War with regular news of NATO exercises across the North German Plain, the importance of protecting the Fulda Gap which was considered one of the main routes for any invading Soviet tank attack on West Germany from Eastern Europe, and of course the Strategic Arms Limitation Talks between America and Russia, know as SALT 1 and SALT II. These were then followed by the Strategic Arms Reduction Treaty talks (otherwise known as the START series).

While the threat of state-on-state war across a linear battlefield was clear and present, there was an enduring feeling that both sides really understood the meaning of Mutually Assured Destruction (MAD), and despite all of their weaponry, neither side was eager to pull the trigger (although there were a few tense moments).

The world has changed substantially since those times. The rise of extremism among non-state actors and, most importantly, their access to high technology and their ability to recruit and spread fear across the world through their actions continues to dominate the headlines of the international media.

These actions too can have major implications for the world's traditional and rising superpowers and their allies: the United States; a resurgent Russia; and China, which has awoken from its long slumber and has taken its place at the superpower table.

Spheres of influence and becoming less defined and old norms challenged. The Russian military's active participation in the Syrian conflict would have been considered an unacceptable strategic move during the Cold War. But western military campaigns in Iraq, Afghanistan and Libya contributed to the rise of Daesh as well as the rise of Iran's influence itself a worrying development for the economically developing Gulf nations in the Middle East.

China's resurgence took the United States off-guard. Now under strong, stable and internationally astute leadership, and fuelled by economic success and internal transformation, the country has significantly expanded its influence, mainly through soft power, most notably witnessed in Africa.

Island-building in the South China Sea has given notice that China is determined to shape its own region as it sees fit and, to date, has been successful in achieving this. Ex-President Obama's strategic 'pivot' to Asia was a late recognition that the status quo there was rapidly changing. This publicly announced change of strategy did not go unnoticed by Russia, which then took advantage of its best opportunity since the Cold War to reshape its own backyard through actions that included the Crimea and Ukraine.

And we haven't even begun to start on the implications of Kim Jong-Un's drive to achieve his goal of owning nuclear tipped, deliverable Intercontinental Ballistic Missiles. Uncertainty is at its highest level since the Cold War and the complexity the strategic picture means this is unlikely to reduce any time in the near future.

ANDREW DRWIEGA,
Editor

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Segma

Major General Ibrahim Al Alawi, commander of the UAE Air Force and Air Defence speaking at the 8th Dubai Air Chief's Conference. The theme of the event was *The Future of Air Power: Exploiting Advances in Network Centric Warfare.*

AIR CHIEFS MEET TO TALK TECHNOLOGY IN DUBAI

Senior international air force commanders and the aviation industry make the biennial Dubai Air Chiefs Conference and Airshow a 'must attend' event for anyone with an interest in the Gulf region.

Andrew Drwiega

The 8th Dubai Air Chief's Conference (DIAC), staged this year on Saturday 11th November 2017, is always the blue-ribbon event ahead of the bi-ennial Dubai Airshow which, for the last few years has been staged at the new Al Maktoum International Airport. This is inland from the man-made port of Jebel Ali, south of Dubai city.

The guest of honour at DIAC was HH Sheikh Ahmed Bin Saeed Al Maktoum, president of the Dubai Department of Civil Aviation and chairman of Emirates Airline. He briefly commented on the importance of air power in the region, pointing out the conflicts taking place in Syria, Iraq and Yemen.

The welcome was presented by Major General Ibrahim Al Alawi, commander of the UAE Air Force and Air Defence who announced that the theme of the conference was *The Future of Air Power: Exploiting Advances in Network Centric Warfare*.

General Stephen Wilson, vice chief of staff, United States Air Force gave the opening address leading off a broad selection of senior military officers. Setting the technology theme, he reminded delegates that "in the globalised, digitised world, over three billion people now own a smart phone - a figure that will double over the next decade. The technology within such phones through apps and their connectivity made them a threat in the hands of those 'with malicious intent'.

He said that it had only been 23 years since the General Atomics MQ-1 Predator had taken its first flight, and now "extremist were able to fly their own commerically built drones". He acknowledged that air power was not assured, as witnessed in the skies over Syria.

Gen. Wilson added that while the capability of 5th Generation aircraft would help to ensure national sovereighty, this came at a high price in both maintenance and operating costs. Low and slow, together with long loiter periods are valuable. Somewhat surprisingly he also noted the value of new, low-end, light attack 'OA-X' aircraft that could provide 'danger close' combat air support to troops enganged on the ground. Although he did not refer to any location specifically, it is a lesson learned not only in Iraq and Afghanistan by NATO and its allies, but also by allied forces in the fight agains Daesh in Iraq and Syria, as well as by Saudi Arabia in Yemen.

The vital requirement to digitally network military systems efficiently was to understand how to collect, share and learn from data quickly, regardless of domain.

Globalisation was allowing an adaptive enemy with access to digital technology, even relatively low technology that was commercially available, to pose major security threats, said Brigadier General Rahed Al Shamsi, deputy commander of the UAE Air Force.

Brig. Gen. Al Shamsi repeated the need to continually reduce sensor to shooter time, for which fast, reliable and secure networks were needed and praised other national forces who had supported the Air Force's capability here. "The UAE is proud to work alongside partners who have provide assistance and support. Many lessons have been learned and areas of improvement identified when networks are realised," he said.

He echoed an oft repeated plea by the military to industry that software and hardware needs to be more upgradable although he acknowledged that network centric systems were not cheap. However, future weapons needed to be viewed as mutli-role/sensor platform. "The UAE AF will spend time and money on networked forces architecture and C4 with a new air operations centre," he stated.

Air Vice Marshal (AVM) Leight Gordan, head of the Joint Strike Fighter programme, Royal Australian Air Force (RAAF) said that Australian defence strategy involved becoming a 5th Generation Air Force, fully networked to deliver leathal and non-lethal air power.

Future operational success would mean "staying ahead of the ever quicker decision making cycle of our adversaries". He added an observation that "the fog and friction of war will never be completely overcome while war remains a human endeavour. Data is the king; shared awareness is the force multiplier".

AVM Gordon said that the experiences being learned by Australian personnel working abroad was helping to define what needed to be more fully understood including "what is 5th Generation logistics, engineering and maintenance - what does that look like?". We need to drive this not only in combat action but also business processes.

BALLISTIC MISSILE THREAT

Vice Admiral John Aquilino, commander of NAVCENT, 5th Fleet, said that the ballistic missiles fired from Yemen at Riyadh, Saudi Arabia, gave an example of current dangers now being faced my numerous nations. "The days of the innacurate SCUD are finished. Non-state actors possessing highly technical weapons threaten both our military and civilian areas."

"There is already much information sharing but it needs to be expanded. Integration, interoperabily, capability and capacity exists today but we need to figure out how to move it around faster," he said.

Regarding ballistic missile defence, he said that targeting quality data had to be shared very quickly between international partners, both sensors and shooters, because the widow of opportunity to act was so small. In the maritime environment, naval forces play a critical role, either as sensor (such as the US Navy's Sea-Based X-Band Radar SBX-1 ship currently operating in the Pacific), or an Aegis destroyer as a sensor / shooter. There have also been successful engagement made by US Army's Raytheo MIM-104 Patriot missile systems.

There is no doubt that the ballistic missile threat can be overcome, but the key is rapid

data exchange between nations and learning to trust, concluded VADM Aquilino.

Other speakers included Air Commodore Philippe Adam, commander for Operations, Aviation Brigade, French Air Force; Lieutenant General Michael J. Hood CMM, commander, Royal Canadian Air Force; Air Vice Marshall Gerry M. Mayhew CBE, commander, No. 1 Group, Royal Air Force; and Air Commodore Robert Adang, deputy director, European Air Group (EAG), Royal Netherlands Air Force.


U.S. Navy

The US Navy's Sea-Based Radar (SBX) is currently operatingin the Pacific, according to Vice Admiral John Aquilino, speaking at the Dubai International Air Chief's conference.

AROUND THE DUBAI AIRSHOW

The UAE Armed Forces made a number of announcements during the show, some of which included older announcements that had been repackaged specifically for the show.

Major General Staff Pilot Ishaq Saleh Al-Balushi, head of the executive directorate of industries and development of defense capabilities at the Ministry of Defense, revealed that a contract would be signed with Dassault and Thales for the upgrade of the Air Force's Mirage 2000-9 aircraft.

Lockheed Martin was also an upgrade winner, through an annoucment by the UAE Armed Forces that it has signed a $1.65 billion contract that will ensure the UAE AF's Block 60 F-16 Desert Falcon fighters receive the latest upgrade. This would address obsolescence issues in the F-16s which were bought back in 2000, said Maj. Gen. Adbullah Al-Hashimi, UAE Air Force.

DUAL-BAND TO MULTI-SPECTRAL

The UAE's Ministry of Defence was revealed as the launch customer for the UTC Aerospace Systems/Goodrich 4th Generation multi-spectral MS-110 reconnaissance pod, derived from the DM-110 dual-band system which the UAE Air Force already operates on its F-16 fighters.

Vice president and general manager for Airborne Systems, Kevin Raftery, explained that the multi-spectral MS-110 now provides "three and a half times more data in a single mission - that's via seven bands of data".

"In the market segment we are in, we have to provide more capablity for less cost," he said. "Our sensors are huge collectors of inetelligence. You will see a transformation over the decade where we will put focus into information sharing, automated recognition and cataloguing than we will be building sensors."

"This involves data fusion and analytics - you need to analyse what you have got," he continued. "We are implementing our previous five year plan. We go from dual-band (visible and infrared) to multi-spectral. We provided day/night capabilities and now we provide all-weather with our radar system. We spend a lot of time talking to our customers to find out their mission needs and desires".

Some customers want to expand their DB-110 sensors while others want to go to multi-spectral. "The results from good mission planning and data interpritation means that they need to learn how to use this increased data to best effect." There are two aspects to this: collect and disemination. The ground segment changes, as the task of disemminating the intelligence means that tools and training need to be expanded, particularly among the mission planners, the operators and the analysists as to how they interpret data, he explained.

The DB-110 has had great success with the Lockheed U2 and more recently with Northrop Grumman RQ-4 Global Hawk. The technology is no longer a major expense and it can be used in more than just defence - drug interdiction, maritime security, disaster analysis and relief.

Looking ahead, one adaptation will be "that we will probably have to make the DB-110 smaller for a few of the new aircraft, there may be a DB-90 or something similar." Mr. Raftery added: "We want a family of systems where we take a long-range vision of what the product would look like which would include realestate space and architecture capabilities that would allow us to adapt the system as technology changes or the mission changes. We could then go and upgrade the system for our customers without them having to make a major investment."

"If DB-110 is 3rd Generation, and MS-110 is 4th Generation, we think there are 5th, 6th and 7th Generations, and to our customers that is a big deal," revealed Mr. Raftery. "We could potentially do a staggered implementation of their systems and customers like that approach. Application growth is a growing business. By the end of the year we will have 75 DB-110s that have been procured and that are currently operational, or are soon to be so. We also have some MS-110s," he concluded, without revealing a number.

LANDING WITHOUT THE HASSLE

One of Raytheon's discussions during the airshow centred around its development of the joint precision approach and landing system (JPALS). As part of the Lockheed Martin F-35 development, and in particular the F-35B for carrier borne aircraft, Raytheon had the contract to develop the JPALS system for the US Navy and the US Marine Corps F-35s. JPALS is a GPS-based precision approach and landing system that assists aircraft to land in all weather conditions. "JPALS uses the GPS system to identify a landing point and could then guide an aircraft to within centimetres of that point," said Tarik Yusifzai, vice president of strategic operations, MENA. "As it is GPS guided, it is also more secure than radar which, once turned on gives the aircraft's position away." A civil version of the system has already been bought by authorities in the UAE to manage aircraft landing at several airports, including the still developing Al Maktoum International Airport.

JPALS is partly integrated with the deck landing system, but it does "bring the aircraft in to the wire," confirmed Mr. Yusifzai. According to Raytheon, JPALS would get the aircraft to that point over the ship's deck: 'the two systems would agree with each other, meaning JPALS could show the pilot on glideslope and the deck landing system would show the same'.

"Our system provides the trajectory, point to land - all of which is displayed on the pilot's Head-Up-Display (HUD)," said Mr. Yusifzai. The pilot is cued through two symbologies: a large

window that shows the general direction of landing when the aircraft is still some distance away, which then transforms into a smaller window for absolute precision. At the end of the mission the two windows close together.

"The other important aspect is that this is equally applicable for UAVs," said Yusifzai. "You can launch a UAV and bring it back using our system," he confirmed. "We have had successes to within centimetres landing on the cable," he said. Using the example of Northrop Grumman's MQ-25 Stingray unmanned carrier aviation air system (UCAAS), it would pick up the JPALS signal and land autonomously when commanded to do so. A Raytheon clarification added that, theoretically, if a UAV was being flown with a pilot in command at a control station, the pilot would see the same instrumentation as the pilot of a manned aircraft.

"We are also working on a system that will serve expeditionary forces on the ground," said Yusifzai. "It is a derivative of JPALS, as it solves classical weather problems such as sand that might interfere with the radar's picture. This would be rapidly deployed in a humvee with four antennas and two operators.

"One system can also control multiple landing sites in a 20nm radius," said Mr. Yusifzai. "One location can provide landing information for up to 50 aircraft in that area, recommending numerous approaches to avoid threats for up to 30 of those operational aircraft. All the aircraft needs is a GPS receiver in the aircraft.

SALES SUCCESS FOR SKELDAR

"It has been an amazing breakthrough year for UMS Skeldar with five sales so far," said David Willems, head of business development at Switzerland-based UMS Skeldar talking on the Saab stand during the airshow (UMS Skeldar is a joint venture between UMS Aero Group and Saab).

Expalining this recent successful take-off of the Skeldar V-200 Remotely Piloted Aerial System (RPAS), Mr. Willems attributed it to finally moving beyond the idea that the V-200 was a prototype platform. "We flew daily at Aero India at the beginning of the year - this was the first time at a manned airshow," he stated.

But he feels that the real breakthrough came following a couple of announcements made during the summer. "We reached an agreement with Jetlease to offer the Skeldar V-200 platform as a leasing product for the civil as well as military market. We got a lot of requests from agencies who don't want to buy, but prefered to trial it or supplement existing capabilities". This includes the 'blue light' emergency services sector as well as emerging military forces that will not develop their own heavy fuel UAV capable of lifting off at a maximum weight of 235kg..

Mr. Willems offers an example of a potential customer: "Perhaps a navy wants to create a Request for Information (RfI) for a UAV platform; but they want to assess what is available in the market before making a decsion. Now we can offer a lease on the V-200 platform for a number of years to allow them to trial and assess its capability."

The second breakthrough came when UMS Skeldar announced an agreement with Sentient Vision Systems to provide the ViDAR (Visual identification Detection and Ranging) system for its UAV systems. This allows the V-200 to use between five and 10 cameras offering between a 180-360 degree awareness around the UAV. The ViDAR uses autonomous detection over a wide area to give a better 'find' capability than more passive electro-optical sensors, claimed Mr. Willems. The company claims over 80 times better area coverage over standard EO/IR systems.

The endurance of the V-200 is around five hours with 40kg of load in a typically average day, but would of course vary if the UAV was operating in more extreme 'hot and high' conditions, or was required to hover for long periods. Willems said that a good constant speed of between 38-48 knots (70-90km/h) would maximise the fuel consumption with an average payload onboard.

The Skeldar V-200 now has a bigger varient, the R-350 which offers two hours endurance with a payload of 30kg. "That is enough to complete a lot of missions," said Mr. Willems. "The R-350 is smaller than the Skeldar V-200 but has been in development for nearly ten years, although the new product is a redesign of the old product."

"We are now working on the next version of both UAVs, the B versions, but with improved performance, upgraded avionics and more stability. Weight reduction is the biggest challenge to improve each platform, and any kilogram saved gives more fuel or heavier payload. We want to make the platform lighter but keep the same payload capability", sais Mr. Willems.

The first sale of an R-350 was made to the German military. Earlier in the year the R-350 conduct trials for the German Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw). But the main targets are 'blue forces' because it is easy to deply with a small footprint.

Typically two operators are required for the R-350 and four for the V-200, especially if it is ship based. Mr. Willems floats the idea that both aircraft could work as a pair, having heavy fuel engines with multiple interoperable payloads."

C2 DEBUT

The Japanese aircraft maker Kawasaki Heavy Industries brought its newly developed C2 transport aircraft to the Dubai Airshow for a debut appearance. With a maximum take-off weight of 155 tons, it slips between the Lockheed Martin C-130 Hercules with 74 tons and the Boeing C-17 at 249 tons.

After the Japanese Government announced that the development of the aircraft was complete in March 2017, the Japanese Air Self Defence Force began receiving its first aircraft with an eventual requirement of up to 30 C2s.

It can house 40 medical litters inside the large cargo compartment (15.6m long; around 4m height and 4m wide). Its range with a maximum payload is reported to be 2,400nm. Five cameras are sited around the aircraft to assist the aircrew and loadmaster, who has a dedicated workstation at the front of the cargo deck. Representatives said that there was triple redundancy in the control system.

Andrew Drwiega

The Kawasaki Heavy Industries C2 medium transport aircraft made its debut appearance at the Dubai Airshow 2017.

C-SOCC

Defence ministers from the Netherlands, Denmark and Belgium sign the Letter of Intent allowing their Special Operations Forces to consider the creation of a Composite Special Operations Component Command.

GLOBAL SOF RESTRUCTURES AS MISSION SETS FLOURISH

As the international special operations community fights to retain tactical and technological superiority over its adversaries, commanders are being forced to reconfigure force structures in order to optimise the utility of their force multiplying units.

Andrew White

At a time when resources remain scarce and operational tempo is high, Special Opera-tions Forces (SOF) are remoulding and reconfiguring themselves to maintain operational effec-tiveness across multiple areas of operation in order to satisfy an ever-expanding range of mission sets ranging from counter-terrorism (CT) and counter-piracy (CP) through to direct action (DA), surveillance/reconnaissance (SR), military assistance (MA), unconventional warfare, counter insurgency (COIN), foreign humanitarian assistance, military information operations, and civil affairs operations.

Nowhere is this better exemplified than in the United States where, in August 2016, the roles and responsibilities of the US Special Operations Command (USSOCOM) were expanded to include the Countering Weapons of Mass Destruction (CWMD) responsibility which had been transferred from the US Strategic Command (STRATCOM) following concerns that the latter agency had not been paying enough attention or resources to this particular area of interest.

The transfer of duties has since placed new strains upon USSOCOM which is already heavily engaged across the world. The decision to provide it with such an additional role has triggered not-for-profit organisation, the Global SOF Foundation (GSF), to suggest that the Tampa-based Command uplift its manpower from 70,000 personnel in order to "...ensure the force is poised to meet today's and future threats and to alleviate stress on the force due to persistently high operations tempo over the last 15 years".

Outlined in its annual advisory notice for USSOCOM, *SOF Imperatives for 2017*, GSF's document explains growing priorities for the international SOF community, particularly in light of the "...growing assertiveness of Russia and its use of hybrid or new generation warfare; and the increased terrorist threat in Africa".

Although falling short of calling for increased manpower, USSOCOM

Commander, General Tony Thomas explained in his annual address to the US Senate Armed Services Committee on 4th May 2017, how the Command continues to witness uplift in demand for SOF.

"While challenges endure and new ones emerge, our force continues to evolve in the attempt to present options and decision space for our national leadership. We are providing key integrating and enabling capabilities to support [US Department of Defense] campaigns and operations. We operate and fight in every corner of the world as an integrated joint, combined and interagency force," Thomas reiterated.

The Polish Special Operations Component Command has enjoyed the benefits of a dedicated and centralised SOF headquarters providing government leaders with a joint capability across the full spectrum of operations.

EVOLVING FORCE

It is precisely this evolution of the force to which the international SOF community has become increasingly adaptable over recent decades, but in a high tempo contemporary operating environment (COE), the need to continue evolving has never been stronger. This momentum has driven SOF organisations around the world to look at restructuring in order to maximise their limited effects on the ground, in the air, and at sea.

In the Netherlands, the armed forces have officially initiated the process of establishing a Special Operations Command in order to fuse the capabilities of the Army's Korps Commandotroepen (KCT) and Royal Netherlands Navy's Maritime SOF (NL MARSOF), as well as considering the introduction of a dedicated special operations air component.

Speaking to *Armada International*, an official source closely associated with the effort explained how a Task Force and designated commanding officer had been established in September 2017 to begin the process of setting up a Special Operations Command. The Task Force has been given a deadline of 2018 for the SOCOM to achieve an initial operating capability.

"Even though we still have no new government and no official notice of an increased budget for the Defence Forces, the task force that has to build the SOCOM organisation has been established and will be in office starting this month to begin this challenge," the source explained.

The SOCOM, should it receive a final go-ahead from the government, would comprise a joint command structure for KCT and MARSOF components as well as the establishment of a dedicated air component to directly support force elements. Currently, SOF air support is supplied by army, navy and air force elements as opposed to a single, dedicated force.

"For the SOF Air Component, the situation is about the same," the source continued. "The idea is for the Airbus Helicopters AS 532U2 Cougar Mk2 to stay in service as the initial dedicated SOF capability and making the Boeing CH-47F Chinook a designated capability that can support the SOF and Cougar if additional capacity is needed. "All we need now is a political decision to raise the budget and than we can start building," the source added.

Such a capability would allow Dutch SOF to deploy in an expeditionary fashion without any reliance upon not only the conventional forces but also partner nations globally, a situation that is faced not only Dutch SOF but other relatively mature SOF components around the world.

Elsewhere in Europe, the Romanian Armed Forces are also in the process of establishing a dedicated SOF Headquarters, according to Major Geen Marian Sima. Speaking at the Global SOF Symposium in Bucharest on 27th September, Maj. Sima warned how only a unified and joint command would be capable of reacting to the "frozen conflict" currently being waged across eastern Europe.

Addressing SOF delegates at the event, he explained how the international SOF community must be "strengthened" in order to become a "very good tool to counter classical and asymmetric military tasks".

Romania is seeking to achieve an Initial Operating Capability (IOC) for the SOF Headquarters by 1st January 2018. The move will see a central and joint command structure for the army's 6th

The Danish Special Operations Command, established in 2014, continues to develop although service commanders have already benefited from a unified approach, as illustrated with its stra-tegic reach around Europe, the Arctic, Africa and Middle East.

Special Operations Brigade 'Mihai Viteazu' and Special Detachment of Protection and Intervention; as well as the Naval Group Special Operations Force. The Romanian Ministry of Defence was unable to provide *Armada International* with further details but defence sources described how the move would allow 'ROU SOF' to expand on its most recent operational projections to Afghanistan in support of the NATO mission.

Similar efforts are also underway in South America where the Venezuelan Armed Forces officially established a Special Operations Command on 17th August 2017 with a view to encouraging further joint operations across the full mission spectrum.

Based out of Maracay in the Aragua State, the SOCOM will enable the army's 107th and 509th Special Operations Battalions as well as the Parachute Brigade's Rapid Reaction Unit to work in a more integrated fashion with the Navy's Special Operations Command; and the Air Force's 10th, 15th and 17th Special Operations Air Groups.

The Venezuelan SOCOM will remain focused on internal security and counter-terrorism operations particularly targeting the networks of organised criminal gangs and paramilitary groups.

Meanwhile, the Japanese Self Defence Force (JSDF) continues to consider the establishment of its own Special Operations Command (JP-SOCOM) as it seeks to emerge from a recent history of reliance upon the US. President Trump's 'America First' policy has forced many commanders within the JSDF's SOF community to consider the establishment of a JP-SOCOM to provide strategic effects on a global basis.

With the combined strength of force elements including the Ground JSDF's Special Forces Group (SFG) and Maritime SDF's Special Boarding Unit (SBU), the JP-SOCOM would in theory be capable of undertaking much of the full spectrum of special operations, although currently it still lacks a dedicated air component.

A unified JP-SOCOM, according to defence sources associated with the various force elements, would also be ideally suited to contributing to coalition operations abroad. As an example, the peaceful nature of Japanese SOF to situations provides them with a unique skill set suitable for intelligence gathering missions in particular; as well as liaison with foreign military partners.

Defence sources explained to Armada International how JSDF SOF components were also ideally suited to human intelligence (HUMINT) and CT missions, as well as rescue and recovery operations and the provision of expertise to wider SDF components. All this, however, would be best optimised with cooperation from the USSOCOM and other partner forces in Asia Pacific, including the Australian Special Operations Command, sources added.

The successful establishment of a dedicated SOCOM is clearly illustrated in comments made by a member of the Danish Special Operations Forces, Col Michael Hyldgaard, during the Global SOF Symposium in which he pinned the contemporary successes of Danish Special Forces down to the "essential" support of the SOCOM.

Established in 2014, Denmark's SOCOM drew together the Army's Jaeger Corps, Navy's Special Warfare Group (also known as Frogman Corps); and Special Support and Reconnaissance Company.

Maj Gen Jørgen Høll, commander of the SOCOM explained to *Armada International*: "There will be plenty of work for Danish special operations capabilities around the world in the future to deal with existing crises and to prevent future crises. I hope to see an increase in the Danish SOF role in Danish whole-of-government approaches where capabilities from different departments work together and complement each other in pursuit of Danish national strategic interests or objectives. That approach will require another type of investment - an investment in people who must learn to work together in new ways across department."

Describing his efforts to establish the new command, Høll added: "My first priority was to build a strong team. We stood up a new headquarters and took command of two SOF units with very different cultural backgrounds. You cannot work together on SOF tasks and mission sets without building a strong team grounded in mutual trust and respect for each other's competencies and responsibilities.

"I had to select the right people from the services for my SOCOM staff as the Danish SOF community were too small to man a joint level headquarters. We haven't thought strategically about special operations in Denmark before, and one of my first conclusions was to initiate that strategic level thinking and begin to formulate a joint Danish SOF concept within the guidance I received from the Danish Chief of Defence," he continued.

Turning his attention to relationship building, which he called integral to both developing as a national and international resource, Høll urged: "I also knew from the get-go that I had to build a strong relationship to the services. We are part of a wider team and I do not own a number of the joint enablers necessary to execute today's special operations at the operational level. I also quickly realised that the knowledge about special operations among the senior decision makers were limited to what they knew

about the two Danish SOF units.

"One of my big tasks continues to be to inform about the wide range of special operation tasks and missions especially the softer side of the spectrum, such as military assistance, working with partners to build capacity, training advice and assist. My staff and I work had to reduce the gap of factual knowledge as a precondition for the best use of Danish SOF to protect and support Danish national interests," Høll concluded.

One option currently being considered by Denmark alongside the Netherlands and Belgium is the creation of a joint SOF command structure; a letter of intent for which was signed by the various defence ministers on 16th February 2017.

Special Forces Components from the triumverate of European countries have agreed to consider the establishment of a Composite Special Operations Component Command (C-SOCC), designed to pool knowledge and resources across operational, training and doctrinal spheres, Danish SOCOM sources confirmed to *Armada International*.

Having taken the lead role in the C-SOCC experiment, Denmark's SOCOM is looking to report back with a basic concept of operation for the joint command by the end of 2017, ahead of a projected IOC in 2019 and full operating capability (FOC) in 2020. It is the vision of the various state actors for the C-SOCC to be certified for support of the NATO Response Force by 2021.

Cooperation would not only involve Dutch KCT and MARSOF force elements with Jaeger Corps, Naval Special Warfare Group and Special Support and Reconnaissance Company, but also Belgium's Special Forces Group (SFG).

The US Special Operations Command, despite its total strength of around 70,000 personnel, remains stretched across multiple operational areas of interest globally. The Command has also been awarded an additional role to Counter Weapons of Mass Destruction.

COOPERATION FOR GREATER EFFECT

Despite such moves to increase cooperation and collaboration between services as well as agencies and other government entities, it appears much work still needs to be completed in order for the international SOF community to truly become a holistic and effective force.

Addressing delegates at the GSF Symposium in Bucharest, Deputy Supreme Allied Commander Europe (DSACEUR), General Sir James Everard described how getting the SOF community to speak with a single, unified voice remained a "priority" for NATO.

To a certain extent, this has already been satisfied by the establishment of the NATO Special Operations Headquarters (NSHQ) in Mons, Belgium, which according to defence sources, has begun a period of transition to extend its sphere of influence beyond merely doctrine and training to the operational environment.

"Information sharing is critical but partnering must go beyond for conclusive effect," Gen. Everard proclaimed, who's comments coincided with the visit of NATO Secretary General, Jens Stoltenberg, to the USSOCOM headquarters at Macdill Air Force Base in Tampa, Florida on 20th September.

Mr. Stoltenberg met with USSOCOM boss, Gen Thomas to discuss 'stepping up NATO's role in the fight against terrorism', service officials from the Command stated.

An official spokesperson explained to *Armada International* how NSHQ comprised SOF components from across the Alliance, capable of providing capabilites to complement air, maritime and ground forces.

This, it was suggested, provided a model for closer cooperation from across the international SOF community, with a centralised headquarters providing doctrinal, training and operational advice to its members.

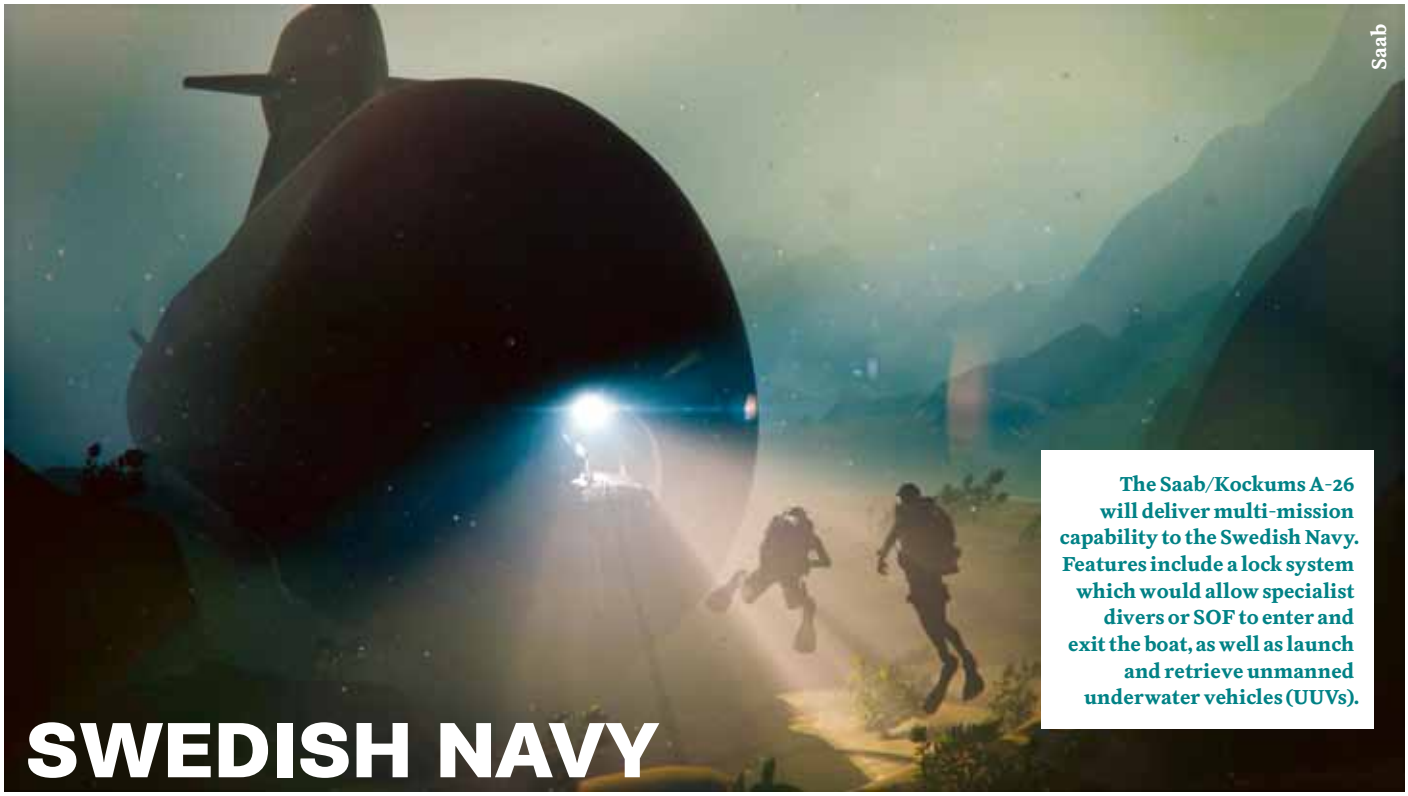
"NATO SOF educates, trains, exercises and evaluates to ensure successful generation and employment of forces. All special operations activities are centred at the NATO Special Operations Headquarters which provides advice to the Supreme Allied Commander Europe [SACEUR] on all matters related to special operations," a spokesperson added while explaining how the Command comprised elements from across 36 Alliance members and three non-NATO entity partner nations, all of whom are capable of coordinating SOF capabilities to meet NATO goals.

Similar sentiments were shared by the Lithuanian vice minister of National Defense, Vytautas Ubrasas who, while describing ongoing anti-terrorist operations in Ukraine and elsewhere in eastern Europe, urged: "We are sharing information but not working as a team to counter these hybrid threats.... (which) are region-specific and require unconventional solutions."

Thoughts were again echoed by the Norwegian Special Operations Command's Lieutenant Colonel Asbjorn Lysgaard who described how integral cooperation between SOF components would be in optimising the operational effectiveness of coalition forces: "Information sharing is the most important need in order to successfully counter terrorist threats," he explained.

The international SOF community has never been busier. However, relevancy remains a critical requirement to these force components who remain the favoured course of action for state actors seeking to exert influence abroad in a military capacity.

In order to maintain this advantage, SOF Commands must not only maintain numbers without reducing selection standards, but also continue to morph as the operating picture evolves yet further.



The Saab/Kockums A-26 will deliver multi-mission capability to the Swedish Navy. Features include a lock system which would allow specialist divers or SOF to enter and exit the boat, as well as launch and retrieve unmanned underwater vehicles (UUVs).

SWEDISH NAVY KEEPS FUTURE PLANS QUIET

Stealthy, economic and effective is how the Swedish Navy has developed - and new plans with Kockums Shipyard aim to progress those progress those attributes even further.

Andrew Drwiega

The Swedish Navy is facing exciting times which looks set to seeing it recover some of the strength that it has lost due to defence cuts over the last few decades. While the number of vessels in the fleet has been significantly reduced since the 1980s, it possesses modern 'stealth' corvettes, updated mine hunters and is looking forward to a new class of submarine. Through its industrial partner Saab (and shipbuilding subsidiary Kockums), the construction of two new A-26 Class submarines has already begun and designs have already been drawn-up for the Swedish Navy's next generation of a stealth family of ships.

On 16 August 2017, the Swedish government announced an increase in defence spending from 2018 onward due its perception of 'the changing security situation in our region'. In addition to existing investments of $60 million (SEK500m) allocated in the 2017 Spring Amending Budget, there would now be an additional $323 million (SEK 2.7 billion) per year from 2018 to further extend 'total defence capability'.

Speaking during a media briefing on 22 November, Rear Admiral (RADM) Jens Nykvist, Chief of Staff, Royal Swedish Navy said that international naval activity in the Baltic Sea, Sweden's back-yard in terms of defence with a long exposed eastern coastline, has increased, calling it a "tricky environment" in which to operate.

RADM Nykvist is an ex-submariner with 15 years "spent below the surface" and was in command of the Swedish attack submarine HSwMS Gotland when it began a one year bilateral training exercise with US Navy anti-submarine warfare forces in June 2005.

Looking back to September, he said that he could not recall a time when there were more warships in the Baltic Sea. These were largely centred around two exercises - a mainly national exercise bolstered by US Marines as well as international Special Operations Forces (SOF) called Exercise Aurora 2017 which focused on the Island of Gotland and territory north of Stockholm, and Exercise Northern Coasts (NOCO) 2017. NOCO is a multinational exercise for NATO, Partnership for Peace and EU countries, which has been conducted annually since 2007 in the Baltic region. This year was particularly busy as it was managed by the Swedish Navy and involved 50 ships from a wide variety of nations and included the patrol ship HSwMS Carlskrona, as well as two Visby Class stealth-corvettes, HSwMS Karlstad and HSwMS Härnösand. The exercise also provided an opportunity to test the initial operational capability (IOC) of the new Swedish-Finnish Naval Task Group.

"We see more importance in the region but also uncertainly", said RADM Nykvist, largely indicating the Russian presence from Kaliningrad and St. Petersburg where that country brings in around '40 percent" of its imports. He said that Russian naval activity

had increased in the small Baltic Sea area that witnesses between 2,000-4,000 maritime vessels in the region at any one time.

The Baltic is characterised by being very shallow, with an average depth of around 65m (to a maximum of 465m), with a rocky seabed on the western side going to a more sandy bottom towards the mainland European coast making it challenging for submarine operations. In addition to protecting sovereign waters, the Swedish Navy addresses economic factors such as pollution and over-fishing, together with a non-inconsiderable threat from mines, of which there are still around 50,000 in the waters that remain from the wars of the late 19th Century through to the two World Wars. Minesweeping is a regular task undertaken by many nations in the region.


Andrew Drwiega

Kockums Gunnar Wieslander, senior vice president and head of business area, explains the submarine development process that has led to the new A-26 Class.

DEFENCE POSTURE

The Swedish defence stance is to create a 'threshold effect' which balances credible military capability, with good force availability and international cooperation. "We have high availability in the Navy, we are professional and we are 'out there' to show how we operate", confirmed RADM Nykvist. The main tasks that are regularly practised include maritime surveillance and reconnaissance to ensure territorial integrity, the protection and sustainment of civilian maritime shipping, and finally coastal defence operations "if someone is attacking us".

The surface and subsurface navy is mainly structured around two corvette naval warfare flotillas, a submarine flotilla and a mine clearance squadron. Manning has been reduced to around 40 personnel on corvettes and 35 on submarines, virtually all professionals, with the result that "our personnel take a lot of responsibility". Although the armed forces are returning to conscription the Navy will not largely participate in this next year (except for a few special positions).

"My main mission is to build the threshold effect of the armed forces", said RADM Nykvist, who is currently helping to oversee a number of international partnerships involving the Swedish Navy. Sea Surveillance Co-operation Baltic Sea (SUBCAS) comprises most of the nations bordering the Baltic (as well as the UK's Royal Navy) and is focused on the provision of general maritime data boosting situational awareness leading and leading to a safer and more secure maritime area for all users. There is also the smaller bilateral SUCFIS between Sweden and Finland, as previously mentioned, which potentially reached IOC following the analysis of operations during the NOCO exercise. The main objective is to reach FOC by 2023.

Another important organisation for the Swedish Navy is the Baltic Ordinance Safety Board (BOSB) which groups Sweden with other Baltic nations in order to focus multinational skills and assets onto clearing the thousands of mines that still pose a danger to all maritime users.

WHAT'S NEXT?

"We have got good knowledge of stealth, and we are good at it from the prospect of both submarines and surface ships. It is vital to go undetected for as long as possible," said RADM Nykvist. He added that the Navy may look to using two crews to each surface platform to allow the ships to go to sea for longer periods.

The Sodermanland Class of submarine was modernised in 2010 with a lifetime extension programme: "it was basically a new submarine; we split the hull into two parts and we put in the Stirling AIP [air independent propulsion] plugin section. We have been using this since 1988 and it will also be used in the A-26 Class. It makes it possible for us to stay down there for weeks," stated RADM Nykvist.

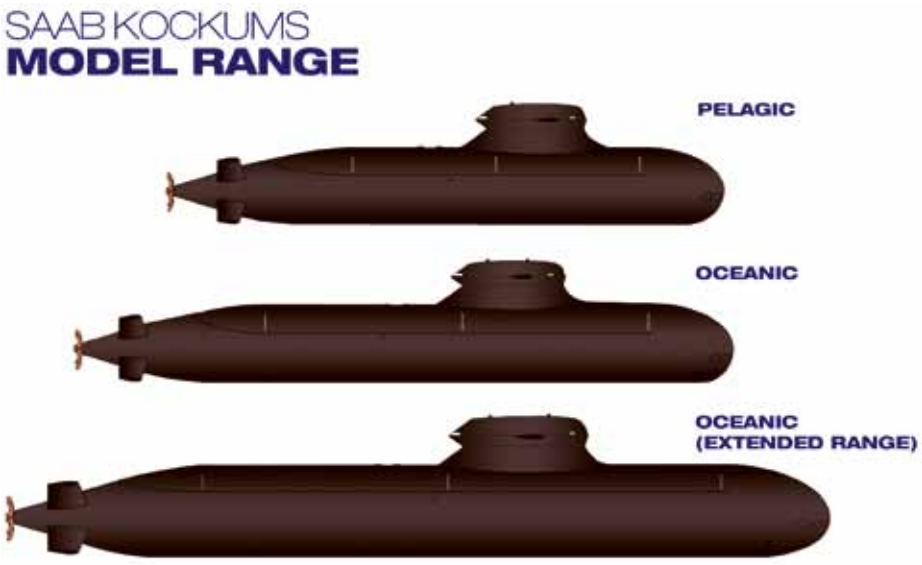
Now two of the Gotland Class submarines are currently being given a mid-life upgrade at Kockums facility within the naval base at Karlskrona in southern Sweden. This upgrade process began at the end of 2015 and both hulls being welded together this summer sea trials will begin next year with delivery expected by the year's end. The work upgraded the Sterling AIP to a Mark 3 version, as well as the submarine's combat and ship management systems together with fins, antennas, and periscope (now an optronic sensor) and will allow both of the submarines to remain operational until 2030.

Many of upgrade systems going into the submarines will also be used in the A-26 Class (although they will be the latest versions). However this is already helping in the de-risking process in terms of crew training and familiarisation with the systems. Initial work has already begun on the two A-26 Class submarines, which are being built in parallel.

Kockums has received a new lease of life after being acquired by the Saab Group from the German organisation ThyssenKrupp in 2014, following a tense tense situation at the Kockums shipyard in Malmö that involved the active participation of the Swedish Defence Materiel Administration.

Gunnar Wieslander, senior vice president and head of business area at Kockums, said that after the takeover Saab decided that a total refurbishment of the Kockums Karlskrona facility would be done, a move that saw the biggest investment in one site by the Saab Group.

The Swedish government was now in a position to invest and in 2015 the Ministry of Defence placed an order through its FMV/FOI organisation with Saab to build two A-26 submarines and to upgrade the Gotland Class. Mr. Wieslander explained that the submarine development path and the integration of the Sterling AIP into submarines has been core to the Kockums business has We have had the continuous development in technology; we take known



technology and refine it. We mitigate the risks by extensive testing before we build it."

The Gotland Class was the first submarine to be built with Sterling AIP system and that will continue into the A-26 Class. According to Mr. Wieslander, "We work with modular cylinders which we weld together, a way of working [which] makes it less complicated. The modular design is practical when it comes to inserting cylinder sections for different purposes although we can still balance the boat. We can insert a cylinder if longer range and endurance is needed with more fuel and supplies, or we can insert more cabins if more people are required and so on".

"The Gotland was cut in two; we put 20 new systems identical to the A-26 into it thus mitigating the risks to the A-26. That saves the Navy a lot of time in training and maintenance in the future," he said.

Kockums has designs for three types of the new A-26 Class submarine: the regular A26 Oceanic; a smaller version called the Pelagic with less range; and a bigger version, the Oceanic (extended range). Both the Swedish Navy and the Polish Navy will take the standard Oceanic version while the Royal Netherlands Navy has been offered the extended range version. But all will be tailored to the customer, with a weight difference from 2,200 to 3,000 tons. Mr. Wieslander explained that building a longer submarine would mean adjusting the length to beam ratio which would require a new, larger cylinder size.

Regarding the strength of the production process, Mr. Wieslander explained: "We have a long recipe for cooking steel; we are one of the few countries that test the submarines with depth charges with the crew onboard [obviously at a predetermined distance for safety]. We have done this for decades and we are happy with the way the steel works. We can cut it and weld it together again and it still retains its strength."

In terms of looking for new business, Kockums has been working with Babcock since cooperating over the Collins Class for Australian Royal Navy. These were enlarged versions of Kockums' Västergötland Class (originally Type 471). Kockums proposed a version of the A-26 as a replacement submarine for the Collins Class and has also been in a partnership with Damen for the tender to replace the Royal Netherlands Navy Walrus Class submarines.

One version of the - three silos for six vertical launched missiles per silo (potentially 18 Tomahawks - "we prepare the boat for but no t fitted with cruise-type missiles". It is based on proven technology. We could put this into production 'before the end of the decade'.

NEW GENERATION SURFACE SHIPS

Mr. Wieslander revealed Kockums vision of the next generation of stealth naval vessels that it could provide to replace the Visby Class which was designed to offer a stealthy low radar cross-section as well as a low infrared signature.

The new corvette would be larger corvette than the Visby Class (100m instead of around 73m) which would have the capability of surface- surface missile (SSM), vertically launched air defence missiles, two guns and anti-submarine torpedos and variable depth sonar. The hull would be manufacured in steel with the superstructure in composite material, ending up with a weight of around 2,500 tons.

A smaller surface combat ship could be either manned or unmanned. "It would not incorporate any of the larger weapons system", said Mr. Wieslander, "but would have an advanced combat management system which could then direct smaller

Saab Kockums Concept vessels including fast attack craft FAC 55, mine counter measure MCMV 80 and next generation Corvvette

"The Gotland was cut in two; we put 20 new systems identical to the A-26 into it thus mitigating the risks to the A-26," said Mr. Wieslander.

boats with different payloads such as SSMs, towed-array systems or torpedoes. They would work in a network; that's the beauty of it....It is also more difficult to take out anything in a swarm."

The system could also be linked to the new corvette as well as Saab's GlobalEye airborne early warning and control (AEW&C) aircraft, based on the Bombardier Express 6000 jet. "We are into this 'look' so we are finding a 'street-fighter' that can be used by itself or sent out in a swarm that is difficult to defend".

The Swedish Navy will need to replace two generations of corvettes and it is the Saab/Kockums vision that this can be provided through a larger Class stealth corvette working in unison with smaller 'streetfighters' to reduce both the cost and risk of acquisition, which providing mission flexibility for territorial as well as international deployments.

"We believe that this next generation could be as sea between 2025-2030", if the decision to go ahead with them is made relatively soon, he added. This family of stealth craft is a concept that began over 10 years ago and has been developed with the involvement of the Swedish MoD's FMV/FOI organisations as well as with the Swedish Navy.

However, providing an insight into the future, Mr. Wieslander concluded with the observation that "autonomous will have quite an impact on surface warfare, and an impact on subsurface sea as well." ◘

MORE POWER TO YOUR ELBOW

As systems that require power and given to soldiers in the field, and as battery technology improves and reduces in size, a wider range of options is emerging.

Peter Donaldson

BAE Systems Broadsword Spine is a wearable garment's insert that delivers power and data connectivity through an e-textile developed by Intelligent Textiles. It allows electronic devices to be connected to the vest without any cables.

Battery technology is improving rapidly and is focused on a range of rechargeable lithium ion chemistries as manufacturers boost energy densities while taming the risks associated with any technology that packs large amounts of energy into a small volume. This will benefit soldiers whose reliance on electronic devices to survive and complete their missions is growing constantly, and are burdened with an increasingly unmanageable number, variety and weight of batteries.

Mitigating technologies are centred on a single battery with power distribution and management systems ranging from simple power only hub and cable set ups to integrated power and data solutions with built-in intelligence. The latter promise to prioritise loads without adding to the soldier's already considerable cognitive burden at critical moments, more of which later.

POWER ONLY SIMPLICITY

Typical of the power-only type is EFB's Soldier Worn Integrated Power Equipment System (SWIPES), a United States (US) Army programme of record with several thousand in service. Weighing under 2lb (0.9kg), SWIPES consists of a hub, cables and a cable management system inside an armour rig or a rucksack. It distributes power from commonly used military batteries to trickle charge most individually worn equipment. This battery-agnostic system, says the company, allows the most efficient use of power while eliminating the need to carry spare batteries for individual devices. (SWIPES II builds on this by adding data transmission capability.)

Comparable products are available from Protonex in the form of its VPM-402 Vest Power Manager and from Tectonica with its Bantam system.

Black Diamond's field-proven family of hubs, which includes the Bare 1-port, Assaulter 2-port and Apex 4-port devices add data capability through USB 3.0 connections, relying on external cabling for connectivity and an Android or Windows tablet or smartphone End User Device (EUD) for control and display.

Power inputs include 12-35 VDC, AC and vehicle adapter cables, and it can accept power from a number of batteries including LI-80 and LI-145, Palladium Energy's conformal wearable battery, the standard BA-5590/2590 and the BB-2590 charger.

POWER AND DATA

Ramping up the capability a notch is Glenair's Star-Pan VI with Personal Area Network (PAN) ports for up to six devices for use in complex missions such as Digitally Assisted Close Air Support (DACAS) in addition to a designated host/EUD port.

Glenair's power port management system is used with a battery and auxiliary power source input, back-up power drawn from the radio and smart battery charging from an auxiliary source. It can provide power monitoring and management for each voltage rail and port, fault mode protection circuitry against surges, reverse voltages and over-currents, plus embedded level three charge control circuitry for a smart battery interface within a wide voltage range, says the company. The power port management system can draw on DC sources and provides a port through which an auxiliary source can run the whole system and charge a central battery for extended missions.

PORTABLE AUXILIARY POWER

The growing importance of auxiliary sources is pushing industry to offer a variety of kits centred on solar panels that also include other power management accessories for dismounted soldiers. The BTK-70689 Soldier Portable System from Bren-Tronics illustrates this point and includes a foldable 62W solar panel, a scavenger lead to charge batteries from others that are nearly discharged, a female cigarette lighter adapter, solar adapters for radios and batteries, a battery eliminator for radios that enables them to run from a central soldier system power source, and a set of extension cables.

Arguably as important as better power sources is standardisation through efforts such as the Generic Soldier Architecture (GSA). Developed to underpin more advanced soldier system developments under the UK's Land Open Systems Architecture (LOSA) effort, GSA is being considered for adoption as a NATO standard and is attracting interest from Australia and New Zealand.

ULTRALYNX SMART POWER AND DATA

September's DSEI event in London's Docklands saw the launch of the UltraLynx system from Ultra Electronics, which is the first smart power and data system that fully implements the GSA standard, according to its creator Tony White, chief technology officer (Land) at Ultra Electronics Precision Control Systems.

UltraLynx, he told *Armada International*, is the production version of Combat Connect, a technology demonstrator built with a mixture of UK Government and company funding under the two part Man Worn Power and Data (MWPD) programme.

For clarity, it is worth digressing here into a little history. MWPD 1 was a proof of concept phase involving teams of companies, one of which consisted of Ultra Electronics and Cosworth of motorsport fame. These two companies parted ways for MWPD 2. Cosworth built its Smart Vest technology demonstrator, focusing on near term capabilities such as integrating current soldier equipment, while Ultra focused on implementing more futuristic capabilities such as the then new Google Glass and a gesture controller, for example.

Towards the end of this effort, Mr. White said, Cosworth's new CEO decided to take the company out of the defence market, so Ultra bought Smart Vest and combined the technology with its own to create Combat Connect, which evolved into UltraLynx.

The technology is now being tried by a number of units in the 'green' and 'black' communities and with some civilian first responders.

Essentially an invest power and data distribution system with an intelligent hub linked to external connectors through what amounts to a flexible Printed Circuit Board (PCB), UltraLynx is capable intelligent management of both power and data, with or without an end user device.

A typical soldier system will, as a minimum, will integrate a radio, a GPS receiver, a battery and some kind of EUD to act as a control and display unit, along with a hub through which to connect all the cables that carry power and data. In a "dumb hub" system, the intelligence lives in the end user device.

"What that means is that all of the information flow from all of those devices has to go through the end user device", Mr. White said. "So if I want to get my location and send it over the radio, then it has to go from the GPS, through the hub up to the end user device, back out of the end user device, back through the hub and back down to the radio", he added.

UNLOAD THE EUD?

"What our intelligent hub does is move some of that work away from the end user device and put it into the hub, making the device simply something that makes use of the information flow around the system without having to be the system manager."

There are several advantages to not having the EUD manage the system, Mr. White pointed out. Firstly, it is the part that's most likely to get broken, lost or damaged, so it becomes a single point of failure for the whole system. It also makes integration easier because the applications required to run the hub and peripherals don't have to be installed on EUDs from different manufacturers. Thirdly, taking the system management function away from the EUD also provides a degree of future proofing with regard to the emerging soldier-as-sensor concept, he argued.

"A soldier wearing a camera and a GPS and a radio could be a useful set of sensors for someone further up the command chain, while the soldier himself may not need to look at any of that stuff."

On the intelligent power management side, Ultra drew on its experience with vehicles. The smarts come in with a means of measuring the power available and sampling the power being consumed by the various loads to enable decisions about priorities to be made.

While the intelligence can simply be provided by the soldier through an application that shows the battery state and the loads and provides a set of software switches to turn them on and off to optimise the power draw for the mission, that does little to reduce the cognitive load; that requires some autonomy, Mr. White said.

PRE-SET ASSUMPTIONS

An initial approach, he suggested, would be to offer pre-sets that based on simple assumptions such as that power does not need to be sent to the torch during daylight, or that the camera should be powered up just before it is needed rather than constantly, or that the radio only has to be turned on every half hour, for example, to make a routine call.

"All of those are the kinds of things that soldiers do now, but we can do autonomously on the system."

Moving on from such relatively simple protocols, a degree of artificial intelligence could be applied to those decisions.

"Some of it is quite sensitive", he said, "but you can imagine that if you are in contact, then the data coming over the radio would give an indication of the situation, and since the system would be receiving information the data would run through the hub it could make decisions about what might be essential."

UltraLynx' physical connectivity flexible PCB technology has been around for decades and is used in many industries, making it a low risk solution, Mr. White argued, adding that the connections between the flexible sections and the processor board are also proven, off the shelf par ts.

BROADSWORD SPINE PROGRESS

BAE Systems' rival Broadsword Spine system is now in production at the company's facility in Rochester in Kent in the South of England, and the company is providing initial units to potential customers on a trial basis at the moment, according to Sarah Davies, assistant capture manager, Soldier Power.

The Broadsword Spine offers the user around eight connection ports arranged across a garment which provides 180 watts of power and communicating over USB.

Black Diamond's provides a family of hubs, which includes the Bare 1-port, Assaulter 2-port and Apex 4-port devices which add data capability through USB 3.0 connections.

Wearing the system on the BAE Systems stand at DSEI, she reported that the centralised power solution was attracting particular interest, emphasising that Broadsword Spine is completely power agnostic.

"We want to the customer to be able to choose whatever power is right for them. It might be what they have existing or new solutions that they want to use. We provide an open interface, so whatever source they choose they can plug into the system."

Expanding on this, she pointed out that her system was using a Bren-Tronics battery, while a colleague's was powered by one from Denchi and the company also had a battery from Revision on the stand.

Broadsword Spine's central power and data manager supports hot swapping of batteries, she emphasised, easing a routine task that today is an onerous one for soldiers.

HOT SWAPPING SUPPORT

"They can plug two batteries into the system, let one run down and system will automatically swap over to the next one, so from the user perspective you don't have to think about the need to swap over. There is a lot less manual involvement."

While the power and data manager controls the flow of both automatically, the system accepts an EUD Ms. Davies' kit had a Samsung mobile phone in a ruggedised case that can display the state of the power source and the consumers and provide the user with direct control.

For demonstration purposes, the Samsung phone EUD had BAE Systems' own Broadsword Spine app installed, which showed all the equipment plugged into Sara Davies' system.

"As an example I've got a light down here, I can switch that off manually from here to conserve power as I wish. I can switch my WebCam on and off, and if I want to I can see that data.

"That is all open source as well. That is up to the customer if they want that sort of capability they can write their own software to do so."

This system provides power and data connectivity in a very different physical manner, using Intelligent Textiles' conductive fabric in place of cables, which offers a weight saving of around 40 percent according to company estimates, along with other benefits.

"There are advantages over cables in that you can bend it and you can flex it and fold it in ways that cables are often limited, and it is also pretty comfortable to wear."

One unresolved issue in terms of standardisation is connectors, of which there are many on the market and, as with other systems Broadsword Spine can be specified with different options.

"We are offering it with three different connector variants", said Ms. Davies. "We've got two on the production line: the AB MagNET connector and the Glenair MouseBud connector and we are also looking at the new Fischer connector."

MAKING CONNECTIONS

Launched at DSEI, Fischer Connectors' new LP360 is a rugged, low profile power and data connector sealed to IP68 standard down to 20m immersion that is designed to be fully cleanable and to connect at any angle to allow as near as possible straight external cable runs between the soldier's vest and other body worn equipment.

The half of the connector attached to the external cable has seven pins while the vest mounted portion has six concentric ring contacts and a central disc, a combination that enables contact to be made at any angle.

AB describes its rectangular MagNET as an auto aligning, self-coupling, self locking connector with an automatic magnetic latching system that enables "one-handed blind mating". Receptacles attached to clothing are flush flat and abrasion resistant so they don't need protective caps, says the company, with an eight-way contact configuration for power and high speed data.

Glenair's MouseBud is a circular connector with a self-locking, auto-coupling and trigger released mechanism, spring-loaded pins and gold-plated contacts for durability and ease of cleaning, stainless steel shells and bayonet coupling rings. The push-to-lock mechanism works in four orientations. Rated for a life of 2,000 coupling cycles, it is rated to Mil-Std-810G for shock, vibration and immersion, says the company.

Additionally, connectors in particular have to be both durable and easily repairable in the field, argued Mr. White, because they are both essential and the parts that soldiers are most likely to scuff, break or bend, he said, something to which he has paid a great deal of attention with UltraLynx.

He regards connectors in general as the weak point for the soldier power and data management industry as a whole, because no single connector vendor meets all perceived end-user requirements, he said.

"As a consequence all of the connector vendors are talking to all of us. So there are about five or six vendor is who are making the kind of connectors that would do some of the job, but none of them do all of the job."

He is emphatic that this is a problem that has to be solved because the credibility of the generic soldier architecture approach depends on all industry players knowing what they are building because all of the interfaces are defined.

"The first thing you look at when you talk about interfaces is how do I plug it in? At the moment there isn't the connector", he said.

"As a consequence until we've got a defined connector we are always going to sit in this slightly vague space questioning the point of having a generic architecture if all the connectors are going to be different.

"I think that is something that is going to drill out over about the next 18 months or so."

MORE REQUIREMENTS SHAPING

While BAE Systems and Ultra represent the high end of the market at the moment, they are expected to face competition from Thales in the near future.

The big decisions for militaries will involve balancing immediate needs for basic power and data management capabilities against longer term needs for more advanced ones, with considerations of longevity and growth capability to the fore. Mr. White expects a couple more years of "requirements shaping" educating potential customers as to the pros and cons of various approaches before any big procurement programmes emerge.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AUDS

The AUDS team has enhanced the counter-swarm capability of the system, with the radar system already capable of detecting hundreds of targets simultaneously.

THE TWISTS AND TURNS OF COUNTERING UAVS

Unmanned Aerial Vehicles (UAVs) have proliferated in recent years, sparking an increased emergence of systems designed to counter them. A number of companies have launched or are developing solutions that use electronic warfare (EW) or cyber techniques to disable and disrupt this new menace.

Gerrard Cowan

The threat to militaries from UAVs has rapidly expanded, with small, commercially available systems capable of carrying out surveillance or even carrying explosive payloads. UAVs have moved from the low-threat hobbyist arena 'to ISR missions - providing enemies with situational awareness of friendly forces - to weaponised tactics such as kamikaze (attacks) and weapon delivery', said Dave Bessey, assistant vice-president, counter-unmanned aerial systems (UAS) at SRC, the manufacturer of the Silent Archer counter-UAV system.

Silent Archer is designed to detect, track, classify, identify, and disrupt hostile UAVs. The system's operations can be divided into three broad areas, according to the company. The first is 'detect'. Silent Archer uses an air surveillance radar, EW and direction-finding systems to scan the airspace for low, slow and small (LSS) airborne targets, collecting information on areas like radio frequency (RF) signatures, 3-D location, and so on.

'Together, these technologies accurately detect, track and identify hostile UAVs for making effective decisions regarding threats,' the company states.

The second area of focus is 'decide', for which the system utilises radar signature data and electronic surveillance information to allow for the positive identification of UAV targets. This can be enhanced through the use of an electro-optical/infrared (EO/IR) camera. When visual identification is made, the operator can confidently decide on what actions to take against the threat, if any.

Finally, there is 'defeat', which uses the EW system in a number of different ways: for example, jamming the communication links of the unmanned system, which makes it return to its base or carry out an emergency landing.

SRC has designed the system to be configured for use in different roles, including vehicle-mounted expeditionary deployment, fixed-site installation, 'or fly-away kit packaging for quick-in, quick-out

missions'. The company is also looking to integrate new technologies to further increase the system's capabilities.

SRC supplies its counter-UAV technology to the US Army and Air Force (USAF), and has seen rising demand, Bessey added. Mr. Bassey said Silent Archer is aimed mainly at defeating smaller UAVs (Classes 1-3), "since they are the most challenging due to their small size, low altitude, slow speed and staggered flight patterns".

Mr. Bassey also pointed to the danger of 'swarm' attacks featuring numerous UAVs, saying that Silent Archer's approach also worked in this area, "since jamming of the RF band can defeat multiple targets simultaneously".

Doug Booth, director of strategy & business development, cyber solutions at Lockheed Martin - manufacturer of the Icarus counter-UAV system – also highlighted the danger of swarm attacks. While just one small, commercial-off-the-shelf (COTS), Class 1 drone is a threat, capable of carrying 5lb (2.2kg) of explosives, the prospect of large numbers of similarly equipped systems increases the danger exponentially.

"When you think about swarming drones all carrying 5lb of payload, that's an even more significant threat, and it's something that you have to be able to defeat,' he said.

Icarus has been upgraded through the development process to better deal with swarm attacks, Booth added. Whereas earlier versions were capable of engaging an individual UAV every half a second, "now we have the ability to engage multiple devices at one time". This 'swarm solution' has been field trialled with customers this year, Mr. Booth added.

Icarus is designed to identify and intercept UAVs, allowing operators to either disable or take control of a hostile system. It is based on three elements, he explained. First, a multi-spectral front end detects the threat. The system then utilises Artificial Intelligence (AI) and analytics to determine that the potential threat is in fact a UAV, rather than a bird, for example.

This 'characterisation' element is a crucial aspect of counter-UAV technology, telling the operator exactly what the threat is and enabling him or her to decide on the appropriate response. Icarus has been programmed to recognise more than 40 commercially available UAVs, he said.

"By characterising them based on an image, an RF signature, or an acoustics signature, w e can determine in some cases exactly what type of drone it is," he explained.

If the operator decides the UAV does represent a threat, Icarus provides them with a number of tools with which they can respond. One of these involves the use of cyber electromagnetic activity to disable the onboard camera or take control of the system. Alternatively, the user can deploy EW techniques to jam the UAV's command and control (C2) link.

Lockheed Martin is working with a number of customers now on further enhancing Icarus, including US military clients, Booth revealed adding that the company has focused on increasing the detection range of the system over the course of 2017.

"On an earlier test Icarus was good out to about half a kilometre,' he explained. 'We've been able to double that range in 2017, so we're out beyond a kilometre for our detection and for our defeat capability.'

While working on the range testing, the company found the system was picking up false alarms, he said: "If people were walking around or vehicles were being driving, or if there was a windsock out there, these were causing alarms".

The company has been able to decrease many of these false alarms, Booth said, through further enhancing the characterisation capabilities of Icarus. "When you're talking about force protection you don't want the device giving false alarms all the time because then it becomes a nuisance, not a support tool," he said.

In addition, Lockheed Martin has focused on further ruggedising the system, so that operators can use it in a variety of environments without being concerned about its durability. "We got feedback from our customers in a lot of the field trials that they want to be able to set it up and forget about it, they just have it sit there and operate it for much of the time," Mr. Booth said. "So we worked on heavy duty ruggedisation of the product."

Finally, Lockheed Martin has focused on miniaturising the system, creating a version that can be carried in a backpack. This system has much of the same capabilities as the larger version. "The miniaturisation enables you to be able to have some of the same detect and defeat capabilities on an individual walking around, or driving in a truck or car,' he stated.

SRC

Silent Archer is designed to detect, track, classify, identify, and disrupt hostile UAVs. The system's operations can be divided into three broad areas: detect, decide and defeat.

Hensoldt

The Xpeller system has a range of target markets, including military users, and has seen increasing interest in recent years, according to Hensoldt. Above, a demonstration in Switzerland.

Mark Radford, chief executive officer of Blighter Surveillance Systems, which is part of the team that manufactures the Anti-UAV Defence System (AUDS), said speed of deployment and reducing size, weight and power (SWAP) are big issues for some customers.

"Our customers want a fully integrated counter-drone system that is quick and easy to deploy," he told *Armada International*. "That's why we have introduced a new, ruggedised version of AUDS that can be deployed on military trucks or commercial surveillance vehicles to provide rapid 'on-the-pause' protection for a temporary base, mobile force or convoy under attack from drones."

AUDS comprises three elements, each made by a different, UK-based company. First, the Blighter A400 series air security radar is used to detect small UAVs. Second, the Chess Dynamics Hawkeye Deployable System and EO Video Tracker are used to track and classify the potential threat. And finally, the smart RF inhibitor made by Enterprise Control Systems can be used to selectively interfere with C2 channels on the UAV, to disrupt its mission.

The company displayed a field mast version of the system at the Defence & Security Equipment International (DSEI) show in London in mid-September. AUDS is also available in several other configurations, including the new version for vehicle deployment.

"We made it more robust to withstand the shock and vibration experienced in a vehicle," Mr. Radford said, adding that this configuration is proving popular on the export market.

The AUDS team has also enhanced the counter-swarm capability with the radar system already able to detect hundreds of targets simultaneously. The team has developed new technology to more effectively defeat multi-drone swarm attacks, but could not provide further details at this stage.

Decreasing the false alarm rate is a key concern, said Robert Barthel, product manager for Xpeller, a counter-UAV system manufactured by Hensoldt. "That's why you need advanced algorithms to carry out classification based on the data coming from the sensors," he said. "You can carry out classification on the radar data, to differentiate a bird from a UAV, or you could do optical classification on top of the videofeed to achieve the same thing."

Effective classification stems from automation, he said, in which "the system decides whether an airborne object is an actual threat that must be countered, or if it's just a bird or even a friendly drone."

This level of automation is beneficial for customers in terms of life-cycle costs, Mr. Barthel explained. "If the level of automation is too low, they need specialised operators," he said. 'If there is a high level of false alarms, this will result in a low level of trust in the system. That's why you need modern technologies like machine learning or deep learning to support decision making."

Xpeller uses a multi-spectral approach to detect and identify drones, and then utilises a UAV interceptor to interrupt the link between the UAV and its pilot or its navigation. The system has a range of target markets, including military users, and has seen increasing interest in recent years, with the majority of this is outside Europe, he added.

The company has carried out a number of demonstrations with customers from which "we are deriving insights into customer requirements and scenarios which we in turn use for further development'.

However, while the counter-UAV solutions are developing all the time, so are the UAVs themselves, admitted Booth. "Adversaries and users of drones who are trying to cause damage have done reconnaissance against our counter-UAV platforms," he said adding that they were building their own countermeasures. They are deploying technology to lower the RF signature of their systems "which makes it harder for our devices to pick up the threat coming in". In addition, they are investing not only in new technologies, but in improving their flying abilities, he said: "That means they're able to fly these devices in ways that can manoeuvre around the sensors."

According to Mr. Booth, these are two areas of particular focus for Lockheed Martin as it continues developing Icarus. They will feature in field trials with customers in late 2017 and early 2018.

Bessey said that in the future, counter-UAV systems will be able to do more with less. They will need to be capable of carrying out several missions, he said. "Radar equipment will need to be able to handle more than one mission, such as air surveillance and counterfire missions," he said. "Electronic Warfare equipment will need to be multimission (counter-IED and counter-UAV)," he concluded.

Barthel said that Xpeller's hardware will remain largely the same in the coming years. However, the level of automation will increase, further cutting down on false alarms. "All this can be rolled out through a simple software update... Every customer buying an Xpeller system today will get those updates and will increase the level of automation all the time."

The threat from UAVs will change, he said, meaning systems like Xpeller have to also be able to evolve. The hardware has been designed to be generic enough to adapt to future threat scenarios. But the market is very dynamic: "Nobody knows what the threat will look like in several years", he observed.

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US Navy

A French Navy L-CAT landing catamaran, launched from the amphibious assault ship Mistral (background), approaches the well-deck of the US amphibious vessel USS Wasp, during the 'Bold Alligator' amphibious exercise off the US east coast in 2012. The L-CAT is able to support operations ashore, as well as conduct tasks at sea.

NEED FOR RAPID SHIP TO SHORE ENDURES

High speed at the high end: amphibious forces continue to deliver theatre entry at distance from the sea

Dr Lee Willett

Amphibious operations are returning to the international military fore. Around the world, naval and other services are investing in marine forces, amphibious platforms, flexible ships, ship-to-shore connectors, and supporting airframes as they seek to deploy personnel ashore from the sea, at speed, and at distance.

Operational emphases always tend to move through phases. The requirement to deliver high-speed manoeuvre at sea to generate effect ashore has always been essential for modern navies. However, there have been times when other concepts for example, in the 1990s, long-range conventional land attack have taken strategic priority.

Today, the requirement to build amphibious capacity is driven by a number of factors. Notably, while amphibious operations in their truest sense are one of the highest of high-end warfighting capabilities, with the raison d'etre being to provide capacity for forcible entry ashore in a contested environment, the ability to project power over the beach from the sea also has relevance at lower ends of the operational spectrum.

In the Asia-Pacific region, amphibious platforms are used to provide presence in areas of interest but have also played a significant part in providing a sea base from which humanitarian assistance and disaster relief (HADR) support can be delivered ashore, for example in the wake of a natural disaster. In recent years, sea-based HADR operations using amphibious platforms have been conducted in response to cyclones that struck Fiji and Vanuatu and an earthquake that struck New Zealand.

However, it is at the higher end of the operational spectrum where the impact of improving amphibious capability is most noticeable. In the Asia-Pacific region, Australia, China, Japan, and South Korea in particular (along with Indonesia, Singapore, and Thailand) are building robust amphibious capabilities. In this region, there is the risk of conflict erupting over a number of territorial disputes; in such instances, there is the question of whether amphibious forces might be put ashore on islands over which there are contested sovereignty claims.

The United States has a significant amphibious presence around the world, including in both the Asia-Pacific and European theatres. High-end amphibious activity has also returned to Europe. Here, the focus is on two particular arenas – the High North and the eastern Baltic. The areas are of significant strategic importance to both NATO and Russia.

THE AMPHIBIOUS CONCEPT

According to some analysts, critics of the utility of amphibious warfare might see the opening scenes of the film Saving Private Ryan as evidence of a flawed concept, with sea based ground forces thrown ashore against a concrete and steel wall. However, such assessments arguably miss the point.

At a strategic level, the use of an amphibious invasion gave the allies the opportunity to launch their sea-borne forces across the beach at the place and time of their choosing.

At an operational level, amphibiosity is designed to see forces inserted ashore precisely where the adversary's presence is weakest or absent altogether. This effectively obviates the

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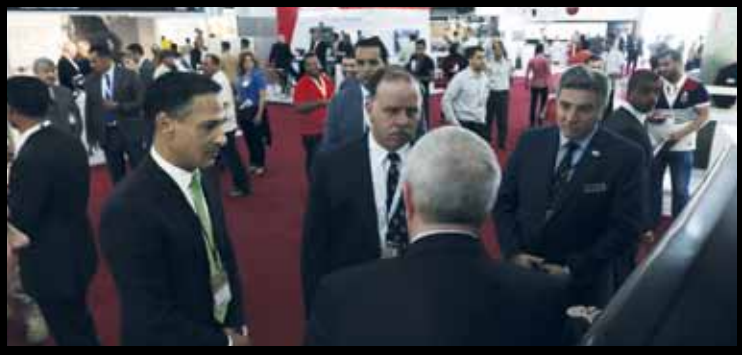

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A US Marine Corps MV-22 Osprey flying from the expeditionary transport dock vessel Lewis B. Puller as part of visit, board, search, and seizure serials during the 'Alligator Dagger' amphibious exercise in September 2017. The platform and airframe pictured are both central elements of US capability to project amphibious effect ashore.

need for a forced entry by using rapid ship-to-shore manoeuvre. Moreover, contemporary technologies enable amphibious forces to reach well beyond the beach.

Amphibious operations have continued to have significant strategic effect. During the Gulf wars, in 1991 an amphibious feint was conducted by US Marines towards Iraqi positions in Kuwait while the main thrust of the assault wheeled left from Saudi Arabia and straight into Iraq; in 2003, amphibious forces assaulted the Al Faw peninsula as Iraqi forces reeled from the 'shock and awe' of the initial air- and sea-launched cruise missile strikes. For the Afghanistan campaign, which began in late 2001, one of the first steps taken was to insert hundreds of coalition marines and special forces ashore from aircraft carriers and amphibious platforms deep into a land-locked country.

In the late 1990s and around the time of the second Gulf War, operational focus for many navies turned towards littoral operations. This included the need to conduct manoeuvre in this confined space, but also to project power inshore towards operational and strategic objectives, known in a number of Western navies as ship-to-objective manoeuvre (STOM). According to Professor Geoffrey Till, in his book Seapower: a Guide for the Twenty-First Century, "STOM relied greatly on improved methods of delivery." Today, the requirement to deliver effect ashore from stand-off ranges deep in-land remains, but has evolved in conceptual terms as new capabilities arrive.

Nick Childs, senior research fellow for Naval Forces and Maritime Security at the International Institute for Strategic Studies (IISS), told Armada that the world's evolving security context underlines the continuing need to project power, including ground forces, ashore from the sea. "With a growing proportion of the world's population concentrated in the littoral - including in ever growing, unstable, and insecure megacities the ability to poise capable forces offshore, insert them and if necessary withdraw them quickly and flexibly 'across the seam' between the maritime and land (domains) could make the difference between being willing and able to intervene and influence a crisis, and not doing so."

As a result, amphibious capability alongside carrier strike and cruise missile land attack, is one of the highest of high-end conventional capabilities. The enduring requirement to insert force ashore from the sea was demonstrated in NATO's recent 'BALTOPS' exercise.

'BALTOPS 2017'

Since 2014, NATO navies have shifted dramatically back towards a focus on higher-end operations, with exercises focused on anti-submarine warfare (ASW) and amphibious operations, amongst other elements. NATO concern about the security of its Baltic member and partner states has seen 'BALTOPS' focus firmly on preparations to conduct amphibious operations. As well as improving NATO's amphibious capacity, such training is designed to provide assurance to the Baltic and other member and partner states and to send deterrent messages to any prospective adversary.

The focus on Baltic security in the most recent 'BALTOPS' iteration, held in June 2017, saw amphibious landings carried out in Ventspils, Latvia, and Ustka, Poland, and an amphibious feint conducted off Putlos, Germany. The amphibious activities were also bolstered by an increased focus on air/sea integration designed to enhance support for operations ashore.

The exercise's amphibious capability was based around 300 US marines embarked in the San Antonio/LPD 17-class amphibious assault ship USS Arlington. The LPD carried two landing craft air cushion (LCAC) vessels to transport the marines, in their armoured amphibious assault vehicles (AAAVs), from ship to shore. Other participants also provided platforms: for example, the Polish Navy deployed two Lublin-class landing ship tank (LST)/minelaying vessels, ORP Gniezno and ORP Krakow.

In order to be able to manoeuvre to an objective, flexibility is central to the concept of amphibiosity. Arlington's flexibility is based in large part around the 800 or so marines it can carry. The ship's commanding officer, Captain Patrick Hannifin, pointed to the key role played by the LCACs in supporting ship-to-shore manoeuvre. The LCACs "are very multimission, and can move things fast whether it's a tank, a couple of AAAVs, Humvees, or over 100 marines", he told embarked media during 'BALTOPS'. "You can (do) ship-to-shore movements, and from a distance: you can do (this) quite rapidly."

Marines and LCACs are only part of the flexibility that a platform such as Arlington can bring. "Typically, single platforms aren't designed to handle (tasks) across the board," said Capt Hannifin. However, he noted that an amphibious ship such as Arlington can mix and match capabilities to reflect operational requirements. While amphibious operations are the primary function, the ship is "rather capable in a number of functions .... The ship fits its function (very) well, with the versatility we have."

As well as providing rapid reaction and flexibility in capability, large-deck amphibious platforms are self-sustaining in theatre. Significant lift capacity also is enabled by the large flight deck and well deck. The former can accommodate several rotary-wing aircraft types, including the Bell Boeing MV-22 Osprey; the latter can deploy a range of large and small craft. In Arlington, "We can fill the well deck and carry multiple other craft in there as well," Capt Hannifin continued.

While NATO's operational and exercise focus arguably only turned back to higher-end taskings in 2014, its maritime strategy (published in 2011) highlighted the importance of amphibious capability in supporting the core alliance requirement of collective defence. According to the 'Alliance Maritime Strategy', possessing 'superior' amphibious forces is central to NATO's collective conventional deterrence and defence capability, contributing to the ability to deliver rapid, decisive force against an opponent, including through forced entry.

CAPABILITY DEVELOPMENT

While 'BALTOPS' demonstrated NATO's focus on amphibious operations, it also underscored the alliance's growing requirement to boost amphibious capability. NATO is hoping that more member states will invest in amphibious forces and commit such forces regularly to exercises such as 'BALTOPS'.

The US Navy is increasing its presence and capability in the European theatre once again:

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US Navy

Demonstrating the flexibility of large-deck amphibious platforms, the Royal Navy's landing platform dock (LPD) assault ship HMS Bulwark is pictured here leading the Combined Maritime Forces CTF-58 maritime security operation in the Gulf in 2006. There is currently a risk that the UK's specialist amphibious shipping – *Bulwark* and sister ship HMS *Albion* – will be withdrawn, as adjustments are made to the UK's force structure within spending reviews.

in amphibious terms, alongside Arlington's presence for 'BALTOPS', this has been demonstrated recently with the deployment of the Bataan amphibious ready group (ARG) to the Sixth Fleet area of operations (AOR).

The ARG comprised the Wasp-class amphibious assault ship USS Bataan, Arlington's sister ship USS Mesa Verde, and the Whidbey Island-class landing ship dock (LSD) vessel USS Carter Hall. Rotary-wing capacity included MV-22 Ospreys from Marine Medium Tiltrotor Squadron 365.

Embarked in the ARG were more than 2,200 marines from the 24th Marine Expeditionary Unit (MEU). According to a US Navy (USN) press release, the MEU's pre-deployment training had focused on the spread of operations, from amphibious raiding, to maritime security activities, to HADR tasks. When the ARG arrived in the AOR in early March, its commanding officer Captain Larry LeGree noted that the ARG is "flexible and capable for any mission that should come our way".

The Bataan ARG sailed for home in September. The US Navy told Armada that amphibious presence in the Sixth Fleet AOR currently is boosted by USS San Diego, a third San Antonio/LPD 17-class ship and assigned to the America ARG.

The rapid ship-to-shore capability delivered by US amphibious forces supports the STOM operational concept. With this concept based around delivering effect quickly, from distance at sea and to deep in-land (for high-end combat or HADR activities), the 'connectors' embarked in these amphibious platforms must be able to deliver support ashore at distance and at speed. This is certainly the case in terms of the LCACs, but also in terms of the Osprey aircraft. The recent spate of hurricanes to hit the Caribbean region has seem US amphibious ships and Ospreys deployed to, for example, Puerto Rico and the Virgin Islands to deliver aid ashore.

One US platform designed specifically to support concepts such as STOM and the wider delivery of high-speed effect ashore are the four Montford Point-class expeditionary transport dock vessels (known originally as the Mobile Landing Platforms). These platforms can provide a base at sea from which various maritime security tasks can be conducted, but the ability to deploy LCACs and a range of helicopters also enables the ships to support various operations ashore.

Another navy demonstrating dimensions of amphibious capability is the French Navy, with its L-CAT ship-to-shore high-speed landing craft. L-CAT has been in service with the French Navy since 2011, and is embarked in the navy's Mistral-class amphibious assault ships. According to builder CNIM, L-CAT can operate on a global scale and can support "civilian assistance operations" as well as higher-end tasks. Alongside delivering troops ashore, the L-CAT's 700nm range also enables it to support wider maritime security and surveillance tasks. The platform has a top speed of 18kt with a full load, and is designed for rapid loading and unloading of equipment. CNIM documentation states that such loads can include: a fully motorized infantry platoon, complete with equipment and vehicles; a single heavy main battle tank; or 80 tons of military or disaster relief equipment.

UK CASE STUDY

The UK naval service arguably is the pre-eminent exponent of amphibiosity amongst NATO's European members, and has for some time built STOM into its amphibious concept of operations (CONOPS). With the arrival of the UK's two new Queen Elizabeth-class aircraft carriers, the UK's amphibious concept has evolved into the concept of Carrier-Enabled Power Projection (CEPP).

Around the 1998 Strategic Defence Review, the UK re-capitalised its amphibious capability with the building of two landing platform dock (LPD) amphibious assault ships, HMS Albion and HMS Bulwark. The UK's amphibious capability also includes one landing platform helicopter (LPH) amphibious vessel, HMS Ocean, and three Bay-class LSTs. The amphibious flotilla was designed to support the deployment of a brigade-sized Royal Marines Commando assault force.

The 2015 Strategic Defence and Security Review (SDSR) announced that the UK would "enhance a Queen Elizabeth-class aircraft carrier to support this amphibious capability". This was especially important with Ocean due to retire in 2018. The carrier in question is second ship HMS Prince of Wales. While the carrier does not have a well-deck, STOM capacity will be provided by delivering marines ashore via Boeing CH-47 Chinook, Leonardo AW101 Merlin, or perhaps even Osprey helicopters (if US Osprey airframes are certified to operate from the carriers).

The UK has also adjusted the scope of the Commando force it intends to be able to deploy ashore: this force will now be an 1,800-strong Lead Commando Group.

Notwithstanding these developments, there are currently questions over the future of the UK's re-capitalised specialist amphibious shipping capability, following BBC reports that as part of discussions within government of options to reduce defence spending the two LPDs and up to 1,500 marines may be withdrawn.

SHIFTING SANDS?

The need to deliver rapid effect deep ashore from distance offshore has become more relevant in the current strategic environment. The development of significant anti-ship missile capabilities notably, ballistic missiles (in the case of China's People's Liberation Army Navy) and cruise missiles (in the case of the Russian Federation Navy) are creating greater anti-access/area denial (A2/AD) threats to Western forces. According to Childs, "the increased potency and reach, as well as the proliferation, of A2/AD capabilities pose new challenges for amphibious operations, and increases the premium of being able to deploy possibly even from over the horizon, at speed, to avoid hazarding amphibious shipping and retaining tactical surprise."

China itself is also developing significant amphibious capability, and has been deploying amphibious platforms in task groups and as single ships. Such single ship deployments have been seen in the Indian Ocean and west of Suez. However, perhaps the most notable aspect of China's amphibious capability is the use of amphibious groups to conduct training in assaults ashore underlining the potential risk of escalation in the Asia-Pacific region over territorial disputes.

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