Defence Global

Land, Sea, Air and Security

November 2019 Edition

Foreword by
General Sir Nick Carter GCB CBE DSO ADC Gen,
Chief of the Defence Staff
British Armed Forces

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FOREWORD

General Sir Nick Carter GCB CBE DSO ADC Gen, Chief of the Defence Staff

We are living through a period of phenomenal change – it's more widespread, rapid and profound than humanity has experienced outside of the two world wars, and it is still increasing – and change at this scale and pace inevitably feeds instability. We have returned to an era of great power competition, and the threats to our countries, our allies and the multi-lateral system that has assured our freedom, our prosperity and our open way of life, are materialising faster than anyone might have anticipated.

This is compounded by a rapidly evolving character of conflict brought on by the pervasiveness of information and extraordinary advances in technology. No longer are the traditional distinctions between peace and war, home and away, state and non-state, virtual and reality as clear as they once were. Our opponents have become masters at exploiting these seams. They have invested thoughtfully in new methods and capabilities that are designed to target our weaknesses.

We are now being challenged on multiple fronts and this requires a strategic response. We must mobilise to meet today's threats; we must modernise to meet future threats; and we must transform ourselves to become more agile and adaptable. Modernisation will involve the integration of five Domains: Space, Cyber and Information, Maritime, Air and Land. This will change the way we fight and the way we develop capability. Trend analysis suggests it will lead to:

- Smaller and faster capabilities to avoid detection;
- More reliance on low-observable and stealth technologies;
- Increasing dependence on electronic warfare and passive deception measures to gain and maintain information advantage;
- The trade of reduced physical protection for increased mobility;
- A mix of manned, unmanned and autonomous platforms;
- Integration into ever more sophisticated networks of systems;
- Less reliance on fossil fuels;
- An open systems architecture that enables the rapid incorporation of new capability, and rapid integration into the network;
- The employment of non-line-of-sight fires to exploit the advantages we gain from information advantage;
- Emphasis on the non-lethal disabling of enemy capabilities, thereby increasing the range of political and strategic options.

This will require us to embrace information-centric technologies, recognising that it will be the application of combinations of technology that will achieve the disruptive effect we need. Predicting these combinations will be challenging, so we will have to place emphasis on experimentation to stimulate innovation in all lines of development. This will enable adaptive exploitation as opportunities become clear.

It is salutary to be reminded that hardly any of the great military inventions of the last century emerged from a military requirement. They came from the outside world and we are unlikely to develop the capabilities we need unless we do so in partnership with the private sector where most of the innovation in technology is found.

Realising this will likely involve the adoption of a new outcome-focused approach to procurement that shares risk and opportunity with suppliers, enabling collaborative development and innovation to build the agility and adaptability needed to seize disruptive technological opportunity, with a responsive commercial function at the leading edge. We simply cannot afford the luxury of a process that uses excessive specification as an insurance policy against programme risk and we must reduce cost.

R&D must change too – we must embrace open, outwardly facing innovation - in recognition that nobody does it all in house any longer. We must establish an academic and entrepreneurial ecosystem.

We also need a different approach to human capability – our adaptive edge. Technology, the competition for skills in an evolving workforce, and the abiding need to integrate across the Domains, and within them will require a new approach that maximises the potential of all our talent from wherever it is drawn. New integrated career structures based on clearly understood skills frameworks will increasingly encourage lateral movement and entry on an enterprise basis with the private sector to provide greater opportunity for talent to be maximised for collective benefit.

Everything I have described requires transformation which is first and foremost about culture. We have to become curious, challenging and we must encourage the conditions to become constantly adaptive. But we must also open our mind to a different relationship with industry – one that is more productive, less adversarial, that is focused on mutual advantage and shared risk – that is underpinned by a sense of enterprise and a determination to build world class partnerships.

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Commercial Partners Critical to DOD Success

Photo By: Army Pfc. Joshua Cowden


Photo By: Army Pfc. Joshua Cowden

Commercial partners are critically essential to the Defense Department's success, the commander of U.S. Transportation Command said.

"*I remind everybody that the only reason that we exist is to project and sustain the joint force*," Army Gen. Stephen R. Lyons said at the National Defense Transportation Association-Transcom fall meeting in St. Louis.

"*Our great airmen, soldiers, sailors, Marines and Coast Guardsmen are out there every day with our commercial partners that are agile and adaptive to be able to respond to dynamic force employment and that is really held in amazement by everybody, but particularly by our adversaries*," he said. *As adversaries look at the United States and the U.S. military, they have a lot of things to admire. We have great leaders, great noncommissioned officers and we have great technology and weapons systems*." But what adversaries admire most is the ability to conduct global command and control on a global scale.

The ability to launch bombers from the continental United States and strike targets in North Africa and return to the United States without ever landing in sovereign territory for refueling is an incredible capability, the general said, but it requires global integration and synchronization of resources that are positioned across three different continents. This joint deployment enterprise framework is a global posture, a network enabled not only by military capability but also by commercial networks. "*The incredible relationships with our like-minded partners and allies across the world allows us to expand this logistics network to a global scale*," he said.

"*Our adversaries know that we can come if we have the will*," Lyons said, noting that few people are aware of such elements as dynamic force employment and the U.S. ability to move every single day.

> **"Our adversaries know that we can come if we have the will."**
>
> *Army Gen. Stephen R. Lyons, commander of U.S. Transportation Command*

Few realize how much is going on inside the mobility enterprise, such as how many brigades or batteries are moving, or how many fighter squadrons are conducting operations while moving across the ocean.

DOD's commercial industry partners are a key part of these capabilities, which serve as a strategic deterrent and clearly demonstrate the U.S. ability to respond if it needs to. Meanwhile, DOD pays particularly close attention to the cyber world, based on the vulnerability of potential consequence. Other areas of interest included sealift recapitalization, improving household goods shipment for service members, aerial refueling and digital modernization. Additionally, China's intent to disrupt 75 years of international norms, its efforts to shape predatory behavior, especially economically through state-owned enterprise and others and its worldwide investments are creating a serious level of competition.

By: Department of Defense
www.defense.gov

EUROPEAN DEFENCE, ONE ACHIEVEMENT AT A TIME

By Javier Solana, first EU High Representative for the Common Foreign and Security Policy (1999-2009) and Head of the European Defence Agency (2004-2009).

"Europe will not be made all at once, or according to a single plan. It will be built through concrete achievements which first create a de facto solidarity."

These words, arguably the most famous of the Schuman Declaration, inspired the foundation of the European Coal and Steel Community in 1952. Yet the road to European integration indeed turned out to be both bumpy and winding. Only two years on, for example, the French National Assembly rejected a treaty that would have established a European Defence Community (EDC). As it happens, the EDC plan had been envisioned by French diplomat Jean Monnet, one of the architects of the Schuman Declaration.

The failure of the EDC – through which six European countries would have created a supranational army – turned the spotlight towards NATO, which had been founded a few years earlier. In the decades that followed, European countries undertook several joint initiatives in the field of defence, but NATO's umbrella overshadowed them all.

At no point was this more glaringly obvious than during the wars in the Balkans in the 1990s, which exposed the shortfalls of the European project in terms of security cooperation and military capabilities. The United States, whose global hegemony was at that time uncontested, stepped into the vacuum created by the EU's inaction.

Wake-up call

Much like World War II, the Balkan wars were a wake-up call for Europe: it was plain to see that the poison of conflict was still corroding the continent. Thus, before the turn of the century, European defence cooperation received a renewed boost. The 1993 Maastricht Treaty opened the door to a common defence policy in the EU, and the 1998 British-French declaration of Saint-Malo decisively endorsed the Union's capacity for autonomous action on the international stage. Ever since, defence integration has been a quiet success story of the EU.

To be sure, concrete achievements in the area of security and defence have come along at a more modest pace than Monnet envisioned – but they have come along nonetheless.

Creation of EDA

One such achievement was the European Security Strategy, adopted in 2003; another was the birth of the European Defence Agency (EDA) in 2004. EDA was a brainchild of the Convention on the Future of Europe, which had been tasked with producing a draft Constitution for the EU.

Although French and Dutch voters rejected the Constitutional Treaty in 2005, the prior establishment of EDA showed the way forward. The fiasco of the Constitutional Treaty was not to be interpreted as a blanket rejection and therefore, many ideas put forward by the Convention ended up finding a new home in the Treaty of Lisbon of 2009.

The Lisbon Treaty enshrined EDA's role as a cornerstone of the EU's flourishing security and defence landscape. The Agency's intergovernmental nature – EDA is subject to the authority of the Council – places it in an ideal position to act as a catalyst for joint capability-building initiatives involving Member States.

All EU countries but one are members of EDA, which has also reached agreements with several non-EU countries (Norway, Serbia, Switzerland and Ukraine). EDA allows countries to cooperate on an ad hoc basis, and provides them with invaluable expert input. Additionally, it represents a useful vehicle for Member States to liaise with key EU institutions, such as the European Commission.

In yet another breakthrough, the Lisbon Treaty offered the option of so-called 'Permanent Structured Cooperation' among Member States. Unfortunately, this became a neglected asset in the EU's toolbox, as Europe entered an onerous decade marked by multiple crises.

New momentum

Nevertheless, the EU once again ended up finding new momentum in the midst of the storm. Instead of allowing itself to be dragged down by the opponents of European integration, who convinced British voters to make the regrettable decision of leaving the bloc, the EU kept moving forward.

First, the European Security Strategy was replaced in 2016 by a more ambitious Global Strategy, which set the development of 'strategic autonomy' as a fundamental goal of the EU. As the Global Strategy puts it, "a sustainable, innovative and competitive European defence industry is essential for Europe's strategic autonomy."

All efforts in this direction have received the vital support of EDA – a critical lever in the EU's quest to underpin its self-sufficiency in an increasingly volatile international environment.

"The 15th anniversary of EDA is a cause for celebration, as well as a perfect occasion to reaffirm the Agency's mission and insist on the need to streamline military spending in Europe"

Second, EDA finalised its Long Term Review (LTR) in 2017, thus answering the Global Strategy's call for enhanced defence cooperation among EU Member States. The LTR refined and reinforced the Agency's role as the central hub in terms of capability development and strategic planning in the EU. Since 2017, EDA has not only taken on new responsibilities, but its added value has also increased across the board.

Third, the 'Permanent Structured Cooperation (PESCO), foreseen in the Lisbon Treaty, finally came into fruition. PESCO was established in December 2017 with the participation of the vast majority of EU Member States.

While it cannot be expected to immediately put an end to today's excessive military fragmentation, PESCO can kick-start a virtuous cycle leading to more robust and cohesive European defence capabilities.

It is important to underline that PESCO and NATO are fully compatible – actually, by tapping into synergies on a European scale, PESCO will reduce wasteful duplications and indirectly benefit other NATO allies.

As European Commission President Jean-Claude Juncker said in 2017, EU countries combined spend half as much as the United States on defence, yet attain only 15 per cent of its military efficiency. A case in point is the fact that EU countries use 17 different types of tanks, while the United States uses only one.

EDA and PESCO: two sides of the same coin

The fortunes of PESCO and EDA are inextricably linked; indeed, they can be thought of as two sides of the same coin. That is true in an institutional sense (EDA is part of the PESCO Secretariat) and in a functional sense (many PESCO projects require EDA's direct support). Moreover, both initiatives illustrate the EU's new-found drive in defence integration, which has also led to the launch of the European Defence Fund (EDF) and the Coordinated Annual Review on Defence (CARD).

Given the intricacies of this burgeoning framework, it is clear that EU Member States need to keep empowering EDA if PESCO is to realise its full potential.

The 15th anniversary of EDA is a cause for celebration, as well as a perfect occasion to reaffirm the Agency's mission and insist on the need to streamline military spending in Europe.

Current levels of fragmentation severely hinder the EU's competitiveness and self-reliance, and are simply unsustainable. EU citizens appear to agree with this assessment, as polls show there is significant public appetite for further integration in the area of security and defence.

EDA is well suited to keep leading this historical process, and to consolidate itself as an epitome of the EU of the future: flexible, smart, and effective.

EUROPEAN DEFENCE AGENCY

By: European Defence Agency
www.eda.europa.eu

Team effort needed in the information battle space

Chief of Defence Force General Angus Campbell addresses the iWar forum at Parliament House, Canberra. Photo: Jay Cronan

The Five Eyes militaries need to coordinate a consistent approach to combat increased threats in the information environment.

That was the message from the Head of Information Warfare, Major General Marcus Thompson, at the division's annual forum, iWar 2019, held at Parliament House.

"*We exist within an ever-expanding information environment that makes us incredibly vulnerable to those who want to target us, or do us harm," Major General Thompson said. "The ADF is building its workforce and the capabilities needed to defend and protect against information warfare threats, which are constantly evolving. This event brings together experts and thought leaders from around the world to examine the information environment in detail. This forum allows us to put the challenges on the table and look at how we're currently responding and what we need to do to prepare for the future information warfare fight.*"

Chief of Joint Capabilities, Air Marshal Warren McDonald, said the ADF needed to be as skilled at non-kinetic (or grey-zone) operations as it is at traditional kinetic warfare.

"A nation's military and strategic advantage is enhanced by its ability to successfully manoeuvre through the information environment," Air Marshal McDonald said.

The event was attended by members of the ADF, Defence, Australian Government departments, Five Eyes militaries, academia, industry and think-tank organisations.

By Australian Government
Department of Defence
www.defence.gov.au

Without effective AI, Military risks Losing the next war

A next war against a near-peer competitor will be fast, chaotic and shockingly bloody, the Director of the Joint Artificial Intelligence Center said.

Air Force Lt. Gen. Jack Shanahan spoke at the National Security Commission on Artificial Intelligence in Washington.

The side with the best AI algorithms will put the other side at an extreme disadvantage, he said, particularly regarding the speed of battlefield decision making.

Dr. Eric Schmidt, Air Force Lt. Gen. Jack Shanahan and Kent Walker speak during a conference hosted by the National Security Commission on Artificial Intelligence in Washington.

Shanahan described such a future battle as "algorithms vs. algorithms," with the best algorithm victorious.

In the future battle scenario, Shanahan said events will move so quickly that a traditional chain of command won't work. Junior, frontline troops will need to be empowered to make the decisions and to adjust AI algorithms on the fly. This decentralization of command entails higher risks and consequences, he said, but without it, "we risk losing the fight."

Marine Corps Sgt. Zachary W. Hill, an artillery section chief with 1st Battalion, 11th Marine Regiment, 1st Marine Division, prepare artillery rounds for fire missions during the Fall Fire Exercise at Marine Corps Base Camp Pendleton, Calif., Oct. 23, 2019. Photo By: Marine Corps Cpl. Jack C. Howell.

To get to the best AI, the department must rely on industry and academia, which are much further along in this endeavor than the DOD.

There are lessons learned from Google's unwillingness to continue working with the DOD on Project Maven last year. The project had to do with AI's use in intelligence, surveillance and reconnaissance operations. There needs to be a shared sense of responsibility and vision, along with trust and transparency from the DOD and industry. National security depends on it.

Another step to take in adopting the best of industry's AI is for service members to work directly in industry and academia and to bring AI experts from industry and academia into the DOD. "That's already happening but we need to scale that up," he said. "Peer-to-peer discussions and personal relationships matter."

A Navy MH-60S Seahawk helicopter hoists search and rescue swimmers during a training exercise in the Arabian Sea. Photo By: Navy Petty Officer 3rd Class Jeremiah Bartelt

Lastly, an important step that was taken was the Defense Innovation Board coming up with a set of AI ethical principles, which he said are excellent.

The DOD will act on the Defense Innovation Board's recommendations and then there will be deliberations on implementing them if the recommendations are accepted. "Implementation is not an overnight task," he said.

The ethical use of AI by the military in training, research, product development and operations should inspire confidence in the industry that the department is making ethical use of this new technology.

By: US Department of Defense
www.defense.gov

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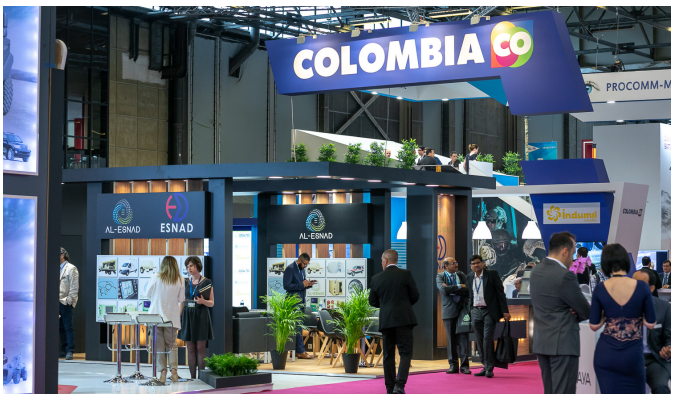
Eurosatory 2020 to be held from 8-12 June 2020

The international reference for land and airland Defence and Security exhibitions, Eurosatory is a biennial event taking place every even year in The Parc des expositions de Paris-Nord Villepinte, near Paris. Save the date for the next edition to come in eight months from 8 to 12 June 2020 and find below the answers to the question "Why Eurosatory is THE place to be"?

To meet all the international defence and security players

Over the past years, Eurosatory has become the unmissable event. It brings together exhibitors, visitors and journalists from all over the world. Last time, in 2018, it hosted 1,802 exhibitors from 63 countries and over 98,700 attendees from five continents (153 countries).



International high-level delegations come to the event from all over the world. In 2018, Eurosatory welcomed 227 official delegations from 94 countries and four international organisations as well as numerous VIP experts from 34 countries like national technical experts, corporate safety directors of private companies and others.

To make business and to network

Eurosatory is the exhibition that was created by industrialists for industrialists. It offers to all its participants exceptional services in order to help them to develop their commercial opportunities, to maximise their visibility and optimise their presence at the exhibition.

The participants' ROI is very important for organisers. They carefully provide participants with multiple services for business: networking tools (between individuals), business meetings (between companies), business consulting. Well designed and performing mobile application is also available and helps to optimise participation. Many business meetings and connexions are realised with the help of these services and tools.

To discover life-size technological showcase and innovation

Eurosatory presents numerous life-size equipment and systems. At the last edition, over 500 new products and systems are introduced to the market for the first time. Companies, from large groups to SMEs present their products on 81,329.92sqm of indoor and outdoor exhibiting area, as well as they participate in Live demonstrations. In addition to big companies and SMEs, Eurosatory gives a significant boost to start-ups. About 80 start-ups are gathered in a specially designed areas the Eurosatory LAB and at GICAT's stand. They present their solutions alongside with big companies.

At Eurosatory many companies are gathered into national pavilions. In 2018, 39 national pavilions were designed: pavilions of Australia (more than 40 companies), Azerbaijan, Bosnia and Herzegovina, Colombia and Latvia participated for the first time in the exhibition's history. Pavilions of Germany, Serbia, South Korea and Turkey enlarged their exhibiting surface in 2018. The most represented countries by exhibitors were USA (152 exhibitors), Germany (118 exhibitors), United Kingdom (85 exhibitors), Israel (72 exhibitors) and Turkey (61 exhibitors).

Attendees of Eurosatory exhibition take advantage of the opportunity to discover Defence and Security equipment and system in action by visiting live demonstrations, a real specificity of the show. There, the products and equipment are presented in real situations. In addition of exhibiting companies, foreign and French special forces take part in the live demonstrations.

To participate in high-profile international conferences Eurosatory supports exchanges of views about the evolution of Defence and Security between all the players of the land and airland defence & security domain. Over 70 conferences and seminars are organised all along 5 days of the exhibition. There high-level experts, senior military, government and industry figures discuss key contemporary and thought-provoking topics.

To recap, Eurosatory is the most exhaustive exhibition in the land and airland D&S domains: all the products and systems of land and airland defence and security can be found there as well as all the worldwide players of the domain come to the show. With such a high number of exhibitors, with a great number of new products and services unveiled at every edition and extremely interesting business opportunities, it's THE must-attend event in land and airland Defence & Security domains!

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For further information visit: www.eurosatory.com

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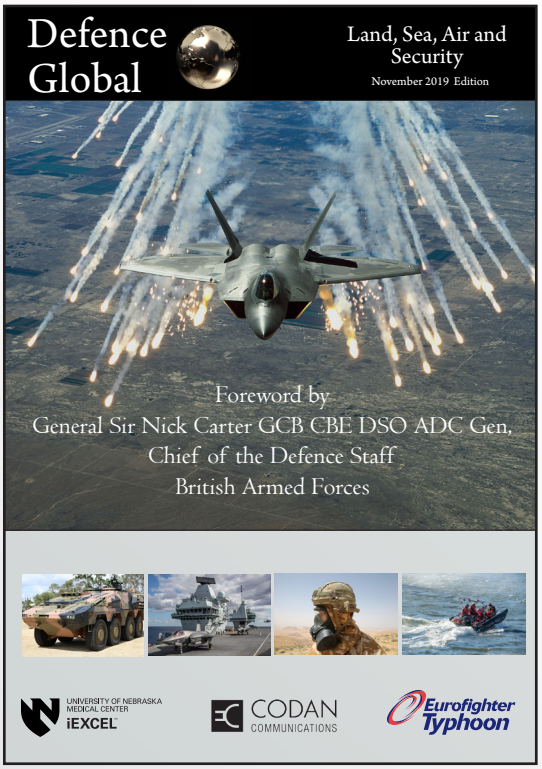

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A contract signed to provide state-of-the-art armoured fighting vehicles to the British Army.

A contract worth £2.8 billion has been signed to provide state-of-the-art armoured fighting vehicles to the British Army.

The Defence Secretary has announced that the army will receive more than 500 Boxer 8x8 high mobility, network-enabled armoured vehicles to transport troops onto the frontline.

Defence Secretary, Ben Wallace, said:

“Our men and women of the Armed Forces deserve to have the best equipment to do their job. “The Boxer vehicle is a leader in its field and I look forward to it arriving in units from 2023.”

The vehicles will form part of the Army’s Strike brigades, new units set up to deploy rapidly over long distances across varied terrains.

Boxer is modular by design to meet these requirements, the same vehicle base can be rapidly reconfigured to fill different roles on the battlefield, from carrying troops across deserts to treating severely injured service personnel on the journey to hospital.

Initially the Army will buy a mixture of the troop-carrying variant, ambulances, command vehicles, and specialist designs to carry military equipment.

Sir Simon Bollom, Chief Executive of Defence, Equipment and Support (DE&S), said:

“This is excellent news for the Army and I’m delighted that we can now move forward with a contract for the Mechanised Infantry Vehicle. We are looking forward to continuing to work closely with the Army and our partners across industry to deliver the best equipment and support for our troops.”

The UK announced in 2018 that it would re-join the Boxer programme within the Organisation for Joint Armament Cooperation (OCCAR) and explore options to modernise its vehicle fleet and meet the Army’s Mechanised Infantry Vehicle requirement.

The UK played a central role in the original design, development and testing of the Boxer. In re-joining the programme last year, the UK reassumed the rights it had as a project partner.

This contract was signed ahead of the pre-election period due to the strong value-for-money agreement reached with industry and other OCCAR nations, which expires on December 31st 2019. It would be possible for a new Government to take a different position.

Boxer armoured vehicle at Army Combat Power Demonstration 2019. Crown Copyright.

By: Defence Equipment and Support
Ministry of Defence
www.gov.uk

Evolution of a commando

Years of overseas service have transformed special forces unit 2nd Commando Regiment into one of the Australian Army's most experienced units.

Celebrating its 10th anniversary this year, the unit has undergone many changes since it changed its name from the 4th Battalion, Royal Australian Regiment.

Sergeant L said the unit had grown and adapted in every area, from equipment to training facilities, to suit its changing mission profiles since he arrived in 2006.

"*Initially, there were a lot of changes in the gear we were using due to our experiences on Operation Slipper the war in Afghanistan*," Sergeant L said.

"*The unit went from young to very senior, with a lot of experienced commandos, in a short timeframe because of the multiple deployments we were doing in Afghanistan*.

"*We've transitioned that knowledge, experience and equipment back into the domestic counterterrorism mission profiles we conduct as part of 2nd Commando Regiment's hostage recovery and counterterrorism role*."

The training for those roles, as well as general commando training, is conducted at the Special Forces Training Facility (SFTF) – a collection of ranges that has grown alongside 2nd Commando Regiment and evolved to meet contemporary demands.

Range manager Sergeant J said the facility, originally comprised of 10 ranges, now had 43 ranges spread across the Holsworthy Training Area and encompassed the hostage recovery and counterterrorism role as well as the commando's "war roles".

"The SFTF comprises two training areas: the indoor range complex, which gives us the ability to conduct the full spectrum of our responsibilities within the CT space," Sergeant J said.

"It consists of multiple ranges which can be linked together to make one large live-fire range – which is unique to this facility.

"The second encompasses the external areas, which allow us to conduct training ranging from breaching, long-term surveillance and sniper engagements through to urban warfighting using live or non-lethal man-marking munitions."

Picture credit
An Australian Army soldier from 2nd Commando Regiment during counterterrorism training at the Special Forces Training Facility at Holsworthy Barracks, Sydney.

By: Australian Government Department of Defence www.defence.gov.au

U.S. Marine Corps orders more Amphibious Combat Vehicles

BAE Systems has received a $120 million contract from the U.S. Marine Corps for additional Amphibious Combat Vehicles under a third order for Low Rate Initial Production (LRIP).

This award is an important next step on the path to full rate production. This latest contract is for the ACV personnel carrier variant (ACV-P), an eight-wheeled amphibious assault vehicle capable of transporting Marines from open-ocean ship to shore and conducting land operations. Each vehicle embarks 13 Marines in addition to a crew of three.

“This award further validates the Marine Corps’ confidence in the vehicle’s proven capability in meeting their amphibious mission, and represents an important step toward fielding the vehicle in the Fleet Marine Force. The ACV is a highly mobile, survivable and adaptable platform designed for growth to meet future mission role requirements while bringing enhanced combat power to the battlefield,” said John Swift, director of amphibious programs at BAE Systems.

Current low-rate production is focused on the ACV-P variant. More variants will be added under full rate production to include the command and control (ACV-C), 30mm medium caliber turret (ACV-30) and recovery variants (ACV-R) under the ACV Family of Vehicles program. BAE Systems previously received the Lot 1 and Lot 2 awards.

The Marine Corps selected BAE Systems along with teammate Iveco Defence Vehicles for the ACV program in 2018 to replace its legacy fleet of Assault Amphibious Vehicles, which have been in service for decades and were also built by BAE Systems.

ACV production and support is taking place at BAE Systems locations in Stafford, Virginia; San Jose, California; Sterling Heights, Michigan; Aiken, South Carolina; and York, Pennsylvania.

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COGIS

Boxer enters the ring

The first of a fleet of new combat reconnaissance vehicles (CRVs) for the Australian Defence Force has been unveiled at a ceremony at Enoggera Barracks, Brisbane.

The 211 new Boxer 8x8 CRVs will be delivered by Rheinmetall Defence Australia under the $5 billion LAND 400 Phase 2 Mounted Combat Reconnaissance Capability program.

The LAND 400 program will provide the Australian Army with a fleet of modern armoured fighting vehicles characterised by increased levels of protection, lethality and mobility.

The new vehicles will be equipped with modern and highly capable sensors and communications suites, which will ensure the new vehicles remain a potent weapon system over the next 30 years.

The Defence Minister, Senator Linda Reynolds said the new vehicles, with their high levels of protection, firepower and mobility, would provide a world-class capability to the Army.

The Minister for Defence Industry, Melissa Price, welcomed the approximately 1450 jobs across Australia that would flow from the construction of the vehicles. “This project presents an exciting opportunity for Australian industry to play a vital role in delivering leading-edge capability and technology to Australia’s Army,” Minister Price said.

Australian industry will secure $10.2 billion of the total investment in acquiring and maintaining the fleet.

A dozen small businesses across Australia will contribute to the Boxer program, ensuring the delivery of these vehicles is a national enterprise.

The first 25 vehicles will be assembled in Germany and delivered to Australia as part of technology transfer activities to familiarise Australian workers and suppliers on the specific manufacturing techniques of these vehicles. The remaining vehicles will be assembled at the Rheinmetall Military Vehicle Centre of Excellence facility in Redbank, Queensland, using companies across Australia.

By: Australian Government
Department of Defence
www.defence.gov.au

With Squad X, Dismounted Units Partner with AI to dominate battlespace

Program highlights manned-unmanned teaming to enhance capabilities for ground units, giving squads battalion-level insights and intelligence

DARPA's Squad X Experimentation program aims to demonstrate a warfighting force with artificial intelligence as a true partner. In a recent field test, the program worked with U.S. Marines at the Air Ground Combat Center in Twentynine Palms, California, to track progress on two complementary systems that allow infantry squads to collaborate with AI and autonomous systems to make better decisions in complex, time-critical combat situations.

"We are in a race with potential adversaries to operationalize autonomy, and we have the opportunity to demonstrate autonomy in a way that we don't believe any nation in the world has demonstrated to date," said Lt. Col. Phil Root (USA), the Squad X program manager in DARPA's Tactical Technology Office. "Developing hardware and tactics that allow us to operate seamlessly within a close combat ground environment is extremely challenging, but provides incredible value."

The exercises in early 2019 in Twentynine Palms followed experiments in 2018 with CACI's BITS Electronic Attack Module (BEAM) Squad System (BSS) and Lockheed Martin's Augmented Spectral Situational Awareness and Unaided Localization for Transformative Squads (ASSAULTS) system. The two systems, though discrete, focus on manned-unmanned teaming to enhance capabilities for ground units, giving small squads battalion-level insights and intelligence.

In the most recent experiment, squads testing the Lockheed Martin system wore vests fitted with sensors and a distributed common world model moved through scenarios transiting between natural desert and mock city blocks. Autonomous ground and aerial systems equipped with combinations of live and simulated electronic surveillance tools, ground radar, and camera based sensing provided reconnaissance of areas ahead of the unit as well as flank security, surveying the perimeter and reporting to squad members' handheld Android Tactical Assault Kits (ATAKs). Within a few screen taps, squad members accessed options to act on the systems' findings or adjust the search areas. Between Lockheed Martin's two experiments to date, Root says the program-performer team identified a "steady evolution of tactics" made possible with the addition of an autonomous squad member. They also are focused on ensuring the ground, air, and cyber assets are always exploring and making the most of the current situation, exhibiting the same bias toward action required of the people they are supporting in the field.

CACI's BEAM-based BSS comprises a network of warfighter and unmanned nodes. In the team's third experiment, the Super Node, a sensor-laden optionally-manned, lightweight tactical all-terrain vehicle known as the powerhouse of the BEAM system, communicated with backpack nodes distributed around the experiment battlespace – mimicking the placement of dismounted squad members – along with an airborne BEAM on a Puma unmanned aerial system (UAS). The BSS provides situational awareness, detects of electronic emissions, and collaborates to geolocate signals of interest. AI synthesizes the information, eliminating the noise before providing the optimized information to the squad members via the handheld ATAK.

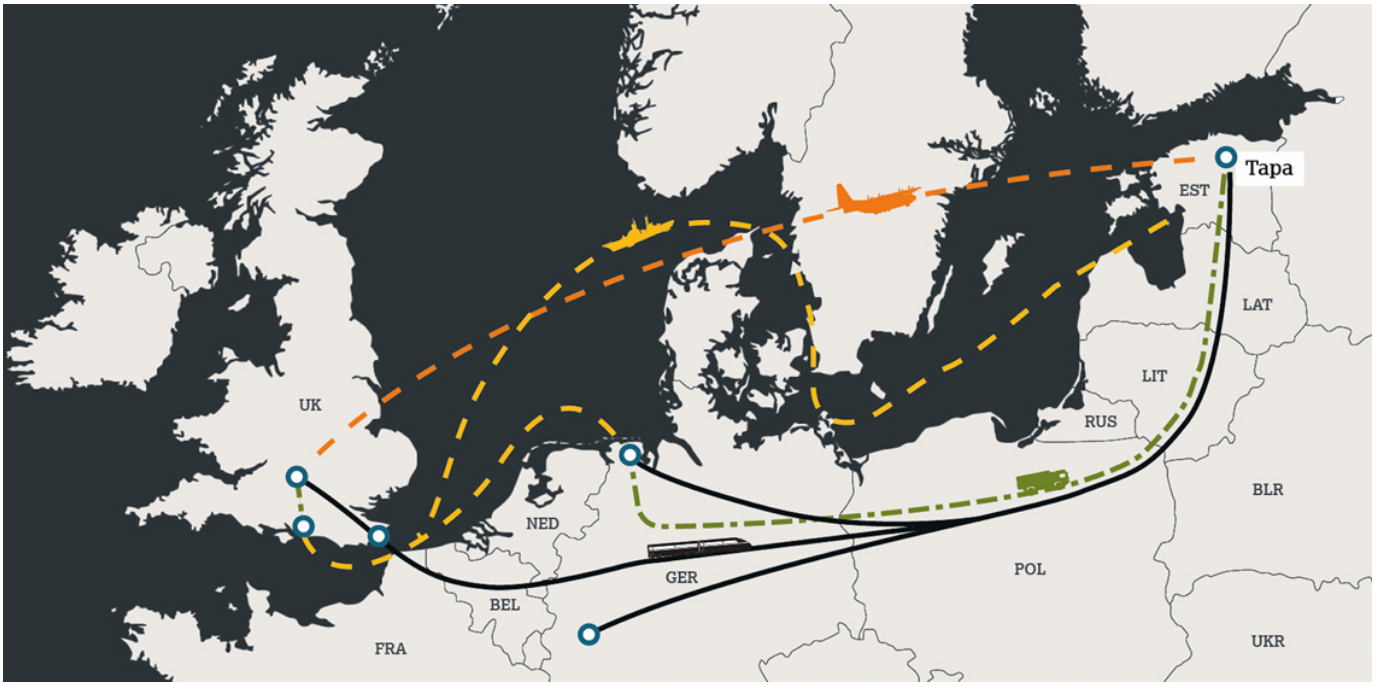
The Squad X program has moved quickly through development and is already well along the transition path, due in large part to the program's focus on partnering with the services to ensure real-world efficacy. For the CACI system, that included an opportunity to test the technology downrange to get real-world information, not simulation. At the most recent experiment with the BSS, service representatives used the system to locate and identify objectives in real time.

For both systems, feedback has included a desire for a user interface so intuitive that training takes an hour or less and any available action is accessible in two screen taps. Staff Sergeant Andrew Hall with the Marine Corps Tactics and Operations Group (MCTOG), an advisory teammate to DARPA's Squad X Experimentation program, says the ability to provide early input will guard against developing a product that either isn't used or is used improperly.

With the conclusion of third experiment, the CACI system is moving into Phase 2, which includes an updated system that can remain continuously operational for five or more hours. Lockheed Martin will conduct its next experiment in the fall of 2019.

CACI's BEAM system is already operational and the Army has committed to continue its development at the completion of Squad X Phase 2. The Army is set to begin concurrent development of the Lockheed Martin ASSAULTS system in fiscal years 2019 and 2020, and then, independent of DARPA, in fiscal year 2021.

For further enquiries contact DARPA Public Affairs at outreach@darpa.mil



By Air. By Road. By Sea. By Rail.

In October 2019, the Army will mobilise across Europe by road, rail, sea and air to complete a routine fleet rotation of vehicles deployed as part of Operation Cabrit – the UK's enhanced Forward Presence (eFP) in Estonia as part of NATO.

Soldiers from the Queen's Royal Hussars (QRH) are due to take over from the King's Royal Hussars (KRH). The Army currently has Challenger II main battle tanks in Estonia, alongside armoured vehicles and artillery which require rotating.

The complicated movement of soldiers, vehicles and equipment across Europe is known as TRACTABLE. It will demonstrate our enduring commitment to collective defence and will reinforce our capacity to work with our NATO allies, bolstering our presence in the Baltic states.

TRACTABLE builds on recent UK deployments that have strengthened the ability to work seamlessly with our partners and by doing so helped to reinforce the common values we defend together shoulder to shoulder. The British Army often deploys along with other international organisations, combined formations, coalitions and partnerships in Europe.

Our presence in Estonia, alongside our troop contribution to the US-led Battlegroup in Poland, is providing stability and reassurance across the region.

The Army's fundamental purpose is to protect the nation and deployments such as this, ensures we are always ready and able to do so. The Army is always ready to meet every challenge and can deploy rapidly, worldwide and working with our NATO partners, help bolster European and UK stability and security.

By: British Army
www.army.mod.uk

Photonics brings to light the use of lasers on the battlefield

Initially it seems like nothing happened. The command, "Laser on" is given, but the laser itself isn't visible to the human eye. Then, sparks fly and the middle of the steel plate placed as a target for the laser beam starts to melt.

It is a common occurrence in the high energy laser lab in the basement of Bartlett Hall at the U.S. Military Academy where Capt. Joseph Fasone and cadets are doing research for the academy's Photonics Research Center.

For now, they are only burning holes in steel plates, and one time by accident the wall in the lab, but in the coming years the technology they are testing will hopefully be used to take down drones and mortars on the battlefield.

The idea of using lasers for defense has been worked on within the Department of Defense since the 1980s starting with the Strategic Defense Initiative, which was also referred to as the Star Wars program.

The initial goal was to develop a way to defend from Soviet Union nuclear weapons.

More than 30 years and countless Star Wars films later, the idea of using lasers as a weapon on the battlefield is closer than ever.

Class of 2021 Cadet Jacob Bohnemann and Capt. Joseph Fasone aim the 1 kilowatt laser in the high energy laser lab in Bartlett Hall. (Photo Credit: Brandon OConnor)

With the fall of the USSR, the research moved on from the idea of zapping a nuclear missile out of the air, but to the ability to use a high energy laser to take down an unmanned aerial vehicle or other munitions is moving closer to being a part of the Army's arsenal.

"For a projectile, like a mortar or a rocket, that's moving at a relatively high rate of speed, as soon as you can track that projectile and you hit that on button, you're instantly depositing that energy on the target," Fasone said.

"In the case of a rocket or a mortar round what you're trying to achieve is some kind of an ignition of the primary charge in that explosive device.

“For an unmanned aircraft, what you're really doing is you have the ability to pinpoint and precisely destroy a component of that aircraft."

At West Point that research is currently being done in the Photonics Research Center.

The center was started in 1987 as one of the first research centers at the academy.

Currently, there are 27 research centers at West Point working in fields ranging from robotics and cyber research to terrorism studies and warfighting in the 21st century.

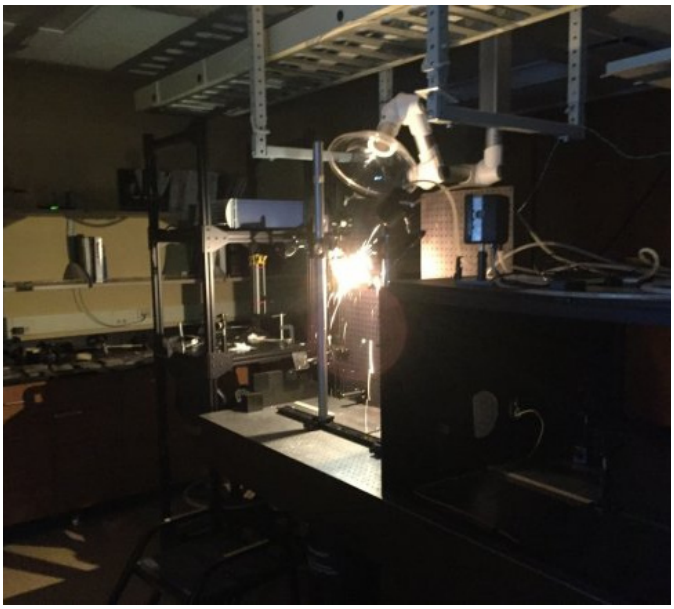
The center studies a wide range of topics all dealing with photonics, which is the study of light.

While some of the research being done in the Photonics Research Center sounds like it was ripped from the pages of a science fiction novel, the researchers in the center are also working on a wide range of projects dealing with energy storage, conductive materials and more.

The center includes researchers from West Point’s departments of electrical engineering, physics and nuclear engineering, and chemistry and life sciences. They also partner with researchers throughout the DOD and at universities from coast to coast.

“There are so many things that combine with materials, chemistry and physics, but it all has to do with photons,” Enoch Nagelli, an assistant professor in the Department of Chemistry and Life Sciences, said.

“Every overarching project has some tie-in with photons, whether you’re working on a materials problem or you’re working on a high energy laser or you’re working with bacteria that can actually absorb infrared.”



Cadet researchers measure the interaction between a 1-kilowatt high energy laser and a standard steel target. The research intends to characterize the relationship between hole formation and the angle which the laser beam is incident upon the target. (Photo Credit: Capt. Joseph Fasone)

Cadets across all four classes at West Point also take part in research. They have the chance to get involved in projects as plebes (freshmen) and the goal, said Lt. Col. Kirk Ingold, who is the director of the center, is for them to be able to publish research in academic journals by the time they graduate.

"We use research as a teaching mechanism," Ingold said.

"We don't just interact with our students in the classroom where we're standing in front of a whiteboard or blackboard lecturing.

“We bring the students into the lab.

“They receive hands on experience, and they learn some of these advanced topics that they wouldn't necessarily see in the classroom."

The physicists in the center work largely with lasers, including the defense applications of high energy lasers.

The electrical engineers involved in photonics research work with optical and nanoscale lasers that can be used for communication or everyday uses like facial recognition on an iPhone, Ingold said.

The chemists and life scientists are able to study how to use light as an energy source to detect materials through spectroscopy and any other applications.

One project currently taking place within the center is studying how to use organic proteins from organisms such as algae, which is easily renewable, to convert sunshine into power and cost effectively store it.

"Energy is a problem wherever you go," Kamil Woronowicz, an assistant professor in the Department of Chemistry and Life Sciences, said.

"Sunlight is present most places during the day, so we need to store it, but at the same time it's a complex issue. There's a whole different set of challenges when using proteins on electrodes."

Class of 2021 Cadets Nathanial Beck and John Boyle set up a steel plate target for the 1 kilowatt laser in the high energy laser lab in Bartlett Hall. (Photo Credit: Brandon OConnor)

Col. John Burpo, Nagelli and their team are working on finding ways to turn nanoscale materials into robust electrical connectors.

That would enable devices to shed considerable amounts of weight by turning the structure itself into a battery instead of requiring a separate battery to be included.

The goal is to potentially harness solar power to make the energy source self-renewable, which builds upon the work being done by Woronowicz's team.

"We do research that's on par with tier one universities that are doing research," Ingold said.

"We're presenting at the same conferences. We're doing research that's comparable. We're collaborating with these universities that are tier one universities.

“When we present, we're advertising ourselves as a university that is doing good quality, basic and applied research."

By: Photonics Research Center
U.S. Army
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Modularity in Marine HVAC

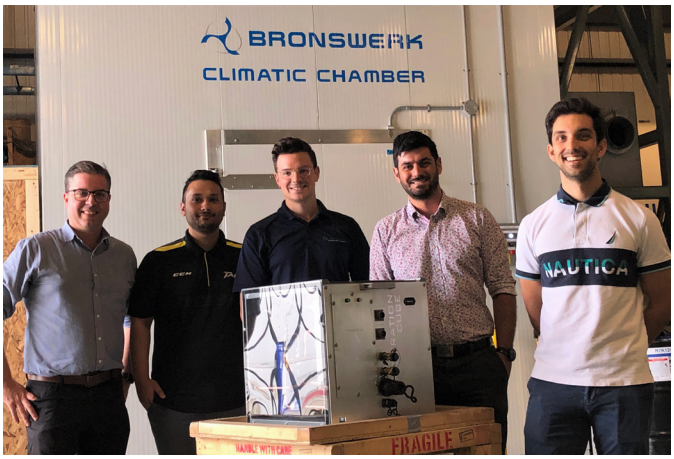
AN EXPANDING APPROACH IN THE HVAC MARINE INDUSTRY

The modular design approach continues to rise, making its way into every aspect of marine air conditioning design. Its flexibility and versatility are particularly well suited for todays' ships and submarines.

Bronswerk Group contributes to the modularity design approach with many innovative designs such as the CUBE®, the ultimate expression of modularity. This compact condensing unit can be used for both refrigeration and air conditioning solutions.

As Simple as Plug & Play

One of Bronswerk's success stories is the development of its patented CUBE® solution for domestic refrigeration. The CUBE® features a plug and play interface allowing any crew member to replace it in a few minutes, eliminating the need for a refrigeration mechanic onboard the ship during missions. The CUBE® can be carried to and from any ship or submarine by only two people. Lightweight (55kg) and compact (460mm x 460mm x460mm), it can serve a small stand-alone refrigerated space or a section of a large one maintaining its temperature between -20ºC and 8ºC.



The CUBE, a small plug & play unit

Modularity: Redefining Redundancy

There are many other advantages of this type of modular system. In fact, modularity redefines the concept of redundancy, an extremely important aspect of marine design. A module can serve as back-up to several on-duty modules, especially when the replacement process is as simple as replacing a CUBE®.

In military applications such as surface combatants or submarines, compact modular units also offer strategic security advantages as the equipment can be removed from the vessel and serviced by the OEM at their location while the system continues to operate with a backup unit. This is especially important when the vessels are deployed around the world avoiding the logistical nightmares of mobilizing repair crews to catch up with the vessel.

Enhancing Systems Efficiency

It is surprising that modular systems also offer an enhancement to system efficiency. It is true that large motors, compressors, fans, pumps, etc., are always more efficient than a collection of smaller ones, however, systems are almost always running at partial capacity. Large equipment tends to be quite inefficient when used at part load. Therefore, when the modular approach is used, unnecessary modules are taken offline and only the ones actually required are engaged, enhancing the part load efficiency of the system as a whole.

Modular systems also offer new design possibilities for engineers during the system design phase. These systems can be easily decentralized and optimized. This approach complements damage control and compartmentalization strategies onboard. It also supports weight savings efforts that minimize ducting, piping and cabling weights.

As modules such as the CUBE® are universal designs, commonality is now possible not only across ships, which is great for spare parts and logistical support, but across systems as well. For example, a refrigeration CUBE® can be used for an air conditioning application where it serves the fan coil unit of an AC space or it can also be used to serve a unit cooler in a refrigerated room. A second level of redundancy is possible when a CUBE® serving a non-critical application can be easily removed and installed to support a critical one.

The modular design approach is gaining popularity as technological developments continue to make it more viable. With solutions like the CUBE®, the flexibility, efficiency and versatility gains in HVAC design are reaching an ever-increasing sector of the marine market.

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Researchers develop groundbreaking process to study barnacle glue which could save the Navy millions

By Cassandra Eichner, U.S. Naval Research Laboratory

Researchers at the U.S. Naval Research Laboratory developed a new method for identifying the glue proteins that barnacles produce to adhere to ship hulls and other surfaces.

The new method is faster, safer, improves efficiency of samples and yields more effective results than traditional methods. Researchers hope the discovery will lead to new solutions for dealing with the accumulation of barnacles on ship hulls, which hinders Navy operations by creating drag and increasing fuel costs.

"*We are developing a new way to actually study the adhesive to see what it is composed of,*" said Janna Schultzhaus, research biologist and National Research Council Postdoctoral Associate at NRL. "*Before we can develop something that will work against it, we have to know what it is*."

These small but mighty crustaceans create a cement-like adhesive layer that is difficult to remove once applied. The adhesive layer, called barnacle glue, is made of proteins that have remained mysterious to researchers. Researchers believe identifying the proteins is the first step toward understanding the glue, and ultimately developing materials to effectively combat the glue's adhesive qualities.

Barnacle samples in pressure cycling technology (PCT) tubes and bullet with barnacle samples in the background are used for proteomics analysis at U.S. Naval Research Laboratory, Washington, D.C. August 2, 2019. The barnacle base plate covers the glue, illustrating how difficult sample collection is; the tubes and bullet are specially designed to handle high pressure conditions. (Navy photo by Jonathan Steffen)

"*If we can figure out how to make them not attach as well, they will be easier to remove or ensure they just won't attach*," Schultzhaus said. "That would save the Navy a lot of money."

Researchers have used solutions like toxic hexafluoroisopropanol to dissolve the glue and identify proteins. The problem with that method is that not all of the glue fully dissolves. That means that while researchers are able to identify some of the glue's proteins, they have no way to identify the proteins in the remaining undissolved glue.

"Imagine if you have a lot of salt and you put it in the water," said Dasha Leary, NRL research biologist "Not all the salt will dissolve. But if you want to study all the salt you need to either add more water or come up with a different way of dissolving it. That's kind of how these guys are. We have chunks of the proteins, but we need them all broken down in the solution to be able to study them."

Schultzhaus and her fellow researchers designed a study to test how well their barocycler machine, a laboratory instrument used to subject specimens to cycles of pressure, could break down the proteins with three separate test solvents. The machine worked by continuously applying and releasing high pressure on the samples.

Barnacles grown on silicone substrate used at the U.S. Naval Research Laboratory for scientific experiments at Washington, D.C. August 2, 2019. The Barnacles use a proteinaceous glue to tenaciously attach to numerous surfaces, including ship hulls, making them a nuisance to the Navy. (U.S. Navy photo by Jonathan Steffen)

In the study, researchers identified more than 80 proteins, about double the number identified in previous studies. After they characterized the proteins, they discovered several enzymes, which Schultzhaus believes may play a role in the production of glue, the transport of proteins, or in the support of the barnacle molting process. She hopes future studies will reveal the purpose of each.

The pressure cycling technology also allowed the researchers to use smaller samples and get results in a shorter time compared to traditional solvent-soaking approaches. "We can do 16 samples at a time while before we could do only one sample and we had to pull several barnacles together to get enough material to study it," Leary said. "Here we can look at material from a single barnacle and tell the individual differences better. It could take several days to get the results with the old process because there were extra steps."

NRL's barnacle team believes developing novel ways to extract proteins will be critical to understanding how barnacles interact with the environment and, ultimately, how to keep them from attaching effectively.

Their findings also have implications for the medical community. According to Schultzhaus, medical researchers can use this technique to study similar substances, like plaques formed during disease.

By: U.S. NAVAL RESEARCH LABORATORY
www.nrl.navy.mil

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At PACIFIC 2019, Rohde & Schwarz showcased its NAVICS integrated communications system for internal and SOVERON for external communications on all classes of ships. Rohde & Schwarz is equipping the Royal Navy's Type 26 Global Combat Ship with an integrated communications system, built around the NAVICS, under a contract from BAE Systems.

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DESIGN OF NEW TYPE 31 FRIGATES SELECTED

This is your first look at the Type 31 frigate which will be on the front line in little more than five years' time.

The Arrowhead 140 by a consortium led by defence firm Babcock was selected by Whitehall as the design it wants for the five general purpose frigates to take their place in the Royal Navy's line of battle alongside eight 'souped-up' Type 26 frigates currently under construction.

The first – unnamed – ship will be laid down in just two years' time and launched in 2023, with the entire class completed by 2028; each ship will have an average production cost of £250m.

The five ships will be built in segments and assembled at Babcock's yard in Rosyth – repeating the process of the Queen Elizabeth-class carriers.

The firm, which has teamed up with Thales to design the new vessels, reckons around 2,500 people across the land will be involved in the construction of the ships and the supply chain. Premier Boris Johnson named Babcock winner of the three consortia bidding for the Type 31 programme.

With a firm eye on the export market, the 31s are viewed as being central to the UK's shipbuilding strategy which Whitehall intends to reinvigorate over the coming decade – including creating a new 'shipbuilding tsar', Defence Secretary Ben Wallace, to work with other government departments, including training a new generation of skilled apprentices to meet the challenges and demands of building ships, boats and yachts in the 21st Century.

Around 150 new technical apprenticeships will be created building the five Type 31s. The ships will replace the existing general-purpose Type 23s – those not fitted with towed array and the full array of submarine-hunting sensors and systems (HM Ships Lancaster, Argyll, Monmouth, Montrose and Iron Duke) – which are reaching the end of their active lives.

"These mighty ships will from the next generation of the Royal Navy fleet. The Type 31 frigates will be fast, agile and versatile warships, projecting power and influence across the globe," Mr Wallace said.

"The ships will be vital to the Royal Navy's mission to keeping peace, providing life-saving humanitarian aid and safeguarding the economy across the world from the North Atlantic, to the Gulf, and in the Asia Pacific region."

BAE on the Clyde is building the eight 26s, successors to the eight Type 23s which are dedicated submarine hunters, as well as capable of performing patrol/ security/board and search/humanitarian aid duties.

By Royal Navy
www.royalnavy.mod.uk

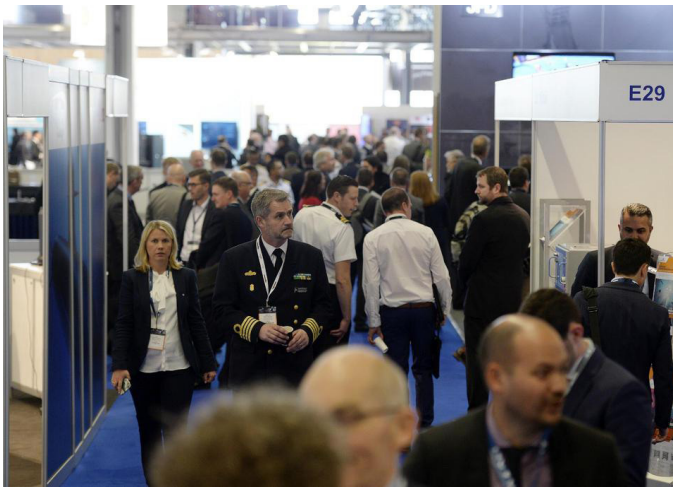
UDT 2020

Undersea Defence Technology (UDT), as the largest global event dedicated to the underwater defence industry, is a multi-faceted exhibition and conference reflecting the community's desire for continuous learning and development.

Designed to equip nations to deal with an increasing diversity of threats and challenges, UDT brings together researchers, military end-users and professionals spanning the entire supply chain to evaluate developing solutions in one of the harshest environments known to man.

In 2020, the show will focus on an aspect of underwater defence and security that is rarely discussed: teamwork.

Cooperation and collaboration are essential in the underwater environment at every level from the tactical to the strategic. These factors are vital in mine warfare and anti-submarine warfare: teamwork between platforms; between industry, research and operators; and between nations. With the introduction of increasingly unmanned systems, the development of technology and concepts to advance man/machine teaming will be key to operational success.



The latest Netherlands defence policy, published in 2018, highlights the investments the 2020 event's host nation will be making in the underwater domain. These investments are across the spectrum of underwater defence with major programmes in the mine counter-measures, ASW frigate, and submarine platform highlighted in the most recent policy papers.

Within the ASW domain, the Netherlands is funding a Maritime Unmanned Systems programme, and interest and focus on torpedo defence is of increasing prominence. These programme developments reflect the Netherlands approach to its defence needs, but many other nations face similar challenges and share the same needs. UDT is an ideal platform to explore these and other aspects of future technological design and employment.

New for 2020, UDT will also launch a NextGen Initiative focused on engaging the next generation of engineers, strategists and operators to enter the undersea defence industry. Through engagement with universities, training colleges and apprenticeship programs, UDT will provide new and aspiring entrants with an invaluable opportunity to meet major players in their market and discuss what lies ahead.

Finally, 2020 will see the evolution of the Military Diver Capabilities conference - a dedicated discussion platform for those engaged in diver operations, training, equipment research and development. Due to popular demand, the conference will expand to a two-day programme with enhanced networking and discussion sessions.

UDT 2020
Undersea Defence Technology
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Visit: www.udt-global.com

Researchers Transmit Energy With Laser in 'Historic' Power-Beaming Demonstration

A laser beam invisible to the naked eye is captured by a special camera as it shoots across the dark expanse of the David Taylor Model Basin at the Naval Surface Warfare Center in Bethesda, Maryland. (U.S. Navy photo by Leonard Pieton/Released)

It was the second day of a three-day-long tech demonstration at the David Taylor Model Basin at the Naval Surface Warfare Center in Bethesda, Maryland, where attendees had gathered to stand around in the dark to look at something they mostly couldn't see.

It was a long-range, free-space power beaming system, the first of its kind. Attendees could see the system itself - the two 13-foot-high towers, one a 2-kilowatt laser transmitter, the other a receiver of specially designed photovoltaics. But the important part, the laser that was beaming 400 watts of power across 325 meters, from the transmitter to the receiver, was invisible to the naked eye.

On one end of the of the testing facility — one of the largest test facilities for model ships in the world — the receiver was converting the laser energy to DC power, which an inverter was turning into AC power to run lights, several laptops, and a coffeemaker that the organizers were using to make coffee for the attendees, or "laser lattes."

As more than one person there had noted, it wasn't exactly an exciting scene. But when you're transmitting hundreds of watts of power with a laser beam "exciting" is not what you're aiming for. You want it quiet, boring and, most importantly, safe. And so it was.

"Power beaming, the concept, has been around for decades and there've been laboratory demonstrations, but this is really a first and a new technology that's getting fielded," explained Tom Nugent, chief technology officer of PowerLight Technologies, the hardware provider for the Power Transmitted Over Laser (PTROL) project.

The culmination of the PTROL project's second phase, the demonstration was two years in the making for PowerLight and Paul Jaffe, an electronics engineer with the U.S. Naval Research Laboratory.

During a briefing that preceded the demo, it was described that day's demonstration as historic.

Early power beaming demonstrations took place in 1975, the first in Waltham, Massachusetts in the laboratories of Raytheon, and the second at the Goldstone Station of the Nasa Deep Space Network in California. Those were the two most important such demonstrations in history, Jaffe told his audience. "The third one you're going to see in a few minutes," he said.

Paul Jaffe, an electronics engineer at the U.S. Naval Research Laboratory, stands beside a monitor displaying a live feed from a highly specialized camera capturing an invisible laser beam as a purple light. (U.S. Navy photo by Leonard Pieton/Released)

At NRL, Jaffe has been conducting space-based solar energy research for more than a decade, focusing in part on transmitting solar energy from space to Earth. One of the biggest challenges he and others working on the problem have faced is the enormous sizes required for the transmitter and the receiver.

The photovoltaics of the receiver are similar to those of a typical solar panel, Jaffe said, though they are designed to be sensitive to the single color of light of the laser, rather than the broad spectrum of sunlight. They convert that particular wavelength with much greater efficiency than would a regular solar photovoltaic.

Standing beside a monitor showing a live feed from an expensive, highly specialized camera that captured the invisible laser beam as a purple light shooting across the dark expanse of the basin, Jaffe called the power beaming system a remarkable new capability. He said it could unlock all kinds of amazing possibilities for the Department of Defense and the private sector.

Imagine using it to send power to locations that are remote, hard to reach or lack infrastructure. Another potential application of the technology would be powering electric unmanned aerial vehicles (UAVs), whose flight time is currently severely limited by their on-board battery life. The third phase of the PTROL project will involve using power beaming to send power to a flying UAV.

Also present for the demonstration was Eric Follstad with Transformation and Concept Development at U.S. Central Command. He compared the proposed UAV power beaming capability to air-to-air refueling for manned aircraft.

According to Jaffe, power beaming could also make possible the transmission of power from solar-energy-collecting satellites in space to the ground, wherever it's needed, whether that's a forward operating base a developing country, or a refugee camp. (The power for the demonstration that day was coming from an electrical outlet in the building.)

"If we could capture the boundless sunlight in space, where it's brighter than anywhere on Earth, we could send it to places that are difficult and expensive to get energy to today," he said. "If we can do that in an effective way and do for energy what GPS has done for navigation, it would truly be revolutionary."

The most notable aspect of the demonstration, however, was the technology's integrated safety systems. No one in the test facility that day was wearing laser safety goggles or any other kind of safety gear, including the personnel operating the system. To put that in perspective, a typical laser of just 1/2 watt requires protective eyewear.

Nearly all power beaming demonstrations in the past have involved at least the risk of exposure to hazardous power densities, whether optical or radio or microwave frequencies. The safety of this new system was validated by the Lead Naval Technical Laboratory for Laser Safety (LNTL-LS).

Among the challenges the designers have had to grapple with is the effects of snow, rain and other weather phenomena interfering with the laser beam. But the designers have also given a lot of thought to the prospect of humans or animals crossing through the beam and inadvertently getting a "face full of laser," as Nugent put it. To prevent such accidents, the safety system is designed to detect objects before they ever reach the laser beam, and turn it off.

Standing by the tall receiver was TJ Sayles, a senior technology developer who leads product development efforts for PowerLight Technologies. He was holding a long rod, on the end of which was affixed a 15-millimeter diameter cardboard disk with one side painted white and the other painted black. Sayles called the disk a "foreign object analogue."

To demonstrate the safety system for the crowd, Sayles would trip it by waving the disk in front of photovoltaics of the receiver. Each time he did so, the laser beam would cut off, a fact attendees could confirm by watching the infrared live feed on the nearby monitor.

"We're detecting foreign objects as they approach the beam, and we're turning off the beam before they can enter it, and we're checking that the beam path is clear before we turn it back on," Sayles explained.

In future, PowerLight intends to increase the wattage the laser beam can transmit, increase the distance the system can send it, and improve the system's overall efficiency. Nugent said he wants the process of operating it to be as simple as flipping a light switch or plugging in an extension cord.

The system has received support and endorsements from the Navy, Marines, Army and Air Force. It's expected to be ready to make the transition to Department of Defense and commercial use in the near future.

By: U.S Navy
www.navy.mil

First UK fighter jets land onboard HMS Queen Elizabeth

Flown by Royal Navy and Royal Air Force pilots, the Lightning jets are embarking in the 65,000 tonne carrier to conduct operational trials off the East Coast of the USA.

This follows successful developmental trials last year with US Lightning jets, where forces conducted 500 take offs and landings over their 11-week period at sea.

These trials are aimed at 'end-to-end' testing of the aircraft and personnel to ensure the aircraft are compatible with the carrier. Tests involve mission planning, arming the aircraft using the ship's Highly Automated Weapon Handling System, flying missions and debriefing on completion.

First F-35 fighter jet lands onboard HMS Queen Elizabeth. Crown copyright.

The landings on HMS Queen Elizabeth are part of the 'WESTLANT 19' Carrier Strike Group deployment. Once fully operational, UK Carrier Strike Group will be a formidable force around the world, using a number of platforms to work alongside our allies.

During this time, the aircraft carrier will be escorted by Type 45 destroyer HMS Dragon, submarine hunter HMS Northumberland, tanker RFA Tideforce and Merlins from 814, 820 and 845 Naval Air Squadrons, Wildcats from 815 squadron and Royal Marines from Lima Company, 42 Commando.

Defence Secretary Ben Wallace said:

"*This is another step towards the UK's carrier strike capability becoming fully operational. The bringing together of the UK Lightnings on the first in class HMS Queen Elizabeth paves the way for the world's most up to date, fully integrated carrier force*."

The Lightning aircraft operates with a cutting-edge design. It is the first jet to combine radar evading stealth technology with supersonic speed, as well as the ability to land vertically. Given its ability to conduct missions both from land and sea, the jets act as a formidable spine to the 'carrier strike' capability. The UK currently owns 18 aircraft, with an additional order placed for 30 jets.

The trials will be led by the joint Royal Navy - Royal Air Force 17 Test and Evaluation Squadron from the Air Warfare Centre. The Squadron will be operating alongside personnel and aircraft from the UK Lightning Force, based out of RAF Marham.

The UK will declare Initial Operating Capability for Carrier Strike by the end of 2020. The first operational deployment for HMS Queen Elizabeth 617 Squadron and a squadron of US Marine Corps Lightning jets is due to take place in 2021.

By: Ministry of Defence
www.gov.uk

Development of Multinational Helicopter Training Centre moves ahead

The EDA Steering Board has approved the way ahead for the new Multinational Helicopter Training Centre (MHTC) to be established in Sintra, Portugal. The European Defence (EDA) together with 18 of its Member States will now develop the technical arrangement (TA) for the opening of this new advanced tactical helicopter training facility by the end of 2022.

Approval for the centre marks the latest milestone in a long line of important helicopter projects managed by the Agency since 2009. EDA currently hosts three collaborative helicopter programmes, which fill a helicopter training capability gap in Europe and are a key component of operational capacity building. The three programmes are aimed at improving European interoperability and increasing standardisation of helicopter aircrews through the adoption of common training activities and the use of common Tactics, Techniques and Procedures (TTPs). All tactics are developed refined and tested before being included in the Helicopter Exercise Programme Standard Operating Procedures (HEP SOP).

Tactics Courses

The Agency's helicopter work includes a Helicopter Tactics Course (HTC) and a Helicopter Tactics Instructors Course (HTIC). The first project focusses on improving the tactical ability of crews through an integrated training course of classroom and simulator instruction that is currently conducted at RAF Linton-on-Ouse in the United Kingdom. The HTC provides a solid foundation for whole crew training and was later developed into the Helicopter Tactics Instructors Course, which takes experienced aircrew and further develops their skills in a "Train the Trainer" course, delivering advanced helicopter tactics and the Helicopter Tactics Instructor (HTI) qualification. The HTIC includes a ground phase delivered in the UK, and a live flying element conducted in Sweden.

Helicopter Exercise Programme

The third element of EDA's helicopter activities is the Helicopter Exercise Programme (HEP) which brings together multinational helicopter crews and an array of assets (fixed wing, Electronic Warfare, ground troops, Special Forces, etc) in an annual multinational training exercise covering the performance of complex missions in demanding environmental areas. The exercises are conducted under the BLADE banner. The next exercise will be SWIFT BLADE, to be delivered in Belgium and the Netherlands in April 2020. The EDA does not have the vocation to be a long-term training provider, but rather a catalyst for cooperative training.

Multinational Helicopter Training Centre

EDA has been successfully managing the three helicopter programmes for over a decade, and during the next five year period, they will progressively be transferred outside EDA to the future Multinational Helicopter Training Centre (MHTC). The MHTC will consist of office space for the technical, administrative and training delivery staff, simulator facilities and a dedicated accommodation block. In addition, it will also develop a more coordinated approach to European helicopter training and will try to harmonise national approaches and drive synergies with NATO doctrine.

EUROPEAN DEFENCE AGENCY

By: European Defence Agency
www.eda.europa.eu

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The Czech Republic joins multinational fleet of tanker-transport aircraft

On 24 October 2019, the Czech Republic joined a multinational effort to acquire and operate new tanker transport aircraft – the Multi Role Tanker Transport Capability. This initiative was launched by the Netherlands and Luxembourg in 2016 and aims to boost the ability of European Allies to refuel aircraft in mid-air.

The multinational fleet arrangement is a concrete step towards reducing the overall European shortage in air-to-air refuelling and the over-reliance on U.S. capabilities. The participants – Belgium, the Czech Republic, Germany, Luxembourg, the Netherlands, and Norway - are now awaiting the delivery of eight Airbus A330 Multi Role Tanker Transport aircraft.

The first two aircraft are expected to be delivered in May and June 2020, respectively. While the aircraft will be predominantly used for air-to-air refuelling, they can also be used for the transport of people, cargo and for medical evacuation.

The initiative has been supported by NATO and the European Union. It is an example of effective cooperation between the two organizations when delivering critical capabilities for its members.

The aircraft are owned by NATO and procured by the NATO Support and Procurement Agency through the Organization for Joint Armament Cooperation. "*I am pleased to see our two organizations come together in this way and hope to see more initiatives like this one in the future*," said NATO Deputy Secretary General Mircea Geoana.

By: NATO
www.nato.int

Small bombs deliver big capability

By Sergeant Max Bree and Corporal Mark Carter

Bombing capacity of F-35As has quadrupled with the arrival of small diameter bombs introduced to No. 3 Squadron in June.

The GBU-39/B Small Diameter Bomb, Increment 1 (SDB1), packs about 16kg of modern high explosive, guided by GPS-aided inertial navigation.

Wing Commander Simon Bird, Chief Engineer at Aerospace Explosive Ordnance Systems Program Office (AEOSPO) – Explosive Materiel Branch, said it was Air Force's most advanced bomb and made best use of the F-35A's internal weapon bay.

"We've got a next-generation bomb to go with our fifth-generation fighter," Wing Commander Bird said.

"Where you used to carry one JDAM (joint direct attack munition) in a position on the aircraft, SDB1 allows you to carry four bombs that each achieve very similar effects.

Although at 285lbs the SDB1 is lighter than a 500lb JDAM, it's highly accurate and packs a more powerful, modern explosive.

"SDB1 is also designed to penetrate harder targets, or can fuse above ground to create area effects."

> "We've got a next-generation bomb to go with our fifth-generation fighter."

The bombs make use of 'Diamondback' wings, which deploy after release to provide greater stand-off range.

"With JDAMs you've got to be very close to the target to engage it, but because of the wings on SDB1, a single F-35A can engage up to eight separate targets from outside the range they can defend against," Wing Commander Bird said.

Flying Officer Matthew Walker, left, delivers bomb familiarisation training to armament technicians from No. 3 Squadron, from left, Corporal Christopher Sorrensen, Leading Aircraftman Adam Fulmizi and Corporal Simon McMillan. Photo: Sergeant Guy Young.

"What's more, because an SDB1 is carried internally, the F-35A can remain low observable and will not be affected by any extra drag from carrying eight bombs."

Four bombs are fitted to new bomb release unit racks before loading on the aircraft.

"With an old JDAM, you had to take all the components and build it up, but that takes time, equipment and people," Wing Commander Bird said.

"You can test the SDB1 without opening the box; you can test them before they're even shipped to the base "This weapon comes fully assembled; you basically take it out of the box and load it."

About 15 armament technicians from No. 3 Squadron received familiarisation training on the bombs before planned test firings in coming months.

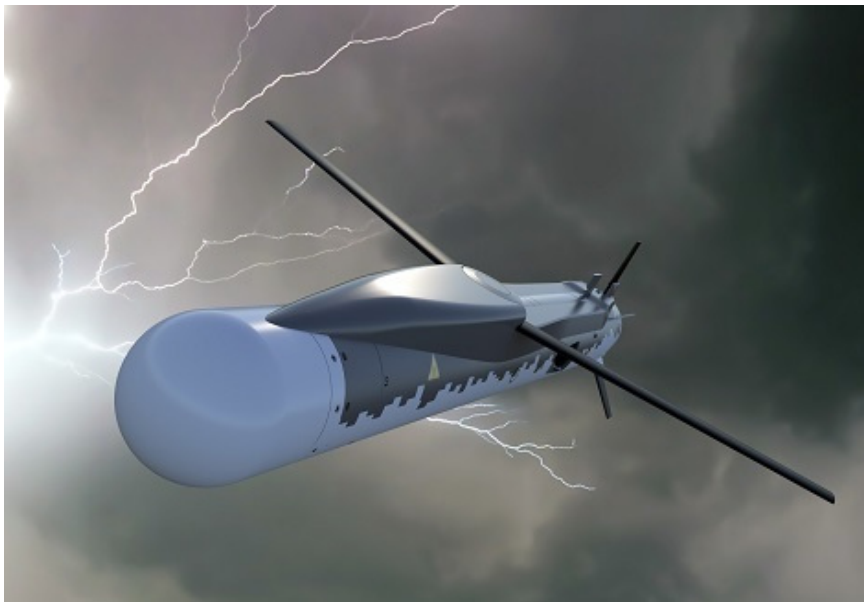
AEOSPO's engineering, logistic and technical staff ensured introduction of the weapons and their delivery was a milestone towards the F-35A's initial operational capability in 2020.

By: Australian Government Department of Defence www.defence.gov.au

MBDA

Working on new SPEAR-EW electronic warfare weapon

MBDA has been awarded a contract to demonstrate SPEAR-EW, a new electronic warfare version of the SPEAR weapon system family on order for the Royal Air Force (RAF).



SPEAR-EW is being developed by MBDA in partnership with Leonardo to complete a wide range of Suppression of Enemy Air Defence (SEAD) missions, under a Technical Demonstration Programme (TDP) contract awarded by Defence Equipment & Support (DE&S). SPEAR-EW will integrate a cutting-edge miniaturised EW payload from Leonardo, which will act as a stand-in jammer to greatly increase the survivability of RAF aircraft and suppress enemy air defences, acting as a significant force multiplier.

Defence Minister Anne-Marie Trevelyan said: “These state-of-the-art electronic jammers will confuse our adversaries and keep our pilots safer than ever in the air. Paired with the devastating power of precision Brimstone and Meteor missiles, our world-class F-35 and Typhoon jets will continue to rule the skies in the years to come.”

Mike Mew, MBDA UK Director of Sales and Business Development, said: “*SPEAR-EW is a revolutionary new capability that, alongside the existing SPEAR3 weapon, marks a fundamental change in the ability of friendly air forces to conduct their missions despite the presence of enemy air defences. Our vision for SPEAR is to create a swarm of networked weapons able to saturate and neutralise the most sophisticated air defences. Adding SPEAR-EW to the family alongside our existing SPEAR strike missile demonstrates the principle of introducing complementary variants to the SPEAR family that will add significant capability and force multiplication without the need to repeat the platform integration. We have an exciting roadmap of variants, spirals and technology insertions in the pipeline to further enhance the family as we move forward*.”

The core of SPEAR-EW’s payload is Leonardo’s advanced, miniaturised Digital Radio Frequency Memory (DRFM) technology, which offers the most advanced and future-proof electronic jamming and deception available on the market today.

The new SPEAR-EW will complement the SPEAR network enabled miniature cruise missile, which is designed to precisely engage long range, mobile, fleeting and re-locatable targets in all weathers, day or night, in the presence of countermeasures, obscurants and camouflage, while ensuring a safe stand-off range between the aircraft and enemy air defences. Powered by a turbojet engine the SPEAR missile offers over double the range, and a far more flexible operating envelope, when compared to a conventional glide weapon. SPEAR-EW utilises this long endurance through its capacity to be launched at enhanced stand-off ranges and loiter while carrying out its jamming mission. The compact size of the SPEAR family allows four weapons to be carried internally in each of the two internal weapons bay of the F-35, or three per station on the Eurofighter Typhoon. SPEAR-EW will keep the same form and fit as the baseline SPEAR to enable a single integration pathway and launcher solution.

SPEAR family complements MBDA’s wider portfolio of strike weapons, filling the gap between the large and very-long range Storm Shadow deep strike missile and the highly accurate Brimstone close-air-support missile.

The SPEAR weapons system also recently completed a set of ground trials and fit-checks of a loaded three-pack SPEAR launcher onto a Eurofighter Typhoon fighter aircraft. The work was undertaken by a joint engineering team from MBDA, BAE Systems, and the Ministry of Defence’s Defence Equipment and Support (DE&S), and took place at BAE Systems’ flight test site in Warton, Lancashire.

For further information visit:
MBDA: www.mbda-systems.com

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Allied training in the high North

Photo: The Norwegian Armed Forces

On the 6th of November three American B-52 Stratofortress from the US Air Force flew together with the Royal Norwegian Air Force in the high north.

The American bombers flew together with Norwegian F-16s in the air space over northern Norway, and over the Barents Sea north of Norway.

The American aircraft from Barksdale Air Force Base in Louisiana are temporarily stationed in Fairford in the UK to conduct flights in the European air space.

As a part of their program, the US Air Force has expressed a wish to train together with Norwegian forces.

Being able to train with our most important ally in the most demanding operational environment that we have in our country, and maybe even in NATO, is very important to us.

Both weather and communications can be very challenging in the high north, and seeing that we are able to handle both together with our allies is reassuring

says Major General Lars Christian Aamodt, Deputy Commander of the Norwegian Joint Headquarter (NJHQ)

The Norwegian Armed Forces has trained together with B-52 bombers on multiple occasions.

The United States is Norway's most important ally. In order for the United States to contribute to the defence of Norway, it is vital that American forces exercise in Norway.

Our ability to operate together is important for effectively defending Norway and the NATO alliance's territory. Through military presence and joint training in Europe, the United States shows that it contributes to NATOs collective defense.

*With new fighter jets and new helicopters in the coming years, the Norwegian Air Force faces major changes in its organisation and structure.

*The Royal Norwegian Air Force provides units and personnel for operations both in peacetime, crisis and war – in Norway and abroad.

By: Norwegian Armed Forces
www.forsvaret.no

Battlefield 2030:
How the U.S. Military Will Bring a Networked Fight to the Enemy

You're a commander preparing for complex battle, focusing on accomplishing your mission. To start, you approach a digital menu of military capability. This is not a mission limited to fighter jets, land-based missile defense systems or ships at sea. You're going to put all of these assets to use, plus many more, including communications satellites, cyber defenses and electronic warfare. To succeed, you'll need to weave all of them together into one plan that ensures you are always steps ahead of the enemy. You'll need some help so you review a virtual play-by-play leveraging artificial intelligence to analyze mission impact, safety and speed. Now trusting these decisions and the technology executing them, you give the order for the mission to begin.

Success in this future battlespace scenario will require what the U.S. military calls Multi-Domain Operations (or MDO). MDO won't just display military technology available for a mission, but will help mission planners weave these elements together, contemplate countless scenarios and make rapid decisions that allow for seamless operations between military assets.

MDO isn't a new concept. Since the advent of war, troops have communicated across domains from the sea, air, space, land and cyber. What is new – and progressing rapidly – are advancements in technologies such as hypersonics, directed energy and the avalanche of data from powerful sensors.

New tech means new data, new data means more noise, and more noise makes communicating under any circumstance more difficult. Mike Smith, a former Navy Officer and current executive at Lockheed Martin, says this is one of the key challenges his company is working on with the Department of Defense.

"We're adding sensors which provide more and more data. And so the challenge is how do we fuse that data in ways that assist the warfighter in decision making," Smith said. "Synthesizing this ever-expanding set of data streams is where the challenge is, because this data needs to give the warfighter the opportunity to take prompt and decisive action before the adversary is aware of what's happening."

This challenge heightens the importance of MDO coming together as one reliable network – linking military assets and communicating life-saving insights, essentially connecting many nodes.

Lockheed Martin demonstrated a new way to connect those nodes in June during an Orange Flag military exercise. Smith say it's intended to evaluate teamwork and integration across the services.

"Working with the Army and the Air Force, we demonstrated for the first time the ability to track live data with an F-35 and send that data to an integrated air and missile defense platform, which was based in Texas, while the F-35 was conducting operations in California.

"This showed that you could have an elevated sensor providing live fire control, quality data to an asset hundreds of miles away on the ground."

In battle, this approach could detect threats across very different platforms that could put military assets or civilians at risk – giving troops the ability to track targets and act as necessary.

To help the military jointly advance the MDO concept, Smith says Lockheed Martin is making significant investments in machine-to-machine learning, open-system architecture, and artificial intelligence, and we're evolving technologies that connect, share, and learn.

At the company's Lighthouse facility in Suffolk, Virginia, customers take advantage of a 50,000-square-foot, high-end laboratory that provides virtual and physical portals that allow them to connect into Lockheed Martin's vast network of laboratories, research centers and engineering facilities.

They can conduct multi-domain integration and experimentation alongside company engineers, to innovate and determine how they can take and combine technologies and platforms and ways never previously imagined.

Based on decades of mission understanding, the engineers at Lockheed Martin are already integrating MDO on military platforms across multiple programs.

By: Lockheed Martin
To learn more visit LockheedMartin.com/MDO

Coalition Autonomous Systems – the future of military logistics

The UK's Defence Science and Technology Laboratory (Dstl), and the US Army Combat Capabilities Development Command's Ground Vehicle Systems Centre (formerly known as TARDEC), have hosted an experiment of prototype semi-autonomous logistic convoys, along with ground and aerial autonomous resupply systems at Camp Grayling Joint Manoeuvre Training Centre, Grayling, Michigan.

It's the first time these British-designed autonomous systems have been operated and demonstrated in the US and is the culmination of a three year collaboration between coalition forces and technologists which has seen the testing of a range of driverless vehicles and novel unmanned aerial systems.

Peter Stockel, Dstl's Autonomy Innovation Lead, said:

"This has been a journey in understanding, not only how to integrate technically the different capabilities, but importantly to help the British and US Armies understand and develop the potential concepts of use, tactics and procedures together in the representative battlefield environments.

"We have gained hugely valuable insights into the reliability and maturity of 'state of the art' technology and how to operate these systems as a UK/US coalition. This is about two major Western partners working together to make future battlefield operations less risky, more effective and efficient."

Delivering supplies to the front line is dangerous and often relies on manual delivery through troops moving backwards and forwards under fire. This experiment shows how unmanned systems will potentially allow the distribution of supplies directly to forward combat areas with fewer personnel at risk and to allow them to concentrate on winning the battle. During the Afghanistan conflict, UK and US troops were injured or killed while trying to deliver convoy logistic patrols. Innovative autonomous systems technologies could allow these missions to take place with fewer soldiers exposed, resulting in fewer casualties and freeing up troops to join the fight and increase the firepower.

Brigadier Darrell Amison, the British Army's Head of Capability Combat Service Support, said:

"CAAR is a great example of successful US/UK Science and Technology and warfighter collaboration. Over three years of trials and experimentation CAAR has rapidly developed the Army's thinking around the use of autonomous capability within an information-led, integrated and technology-enabled supply chain. Exploitation into the Army's core Combat Service Support modernisation and transformation programmes is now a priority and we'll seek opportunities for collaborative capability development where it makes sense to do so."

The latest MIRA VIKING 6x6 Unmanned Ground Vehicle (UGV)

During the Michigan experiment, a multi-vehicle fully integrated UK/US convoy was operated, with the lead vehicle in various modes, including controlled semi-autonomously through the use of designated waypoints, with the following vehicles operating only from data sent by the lead vehicles and their own sensors. Researchers used UK and US tactical resupply vehicles together in the convoy, with both sets of vehicles being equipped with the US research centre's autonomous technology. During the final end-to-end demonstration event, robotic and autonomous systems for many parts of the deployment supply chain were showcased; including operation and mission logistic planning tools, robotic and semi-autonomous load handling vehicles, semi-autonomous leader-follow logistic convoy and autonomous 'last mile' resupply capabilities.

In three weeks of experimentation prior to the demonstration event, smaller unmanned ground vehicles and unmanned aerial vehicles developed under the UK's 'Last Mile Challenge' were tested, undertaking autonomous delivery missions to remotely deliver a variety of representative payloads including ammunition, food and medical supplies.

Major Andrew Scruggs from the US Army said:

"The collaboration is vital and has been one of truly mutual support and burden-sharing. Both nations have put their expertise and resources together to learn and create new ideas and approaches for Army logistic operations of the future. We have been able to look at the challenges of working with how you take different systems from different nations and different companies and get them all to talk together."

For further information visit:
Defence Science and Technology Laboratory
Ministry of Defence
www.gov.uk

NATO co-funded demilitarization facility re-opens in Serbia

On 25 September 2019, dozens of officials from Serbia, donor countries and NATO gathered in the Serbian town of Kragujevac to mark the reopening and expansion of the country's main demilitarization facility.

Newly opened installations in Kragujevac; Photo: Ministry of Defence of Serbia

The refurbished facility will help speed up the destruction of around 1,300 tons of old bullets, mortars, rockets and missiles from Serbian stockpiles, making Serbia and the region safer.

"Serbia is our neighbour and a valued partner", said NATO Spokesperson Oana Lungescu. "NATO is committed to helping the countries of the Western Balkans, including Serbia, to safely store their weapon stockpiles and to destroy old and dangerous surplus ammunition. This is good for Serbia and good for the region."

Serbia holds significant stocks of old and unstable munition that can pose risks for the population and the environment. For years, NATO has been helping the Serbian authorities to destroy old ammunition left over from the wars of the 1990s. To date, around 255 tons of hazardous material and obsolete ammunition have been destroyed with NATO's help. Overall, the project aims for the safe disposal of some 1,300 tons of ammunition at a total cost of 4,150,000 EUR, paid for by NATO Allies. NATO's Support and Procurement Agency is responsible for the project which started in 2016.

By: NATO
www.nato.int

Army Medical Logistics Command receives distinctive unit insignia

The U.S. Army Institute of Heraldry in October 2019 approved the new Army Medical Logistics Command's distinctive unit insignia. (Photo Credit: Army Institute of Heraldry)

"Prepare, Deploy, Sustain."

Those words are proudly displayed on the Army Medical Logistics Command's new distinctive unit insignia, approved by the Army Institute of Heraldry in October 2019.

The AMLC, headquartered at Fort Detrick in Frederick, Md., was created through an Army restructuring last year and was ceremoniously activated Sept. 17 to serve as the Army's primary medical logistics and sustainment command.

The new insignia serves a symbolic representation of the AMLC and its responsibilities worldwide - to project and sustain medical materiel capabilities and data for the Army and Joint Forces. As a new major subordinate command of the Army Materiel Command, the AMLC is responsible for managing the global supply chain and medical materiel readiness across the total force.

The AMLC is led by Col. Michael B. Lalor and has three direct reporting units, including the U.S. Army Medical Materiel Agency, the U.S. Army Medical Materiel Center-Europe and the U.S. Army Medical Materiel Center-Korea.

According to the artists at the Institute of Heraldry, the maroon-and-silver color scheme coincides with the traditional colors of the Army Medical Department. A blue disc inside the maroon band is a reference to the earth, signifying the AMLC's global posture.

The two serpents, facing one another, were adapted from the Army Medical Corps branch insignia that denotes the concept of medical hearing. Their tails wrap around the band bearing the AMLC motto, further suggesting the close connection between the command's duties and the Army's ability to provide medical care to those in need.

Expressive of a guiding light, the torch in the center characterizes the AMLC's mission of enabling readiness through the planning, preparing and executing of medical logistics support. A single white star, conveying the organization's status as a 1-star command, is centered in the design.

For further information visit:
Army Medical Logistics Command
www.amlc.army.mil

ARMY EMPHASIZES SPEED AND RELIABILITY OF MEDICAL LOGISTICS

The need for planning and procedures that improve readiness and survivability of Soldiers cannot be overstated in the U.S. Army's larger mission of fighting and winning wars in any setting.

That fact is not lost on Gen. Gus Perna, commanding general of the Army Materiel Command and the Army's senior logistician, whose vision aims to ensure essential Class VIII medical supplies and equipment are always in, "the right place at the right time" to support Army and Joint Forces operations.

"This is like bullets … when you do not have bullets, you are not fighting a war," Perna said. "If you do not have medical supplies, you have people dying."

Perna provided guidance to Army Medical Logistics Command leaders during a quarterly update briefing held at Army Communications-Electronics Command (CECOM) at Aberdeen Proving Ground in northeast Maryland.

Putting readiness to the test, members of the U.S. Army Medical Materiel Agency exercise their ability to rapidly issue Army Prepositioned Stock (APS) medical materiel in South West Asia, July 2018, handing off more than $6.3 million in medical equipment and assemblages to the 155th Armored Brigade Combat Team (ABCT). (Photo by Ellen Crown)

The update was the command's second quarterly report to Perna – and first for Col. Michael B. Lalor, the AMLC's first commander – as a newly formed major subordinate command under the AMC.

The AMLC, borne out of an Army restructuring last year, was created to be the Army's primary medical logistics and sustainment command, responsible for managing the global supply chain and medical materiel readiness across the total force.

"We're starting to see ourselves better," Lalor said, pointing to efforts to address gaps and recommendations that resulted from recent exercises.

Lalor outlined his priorities for the AMLC, including Class VIII distribution integration and centralization of medical materiel, as well as optimization of medical maintenance.

Lalor talked about a recent training drill at Sierra Army Depot in which the U.S. Army Medical Materiel Agency, a direct reporting unit of the AMLC, took part to assist in deploying a hospital center.

"The draw has gone well," Lalor reported and agreed with Perna that it's important to look for ways to make the process smoother and, ultimately, faster.

The general also emphasized a need for predictability and confidence that medical supplies will be readily available and mobile on demand. He said he wants depots and pre-positioned stocks nationwide "racked and stacked," so deploying units can get in and get out.

Transportation, logistics and sustainment operations all present valuable resources for the AMLC's developing mission and purpose, said Perna, who urged Lalor to work collaboratively with end-goals centered on improving overall force readiness.

For further information visit:
Army Medical Logistics Command
www.amlc.army.mil

Structure-Guided Drug Design Could Yield Fast-Acting Remedies for Complex Neuropsychiatric Conditions

Focused Pharma program will pursue new drugs that work quickly and deliver lasting remedies for conditions such as chronic depression and post-traumatic stress

In the wake of the Iraq and Afghanistan wars, the mental health crisis among U.S. military veterans remains unrelenting, despite the best efforts of healthcare researchers and providers to confront the scale and scope of the problem. According to a 2018 report from the Department of Veterans Affairs, an average of twenty U.S. veterans commit suicide each day.

To address the acute need for improved treatment options, DARPA announced Focused Pharma, a program that seeks to revolutionize mental healthcare by developing completely new psychotherapeutic drugs to quickly remedy prevalent neuropsychiatric conditions such as post-traumatic stress, depression, anxiety, and substance abuse. While the neurophysiology underlying these conditions may be distinct, an aspect in common is the presence of a deleterious, repetitive thought process that negatively impacts an individual's ability to function. For someone with post-traumatic stress, it involves re-experiencing trauma and the feelings associated with it; for depression it can take the form of a recurrent internal editor that attaches negative connotations to normal life events; for addiction it is the preoccupation with acquiring and using the substance of choice.

The goal of the Focused Pharma program is to develop novel compounds that directly affect specific neurotransmitter signaling processes that are often implicated in neurophysiological dysfunction, while overcoming limitations of current approaches. The envisioned drugs would selectively target and bind to specific neurotransmitter receptors, and activate only specific neural signaling pathways that may impact the conditions of interest. At present, psychotherapy, psychopharmacology, and direct brain stimulation are the most effective means of treating the symptoms of neuropsychiatric conditions. While valuable, these approaches also have substantial drawbacks that make them less than ideal for treating a challenge on the scale of mental healthcare for the military community. Existing medications exhibit variable effectiveness from one individual to another, can lead to undesirable side effects, can take weeks to months to observe therapeutic benefits even when paired with counseling, and do nothing to prevent relapse once a patient stops taking them. In the case of psychotherapy and direct brain stimulation, finite availability of treatment makes it difficult to meet high demand over wide areas, and direct brain stimulation requires surgery.

DARPA examined evidence from privately funded human clinical studies demonstrating that certain Schedule 1 controlled drugs that engage serotonin receptors show promise of rapid and long-lasting therapeutic effect in treating neuropsychiatric conditions such as chronic alcohol dependence, post-traumatic stress, and treatment-resistant depression following only limited doses. However, because such drugs act on many neurotransmitter receptors and receptor subtypes in the brain without specificity and indiscriminately activate numerous signaling pathways, they produce significant side effects, including hallucination. These effects, coupled with their unpredictable consequences, render the drugs unusable in a military healthcare setting.

Researchers supporting the program will have to address a series of challenges, innovating beyond the state of the art in molecular pharmacology and functional chemical neurophysiology. Additionally, they will be responsible for validating the effectiveness of their compounds in animal models that are robust and accepted as preclinical models. DARPA has scheduled a review at the mid-point of the program to validate the hypothesis that the efficacy of these drugs can be de-coupled from side effects, and will terminate the effort if research does not support that hypothesis. Focused Pharma will not include human clinical trials, but at the end of the scheduled four-year program researchers must have an Investigational New Drug application ready for submission to the U.S. Food and Drug Administration.

By: DARPA Public Affairs: www.darpa.mil

Healthy exchange between US and Australia

On call for three weeks and without knowing details until the morning of a flight, RAAF and United States Air Force (USAF) personnel were put to the test during Exercise Mobility Guardian (MG19).

It included simulated scenarios and patient emergencies for aeromedical evacuation (AME) teams, made up of doctors, medics, specialists and nurses, who shared roles and responsibilities across different aircraft.

Lieutenant Colonel Adam Newell, the USAF Air Force Interoperability Council Lead for Aerospace Medicine, said the exercise focused on the Five Eyes nations running patient operations, including medical facilities and AME handovers, as a joint mission.

"We are trying to identify gaps in data gathering and transfer systems, especially with respect to medication and dosage, and patient tracking and transport."

Flight Lieutenant Kimberley MacDonald, the Office in Command-Medical for MG19, said seamless integration was the goal.

"We have had the opportunity to fly on a number of different aircraft – both US and RAAF – over the course of the exercise simulating mass casualty events," Flight Lieutenant MacDonald said.

"This has allowed us to test our equipment on a number of platforms and will better our practices when we go home."

Royal Australian Air Force and United States Air Force personnel carry out a mid-air simulated aeromedical evacuation scenario on board a USAF C-17 Globemaster III aircraft during Exercise Mobility Guardian 2019. Photo: Corporal Nicci Freeman

"This includes the authorisation to update the crew manifest, conduct pre-flight reporting and adhere to crew rest requirements.

"Essentially at MG19, we are training to be able to place AME equipment and crews from country X on country Y's aircraft in order to operate effectively with minimal administrative or technical difficulty," Lieutenant Colonel Newell said.

Mobility Guardian 19 was a scenario-based exercise with operations conducted in Washington State in the United States. It included airlift, airdrop, aerial refuelling, aeromedical evacuation, humanitarian assistance, and disaster relief and contingency response training for several international air forces.

By: Australian Government
Department of Defense
www.defence.gov.au

The art of moulage

METC combat medic manikins simulate realistic wounds

Combat Medic Training program students at the Medical Education and Training Campus at Joint Base San Antonio-Fort Sam Houston conduct an emergency cricothyrotomy on a "casualty" during simulation training. The "wounded" manikin also presents with facial burns that were created with moulage techniques. (DoD photo by Lisa Braun)

The saying "train like we fight" is a common idiom in the military training spectrum. As combatants, service members must train for a variety of scenarios that will prepare them to succeed when engaged in real-life conflicts.

Simulation plays an important role in preparing enlisted medical trainees at the Medical Education and Training Campus, or METC, at Joint Base San Antonio-Fort Sam Houston to respond appropriately when faced with an actual life-or-death situation.

For the combat medic trainees in the Department of Combat Medic Training, or DCMT, program who, due to the sheer size and number of classes, will not have an opportunity to see real patients until after they graduate from the program, the realism goes a step further. The use of high-fidelity human patient simulators that mimic actual patient encounters will prepare Soldier medics with the basic skills that will save lives on and off the battlefield.

When the training scenario calls for treating casualties with combat wounds or injuries, however, less expensive generic manikins are incorporated and given a makeover to look the part because not many manikins have wounds already on them.

"To better simulate battlefield wounds or injuries our simulation instructors have become moulage artists to make realistic wounds and injuries that give these manikins more realism," said Donald Parsons, DCMT program director. "This allows the students to actually see and treat wounds they will see on the battlefield, but they can also make their mistakes on the manikin without risking someone's life."

These realistic injuries may include an amputation, head and chest gunshot wounds and other traumas associated with combat injuries. As the combat medic trainees, or Soldier medics as they are called in the training environment, respond to the simulated casualty they are simultaneously reinforcing the skills they learned in the classroom – from a basic injury assessment to more complex wound care.

Camille Espinoza, a civilian DCMT training instructor and simulations technician, heads the process of transforming a generic, low-fidelity manikin into a combat casualty. As an art, moulage is a process of trial and error so she is always learning new techniques. Her team offers ideas and assists with some of the moulage application. She has had to create a way for students to apply needle chest decompressions, or NCD, on the manikins, for example. An NCD is a medical procedure that is most commonly used to treat patients suffering from a punctured or collapsed lung by inserting a needle with a catheter on the end through the chest cavity. In the past, students would utilize a task trainer for working on specific procedures, such as a NCD, tourniquet, or wound packing among others. The students would assess the manikin then turn to a task trainer to treat the wounds.

Espinoza modified the chests on the low-fidelity manikins which are made out of PVC, so that the NCD insertion spots are soft enough to allow students to puncture through the manikin without causing the catheter to bend. She also gave them trachea inserts that she carved into the manikins and added injuries that look more realistic.

Now, students can examine and assess the "casualty," inspect the location of the wounds and perform all of their interventions directly on the manikin itself. A set of manikins was created to use just for testing as well. One of the biggest challenges with creating the wounds is that the manikins take a lot of abuse when students practice with them because they get moved around a lot to different outdoor locations where dirt and other elements wear down the moulage effect.

Many of the materials would break down or wear off too quickly, so experimenting with different moulage techniques and materials that make the wounds last longer is part of the process. Feedback from instructors was also an important factor in determining what works and what doesn't.

"A lot of the stuff that special effects people do is usually a one or two time use, so it doesn't need to last a long time," Espinoza explained. "Unfortunately, I have students from three Whiskey teams that come down to the simulation lab so we're running around 1,000 Soldiers through there. I had to figure out what the best materials were, the least expensive, the most effective; there was a whole lot of stuff that was going on trying to come up with the best way to apply the moulage and then hope it doesn't break up too quickly. It's all trial and error."

Through the process of trial and error, Espinoza discovered that silicone-based material helps the moulage stay on longer. If it gets worn out it can easily be cleaned up and redone. The manikins can potentially be used hundreds of times before the moulage wears down, depending on the type of injury.

Some wounds, like amputations, don't last as long because the manikins are being dragged continuously through the dirt during training. Facial wounds, though, tend to last longer because the face does not make contact with hard surfaces. Modifying a manikin may take two or three days, depending on the wound being depicted. Some injuries needs to be created in steps and can be time consuming, so an assembly line process is ideal. Espinoza and her team can line up three to five manikins, start working on one then move on to the next one while the previous one is drying, solidifying or cooling from having to heat the plastic to soften it for an effect.

The most important factor is making sure that the manikin is dry before moving on to the next step. Rushing through a modification may result in the moulage not staying on.

Depicting a shrapnel wound, for example, means that Espinoza will need to cut into the manikin. In order to do this, the area on the manikin where the wound will be created is heated in order to soften it so it can be cut and manipulated to form a wound. Then it will be painted to look realistic and set to dry. If it's possible to make use of materials already on hand, Espinoza will find a way to incorporate them into her design as well.

Ground charcoal is added to the red paint on the face of the manikin to create a realistic facial wound. Moulage transforms low-fidelity manikins into combat casualties to simulate battlefield wounds or injuries to train combat medics. (Photo by Lisa Braun)

Espinoza has used the popcorn material used for packing boxes to stuff the lower portion of manikin legs where a wound is depicted before adding foam to the area so students could learn how to pack the wound and practice applying tourniquets. Prior to that, the foam would crack and fall apart. She takes great pains to ensure she creates as realistic a product as possible.

"I want the students to get that shock and awe when they see the injuries without having that reaction the first time seeing it on a person, on a Soldier, on their battle buddy," she added. "I would rather they have something as realistic as possible in these manikins without having somebody actually injured.'

A fellow instructor of Espinoza's, who is now retired, once told her that what they're doing now is saving lives through other people's hands. Those words have always stuck with her.

Making mistakes on the manikins is the point of the training.

"You have to make mistakes to learn. If the students do it wrong here they can learn from it. I want them to do it wrong, because if they always do it right then what are they going to learn?

"That's exactly what I've done with these manikins," she added. "I've had to make mistakes to learn how to make them better for the students to make their mistakes so they can get better. I'd much rather they do that here then on the battlefield."

By: Medical Education and Training Campus at Joint Base San Antonio-Fort Sam Houston
www.jbsa.mil

New solar panels generate savings at Worthy Down

Solar panels are helping the environment and saving money at the Defence College of Logistics, Policing and Administration (DCLPA) at Worthy Down.

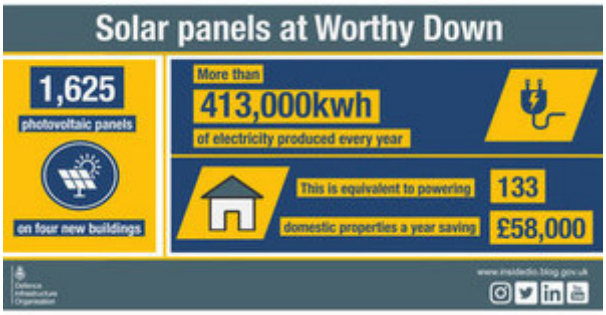
The panels have been installed as part of work being delivered by the Defence Infrastructure Organisation (DIO) in partnership with Skanska and AECOM. A total of 1,625 photovoltaic roof panels have been erected on four new buildings on the site of the new £300-million tri-service facility. The panels, which will produce 413,307kWh/year of electricity annually, will save the base almost £58,000 per year. This saving is equivalent to powering 133 domestic properties for a year.

Matthew Richardson, DIO's Principal Project Manager, said:

"Prior to the installation of the panels, the base did not have the capability for on-site electricity generation, so this is an exciting new addition."

"The photovoltaic panels will not only deliver considerable savings to the Ministry of Defence (MOD), but also help preserve the planet's resources, so it's a win-win situation."

Image that shows the solar panels installed on the roof of the new buildings. DIO Crown Copyright 2019.



Infographic that outlines the impact of the installation of the new panels. DIO Crown Copyright 2019.

The completion of the new facilities will see personnel from the Royal Navy, Army and Royal Air Force all training at the site. Having all 3 services training at 1 site allows for the sharing of resources, technology and learning.

The work at Worthy Down is one part of a two-part scheme which forms Project Wellesley. The second part of the project is the development of a new community called Mindenhurst at the former Princess Royal Barracks in Deepcut, Surrey. The project supports the MOD's continuing rationalisation of its estate.

By: Defence Infrastructure Organisation
Ministry of Defence
www.gov.uk

Demolition will lead to construction in Baumholder housing

Demolition crews tear down a housing building in Baumholder's Wetzel Housing recently. The demolition make way for the new construction of 72 new units will are scheduled for construction in FY2021. (Photo by Jim Gillis) (Photo Credit: U.S. Army)

BAUMHOLDER, Germany: Crews are demolishing several legacy apartment buildings in Baumholder's Wetzel Housing Area signaling the start of an almost decade-long project that should see new housing construction in Fiscal Year 2021.

“The first 72 units in Wetzel are already being designed,” said Jim Gillis, senior housing management specialist at Baumholder.

Those 72 units will be townhomes located in the lower Wetzel area. The Army previously had housing on that parcel. Much of the infrastructure was in place and ready for upgrading and improvements.

The housing project’s first changes will be on Baumholder’s Smith Barracks where housing buildings will be “right-sized.” For example, buildings with 24 smaller apartments will be remodeled so they only have 16 more spacious apartments.

“Those 16 apartments in buildings on Smith Barracks will have elevator access and be way bigger than the 24 were before to accommodate for American furniture and more elbow room,” said Jil Gillis.

Baumholder housing reached another milestone in October when the last residing family moved out of Quality 4 rated housing. The family's move met then-Under Secretary of the Army (now Secretary of the Army) Ryan McCarthy's order from early this year that all military families be moved out of Q4 housing. The Army considers Q4 housing its lowest-rated housing.

"*We will stop at nothing to make sure that we are doing the right thing by our Soldiers*," McCarthy said in an interview earlier this year. "*It shouldn't take us going to stand in someone's kitchen to understand the extent of the problem*."

"*Soldiers and families living in installation housing have a right to safe, clean and healthy homes. Our mission is to ensure that happens,*" said Col. Jason Edwards, U.S. Army Garrison Rheinland-Pfalz commander.

"*Residents are encouraged to use existing reporting systems to request maintenance of their quarters. Additionally, Soldiers and families are encouraged to bring any issue to installation leadership and the Soldier's chain of command*."

BY: IMCOM-EUROPE
www.home.army.mil

HMNB Clyde selected for first UK military accommodation trial

Scottish naval base is the first to launch the Future Accommodation Model pilot for service personnel.

Scotland's largest military establishment, the HM Naval Base in Clyde, has been selected as the first UK test site for a study that could change the way soldiers, sailors and aircrew are housed.

The 3,400 submariners, sailors and Royal Marines based at (HMNB Clyde) have been selected as the first UK personnel who could benefit from the Future Accommodation Model (FAM) pilot study.

The FAM pilot will provide financial support to service personnel at HMNB Clyde who want to rent or buy a home within a 50 mile radius of the Base, giving personnel more choice where and with whom they can live.

Service personnel can also still choose to live in the onsite single living accommodation or family accommodation, such as the Churchill Housing Estate in Helensburgh.

FAM launches at HMNB Clyde

Minister for Defence People and Veterans, Johnny Mercer MP said:

This launch is the latest step in providing greater choice and more flexibility to our armed forces in how they live and work.

Expanding accommodation options underlines our commitment to continuing be an employer that meets the changing needs and expectations of service personnel and their families.

The (MOD) is committed to better balancing a career in the Armed Forces with modern family life.

Rear Admiral Mike Bath, Naval Secretary, Assistant Chief of Naval Staff launching the pilot said:

"As part of the wider Armed Forces' programme to modernise for the 21st Century, HM Naval Base Clyde was chosen for this first pilot study due to its strategic importance for Royal Navy operations. This includes the relocation of 1,700 submariners from Devonport to the Clyde, as the Scottish site becomes the Royal Navy's single integrated submarine operating base from 2020.

"We anticipate that more submariners and their families will choose to move permanently to the West of Scotland, to live, work and put down roots, safe in the knowledge that their careers will be focused on a single site in Scotland which provides for all of their training, operational and support needs."

The pilot study will be extended to a total of three sites across the UK by next year and will last for approximately three years.

Following the launch of the pilot at HMNB Clyde, a second pilot will launch at Aldershot Garrison from January 2020, and the third and final one at RAF Wittering from May 2020.

The three studies will be used to test military accommodation policy and assess the attractiveness and benefits for service personnel of FAM. No one at a FAM pilot site will be asked to leave their current single living or family accommodation.

Only once the pilot is complete, and the results analysed, will a decision be taken whether to roll-out FAM across the rest of the United Kingdom.

By: Ministry of Defence
www.gov.uk

Production starts on world-leading respirators for UK armed forces

UK service personnel will be equipped with world-class respirators

Wiltshire-based Avon Protection Ltd. will manufacture and supply the potentially life-saving masks over the remaining period of the five-year contract, having completed 18 months of successful tests and trials.

The £16 million contract has created 22 new jobs at Avon Protection - three management and 19 shop-floor production - as well as helping to sustain their 180 employees in Melksham.

Defence Minister Anne-Marie Trevelyan said:

“Last year the MOD spent over £5.2 billion with UK industry in the South West. This multi-million-pound contract will boost this contribution even further and support over 200 jobs in Melksham.”

“These lightweight respirators protect our service personnel while ensuring they can communicate effectively on the battlefield.”

Dr Simon Dakin, Director ISTAR at DE&S, said:

“We are very pleased the production and supply of General Service Respirators to our servicemen and women will continue for years to come.”

“The fact this is a product manufactured in the UK for the UK armed forces is one of many positives from this five-year partnership with Avon Protection.”

The design of the twin-canister, single-visor mask has been made with the safety and comfort of troops in mind, using high-performance filtration technology to ensure they are protected while still being able to communicate easily on the frontline.

Colonel Timothy Chapman, Assistant Head C-CBRN Army HQ, said:

“The Army, on behalf of Defence, are pleased to welcome Avon Protection as industry partners to continue the delivery of the excellent GSR to all British forces in order to protect sailors, soldiers, airmen and women from a range of inhalation threats.”

The General Service Respirators (GSRs) are personally fitted and issued to all UK service personnel across the Army, Royal Air Force and Royal Navy. The company is aiming to produce an initial batch of 15,380 GSRs over the next year and will also supply in-service support for the equipment.

Service personnel on operations are deployed with GSRs as a precautionary measure.

General Service Respirator.
Crown Copyright

By: Defence Equipment and Support
Ministry of Defence
www.gov.uk

Sprayable Decontaminant Slurry could be in warfighter hands soon

Product out-performs current method of decontamination

CCDC Chemical Biological Center chemist Janlyn Eikenberg rinses slurry from a test door during a demonstration to U.S. Army Pacific Command at Bellows Air Force Base, Oahu, Hawaii.

This year marks an exceptional year for US Army Combat Capabilities Development Command (CCDC) Chemical Biological Center chemist Joseph Myers and his sprayable decontaminant slurry.

After three demonstrations between March and June 2019, the slurry has more than met expectations and it could be in warfighters' hands in as little as three to five years.

It's been five years since Myers began working on the paint-like substance that can decontaminate an entire vehicle quicker and more thoroughly than the previous method of washing it down with soapy water, and it does so with a fraction of water.

"Just a quart-size sprayer filled with slurry can decontaminate up to 50 square feet of vehicle surface and have it back in action as fast as a warfighter can spray it," Myers said.

The slurry works by employing a blend of hydrolytic and oxidative chemistries with a small amount of water, solvent, and binder. Because the active ingredients react readily with both blister and nerve agents, it can detoxify a range of chemical warfare agents. In small-scale laboratory studies, Myers has put the slurry to test on the blister agent HD, commonly known as mustard gas, as well as nerve agents GD, or "soman", and VX.

HD was used for the first time in 1917 during WWI by the Germans against the Allied Forces, causing more than 2,100 casualties. Although banned in 1925 by the Geneva Protocol, the garlicky or mustardy-smelling agent was used recently in the civil war in Syria. In addition to blistering the skin, it can cause temporary blindness and even death by way of hemorrhaging of the lungs.

Odorless and tasteless, the nerve agent VX is one of the deadliest chemical warfare agents. It was used to kill the half-brother of North Korean leader Kim Jong-un.

Following successful lab trials on two-inch panels against multiple chemical agents between 2014 and 2018, Myers graduated his research to large chamber testing.

“This was the first large-scale study for the slurry with neat, or undiluted, chemical warfare agent,” Myers said. “As technologies develop, they need to be proven out on a larger scale.”

Upon receiving additional funding from the Defense Threat Reduction Agency (DTRA), Myers began designing an appropriate large-scale test item for use in the center’s Engineering Directorate Toxic Chamber facility.

Instead of a full-sized vehicle, Myers designed an 18 in. X 24 in. mini vehicle door with a window, door handle, seams, screws and threads – all of the things one would expect to find in a typical vehicle door. Testing the slurry on a realistic scenario has to continue to advance the technology readiness level (TRL). Decon slurry currently sits at TRL 5 where researchers must demonstrate the project at an operationally relevant scale. Each readiness level thereafter moves the project closer to field testing. In the end, if everything goes well, decon slurry could be included in a program of record for the Army.

During large-scale testing, operators contaminated doors with HD and contaminated other doors with VX. Doors were decontaminated using the typical method of soapy water and with Myers’ decon slurry.

“For HD, after using the slurry, we could not find any contaminant at all, and a significant amount was applied initially,” Myers said. “With VX, we had one spot of residual agent, and that was a screw thread so it was a place where the slurry simply could not access, which is typical.”

Compared to the soapy water wash down, the slurry performed well.

“It was multiple orders of magnitude better efficacy and better removal using the slurry,” Myers said.

With that outcome, Myers and fellow chemist Janlyn Eikenberg found themselves on a plane to Hawaii the following March to demonstrate the slurry and brief the U.S. Army Pacific Command on the slurry’s development and use.

With the help of private sector company FLIR, who partnered with Myers, the two provided a demonstration of a process called “tactical decontamination”. Tactical decontamination refers to a rapid process in which warfighters use an indicator to locate contamination on their vehicle and a decontaminant to mitigate the contamination.

“The other technology integrated into our demo is called CIDAS – Contaminant Indicator Decontamination Assurance Spray,” Myers said. “CIDAS is an indicator technology. If you spray it on a surface, it will change color in the presence of agent.”

Using a simulant, the FLIR presenter marked the door Myers designed with a large X. She then sprayed the door with CIDAS, which indicated the presence of a contaminant by turning red.

With success in Hawaii, Myers and Eikenberg demonstrated the slurry’s capability in June, in Germany, once at Ramstein Air Base to the US Air Forces Europe and another in Grafenwoehr to the US Army European Command Chemical Biological Radiological Nuclear Explosive Detachment.

The whole idea behind tactical decontamination is that Soldiers could decontaminate a vehicle quickly and get back in the fight and that goes toward Army readiness,” Myers said. “Without the slurry, you’re basically out of commission until a decontamination unit arrives to do a soapy water wash. The point is to get warfighters and their equipment back in the field as fast as possible, and the slurry does that.”

A test door is coated with sprayable decontaminant slurry. The slurry uses a tenth of the water required by current equipment decontamination methods and can decontaminate a vehicle while the vehicle is in use.

Currently, those decontamination units rely on hundreds of gallons of water – something that can be hard to find in some environments or have at the ready. Containing 10 percent water, the slurry eliminates that need.

Not just the commands were impressed by the slurry’s performance. DTRA is also enthusiastic about Myers’ product. They have committed to providing funding for the design of a custom and battle- hardened sprayer for the slurry. Up to now, the slurry has been demonstrated with a commercial-off-the-shelf paint sprayer.

Even more good news has come from Myers’ demonstrations. Another private sector company will soon enter into a cooperative research and development agreement with the Center to openly share information in an effort to refine the formula and advance the slurry so that it can be in the hands of warfighters in the next three to five years.

By: U.S. Army Combat Capabilities Development Command Chemical Biological Center www. cbc.ccdc.army.mil

UK at forefront of ridding the world of chemical weapons

More than 105 delegates representing 53 organisations and 13 countries attended a unique gathering of chemical weapons demilitarisation specialists in London

Hosted by the Defence Science and Technology Laboratory (Dstl) on behalf of the Ministry of Defence, the annual Chemical Weapons Demilitarisation Conference is the only regular forum of international chemical weapons demilitarisation experts.

The gathering included the Director-General and key staff of the Technical Secretariat of the Organisation for the Prohibition of Chemical Weapons (OPCW), the international body responsible for the Chemical Weapons Convention which provides a near global ban on chemical weapons. Lord Howe, Minister of State for Defence, gave a keynote speech. Participants included representatives spanning government, armed forces, industry, academia, and research and development establishments. The Conference aims to develop and share scientific and technical knowledge and expertise, and to promote collaborative working to complete the world-wide elimination of chemical weapons.

The UK continues to be at the forefront of the global fight to eliminate chemical weapons, including in the key area of science and technology. The UK laboratory at Dstl is designated by the OPCW for analysis of chemical samples, and is accredited to analyse environmental and biomedical samples to the highest international standards.

The UK, including Dstl, provides extensive support to the OPCW. In April 2019, the UK contributed £1.1 million to support the activities of the OPCW, including support for the OPCW's planned new Centre for Chemistry and Technology, support for aspiring analytical laboratories in Africa and Latin America, and provision of assistance to countries in East and West Africa to help improve their capability to respond to chemical weapon attacks, as well as support for the OPCW's work to tackle use of chemical weapons in Syria.

This major new financial contribution complements the UK's and Dstl's longstanding technical and financial support to the OPCW, which has included specialist inspector training, and training in analytical chemistry and the chemistry of scheduled chemicals, in addition to support through the Designated Laboratory system.

This year's Conference - the 22nd in the series - featured 38 speakers covering progress on chemical weapons destruction and advances in technology. The wide-ranging programme included: location and disposal of chemical weapons in hostile environments; advances in portable and static destruction technologies; remote monitoring in unsafe environments; public information; environmental impacts; and aerial surveys.

The Conference received updates on the global progress to eliminate chemical weapons worldwide. These programmes are moving into their final stages, with only a few percent of declared stockpiles, which dated back to the Cold War, still to be destroyed. In total, some 70,000 tonnes - more than 97% - of the more than 72,000 tonnes of chemical weapon agent declared by 8 states have been destroyed since the Chemical Weapons Convention came into force in 1997.

Work is ongoing to recover and destroy chemical-weapons that were abandoned in China in World War 2. In addition, each year many old chemical weapons, produced during or before World War 2, are found and destroyed in locations across the globe.

In recent years, the OPCW has verified the destruction of declared chemical weapon production facilities in Iraq and declared chemical weapons from Libya and Syria. New and different approaches were required in each case, including removal of the chemicals from the possessor state for destruction in more secure environments, in industrial facilities. New technologies have been used to verify destruction remotely, and the requirement for these is expected to grow.

The CWD Conference seeks to bring together those who have identified requirement to address new challenges, and those who can provide the necessary technical solutions. Future conferences will increasingly focus on these areas. In this context, the UK, jointly with the US, is funding the "Don't Blow It!" competition, to address such new challenges by developing novel and innovative technologies to access, disable or destroy chemical and biological weapons, bulk agents, and precursor materials in austere and resource-limited environments. Projects being developed include remote robotic treatment and man-portable destruction technologies.

For further information visit: www.gov.uk

Belgian MILENG capabilities as multirole specialists on the road to 2030

Belgian Defense Forces have always focused on a contribution with well trained and specialized units tailored to the mission. A modern Defense is one of the essential security and safety components to guarantee credibility on national and international level. This is actually one of the main guidelines for recent developments within the Belgian Defense Forces on the road to 2030, taking into account all the challenges related to financial, human and material resources.

MILENG in Belgium encompasses Engineer, EOD and CBRN Defense capabilities. The main part of manpower, material and equipment is inbedded in TWO Multirole engineer battalions, ONE EOD group and ONE Field accommodation unit. They provide both combat and general support to ALL Components and Services based on a centralized planning and coordination by a Chief Engineer and MILENG staff at LANDCOMPONENT level in combination with a decentralized execution.

Future developement

On the road to 2030, the 4th Engineer battalion in AMAY and the 11th Engineer battalion in BURCHT will further evolve to TWO identical and multirole units each composed of ONE motorized combat engineer coy, ONE light combat engineer coy and ONE CBRN & general engineer support coy. Each motorized combat engineer coy will have THREE combat engineer platoons and ONE mobility support platoon. The motorized combat engineer platoon will be composed of ONE explosive detection dog team, ONE EOD squad and THREE combat engineer squads of which ONE will be advanced search capable.

The mobility support platoon will encompass heavy mobility, bridging and mounted route clearance capabilities. The light combat engineer coy's will have TWO Combat engineer platoons and ONE amphibious support platoon. The amphibious support platoon will encompass TWO engineer amphibious reconnaissance and search teams and TWELVE inflatable and foldable motorized boats (150Hp) able to transport ONE combined arms coy in ONE wave. Both motorized combat engineer coys will mainly focus on supporting the motorized Brigade and its FIVE motorized battalions, while both light combat engineer coys will mainly focus on supporting the Special operations command, its Special forces group and its TWO Ranger battalions. The light and the motorized combat engineer platoons have exactly the same composition and as embedded in the same battalions, allowing them to be educated and trained on the same vehicles, equipment and weapon systems. The new CBRN & general engineer support coy will be composed of ONE multifunctional CBRN platoon, ONE vertical construction platoon and ONE horizontal construction platoon. Each multifunctional CBRN platoon has TWO deployable sub collection centers (DSCC), ONE hazardous site evaluation team (HSE-T) and TWO sampling & identification teams of biological, chemical and radiological agents (SIBCRA-T) and TWO medium CBRN decontamination squads. Each vertical construction platoon will be composed of FIVE vertical construction and TWO lifting squads while each horizontal construction platoon have TWO horizontal construction squads.

The Belgian EOD group has multiple capabilities. The unit is responsible for the clearance and destruction of explosive ordnance of conventional, chemical and toxical ammunitions from both World Wars on national territory. Some EOD(IEDD) teams are permanently stand by for intervention on national territory in support of the Federal Police. EOD(IEDD) teams are also engaged for EOD operations abroad in support of ALL Components, providing education, training and force protection to own and to foreign troops.

The mission of the Field accommodation unit (FAU) is to provide the necessary deployable force infrastructure to all Belgian units deployed abroad and this regardless of component or service. This unit can provide all necessary accommodation assets, power supply, force protection equipment, containers (offices) for a battle group up to 1200 deployed soldiers including air or land staff and ONE role two (MED).

In the last 25 years the Belgian Armed Forces were engaged in a wide range of operations worldwide, from Africa to the Middle East. Engineers, EOD and CBRN specialists participated in crisis response, reconstruction, humanitarian assistance, demining and "train, advise & assist" operations all around the world, contributing to as well NATO as to UN and EU operations or supporting partnership countries in Africa and more recently in the Baltic States.

Since refugees came massively to EUROPE and since the terrorist attacks in France and Belgium, all MILENG units have been heavely involved in homeland operations. in order to support the Federal police and the Ministry of Internal Affairs in providing safety and security to the population and to national critical infrastructure and in providing accommodation and hosting for hundreds of refugees. Specialized military engineering capabilities like EOD, Military search and CBRN provide services to support this tasks.

By Military Engineering Centre of Excellence
http://milengcoe.org

CCDC Soldier Center and Harvard University are collaborating to advance Soldier technologies

The U.S. Army Combat Capabilities Development Command Soldier Center is working with Harvard University to research a wide range of technologies to enhance Soldier protection and performance. Soldier knowledge and input are playing a key role in the partnership.

"The collaboration between the CCDC Soldier Center and Harvard University will help identify and address capability gaps to better meet the needs of Soldiers and will help to get new critical capabilities into the hands of our Soldiers more quickly," said Douglas Tamilio, director of the CCDC Soldier Center.

"Research will also benefit immensely from the ingenuity of both organizations and from the added insight made possible by the involvement of former and current Soldiers throughout the research, development, engineering and testing process."

The CCDC Soldier Center is dedicated to using science and technology to ensure America's warfighters are optimized, protected, and lethal. CCDC SC supports all of the Army's Modernization efforts, with the Soldier Lethality and Synthetic Training Environment Cross Functional Teams being the CCDC SC's chief areas of focus. The center's science and engineering expertise are combined with collaborations with industry, DOD, and academia to advance Soldier and squad performance.

The center supports the Army as it transforms from being adaptive to driving innovation to support a Multi-Domain Operations Capable Force of 2028 and a MDO Ready Force of 2035. CCDC SC is constantly working to strengthen Soldiers' performance to increase readiness and support for warfighters who are organized, trained, and equipped for prompt and sustainable ground combat.

Some of the research being performed by Harvard and CCDC SC comes under a Cooperative Research and Development Agreement, or CRADA, between CCDC SC and Harvard's John A. Paulson School of Engineering and Applied Sciences, or Harvard SEAS.

"The Master CRADA will provide a streamlined way for the organizations to collaborate in diverse areas of mutual interest and leverage each other's expertise," said Sheri Mennillo, CCDC SC's technology transfer manager who helped develop the Master CRADA between Harvard and CCDC SC.

The U.S. Army Combat Capabilities Development Command Soldier Center is working with Harvard University to research a wide range of technologies to enhance Soldier protection and performance. Soldier knowledge and input are playing a key role in the partnership. The boot pictured here is coated with a nanofiber reinforced polyurethane boot sole. The nanofibers were developed by Harvard and are being tested by the CCDC Soldier Center. The nanofibers have some unique abrasive properties that may help Soldiers better navigate lava rock and terra firma. The nanofibers may also serve as ballistic protection in other items and have the potential to be used to create lighter body armor. (Photo Credit: Photo courtesy of Harvard University)

Dr. Kevin "Kit" Parker is the technical point of contact for Harvard for the CRADA. Parker is the Tarr Family Professor of the Bioengineering and Applied Physics Disease Biophysics Group, Wyss Institute for Biologically-Inspired Engineering, at the John A. Paulson School of Engineering and Applied Sciences at Harvard University. Parker, a lieutenant colonel in the U.S. Army, is also a professor in the department of Chemical and Life Sciences at the United States Military Academy at West Point.

Parker and other scientists in his lab are working closely with the Soldier Center.

"Collaboration with academia is a critical means by which we at Soldier Center can ensure that we can provide truly innovative ways to increase Soldier lethality," said Dr. Richard Green, director of the Soldier Protection and Survivability Directorate at the CCDC Soldier Center. "The Soldier Center is located near some of the premier academic research institutions in the world, and we regularly engage with local universities and universities that are farther away to help enable

solutions that may not have been thought possible in the past. Through collaborations, such as our collaboration with Kit Parker's lab at Harvard, we learn more about the art of the possible, and academia gets a better understanding of challenges the Army faces as we work to modernize for the future fight."

“Academic collaborations, especially those with distinguished local universities such as Harvard, provide CCDC SC the opportunity to leverage cutting-edge expertise and facilities to augment our own R&D capabilities,” said Dr. Kathleen Swana, a researcher at CCDC SC. “CCDC SC, in return, provides valuable scientific and Soldier-centric expertise and testing capabilities to help drive the research forward. Dr. Kit Parker’s experience and technical prowess also provide a unique perspective on potential science and technology solutions for the Soldier, and I look forward to seeing the outcome of future collaborations with his lab.”

The spark for the initial idea for the partnership came about when Parker and Brian Wood, the G-8 budget officer at CCDC SC and formerly a lieutenant colonel in the U.S. Army Reserves, were attending a Pacific Operational Science and Technology meeting. Parker and Wood realized the many potential benefits of CCDC SC working with Harvard to advance technologies for the Soldier. Both men served in the same unit in the U.S. Army Reserve Sustainment Command Detachment 8.

One of the projects that CCDC SC and Harvard University are working on together is the development and testing of ballistic protection nanofibers, which have the potential to be used to create lighter body armor.

Grant Gonzalez, one of Parker’s PhD students, invented the nanofibers.

“We are reimagining Kevlar fibers, attempting to make them stronger and tougher, by decreasing their diameter to change how the polymer inherently organizes and crystalizes,” said Gonzalez. “These fibers will decrease the weight the warfighter carriers without sacrificing protection.”

The Harvard inventor needed CCDC SC’s ballistics and testing expertise. Gonzalez, who has been the primary liaison between Parker’s laboratory and CCDC SC, has now graduated and is the first PhD student to be jointly mentored by people at CCDC SC and Harvard.

In addition to ballistic protection, it was noted that the Kevlar nanofibers invented by Gonzalez have other potential uses. Gonzalez explained that the fibers may also have applications for emergency responders, police, and firemen.

Former and current Soldiers are involved throughout research, development and testing process, providing all-important insight into identifying capability gaps to meet the needs of the warfighter.

“Army Reserve Soldiers bring a critical combination of expertise to the table - civilian education and professional experience coupled with military experience and associated professional relationships from both sides," said Wood. "Having current and former Soldiers involved in S&T brings expertise, experience and the passion to follow the effort to completion. Further, these Soldiers may personally benefit from the S&T developments and new capabilities in an operational environment. Through Soldiers' knowledge and operational experience, they bring critical insight as to what is needed and if/how the new equipment will be used."

Parker served several combat tours in Afghanistan and has first-hand knowledge of issues and capability gaps faced by Soldiers on the battlefield. Parker's lab at Harvard includes many military veterans, including veterans who did tours of duty in Iraq and Afghanistan, as well as tours in Africa and the Philippines.

West Point cadets also participate in Parker's lab at Harvard. CCDC SC works collaboratively with West Point cadets as well.

Parker pointed out that there is great potential for Soldiers to work in labs after uniformed service. He noted that this experience builds on, and exploits, their value to the nation and supports the model of Soldier for Life.

"I have a bunch of military veterans, including Army, working in my lab," said Parker. "Taking these junior enlisted and junior NCOs and bringing their subject matter expertise, technical knowledge, and applications orientation to the basic science lab is extremely unusual and points to what I call 'Soldier innovation.' Junior enlisted and NCO corps expertise are one of the greatest untapped resources that our defense research complex needs to access."

Parker said he greatly admires the brain power available at CCDC SC. He is eager to expand his research ties throughout CCDC SC and is eager to establish a working relationship with the Combat Feeding Directorate in particular.

Both Wood and Parker are dedicated to serving the Soldier and believe the CRADA will lead to even more collaborative efforts in the future.

"Since the CRADA reaches into the entire School of Engineering and Applied Sciences, we anticipate that this agreement could lead to break through developments in multiple technical areas," said Wood.

"I want to be able to say that the Soldier in the field is better off because of something we did in the lab," said Parker. "We want to make a major contribution to the Army's future."

By: U.S. Army Combat Capabilities Development Command Soldier Center www.army.mil

Making advances in protection materials

Dr. Adam Rawlett, Senior Research Scientist for Materials describes CCDC Army Research Laboratory essential research programs. (Photo Credit: Courtesy photo by Jessica Ader)

The Materials in Extreme Dynamic Environments Collaborative Research Alliance, or MEDE CRA, conducted its annual meeting in October. During the meeting, the group showcased research accomplishments for new protection materials, as well as new computational design codes and tools for armor applications.

Johns Hopkins University is the lead research organization for the alliance. 120 people participated in the meeting, including principal investigators and students from consortium institutions and researchers from the U.S. Army Combat Capabilities Development Command's Army Research Laboratory.

Special guests hailed from the United Kingdom's Defence Science and Technology Laboratory; the U.S. Army CCDC Soldier Center; the U.S. Army Engineer Research and Development Command; Office of Naval Research and the National Ground Intelligence Center. Dr. Sikhanda Satapathy, from the laboratory, and Professor K.T. Ramesh, from Johns Hopkins, led the meeting, which focused on technical collaboration across the alliance and program planning for the upcoming year.

Dr. Adam Rawlett, the laboratory's senior research scientist for materials, opened the meeting with a presentation on the transition of the lab to the Army Futures Command, and an overview of the lab's essential research programs, known as ERPs.

The meeting also provided the opportunity to thank Dr. John Beatty, former MEDE cooperative agreement manager, who retired recently. The group presented Beatty with an official note from the laboratory's Director of the Weapons and Materials Research Directorate and a letter of recognition from the Dean of the Johns Hopkins School of Engineering.

Highlighting the event was the poster session, which provided a forum to collaborate across the MEDE CRA and with the lab's internal protection materials programs.

For Dr. Jeff Lloyd, co-lead of the lab's metals material group, this meeting provided a chance to meet in person and plan for the future.

"This coming year will likely be the most important for the program," Lloyd said. "We hope that the program's continued success and transition of products will show that this program continues to be a model for how academia and government organizations can partner together to solve the nation's most pressing and challenging problems."

The MEDE CRA is an integral part of the Army's Enterprise for Multiscale Research of Materials. The objective of the alliance is to develop the capability to design, optimize and fabricate material systems exhibiting revolutionary performance in extreme dynamic environments. The underpinning science for these materials will lead to improved protection for Soldiers and military vehicles.

By: CCDC Army Research Laboratory
U.S. Army
www.army.mil

Army researchers dug into the effects of MREs on gut health and here's what they discovered

Bacteria live all around us. They live in the soil, in our food and even inside our bodies, particularly in our digestive tracts. These trillions of bacteria that live in the human gut, better known as the gut microbiome, are not merely passengers. A growing amount of scientific evidence has shown that the gut microbiome communicates with many other parts of our bodies, affecting our physical, mental and general health.

Scientists from the U.S. Army Research Institute of Environmental Medicine (USARIEM) are exploring the complex relationship between the gut microbiome, health and operational readiness. Research by Army and civilian scientists is beginning to show that the gut microbiome reacts to stress, influences responses to stress, and can be shaped by diet. These findings suggest that interactions between diet and the gut microbiome may be factors in mission success.

Soldiers inevitably experience changes in physical activity, environment, diet, and sleep patterns during operations. These changes may affect the health and diversity of their gut microbiomes, and they may increase gastrointestinal symptoms and intestinal permeability, also known as gut leakiness. Gut leakiness is a condition that is influenced in part by the gut microbiome, in which the intestinal walls weaken and allow waste products to leak into the bloodstream. These factors could ultimately compromise Soldier health, readiness and lethality.

During operations, Soldiers often shift from eating their regular diets to eating military rations, particularly the Meal, Ready-to-Eat (MRE).

The MRE contains similar amounts of carbohydrates, fat, protein and fiber as the average American diet, and the vitamin and mineral content is designed to meet Soldier nutritional requirements. However, unlike most diets, the MRE needs to withstand rough conditions and exposure to the elements while maintaining a three-year shelf life. As a result, commercially sterile, highly processed items and no fresh foods are used.

The Surgeon General's current policy allows the MRE to be consumed as the sole source of subsistence for up to 21 days. Earlier studies demonstrated that consuming the MRE for 21 days had no negative effects on Soldier nutrition status.

However, the question of whether subsisting solely on MREs could cause gut leakiness or other gastrointestinal symptoms and change the gut microbiome had not been considered.

Adrienne Hatch, right, a research dietitian from the U.S. Army Research Institute of Environmental Medicine (USARIEM), administers a questionnaire with two study volunteers as part of a study to see how military rations affected Soldiers' gut health. USARIEM researchers had half of 60 volunteers eat nothing but MREs for 21 days straight. USARIEM recently published the study results in the Journal of Nutritional Biochemistry. (Photo Credit: Mr. David Kamm (RDECOM))

It turns out that the MRE does not appear to have negative effects on gut health and has only a small impact on the gut microbiome community.

USARIEM recently published these findings in the Journal of Nutritional Biochemistry in a report that concluded, "The MRE ration diet alters fecal microbiota composition and does not increase intestinal permeability."

Dr. Phil Karl, the principal investigator, explained that the study's purpose was to understand how military rations interact with the gut microbiome and impact various measures of gut health like gut leakiness.

To do this, the scientists wanted to separate the effects of the MRE diet from any other factors that could potentially affect the gut microbiome in a stressful operational environment.

Sgt. Alfonso Patino, a research technician from the U.S. Army Research Institute of Environmental Medicine, prepares to analyze a blood sample, as part of a research study to see how consuming the Meal, Ready-to-Eat (MRE) for 21 days affects Soldiers' gut health. (Photo Credit: Mr. David Kamm (RDECOM))

"Usually, when someone is eating an MRE, they aren't sitting at their dining room table to enjoy a meal," Karl said. "MREs are often consumed in the field, where Soldiers can be operating in hot, cold or high-altitude environments and performing strenuous activity while not getting enough sleep. Psychological stress is also common. All of these factors can affect the gut microbiome and gut function.

"We found that the MRE does not increase gut leakiness, does not appear to negatively impact gut health, and has only subtle effects on the gut microbiome in people eating the MRE while going about their normal daily lives."

According to Karl, the scientists conducted the study in response to growing evidence demonstrating that the gut microbiome is highly reactive to diet, essential to overall health, and might play a role in cognitive and physical performance. Another reason they did the study was because of Soldier anecdotes of gastrointestinal issues while eating the MRE in operational environments. Whether those issues were due to the MRE or to other factors present in operational environments had not been studied.

The need for the study became even more apparent after Karl was part of a team that conducted a nutrition study in 2016 at USARIEM's high-altitude research laboratory in Pikes Peak, Colorado. One purpose of that study was to see how a high-altitude environment might affect the gut microbiome and gut leakiness. The study volunteers experienced gastrointestinal discomfort and increased gut leakiness while at high altitude, along with minor changes in their gut microbiomes. Volunteers in that study also ate a diet mainly consisting of MREs.

"After that result, we wanted to next determine whether the high-altitude environment, the MREs, or their combination were responsible for the findings," Karl said.

To address the question, the scientists collected data from 60 volunteers. Half of the volunteers committed to consuming only MREs for 21 days, and the other half continued their regular diet for the entire study. Both groups visited USARIEM's lab at the Natick Soldier Systems Center three times weekly. The scientists collected blood, urine and fecal samples from all of the volunteers before, during and after the study. They also administered questionnaires to see if any of the volunteers were experiencing gastrointestinal symptoms like gas, diarrhea, constipation or bloating.

The scientists analyzed the samples in the laboratory to look at how gut microbiome composition in the MRE group changed relative to the control group. Gut microbiome compositions in the control group remained the same throughout the study. Meanwhile, scientists found less lactic acid bacteria in the MRE group's samples while they were eating MREs. After looking at records of what the volunteers were eating before and after the 21 days of MREs, Karl suspected the decrease was a result of eliminating fermented foods from the diet.

MREs do not contain fermented yogurts and cheeses, which, for most people, are the primary dietary sources of lactic acid bacteria. Despite these differences, volunteers who ate the MREs reported few, minor differences in gastrointestinal symptoms and did not experience an increase in gut leakiness compared to the control group. These study results strengthen the theory that Soldiers experience gut leakiness and gastrointestinal symptoms during operations due to psychological and environmental stress, rather than the MRE diet.

This fall, the research team is preparing to expand upon the 2016 Pikes Peak study. Their goal is to determine if gut leakiness at high altitude can be reduced or prevented with the help of a dietary intervention designed to nourish a healthy gut microbiome.

The Army has spent decades making field rations nutritious and safe. USARIEM nutrition scientists constantly work with food developers at the Combat Capabilities Development Command Soldier Center to find new and improved ways to provide Soldiers with the nutrients they need to perform optimally in operational environments. Karl explained that this ongoing gut microbiome research is part of that mission. Understanding how the gut microbiome behaves in future battlefields, and how diet can be used to promote a healthy and resilient gut microbiome, will enable the Army to develop gut microbiome-targeted nutrition interventions that improve health and readiness.

"By having a better understanding of how the gut microbiome is impacted in an operational environment, and the role of diet in that response, we will be able to develop foods that can help make the gut microbiome, and, as a result, the Soldier, more resilient to operational stress," Karl said. "Doing so will improve Soldier health, readiness and, ultimately, lethality."

By: U.S. Army Research Institute of Environmental Medicine (USARIEM)
www.army.mil

Ketogenic Diet: useful or not?

It's no secret the ketogenic diet has gained public popularity over recent years and is a hot topic of conversation among military personnel. A quick "keto" internet search produces numerous health claims ranging from the final solution for weight loss to a possible therapy for several chronic diseases including diabetes, dementia and cancer. Even the Navy SEALS have been associated with studies to determine if the high fat, very low carbohydrate diet may decrease risk for seizures during underwater missions. Is keto everything it's advertised to be?

What is keto?

Surprisingly, the classical ketogenic diet is not a new discovery to the medical community. According to the Academy of Nutrition and Dietetics, ketogenic diets have been used to help control seizures in children with epilepsy since the 1920s. A typical ketogenic diet is 80-90 percent fat, 6-15 percent protein, and carbohydrate intake that is restricted to less than 5-10 percent of total calories. This high fat diet forces the body and brain to use ketones (a byproduct of fat breakdown) for fuel instead of glucose which is referred to as ketosis.

(Photo Credit: Eric P[illegible], Fort Knox News)

Is it easy to follow?

The diet seems simple enough; however adherence is difficult and one must consistently monitor blood or urinary ketone levels to ensure ketosis is maintained. Eating too many grams of carbohydrates or protein and you are back to using carbohydrates (glucose) for energy. Many dietitians will agree that the popularized version of keto is not as comparable to the classical ketogenic diet used when attempting to control seizures. Various commercialized keto recipes emphasize protein and vegetables and primarily limit carbohydrates. This more closely aligns with a modified Atkins Diet which may or may not result in ketosis.

What does research say?

Current research is limited to support using the ketogenic diet for treatment of chronic illnesses such as obesity, diabetes and dementia. The Academy of Nutrition and Dietetics discourages individuals from following a ketogenic diet if pancreatic, liver, thyroid or gallbladder problems exist or if any history of an eating disorder is present. Further research is needed to determine short- and long-term effects of adhering to the diet. Nausea, dizziness, headache, and fatigue (known as "keto flu"), changes in bowel regularity, and difficulty sleeping are frequent complaints when beginning the diet. Long-term health risks include kidney stones, liver disease, and vitamin and mineral deficiencies.

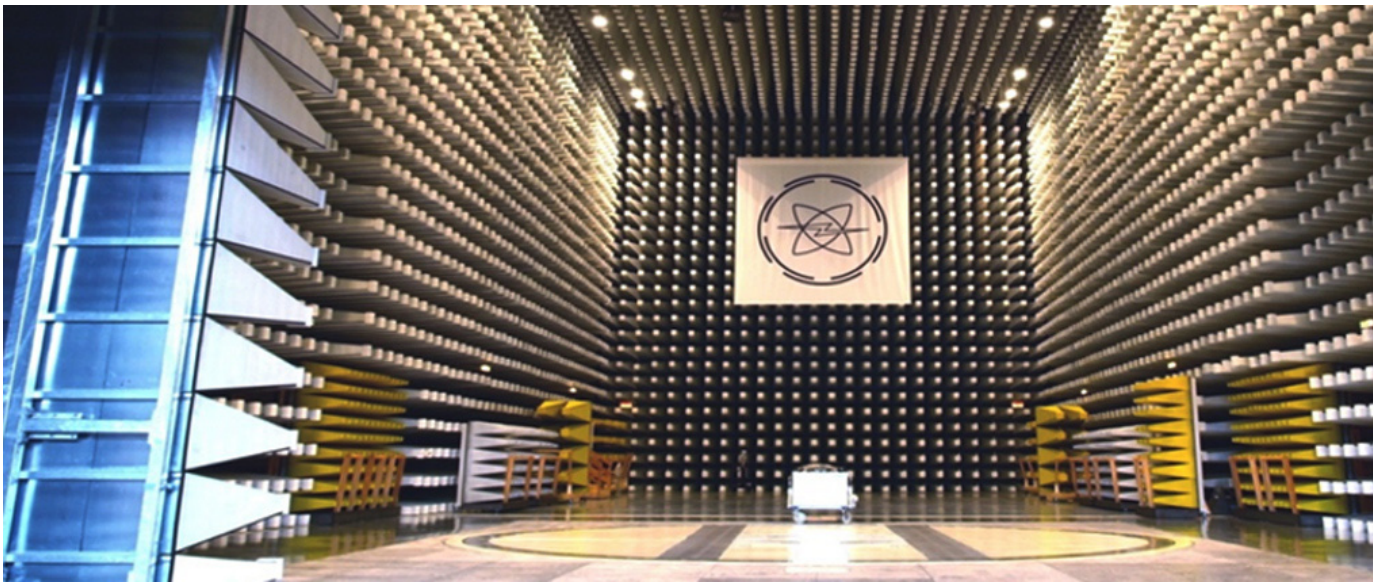
Should the military use it?

Areas of interest for implementing the ketogenic diet among military personnel are also ongoing. A recent study published in Military Medicine concluded that "U.S. military personnel demonstrated high adherence to a ketogenic diet and showed remarkable weight loss without compromising physical performance adaptations to exercise training."

Keto has also been a hot topic within U.S. Special Operations due to the diet's potential impact on increasing time Navy SEALS may be able to remain underwater and avoid seizures. Overall practicality of implementing the diet is still out for debate and not enough evidence exists to support using the ketogenic diet over current sports nutrition guidelines.

By: Eisenhower Army Medical Center
www.army.mil

ENTER project delivers network of electromagnetic test centres



Picture: Bundeswehr Technical Center for Information Technology and Electronics in Greding (Germany)

With its final working group meeting held at the Agency premises on 26 September, EDA's European Network on Electro Magnetic Effects Test & Evaluation capabilities Rationalisation (ENTER) project has been officially concluded.

Launched in 2014 as a so-called Category B project within the EDA's Defence Test and Evaluation Base (DTEB) initiative, it was supported by eight Member States: Austria, Belgium, Czech Republic, Germany, Italy, Spain, Sweden and The Netherlands. The main objective of ENTER has been achieved: the creation of a coordinated network of EME (Electro-Magnetic Effects) test centres in the participating countries, which will facilitate the future cooperation among them based on a shared technical understanding and background. The various centres attached to the network are:

• Armament and Defence Technology Agency, Electrical Engineering Division (Vienna, Austria)

• Royal Military Academy, Department of Communication Information Systems & Sensors (Brussels, Belgium)

• Military Technical Institute (Prague, Czech Republic)

• WTD 81 - Bundeswehr Technical Center for Information Technology and Electronics (Greding, Germany)

• CISAM - Centro Interforze Studi Applicazioni Militari (Pisa, Italy)

• INTA - Instituto Nacional de Técnica Aerospacial (Torrejon de Ardoz - Madrid, Spain)

• FMV - Swedish Defence Materiel Administration – T&E Division (Ostersund, Sweden)

• RNLM/DMI/MT Sensors and Weapon Systems (Den Helder, The Netherland).

The network of EME test centres and related national experts will now continue to cooperate in the specific EME sector within the DTEB framework. The damaging effects of electromagnetic interference pose unacceptable risks in military technologies. Against this backdrop, the ENTER network will jointly develop ways and means in order to mitigate the risks of fatal electromagnetic interference during EU missions, among other things by examining the hazardous impact of civil equipment on military operations and vice versa.

Besides working on the network, the ENTER project also allowed participating Member States to conduct joint tests, to promote the use of harmonised test procedures, maintain and develop T&E capabilities and expertise and share knowledge, expertise and equipment. ENTER's results and final recommendations will be further exploited to improve the EME section of the DTEB database.

EUROPEAN DEFENCE AGENCY

By: European Defence Agency
www.eda.europa.eu

THE SCOPE FOR DIGITAL TO TRANSFORM TRAINING IN TODAY'S ARMED FORCES

Despite the initial resistance, the procurement director's strategy of focussing on true added value was now bearing fruit. After two years at a department she was determined to transform, strangely, it was training that exemplified the gains. Detailed, rigid specifications, designed to drive costs down through tendering, had given way to an agile approach that enabled trainees' needs to be met at the right time and in the right place by harnessing the power and possibilities of digital. Groundbreaking tools like simulators, and a collaborative platform to capture and share the force's vast collective know-how were now firmly in place. The result was a clear success: the new methods had proved a much better fit to the needs of the force's digital-native recruits, helping make a career in the forces a more appealing proposition and generate savings in staff retention and exercise costs.

Rapidly changing geopolitics and technologies mean that today's armed forces are using a panoply of ever-more complex systems across increasingly broad theatres of operation. With missions encompassing everything from peacekeeping to people trafficking, force readiness is more critical than ever.

Yet the key to people readiness is high-quality training. Like missions, training needs are evolving rapidly. The use and maintenance of complex systems isn't intuitive: sophistication and digitalisation come at a price; recruits are increasingly digital natives, more used to video clips than lecturers, and specialist operators aren't always available when trainees require coaching from them. What's more, personnel turnover rates are rising - a trend partly driven by what younger recruits see as old-school training methods and a reducing number of experts are seeing themselves increasingly in demand on foreign missions.

Yet forward-thinking forces see this as an opportunity and they're increasingly turning to Thales to help them seize it. The challenge they've set the company is to combine its roles of systems developer, established training provider, and digital trailblazer, to help unlock digital's potential for personnel development at all levels.

Adopting a firm focus on meeting trainee needs, Thales set about creating a continuous process - working hand in glove with its customers and end users and drawing on its deep relations with them, as well as its global reach and multidisciplinary expertise. Through the skilful application of design-thinking principles, our training solutions enable users to maximise the operational capacity of Thales systems and optimise maintenance providing services that are perfectly adapted to their needs, at the right time and in the right place, throughout their missions and equipment life cycles.

The offering's scope covers technical, performance and live training. It makes strong use of, now mature, tech-nologies such as Virtual and Augmented Reality (VR/AR), and simulation and digital twins, to ensure that

personnel gain competence quickly on the latest operational systems and maintenance procedures.

These agile tools are underpinned by secure and collaborative platforms such as Thales's ePAC used to capture and share collective know-how. Younger generations can learn when they want, where they want, and how they want; and digital knowledge databases allow personnel to find answers, even when no expert is available.

It's clear that the potential for such transformation is vast. And, for an increasing number of forces, digitally transforming training, once a poor relation in budget and priority terms, is becoming a driver to make a career in the forces more attractive, improve staff retention, and, ultimately, deliver better readiness and performance.

THALES

By: THALES
www.thalesgroup.com

Fresh Tactics

MIDS JTRS enables the modernization of military tactical data link terminals

In 2015, the U.S. Joint Chiefs of Staff issued a mandate, "for the production, distribution, and use of Link 16 Communications Security (COMSEC) keying material for legacy and crypto-modernized Link 16 systems." Simply, the order requires interoperability of allied and coalition defense operators using Link 16 military tactical data link terminals for two-way communications in addition to the sharing of sensor data to update those terminals to a new cryptographic subsystem by 2022. With Link 16, aircraft, ships, and ground forces can exchange their tactical picture securely, in near-real time.

The mandate will bring different generations of airborne platforms onto a common communications network, while modernizing communications so they can be easily adapted in the field. MIDS JTRS will enable this modernization and create more stable communications gateways in the most contested environments.

Data Link Solutions (DLS), a joint venture between BAE Systems and Collins Aerospace, is a market leader in tactical airborne networking. The DLS team is delivering next-generation capability today to help the Department of Defense meet the tactical mandate, supplying cryptographic modernization terminals for the platform transition and providing advanced airborne networking to improve effectiveness, ensuring connectivity and smart flexibility to tailor networks to mission needs in real time.

One of those terminals is DLS' Multifunctional Information Distribution System Joint Tactical Radio Systems, or MIDS JTRS, which is used to process communications data without occupying too much bandwidth. The Department of Defense (DoD) is fielding MIDS JTRS on the F-15, F-16, F-18, and F-22 aircraft, as well as ship and command and control assets.

MIDS JTRS is a four-channel radio designed to run the complex Link 16 waveform and up to three additional communication protocols, enabling enhanced operational effectiveness without consuming additional space, weight, or power. It also includes the Tactical Air Navigation System, or TACAN, which provides bearing and range information to the warfighter.

The team has ramped up MDIS JTRS production to meet the requirements of the mandate to enhance battlefield situational awareness and mission effectiveness with jam-resistant, line-of-sight voice, video, and data communications for ground, air, and sea assets.

As we near the deadline for the crypto mandate, DLS will continue to apply its operational excellence to the increased demand for updated MIDS JTRS terminals.

By: BAE Systems
www.baesystems.com

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**approximate*

Speeding up Defence computers

Combat systems operators Able Seaman Michael Curry and Leading Seaman Michael Cameron in the operations room on board HMAS Toowoomba. Photo: Leading Seaman Tara Byrne

Game-changing is a phrase used often these days. But Defence Science and Technology's John Taylor says it's an apt descriptor for the high-performance computing (HPC) service that DST is building for Defence.

"It really will make a difference," Mr Taylor said. His confidence is based on his experience establishing and managing a HPC team at CSIRO. "Defence scientists will be able to run code thousands of times faster than on their high-end desktop computers," he said. "That means shortening the run time for complex problems to realistic time frames and tackling problems we couldn't even dream of attempting on a desktop.

Mr Taylor likens high-performance computing to the equivalent of Formula 1 racing cars compared with a family car.

"These super computers tend to be one-off, unique designs tailored for specific needs and tuned for the best performance. Everything the HPC team does is designed to improve the performance of researchers' codes," he said.

There has been a massive uptake of HPC by universities and research organisations. It has become a tool of the trade and a way to deal with huge amounts of data and most areas of Defence research will benefit from the new capability.

"Whether it's modelling and simulation of a hypersonic object travelling through the atmosphere, or analysing the vast amounts of data from our modern weapon systems, datasets are now being described in petabytes, and will be rapidly expanding to collections and data sets measured in exabytes," Mr Taylor said.

DST is aiming for a top-50 spot in the list of the world's 500 fastest computers. In November 2018 the IBM Summit supercomputer developed for the US Department of Energy was ranked nummber one, with a speed rating of 122.3 petaflops. One petaflop is a unit of computing speed equal to one thousand million million floating-point operations per second.

His team has been operating a pilot high-performance computing capability at DST's Melbourne site, with beta users helping to ramp up DST's knowledge of how to operate a supercomputer in a secure environment, and, just as importantly, how to support and manage users efficiently.

By: Australian Department of Defence
www.defence.gov.au

Tune into SOVERON for digital sovereignty

SOVERON gives government customers a secure, high-performance network architecture consisting of state-of-the-art, innovative hardware and software, cryptology and intelligent routing. It takes into account their security and national interests and enables them to achieve information superiority.

Germany's procurement agency BAAINBw awarded a modernization contract of PUMA infantry fighting vehicles (IFV) and other German Army equipment for NATO's Very High Readiness Joint Task Force (VJTF) 2023. In this context, the seamless command radio link for the PUMA IFV for VJTF 2023, including connecting the infantryman of the future (IdZ-ES) to the vehicle, is provided by Rohde & Schwarz, supplying the latest tactical SDR together with suitable waveforms, integration, training and services.

The SOVERON family works with the high data rate jam resistant SOVERON WAVE for tactical rugged use on the first mile. All members of the SOVERON WAVE offer mobile ad hoc network (MANET) functionality.

As key components of the SOVERON communications system architecture, Rohde & Schwarz' innovative SOVERON SDRs are available for tactical communications scenarios and for deployment on airborne platforms:

-SOVERON HR covers the "first mile" with a secure and trustworthy handheld SDR suitable for dismounted applications;
-SOVERON VR is optimized for vehicle-based communications and covers the complete VHF/UHF frequency range;
-SOVERON AR is the newest member of the SDR family for deployment on airborne platforms and can also be used as a certified civil ATC radio.
-SOVERON WAVE is a family of high data rate and jam-resistant IP based waveforms with low latency and MANET capability;
-SOVERON NETWORK MANAGEMENT enables network planning, radio network planning and data distribution in a secure environment;
-SOVERON LAB enables development of modern and complex waveforms, protecting intellectual property rights of the original waveform owners and ensures national crypto customization;
-SOVERON CRYPTO is a state-of-the-art security management system for the SOVERON software defined radio family for managing security-critical elements in tactical radio and IP networks;

Other OEM equipment such as routers and switches for tactical and stationary use complement the portfolio in the tactical range.

In naval communications, SOVERON is responsible for external communications in a joint environment within a formation, up to Fleet Command and other forces.

NCI Agency deployed: Inside the initiative

Each year, highly skilled staff from NATO's technical Agency deploy to support the Alliance's operations and missions.

Experts from the NATO Communications and Information (NCI) Agency support the Alliance every day remotely. But staff also deploy to areas where NATO operations are conducted to provide their expertise in-person.

The Agency is constantly deploying its personnel to NATO mission areas such as Afghanistan, Iraq and Kosovo. Some employees deploy for short trips, while others fill crisis establishment posts for three to six-month rotations.

The Agency mans 12 such posts for the Resolute Support Mission in Afghanistan, and two such posts for NATO Mission Iraq. “It’s an Agency priority to give operations our full support,” said Gioia Aoi, a Staff Officer for Operations at the NCI Agency.

While deployed, Agency staff members provide technical expertise and support, troubleshooting, training and more. The Agency recently adjusted its method for deployments. Instead of deploying for six months at a time, a pool of subject matter experts rotates for shorter three-month tours once a year, said Oliwer Stavarache, Personnel and Operations Manager at the NCI Agency.

When an Agency employee volunteers for the first time, the employee is given pre-deployment training, so they will know what to expect, Stavarache said. Employees are also given preparatory medical care, such as vaccinations. But the Agency also encourages those new volunteers to discuss the experience with others who have gone before them.

Francisco Javier Garcia Cidoncha recently returned to Europe after filling a crisis establishment post in Afghanistan. Garcia Cidoncha served as the Deputy Commander of the Resolute Support Signal Support Group, a crisis establishment post. “The NCI Agency needs to ensure boots on the ground to enable efficient achievement of its goals and objectives,” Garcia Cidoncha said. “In my opinion, this is the only way to establish and sustain the necessary links between the back office in Europe and operational support activities carried out in theatre. The feedback and input provided by the NCI Agency’s boots on the ground have proven to be oftentimes of paramount relevance to sort out problems.”

In Resolute Support, the Signal Support Group supports 21 sites and nine networks.

Garcia Cidoncha deployed multiple times while serving in the Spanish Air Force, and during his previous assignment as a NATO civilian in Germany, but this is his first time in Kabul as an NCI Agency staff member. As the technical authority over all Communications and Information Systems-related matters, it’s valuable to have Agency staff deploying to crisis establishment posts, said Michaël Danys, who filled such a post in Resolute Support in 2017. Agency staff bring to the positions their experience of how the Agency operates.

Danys, who had never deployed to an operational theatre, was convinced by co-workers to volunteer for the post. Danys described the experience overall as “nothing short of amazing.” The handover and takeover process helped Danys settle in, but it helped too that everyone is away from home and is experiencing similar feelings. Talking with others deployed at the same time helps you to process the environment.

Filling a crisis establishment post allows you to learn a lot in a very short amount of time. And in Danys’ case, it also opened some doors after deployment. During deployment, Danys served in a position at the management level for the first time, as the Service Management Section Head in the Signal Support Group. In the year and a half since returning from Afghanistan, Danys has acted in a management role as the Service Transition Section Head.

By: Nato Communications and Information Agency
www.ncia.nato.int

Latvian Air Force receives a new voice communication system

National Armed Forces Aviation Base, the Latvian Air Force received a new voice communication system. The handover of the new system was completed during a meeting between the Latvian Ministry of Defense and the NATO Communication Information (NCI) Agency.

"With the support of the new system, the Air Force will be able to accomplish its tasks more effectively while strengthening regional safety.

"I'm pleased to acknowledge that through our cooperation with the NCI Agency the implementation of the new Voice Communication System at our National Armed Forces Aviation Base was a great success," stressed Defence Minister Artis Pabriks.

The new system, which is part of the Air Command and Control System (ACCS) has been a work in progress since December 11th, 2014 when Latvia agreed to the system by signing a memorandum of understanding with the NCI Agency and joining Albania, Bulgaria, Estonia, Iceland, Lithuania, Croatia, Romania, Slovakia and Slovenia also participating in the program.

Implementation of the system began in 2016 through the signing of a contract between the NCI Agency and Industry Consortium providing the voice communication equipment. The two companies involved were CS Communication & Systems from France and the Norwegian company, Thales Norway. The total cost to implement the new system was 4.3 million euros. The first 3.1 million euros came from the NATO Security Investment Program with the remaining 1.2 million euros coming from the national budget.

This system is the second project implemented at the National Armed Forces Aviation Base that has been co-financed under the NATO Security Investment Program. The first project which started in 2009 and was completed in 2013 included the building of the airfield in accordance with national and NATO standards. This included creating a multifunctional military base to support NATO missions and aircraft, fulfilling state defense responsibilities.

For further imformation contact:
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Army prototypes radio network management software tool suite

To address Soldier feedback requesting easier and faster ways to plan and manage the Army's advanced software defined radios, such as the 2-Channel Leader Radio, the service is piloting a new software tool suite that reduces the time it takes to initialize, plan and load a brigade's worth of radios, from four weeks to minutes.

These new user-friendly software prototypes also lay the foundation for rapid unit task reorganization and enable tasks once performed by advanced Signal Soldiers to be performed by general purpose users for increased operational flexibility.

The Army's Program Executive Office for Command, Control and Communications-Tactical (PEO C3T) leveraged its Unified Network Operations Middle Tier Acquisition (UNO MTA) authority to develop these pioneering capabilities in just three months, compared to a traditional full custom Army development effort that would have taken 12 to 18 months, or more.

"Our new user-friendly Network Operations planning and management software prototype tools work hand-in-hand to initialize, plan and load a brigade's worth of radios faster than ever before," said Cpt. Nicholas Milano, assistant product manager for Tactical Cyber & Network Operations, Project Manager Tactical Network, assigned to PEO C3T. "Each integrated piece of software works in unison in an end-to-end network planning and initialization workflow."

The prototype software tool suite includes:

- The Integrated Planner: an overarching system that plans and creates configuration files for numerous network elements, including the software defined radios supporting the Army's tactical network. This planner was developed to integrate or replace existing network planners.

- Network Operations Management System (NOMS): an overarching prototype system used to manage the network and support non-classified, classified and coalition network enclaves with common look, touch, feel, and functionality.

- Initialization Tool Suite (ITS): enables Soldiers to manage and modify their network initialization data products network design on the ground in theater. Data Products provide the information required to enable end-to-end network connectivity and interoper ability across the Army's tactical internet.

- Codex: an authoritative database with a common data model and open Application Programming Interfaces (APIs), enabling standard access to the data product network design. APIs enable applications to "talk" to each other.

- Atom: a simplified radio planner that provides intuitive workflow and an open API that uses the data product network design to provide a radio waveform plan. The Atom prototype will inform enhancements and future capability and fielding decisions on the final new solution to support existing and emerging planning requirements, potentially replacing the legacy Joint Enterprise Network Management Capability.

- Black Sails: a simplified radio configuration tool that uses the waveform plan through an open API to configure software defined lower tactical internet radios. Atom and Black Sails work hand-in-hand - Atom creates the plan and Black Sails generates the configuration files and loads the radios.

The Program Executive Office Command, Control, Communications - Tactical (PEO C3T) provided a leaders' professional development session to the 1st Brigade Combat Team, 82nd Airborne Division, on August 26, 2019, in preparation for the fielding of Integrated Tactical Network capabilities. (Photo Credit: 1st BCT, 82nd Airborne Division public affairs)

The UNO MTA is helping the PEO rapidly deliver a more robust, integrated, and standardized set of network management capabilities that enable Soldiers from tactical edge up through corps to plan, configure, manage, monitor, provision and secure/defend their network assets. UNO efforts simplify and reduce the number of tools Soldiers use to manage and defend the tactical communications network.

"We are leveraging the OTAs to prototype solutions to configure and integrate tactical and enterprise networks, enabling the delivery of information and communications among Soldiers at all echelons, utilizing network resources prioritized according the commander's intent," Milano said.

A forward observer with the 508th Parachute Infantry Regiment, 82nd Airborne Division uses Integrated Tactical Network components during a live fire exercise at Camp Atterbury, Indiana in January 2019. (Photo Credit: Kathy Bailey, PEO C3T public affairs)

To create the unified radio planning and management software tool suite, the UNO MTA team-of-teams concentrated on prototyping commercial-off-the-shelf software applications for network planning and management, integrating them into existing government programs of record, and then quickly inserting them into military formations to gain feedback for further enhancements and to support future Army capability decisions.

The team is working with operational units to pilot these software tools and leverage Soldier feedback to inform requirements as part of the Army's developing Integrated Tactical Network, or ITN. The ITN capabilities work together to enable commanders to leverage both military and commercially available networks for secure and reliable multi pathway communications and information sharing between Army, joint and coalition partners. The ITN commercial-off-the-shelf equipment includes new expeditionary satellite terminals, line-of-sight backhaul, mobile broadband kits, radio waveforms, a two-channel Leader Radio, single channel radios, end user devices, network gateways, unified network operations tools and data products.

As part of a developmental operations construct, PEO C3T engineers are implementing continuous exploration, integration, and deployment of the software prototypes that include quarterly Soldier touch points with various units, including the 1st Brigade Combat Team, 82nd Airborne Division; 1st Battalion, 508th Parachute Infantry Regiment, 3rd Brigade Combat Team, 82nd Airborne Division; and the 10th Mountain Division. Using this common cadence, each program office has the dedicated resources necessary to continuously define, build, test and deliver value to the Army, said Keith Whittaker, network planning product lead for PM Tactical Network.

Through requests for proposals and technical exchange meetings - initiated by the Network-Cross Functional Team - PEO C3T determined the best options for integrating existing capabilities with minimum development efforts.

Throughout the development process of the radio planning and management software tool suite, the team purposely laid a foundation for an open framework and open standards, including open APIs.

"This open architecture ensures future DoD software and system development can most effectively and efficiently share information between systems and more easily and rapidly integrate future systems to improve functionality and capability," Whitaker said.

The open construct will be critical to future network modernization endeavors, as the DoD continues to develop integrated capability, such as the ITN, which includes multiple vendors, hardware, software, configurations, and systems that overarch multiple programs.

By: Program Executive Office Command, Control, Communications - Tactical (PEO C3T)
www.army.mil

iEXCEL: Improving Human Performance and Effectiveness in Healthcare

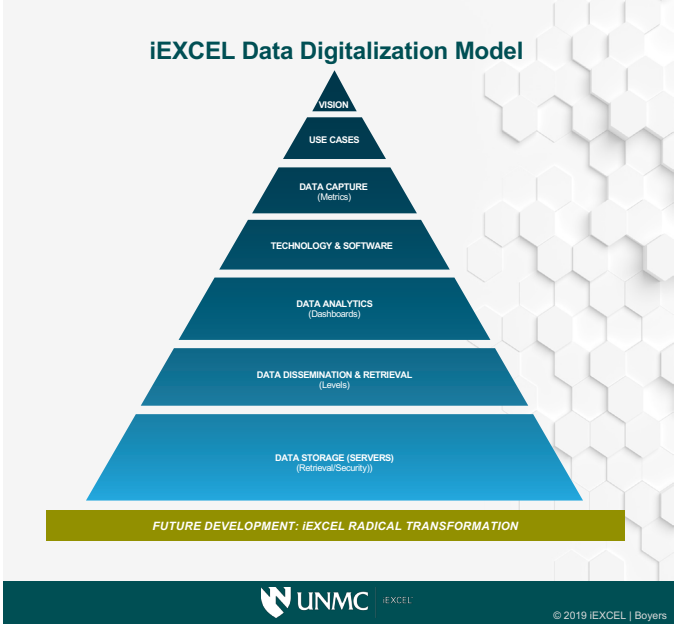
"Not everything that counts can be counted, and not everything that can be counted counts" - Albert Einstein

Optimizing Human Performance in Healthcare

For the iEXCEL* mission of improving human performance and effectiveness in healthcare to be fully realized, a critical and central factor in planning a new simulation facilty in Omaha, Nebraska was to create a digital data infrastructure that offered the ability to measure and report the returns on this significant investment. With the goal of understanding the impact of highly advanced medical simulation technology on training and patient care outcomes, and to tackle the complexities related to the collection, analysis and distribution of relevant data - an iEXCEL digital data capture model is being realized.

Data Capture in an Advanced Simulation Facility
Data is to be captured from a range of technology and software sources including scheduling, registration, invoicing, inventory, technology usage, a customer relations management system (CRM), technology and software assets, and a simulation capture system. This data capture model will facilitate:

- Identifying level of performance with given tasks and scenarios
- Provision of timely feedback to learners and facilitators on performance scores
- Identifying competencies to be assessed and define best assessment or skill refreshment methods
- Enable identification of gaps in the curriculum for individual learners or cohort/s of learners
- Comparing and contrasting criteria - such as discipline, and level of training
- Tracking of ROI, including costs, staffing, numbers and type of visitors and learners
- Assigning accountabilities for managing software, technologies and servers
- Provision of real-time feedback in the form of dashboards for executives, staff and other stakeholders.



Laying the Foundations for Data Capture
Based on careful review and heeding lessons learned from industry and the military - as well as from prior professional experience operating advanced clinical simulation centers - the technologic groundwork for assessing human performance and effectiveness should be accomplished in collaboration with an experienced global technology integration company. Selecting a single (sole source) entity improves risk management due to better performance metrics for costs associated with delivery.

These improved metrics are the result of a single design-build firm that takes ownership of the risks for overall functionality and is directly responsible for the system commissioning and final design outcome. In addition, change orders due to third-party errors and omissions are virtually eliminated, because the design-build firm has the responsibility for developing drawings and specifications as well as delivering and supporting a fully-functioning, holistic technology solution. Selecting one integrator can also provide benefits in regard to the training of educators and staff on the proper use of technology and providing exclusive long-term support

and service agreements. Perhaps of greatest value for future operations is the accountability for reliable and successful functioning then falls to one entity.

In complex facilities involving extensive technologies combined with the need to capture performance data, at the start of the project the recommendation is to ensure two distinct and separate contracts and budgets – one with the architect and the second with the technology integration company. However, this seems to be a significant departure from the traditional contracting model applied to designing and constructing educational facilities. It is critical that this duo work closely together during the design and construction process.

The authors have found that working directly with a globally recognized integration company has offered the additional benefit of leveraging costs through company size and their contractual arrangements with suppliers. Additionally, a globally connected integration company can effectively service organizations that are collaborating and span the globe (i.e. a university in the U.S. that is collaborating internationally). This benefit can prove significant and for those who desire global collaboration is highly recommended - versus utilizing, for example, one integration company for the U.S. entity and another for a European entity.

Better Healthcare

Healthcare professionals should truly be considered, and trained, as athletes. In order to provide the highest quality healthcare, they are expected to be operating consistently at their prime so as to avoid lapses in performance which lead to avoidable medical errors. As iEXCEL* heads into the realm of health professions performance and safety (for the caregivers as well as their patients) more attention must also be paid to the long-term health and well-being of our healthcare providers. Carefully designed simulation training facilities that focus on improving performance must therefore be mindful of the impact of stress and fatigue, and the concept of resilience.

At UNMC, we are fully aware that optimizing performance in any profession requires ongoing research and expertise beyond the traditional healthcare team, including exercise and stress physiology, biomedical engineering, data analytics, and a wide range of human factors expertise. In terms of moving into the future, and only too aware of our limitations, we have reached out to industry collaborators who possess special expertise in measuring how humans think, learn, and perform. By better understanding human-machine learning. combining performance metrics and applying data analytics, iEXCEL will be able to meet our goals to measure, analyze, and improve human performance and effectiveness – leading to safer and improved healthcare training outcomes.

*Interprofessional Experiential Center for Enduring Learning

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For further information visit: www.unmc.edu/iexcel

Center Designers Deliver Realism to CBRN Warfighters

Army training facility gets high-resolution upgrade to create Immersive environment

When it comes to training, realism is a key component to prepare Soldiers, Sailors, Airmen and Marines for the potential scenarios they may face during a mission.

The Army Futures Command's focus on a synthetic training environment (STE) has provided more training resources to the warfighter than ever before, from augmented and virtual reality (AR/VR) to traditional training in a physical location. In some cases U.S. Army specialists require highly sophisticated training facilities due to their unique missions and highly hazardous work.

Fort Leonard Wood, Missouri, is home to the U.S. Army Chemical, Biological, Radiological, and Nuclear (CBRN) School which owns the Department of Defense's only live, toxic chemical warfare agent training facility offering realistic training scenarios to CBRN warfighters. Since the facility's opening in 1999, the Chemical Defense Training Facility (CDTF) team has endeavored to create a more immersive training experience for warfighters resulting in greater knowledge retention, the development of muscle memory, and a reduction of fear by building trust in our military equipment – all goals of immersive training.

Several years ago, the CDTF Director crafted a vision for the context of the toxic training space which resulted in a new look and feel for the facility designed and visualized by the U.S. Army Combat Capabilities Development Command (CCDC) Chemical Biological Center's Advanced Design Manufacturing (ADM) facility.

The CCDC Chemical Biological Center's Advanced Design Manufacturing facility specializes in a variety of industrial manufacturing capabilities including electronics, 3D printing and metalworking. For this project, ADM's Interactive Software & Visual Media shop would support the CDTF's vision due to their past experience in conceptual rendering.

Each year thousands of CBRN warfighters complete training at the CDTF, putting their skills to the test with actual toxic chemical agent. The CDTF also welcomes many international partners to complete the training. With advances in available technology, increased demands for training requirements and greater warfighter expectations, it became clear that it was time for a paradigm shift of the toxic training program at the CDTF.

"The U.S. Army's move from counter-insurgency/terrorist threat-based training to large scale ground combat operations necessitated the retooling of our training program if we were to remain a relevant part of our national strategic CBRN enterprise readiness," CDTF Director Daniel Murray said. "As the Center of Excellence for CBRN defense within the Department of Defense, the redesign of the CDTF was essential to maintain our edge with regard to providing the most rigorous and challenging training possible in the area of Counter Weapons of Mass Destruction (C-CMWD) missions."

The Joint Program Executive Office for Chemical, Biological, Radiological, and Nuclear Defense (JPEO-CBRND) provided the funding for the redesign project under its mission to provide affordable capabilities to the joint force.

Composite photography and 3D rendering were used to transform each target location from a seemingly simple brick and mortar room into a realistic, near-peer location warfighters may be deployed.

"Through research into current threats and a review of current intelligence data, we focused each target area on specific near-peer threats," Murray said. "The context of each target area helped drive the design and experience of each location."

According to Don Lail, project lead for design, the context for each scene was based around real-life scenarios warfighters could find themselves in during a mission to address a chemical agent threat. Based on the story of each scene, the design team began the monumental task of researching geographic locations described for each room, diving deep into the minute details of what a crumbling building looks like after an explosion, the textures of rock, steel and glass, as well as perspective, which would pose one of the biggest hurdles to the team.

"Early on in design, we realized that misuse of forced perspective could cause trainees to experience distortions in the images as they walk through the space detracting from the realism," Lail explained. "Using virtual reality (VR), we were able to make design changes to correct the perspective issues we saw, walk around the space virtually, and then go back to the computer to make further refinements."

The Center's custom wall graphics and attention to detail help bring training facilities like this on at the CDTF to life. (Photo credit: JPEO-CBRND)

To combat the issues associated with perspective, walls were illustrated using a combination of orthographic projection (no main point of perspective) and single point perspective (gives the feeling of looking down a city street).

In addition to the expert design team, the Center leveraged its expertise as the nation's leader in chemical and biological threat solutions to help the designers understand what a near-peer chemical production facility actually looks like. Through classified briefings from the Center, the design team was able to gain insight on the details necessary to really bring the scenes to life.

With the design team in Maryland and the customer in Missouri it became apparent that regular image design reviews or even video conferencing reviews wouldn't work, so the team decided to use virtual reality as the primary means of reviewing designs for the customer. At each project milestone, virtual reality goggles were uploaded with the current version of each target location. CDTF leadership would don the goggles and tour each location virtually while on a conference call with the development team.

After several iterations, the end result is second to none in terms of realism and detail. Stepping into each target location, it's difficult to sometimes tell where the physical boundaries of the room end due to the high resolution of the images. Many elements in the images were developed through 3D rendering tools like those used to enhance feature films with computer-generated imagery. Warfighters are immediately immersed in the location and the mission during their training session.

Each target is also packed with physical features and training aids to further enhance the training. From crates and oil drums to Humvees and even a real subway train car, the attention to detail creates a convincing scenario environment.

Specialty lighting and surround sound effects, such as urban bustle, gunfire, explosions and aircraft fly-bys were incorporated to further enhance immersion and realism.

Each target is also reconfigurable so all the physical fabrications can be moved around to suit customer desire.

"Humvees are on casters so they can be rolled into a different position in the room, boxes and other props can also be moved," Lail said.

"Even the signage can be changed to further obscure the threat or provide additional context in the training experience. Sometimes there may be no signage, other times signs might be in Chinese and another time they might be in English."

By: The U.S. Army Combat Capabilities Development Command Chemical Biological Center (CCDC Chemical Biological Center)
www.cbc.ccdc.army.mil

IT²EC 2020

Held annually, ITEC is Europe's primary forum for representatives from across the military, civil sector, industry and academia to connect and share knowledge about simulation, training and education. The three-day exhibition and conference has served the military training community for more than 30 years, establishing itself as Europe's premier event in this space. In 2020, recognising the new direction that the industry is taking us, it is time to shake things up a bit.

The world of military training has shifted, gaining increasing parallels with consumer technologies such as gaming and VR. There is a proliferation of technology-oriented startups and SMEs entering the market, with growing interest in disruptive technology. You will notice one recurring theme: technology. Given its growing importance in underpinning current and future solutions, we have placed it alongside training at the very heart of our identity:

IT²EC: International Training Technology Exhibition & Conference

As part of this refreshed identity, we have partnered with RiVR – a virtual reality production company – to expand our activities. This will include animations, VR experiences and other dynamic content. As official Technology Partner at the event, RiVR will run a live technology lounge feature on the showfloor and offer VR/video services to clients as part of an expanded exhibitor care programme.

UK Land Forces are redesigning their training system to one that is designed around the person and the team, thereby creating a cycle of Train, Reflect, Learn and Train Again (TRLTA). What is widely emerging as a TRLTA enabler is the technology-supported Reality-Simulation-Reality (R-S-R) cycle, which near-seamlessly fuses simulation and training with real-life operations and assets. Embedded inside the R-S-R cycle, the concept of the 'Digital Twin' has come to the fore. As a digital replica of a living or non-living physical entity, Digital Twins have the potential to accelerate and de-risk activities such as mission planning and training. The research into, and implementation of, these new paradigms will form the core of the event's discussions.

The theme for the 2020 conference is also focused on technology. The challenge of delivering defence and security that today's armed forces and their civil counterparts face is to deliver individual excellence within joint, combined and inter-agency frameworks that are ever more complex. This requires education and training at the individual level; and the ability to experiment and rehearse to develop and enhance collective excellence. The blending of digital technology with more traditional methods offers exciting solutions. There are many lessons and ideas to be shared among the armed forces and civil responders of different nations, researchers, and industry in order for the training community to make progress. IT²EC 2020 is shaping its agenda around this exchange of ideas and experiences to explore the opportunities new technologies and methods offer to address those needs.

Finally, 2020 will see the evolution of the DisTec theatre as a dedicated focus on the disruptive technologies area of the market. Exploring the solutions re-shaping the future of training and simulation, it showcases the latest pioneering research and development in areas such as wearable tech, xR, machine learning and AI.

ITEC
28-30 April 2020
ExCeL, London, UK

Visit: www.itec.co.uk

Robots can outwit us on the virtual battlefield, so let's not put them in charge of the real thing

StarCraft II is the latest complex game to be conquered by artificial intelligence. But if robots now reign supreme at virtual war, where does that leave us when it comes to real conflict?

Artificial intelligence developer DeepMind has announced its latest milestone: a bot called AlphaStar that plays the popular real-time strategy game StarCraft II at Grandmaster level.

This isn't the first time a bot has outplayed humans in a strategy war game. In 1981, a program called Eurisko, developed by artificial intelligence (AI) pioneer Doug Lenat, won the US championship of Traveller, a highly complex strategy war game in which players design a fleet of 100 ships. Eurisko was consequently made an honorary Admiral in the Traveller navy. The following year, the tournament rules were overhauled in an attempt to thwart computers. But Eurisko triumphed for a second successive year. With officials threatening to abolish the tournament if a computer won again, Lenat retired his program.

DeepMind's artificial intelligence-powered AlphaStar (green) repels an attack in the virtual world of StarCraft II. DeepMind

DeepMind's PR department would have you believe that StarCraft "has emerged by consensus as the next grand challenge (in computer games)" and "has been a grand challenge for AI researchers for over 15 years".

In the most recent StarCraft computer game tournament, only four entries came from academic or industrial research labs. The nine other bots involved were written by lone individuals outside the mainstream of AI research.

In fact, the 42 authors of DeepMind's paper, published today in Nature, greatly outnumber the rest of the world building bots for StarCraft. Without wishing to take anything away from an impressive feat of collaborative engineering, if you throw enough resources at a problem, success is all but assured.

Unlike recent successes with computer chess and Go, AlphaStar didn't learn to outwit humans simply by playing against itself. Rather, it learned by imitating the best bits from nearly a million games played by top-ranked human players.

Without this input, AlphaStar was beaten convincingly by 19 out of 20 human players on the StarCraft game server. AlphaStar also played anonymously on that server so that humans couldn't exploit any weaknesses that might have been uncovered in earlier games. AlphaStar did beat Grzegorz "MaNa" Komincz, one of the world's top professional StarCraft players, in December last year. But this was a version of AlphaStar with much faster reflexes than any human, and unlimited vision of the playing board (unlike human players who can only see a portion of it at any one time). This was hardly a level playing field. Nevertheless, StarCraft does have some features that makes AlphaStar an impressive advance, if not truly a breakthrough. Unlike chess or Go, players in StarCraft have imperfect information about the state of play, and the set of possible actions you can make at any point is much larger. And StarCraft unfolds in real time and requires long-term planning.

Robot wars

This raises the question of whether, in the future, we will see robots not just fighting wars but planning them too. Actually, we already have both. Despite the many warnings raised by AI researchers such as myself – as well as by founders of AI and robotics companies, Nobel Peace Laureates, and church leaders – fully autonomous weapons, also known as "killer robots", have been developed and will soon be used.

In 2020, Turkey will deploy kamikaze drones on its border with Syria. These drones will use computer vision to identify, track and kill people without human intervention. This is a terrible development. Computers do not have the moral capability to decide who lives or dies. They have neither empathy nor compassion. "Killer robots" will change the very nature of conflict for the worse.

As for "robot generals", computers have been helping generals plan war for decades.

In Desert Storm, during the Gulf War of the early 1990s, AI scheduling tools were used to plan the buildup of forces in the Middle East prior to conflict. A US general told me shortly afterwards that the amount of money saved by doing this was equivalent to everything that had been spent on AI research until then.

Computers have also been used extensively by generals to war-game potential strategies. Just as we wouldn't entrust all battlefield decisions to a single soldier, handing over the full responsibilities of a general to a computer would be a step too far.

Machines cannot be held accountable for their decisions. Only humans can be. This is a cornerstone of international humanitarian law.

Nevertheless, to cut through the fog of war and deal with the vast amount of information flowing back from the front, generals will increasingly rely on computer support in their decision-making.

US fighters flying over Kuwait in 1991. Positioning military hardware is complex and costly. US Air Force

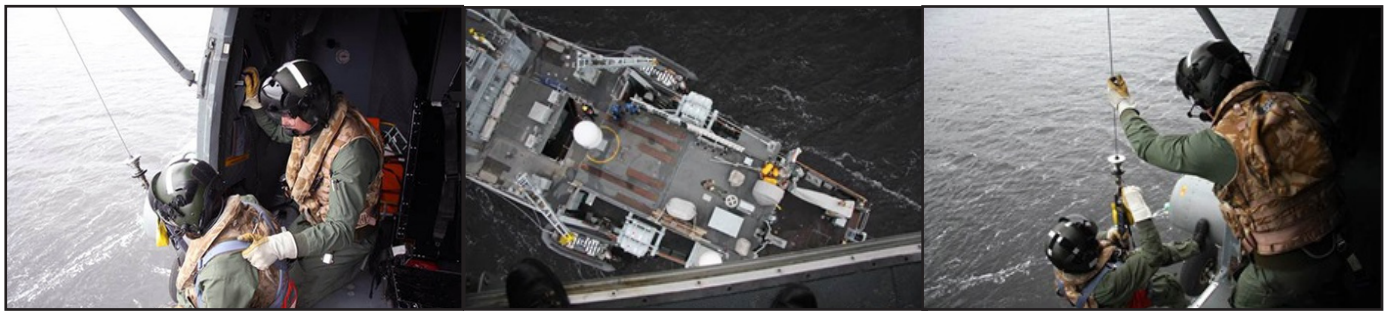
If this results in fewer civilian deaths, less friendly fire, and more respect for international humanitarian law, we should welcome such computer assistance. But the buck needs to stop with humans, not machines.

Here's a final question to ponder. If tech companies like Google really don't want us to worry about computers taking over, why are they building bots to win virtual wars rather than concentrating on, say, more peaceful e-sports? With all due respect to sports fans, the stakes would be much lower.

Article by: Toby Walsh, Professor of AI at UNSW, Research Group Leader, Data61

For further information visit:
University of New South Wales (UNSW)
www.unsw.edu.au

FLYING TIGERS PRACTISE LIFESAVING EXERCISES



The squadron's Merlin Mk2 helicopters are regularly called upon to support both Royal Navy operations and Royal Navy training north of the border. Faslane naval base is just 40 miles away… a matter of minutes in an aircraft which cruises at speeds in excess of 170mph…

We may have handed over Search and Rescue duties to the Coastguard on New Year's Day in 2016, but…

(1) that doesn't mean the Fleet Air Arm is no longer in the lifesaving business and

(2) that doesn't mean the principal Fleet Air Arm base for lifesaving north of the border is no longer needed.

In fact, HMS Gannet at Prestwick is almost becoming a second home for the aviators of 814 Naval Air Squadron, normally based 380 miles away in Helston, southwest Cornwall.

As well as being the home of the Silent Service and all Sandown-class minehunters, Faslane is also the hub for training all small ships (survey vessels, mine warfare, patrol ships).

Hunters HMS Penzance and Hurworth, plus the latter's sister Cattistock, are currently in the throes of Operational Sea Training – which prepares all Royal Navy warships for front-line duties.

None possesses a flight deck – but each must be able to get an injured shipmate to shore by the quickest means possible: helicopter transfer.

Which is a very skilful manoeuvre for ship's company and aircrew alike. There is not even a winching deck on a Hunt-class ship like Hurworth.

There is, however, a lot of clutter and obstructions… and a space large enough to accommodate a stretcher.

With observer Lieutenant Michael Moxom on the winch and aircrewman Petty Officer Chris Roadley on the wire, the Merlin moved in to lift a simulated casualty (two broken legs) on board and get them to hospital as quickly as possible.

"The main mast of the ship is about six feet from the pilot's window so their hovering has to be spot on – failing to anticipate a gust of wind or the roll of the sea could end very badly" explained flight commander Lieutenant Commander Martin Young.

"And from the ship's perspective it is difficult to maintain your course with 14 tons of downwash pushing the stern of your vessel around. Add in a very busy shipping plot in the confined waters of the Firth of Clyde, tide, wind, and it makes for a challenging seamanship evolution."

And one which Hurworth, Penzance and Cattistock all have to successfully complete before their OST training concludes at the end of next week.

"The challenge with mine countermeasures vessels is that their decks are covered in lots of equipment for the disposing of mines so you have to be careful not to harm your aircrewman as you lower them to the deck"

Lieutenant Commander Martin Young

By: Royal Navy
www.royalnavy.mod.uk

Soldiers' air assault skills tested

A fleet of helicopters flew into Colchester this week for soldiers and airmen to practise the basic skills behind planning and executing air assault operations together.

Air assault – using helicopters to deliver troops and equipment into battle – is one of the defining capabilities of 16 Air Assault Brigade.

Exercise Decisive Manoeuvre saw 100 troops transported by two Chinook and three Puma support helicopters from the Royal Air Force, escorted by two Army Air Corps Apache attack helicopters.

Troops were lifted from a landing zone set up on sports pitches, which tested 13 Air Assault Support Regiment Royal Logistic Corps on how they run marshalling areas to load helicopters. The paratroopers of 2nd Battalion The Parachute Regiment were landed in Friday Woods, practising getting on and off helicopters in tactical conditions. For the helicopter crews, the training gave valuable experience in formation flying and moving personnel.

Exercise planner Major Adam Parmenter, of Headquarters 16 Air Assault Brigade, said: "This exercise has been a great opportunity to bring the RAF's support helicopters, the paratroopers they transport and the AAC Apaches that escort them together to practise all the individual skills that go into making it work".

By: British Army
www.army.mod.uk

Delivering Training Solutions Worldwide
The Future of Training is Now

Putting someone in the fanciest race car doesn't mean they'll know how to drive it effectively, let alone win a race. The same can be said about training. The latest, greatest technology is helpful. But, when it comes to training future aircrew, sailors, and soldiers, it's the integration of advanced technology, proven learning methodologies and innovative business solutions that enables desired training outcomes – whether it be in the air, on the sea or on land.

Lockheed Martin's approach is to forge partnerships with the best companies to bring discriminating technologies, capabilities, and experience to create customized military training solutions to meet each customer's unique needs. In all cases, Lockheed Martin leverages local companies first, a practice proven to bring unique experience and perspective while often lowering costs.

"The right mix of technology is important in modern training solutions, but success depends on the experience brought by our team and business models that bring increased affordability and decreased risk for our customers" ~ Lockheed Martin Business Development Director, Tom Quelly.

"The right mix of technology is important in modern training solutions, but success depends on the experience brought by our team and business models that bring increased affordability and decreased risk for our customers," said Lockheed Martin Business Development Director, Tom Quelly. "Our aim is to bring our customers a significant boost in training capability, continuous improvement over the course of the program, and enduring economic benefit to our customer's industrial base."

Canada's Future Aircrew Training (FAcT) program offers a once-in-a-generation opportunity to reimagine mission readiness by delivering a 21st Century training solution for the Royal Canadian Air Force (RCAF). Given what Canadians, ask of the RCAF, its men and women deserve only the best in their training. However, by its size, complexity and criticality, the FAcT program offers significant challenges to industry. With that perspective, Lockheed Martin is best positioned to deliver this capability due to the success of existing global training programs across air, land and sea domains.

Let's take a look:

In military flight training, Lockheed Martin has consistently delivered enhanced training effectiveness, while reducing training time and cost. Most important to the customers Lockheed Martin supports, the team has delivered on-time transitions from legacy systems to modern, integrated training solutions.

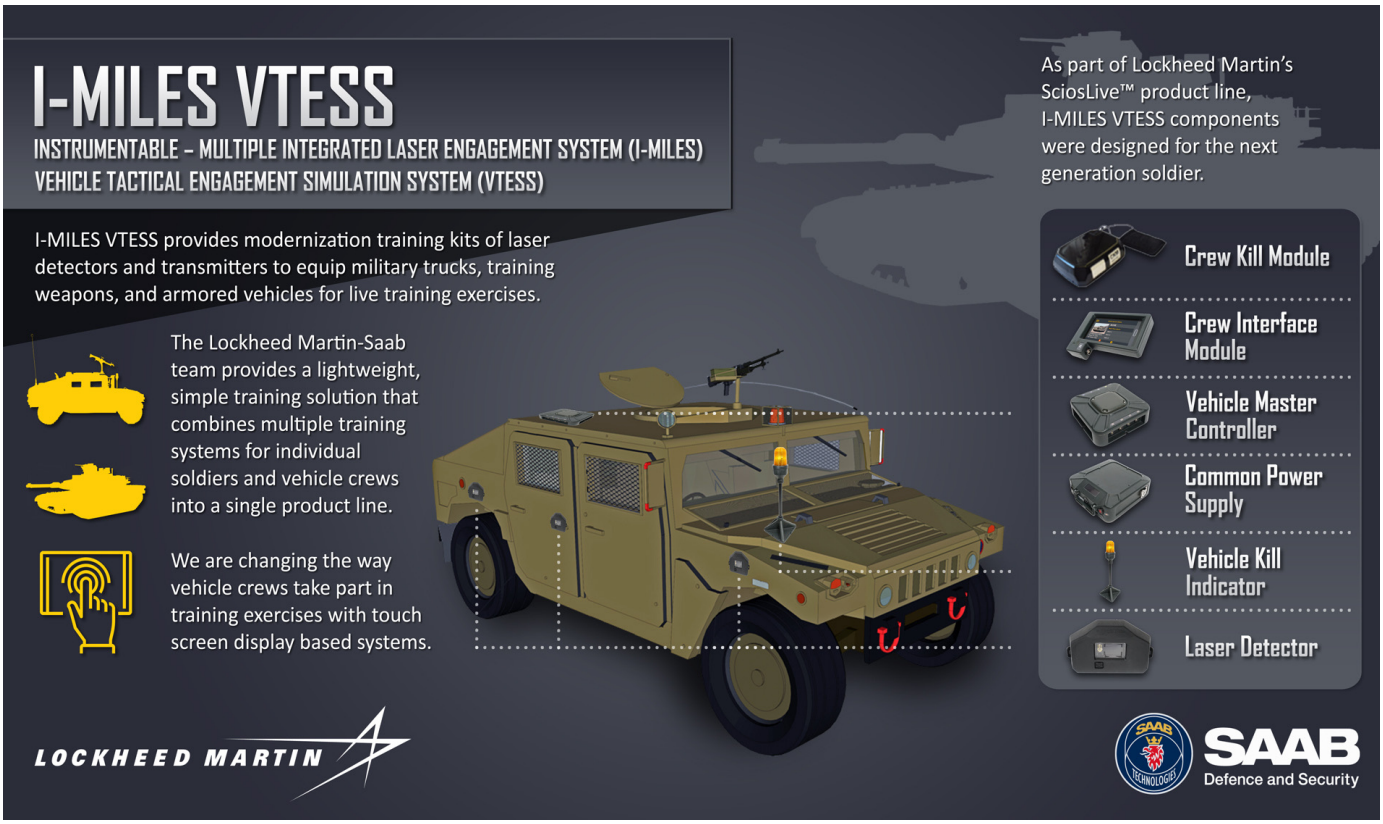
One example is the United Kingdom Military Flying Training System (UK MFTS). Since 2006, Ascent – a joint venture of Lockheed Martin and Babcock - has partnered with the Ministry of Defense to deliver a full-spectrum aircrew training solution.

To-date, the program has delivered 70 new aircraft, more than 403,497 flying hours, and 8,278 lessons. More recently, Lockheed Martin delivered an integrated pilot training solution to the Australian Defence Force, which commenced training for its pilots in 2019.

The Australia Pilot Training System brings transformational training capability to support the Royal Australian Air Force transition to Fifth Generation capability.

Texan T1 flight simulator at RAF Vally. Photo credit: Ascent Flight Training

For land forces, the Instrumentable-Multiple Integrated Laser System (I-MILES) Vehicle Tactical Engagement Simulation System (VTESS), a U. S. Army program, delivers flexible and affordable training leveraging an open architecture training solution. The system, developed by Lockheed Martin and Saab, includes laser detector and transmitter kits to equip military trucks, training weapons, and armored vehicles. The system enables soldiers to conduct live, highly realistic, force-on-force training with their existing platforms and weapon systems.



I-MILES VTESS provides modernization training kits of laser detectors and transmitters to equip military trucks, training weapons, and armored vehicles for life training exercises. Photo credit: Lockheed Martin

For the sea service, Lockheed Martin's On-Demand Trainer ensures sailors are ready to fully exploit their ship's latest capabilities. Leveraging advanced, rapidly reconfigurable technology, the trainer offers a near-identical simulation of actual ship systems.

The trainer is brought right to sailors and operates pier-side, reducing sailor's time away from the ship and their families. Crews can integrate training activities into their normal in-port routine.

The On-Demand Trainer brings training directly to sailors where they need it – at the shipyard, naval station or pier. Photo credit: Lockheed Martin

In Canada, Lockheed Martin partners with the Royal Canadian Air Force for the continued sustainment of the C-130J and has served as the combat systems integrator for the Royal Canadian Navy for more than 30 years.

Having served as a trusted defence partner to Canada for 80 years, Lockheed Martin Canada looks forward to expanding this partnership to support the nation's future air, land, and sea training needs.

About Lockheed Martin
Headquartered in Bethesda, Maryland, Lockheed Martin is a global security and aerospace company that employs approximately 105,000 people worldwide and is principally engaged in the research, design, development, manufacture, integration and sustainment of advanced technology systems, products and services.

By: Lockheed Martin
For further information visit:
www.lockheedmartin.com

National Guard disrupts cyber attacks across US

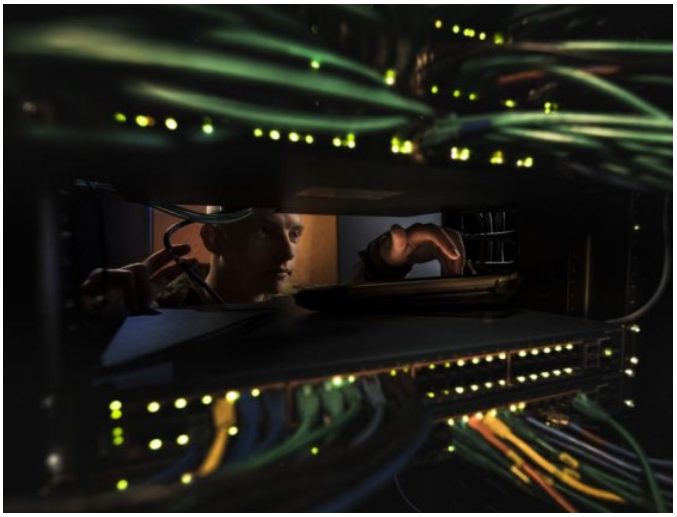
The National Guard is ready to mobilize its cyber-defenses in case of a potentially devastating domestic attack.

"When I first joined the National Guard, cyber was not part of our vocabulary, but certainly now it is one of our daily battlegrounds," said Air Force Gen. Joseph L. Lengyel. "Our adversaries and non-state actors use cyber activity to target personnel, commercial and government infrastructure and the effects can be devastating."

Lengyel, chief of the National Guard Bureau, talked about the Guard's cybermissions and capabilities during a media roundtable on Nov. 5 at the Pentagon.

Lengyel said cyberattacks have occurred at both the federal and state levels.

Earlier this year, a number of school districts and agencies in Louisiana and Texas suffered ransomware attacks. Ransomware is a type of malicious software designed to block access to a computer system until a ransom is paid.



Air Force Airman 1st Class Thomas Schoening, a cyber transport systems airman, stands in the server room at the 153rd Airlift Wing, Wyoming Air National Guard Base, Cheyenne, Wyo., Nov. 1, 2019. (Photo Credit: U.S. Air Force photo by Staff Sgt. Jonathon Alderman, Wyoming Air National Guard)

With the help of the Guard, schools opened on time and agencies were able to get back to work, Lengyel said.

"Ransomware is obviously a new and emerging kind of enterprise. We are able to access superb civilians and skill sets, and they can bring capabilities that the military sometimes does not have," Lengyel noted.

In Texas, 22 counties were attacked with ransomware during June, disrupting local service, said Army Maj. Gen. Tracy R. Norris of the Texas National Guard. Norris said Texas' department of emergency management called the Guard, and officials assessed the attacks with a team of Guard soldiers and airmen.

"It was a joint team that went out to assess the damage," she said. "From there, they picked different places to go in the counties for the recovery process. We thought it was bad in the beginning, and it couldn't have been much worse."

"We already had a team in place and sent them out to assess, and we then aligned the team based on what the assessment showed," Norris said.

Lengyel said the Illinois Guard is forming a cyber task force to assist the state of Illinois, as the need arises.

The Illinois task force will involve Guard soldiers and airmen performing cyber, information technology and other military functions.

Indiana recently started a cyber battalion, and personnel will be trained to military standards for use in a domestic response capacity if they need to be, Lengyel said.

"So, this will be part of the cyber mission force that will be part of the Army mission that, if needed, can be federalized and mobilized to do cyber activity for the U.S. Army or the U.S. Cyber Command," Lengyel said.

"And when they're not mobilized, we can do our home land mission."

Lengyel said many of these Guard members have cyber-related civilian jobs. He said it's an example of how the varied skill sets of Guard members contribute to national defense.

"They can do things working in national defense they can't do in their civilian careers," he said of Guard members.

Other attendees included vice director of domestic operations, National Guard Bureau; National Guard adjutant generals from Washington and Illinois; and the National Guard advisor to the commander of U.S. Cyber Command.

By: National Guard Bureau
U.S. Army
www.army.mil

NATO Cyber Defence

Cyber threats continue to evolve. Recent high-level cyber-attacks against NATO Allies demonstrate that bolstering our cyber defences and resilience should be a top priority.

NATO's approach to cyber defence

Allies recognise that cyber-attacks could be as harmful to our societies as a conventional attack. As a result, cyber defence is recognised as part of NATO's core task of collective defence.

NATO declared cyberspace as a domain of operations – just like air, land and sea - at the Warsaw Summit in 2016. This enables NATO's military commanders to better protect missions and operations from cyber threats.

Allies are also strengthening the cyber defences of their national networks and infrastructures through initiatives such as the Cyber Defence Pledge, adopted in 2016. This is central to enhancing cyber resilience.

While each Ally is responsible for its own cyber defences, NATO supports its members in boosting these defences, for example by:

- Sharing real-time information about threats through a dedicated malware information sharing platform, as well as exchanging best practices on handling cyber threats;
- Maintaining rapid-reaction cyber defence teams that can be sent to help Allies in addressing cyber challenges;
- Developing targets for Allies to facilitate a common approach to their cyber defence capabilities;
- Investing in education, training and exercises, such as Cyber Coalition, one of the largest cyber defence exercises in the world.

NATO has also put in place policies that will allow it to draw on Allies' national cyber capabilities in its operations and missions, in line with its defensive mandate and subject to political control. Several Allies have offered their sovereign cyber effects for the benefit of NATO operations and missions. Allies keep full ownership of these capabilities – just as Allies own tanks, ships and aircraft.

As in all other domains, in cyberspace NATO's actions are defensive, proportionate and in line with international law.

Cyber-attacks against NATO

NATO's IT infrastructure covers over 60 different locations – from the political headquarters in Brussels, through military commands to the sites of NATO operations. More than 100,000 people rely upon NATO networks. These have been increasingly targeted with cyber-attacks over the past decade.

NATO cyber defence systems register suspicious events each day: from low-level attempts to technologically sophisticated attacks against NATO networks. The majority are detected and dealt with automatically. Some require analysis and response by our experts. A 200-strong cyber team defends NATO's networks around the clock. It prevents intrusions, detects, analyses and shares information on malware, prevents data loss, and conducts computer forensics, vulnerability assessments and post-incident assessments.

NATO's cyber structures

The **NATO Computer Incident Response Capability** (NCIRC) based in SHAPE, Mons, protects NATO's own networks through round-the-clock cyber defence support. Its team of 200 experts handles incidents and provides NATO and Allies with up-to-date analysis of the cyber challenges we face. The NCIRC is part of the NATO Communications and Information

Agency, which supports NATO operations, connects NATO's information and communication systems, and defends NATO's networks.

As part of the reinforcement of its cyber defences, NATO is setting up a new **Cyber Operations Centre** in Mons, Belgium. The Centre will be fully operational in 2023. It will support our military commanders with situational awareness to inform our operations and missions, and strengthen NATO's cyber defences. The centre will also coordinate NATO's operational activity in cyberspace, ensuring our freedom to act in this domain and making our operations more resilient to cyber-attacks.

NATO as an organisation has no plans to develop its own offensive cyber capabilities. At the same time, Allies can volunteer their **sovereign cyber effects** for NATO operations and missions. Allies will retain control of their national cyber capabilities at all times when they are used in a NATO context. Several Allies have already offered their national cyber effects to NATO. This ensures NATO's defences continue to evolve at a pace with the fast-moving cyber threats.

The **NATO Cyber Range** in Estonia, is a platform for NATO exercises and training in Estonia. It is operated by the Estonian Defence Forces. The Cyber Range facilitates NATO's flagship annual cyber defence exercise "Cyber Coalition".

The NATO Cooperative Cyber Defence Centre of Excellence in Tallinn, Estonia is a NATO-accredited research and training facility dealing with cyber defence education, research and development. The Centre provides valuable expertise on cyber defence, and organises cyber exercises involving both NATO Allies and partners.

The **NATO School** in Oberammergau, Germany conducts cyber-related education to support Alliance operations, strategy, policy, doctrine and procedures. Training for NATO's cyber workforces will also be provided by the **NATO Communications and Information Academy**, which is currently being built in Oeiras, Portugal. Finally, the **NATO Defence College** in Rome, Italy fosters strategic thinking on political-military matters, including on cyber defence issues.

Cooperation with partners

Partnerships play a key role in effectively addressing cyber challenges. NATO engages with a wide range of partners – including international organisations, industry and academia.

Cyber defence is one of the areas of strengthened cooperation between NATO and the European Union, as part of the two organisations' increasingly coordinated efforts to counter hybrid threats. NATO and the EU share information between cyber incident response teams and exchange best practices.

NATO is also helping partner countries tackle cyber challenges. For example, one of the NATO Trust Funds in support to Ukraine is focused on cyber defence. Cyber defence is also an area where NATO supports Jordan, as part of our Defence and Capacity-Building assistance.

NATO is strengthening its relationship with industry and academia through the NATO Industry Cyber Partnership, which supports NATO's efforts to protect our networks, increase resilience and help Allies develop their cyber capabilities.

Information sharing, exercises, training and education are a few examples of areas where NATO and industry are working together.

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CODE LOW, DEPLOY HIGH

Raytheon, Red Hat partner on DevSecOps software development tools

"Code low, deploy high."

That describes the ways Raytheon engineers are using DevSecOps processes and tools on programs from a new, strategic partnership with open-source software giant Red Hat.

DevSecOps, short for development, security and operations, integrates security into the rapid software development processes of DevOps. Raytheon and Red Hat are developing a new, cross-domain, DevSecOps product that allows for development at an unclassified level (coding low), and speeds up the time to deployment in a classified environment (deploying high).

"We've always maintained the highest levels of cyber-security in our technologies and programs," said Jon Check, Raytheon Cyber Protection Solutions senior director. "But with Red Hat's platform, we're taking it to a new level. DevSecOps will be baked in from start to finish, because OpenShift automates many of the security tests from end to end."

Unlike traditional development approaches that were point-in-time and potentially disruptive, DevSecOps is seamless and continuous, according to Check.

"A DevSecOps framework uses automated tools and ensures security is built into applications, rather than being bolted on afterwards," Check said. "It ensures security is paramount during every stage of the software delivery life cycle. We experience continuous integration, where the cost of compliance is reduced and software is delivered and released faster."

The partnership is relying on Red Hat's OpenShift platform, which is based on the company's Enterprise Linux operating system. It will help Raytheon developers detect, compare, correlate and respond to security vulnerabilities through the entire DevSecOps workflow.

"OpenShift is a solution recognized by our customers that works across all cloud services, like Amazon, Microsoft, Google, or on-premises data services," Check said. "Our developers don't have to worry about what environment they're coding for, and it's a repeatable process. They will no longer have to learn new tools or new processes every time they're assigned a new project…and then try to make the magic happen."

Check believes this represents the future of secure software development. Red Hat is already working on a number of programs with Raytheon.

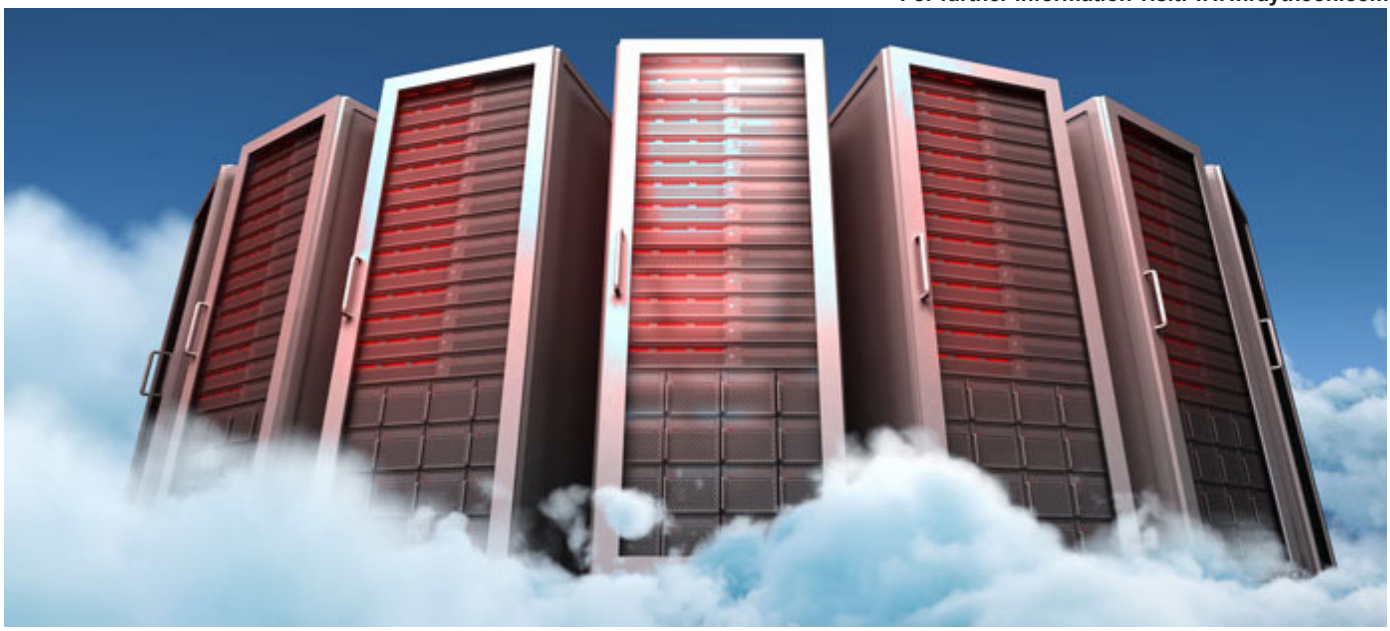
"Our relationship in the last year has grown at 100 percent," said Paul Smith, Red Hat senior vice president and general manager, Public Sector. "It's a very significant partnership, and we see it growing over the next year. Raytheon has the mission knowledge."

Choosing the right container platform is critical to the future of companies conducting software development, according to Smith. He compared choosing a container platform to the "operating system wars" between Microsoft and Linux. "The container is today's modern-day warfare," Smith said. "You don't want to be locked into platform that creates silos. You don't want your developers having to be mindful and thinking, 'What I am writing this for – Amazon, Microsoft, Google?'"

With OpenShift, Raytheon's software developers can do what they were trained to do. For one program, about 100 Raytheon software engineers went to Red Hat's Open Innovation Labs to get trained quickly on tools and processes on their program. More and more developers will train to use Red Hat, according to Check.

"A core aspect of this collaboration is letting Raytheon and Red Hat do what they do best," he said. "And co-create on new programs, and grow both of our businesses."

For further information visit: www.raytheon.com



Electronic Warfare Europe 2020

Complex Electromagnetic Warfare and the Multi Domain Battle

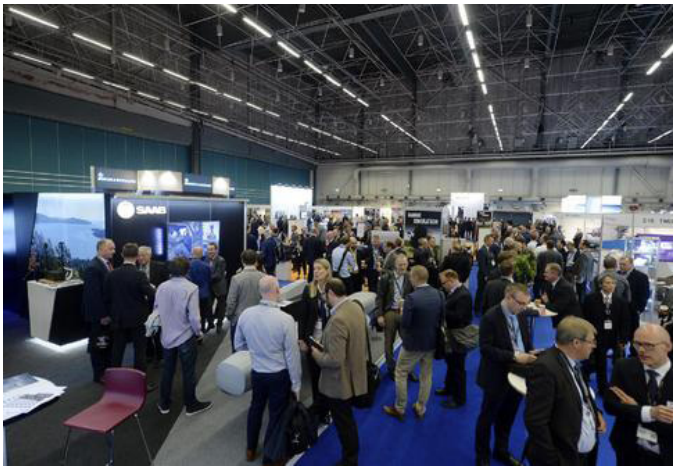
Building on the success of the 2019 edition in Stockholm, Electronic Warfare Europe will be hosted by Liverpool, UK in 2020. The event, which is organised by the Association of Old Crows in partnership with Clarion Defence & Security, is Europe's leading specialist forum for EM and Information Domain warfare experts from the military, government, academia and industry.

Increasing global activity within the Fifth Dimension of Warfare means that this area of operational development has never been more important.

Recently, the British Chief of the Defence Staff said that Britain is "at war every day" due to constant cyber-attacks from Russia and elsewhere. As our traditional platforms become more and more reliant on unmanned and autonomous systems, the risk to tri-force capabilities only proliferates.

In 2018 the UK MoD displayed its commitment to cyber and electromagnetic activities by publishing its Joint Doctrine Note on CEMA, which stipulated that single services must "develop a tailored CEMA concept" whilst remaining aligned to the UK JFC CEMA plan.

Discussing the very latest research and application of both technology and practices, the three-day conference will explore advances in SIGINT and ELINT, platform protection, spectrum management capabilities and multi-domain challenges.



ASSOCIATION OF OLD CROWS

Electronic Warfare Europe

16-18 June 2020
Exhibition Centre Liverpool, UK

First Poseidon aircraft delivered to the RAF

The first submarine-hunting Poseidon MRA1 Maritime Patrol Aircraft (MPA) has been delivered to the Royal Air Force.

The first RAF Poseidon MRA1. Crown Copyright.

The MOD is investing £3 billion in nine state-of-the-art jets which will enhance the UK's tracking of hostile maritime targets, protect the British continuous at-sea nuclear deterrent and play a central role in NATO missions across the North Atlantic.

Following an unveiling ceremony in Seattle, the aircraft was flown to Naval Air Station Jacksonville in Florida where RAF personnel are being trained to operate the aircraft.

On arrival Michelle Sanders, DE&S Delivery Team Leader, signed the paperwork to formally transfer the aircraft, named Pride of Moray, to UK ownership.

The Poseidon MRA1 is designed to carry out extended surveillance missions at both high and low altitudes. The aircraft is equipped with cutting-edge sensors which use high-resolution area mapping to find both surface and sub-surface threats.

The aircraft can carry up to 129 sonobuoys, small detection devices which are dropped from the aircraft into the sea to search for enemy submarines. The systems survey the battlespace under the surface of the sea and relay acoustic information via radio transmitter back to the aircraft.

The aircraft will also be armed with Harpoon anti-surface ship missiles and Mk 54 torpedoes capable of attacking both surface and sub-surface targets.

As leading members of NATO, the UK has signed agreements with both the US and Norwegian militaries to cooperate closely on operating their Poseidon fleets across the North Atlantic.

To maintain the skills required to deliver this vital capability, the RAF has embedded aircrew within MPA squadrons in Australia, Canada, New Zealand and the USA.

The first aircraft will arrive in Scotland in early 2020, with the fleet to be based at RAF Lossiemouth in Moray. All nine aircraft will be delivered by November 2021.

The aircraft will be flown initially by 120 Squadron which was originally stood up on 1 January 1918 and was the leading anti-submarine warfare squadron in WWII. 201 Squadron will also join the programme in due course.

The Poseidon MRA1 programme is bringing significant economic benefits to the communities near RAF Lossiemouth. A total of £460 million is being invested in the station to prepare for the arrival of the new aircraft, including the construction of a £132 million strategic facility for the fleet to be completed next year.

The programme will also bring around 700 additional personnel to Moray, taking the total number of employees there to approximately 2,500.

By: Ministry of Defence
www.gov.uk

Largest EU funded defence research project tested in the Mediterranean Sea

The OCEAN2020 project, managed by a 42 partner consortium from 15 EU countries, has successfully launched its first sea demonstration in the Gulf of Taranto, Italy.

The OCEAN2020 Live Sea Demonstration involves a total of 9 unmanned assets and six naval units from Italy, Spain, Greece and France. The deployment of manned and unmanned systems, when integrated with satellite and communication networks, aims to enhance overall maritime situational awareness and build a comprehensive picture of developing situations for military decision-makers.

Pierre Delsaux, Deputy Director General, DG GROW - European Commission, said, “Ocean 2020 is demonstrating its technical achievements, but also that joint research and development at the EU level works. With the preparatory action on defence research we started small. But it helped us to gain valuable experience for the fully-fledged European Defence Fund in place in 2021 to further strengthen the competitiveness of our defence industries.”

Led by Leonardo, the OCEAN2020 (Open Cooperation for European mAritime awareNess) maritime initiative brings together technical specialists in the maritime domain covering the observing, orienting, deciding and acting operational tasks.

In the Mediterranean Sea Demonstration, OCEAN2020 brings together data and information from a variety of sources; 9 unmanned assets – four aircraft, three surface and two underwater, six naval units, five satellites for communication and surveillance, four National Maritime Operations Centres (MOC), two ground communication networks and a prototype of a European Maritime Operations Centre (EU MOC) to build a comprehensive maritime picture.

The two-day live demonstration is the latest phase in the ambitious project which aims to demonstrate enhanced situational awareness in a maritime environment through the integration of legacy and new technologies for unmanned systems.

OCEAN2020 aims to achieve operational and technical objectives, these range from enhanced situational awareness, autonomy, cost effectiveness and increased interoperability for joint missions also using protocols compatible with NATO standards. The variety of assets involved in OCEAN2020 highlights how collaborative autonomy between multi-domain unmanned vehicles can provide a force multiplier.

Giovanni Soccodato, Chief Strategic Equity Officer at Leonardo, speaking on behalf of OCEAN2020 Consortium, said: “OCEAN2020 is an incredibly ambitious project. To deliver it, we are bringing together a pan-European team of experts, each of which is contributing its own area of world-class capabilities.

“Operationally, this project is important demonstrating the possibility to enhance maritime surveillance – of vital interest to European defence – integrating unmanned platforms with traditional systems. More broadly, OCEAN2020 demonstrates the potential and the true spirit of European collaboration in the defence sector, having enabled a real partnership of large and small industry, academia and defence ministries from across the continent.”

From sea to EDA: EU MOC prototype in Brussels
To highlight the capability of OCEAN2020 to a wider audience, a prototype of an EU MOC was installed at EDA in Brussels. Today, a demonstration took place offering an opportunity for OCEAN2020 consortium members, project stakeholders and members of the press to discuss the impact of the project and follow the exercise taking place in Italy live via the EU MOC.

Jorge Domecq, EDA Chief Executive, said, “Today’s demonstration is proof of the added-value of EU supported defence research. In deploying 9 unmanned assets, naval assets and integrating them with an extensive satellite and communication networks, OCEAN2020 takes the aims of PADR and puts them into the operational domain where the benefits of European defence cooperation are confirmed.”

First sea demonstration 20-21 November 2019
Today’s Mediterranean Sea Demonstration, led by the Italian Navy, tests how the fusion of data and information collected from the assets deployed in the area of operations can be integrated to create a Recognised Maritime Picture (RMP).

OCEAN2020 aims to show how multiple information sources can be integrated with Combat Management Systems (CMSs) to create a RMP, while equally highlighting how collaborative autonomy between multi-domain unmanned vehicles can provide a force multiplier. The demonstration runs two scenarios; a threatening vessel interdiction and interception of a mine laying vessel before an amphibious operation.

Baltic Sea 2020
A second Live Sea Demonstration will take place in Summer 2020 in the Baltic Sea and will be led by the Swedish Navy.

Background
Funded from the European Union’s Preparatory Action on Defence Research under grant agreement No 801697, OCEAN2020 received funding of €35.48 Million. Since its launch in April 2018 the project has undertaken extensive research and technology work to reach the point of undertaking a live sea demonstration. The consortium have been involved in a significant amount of solution analysis, system design, technical development and system integration of individual assets and trials.

EUROPEAN DEFENCE AGENCY

By: European Defence Agency
www.eda.europa.eu

WVNG hosts multiagency swift water search-and-rescue exercise

First responders maneuver their boat into rotor wash from a West Virginia Army National Guard UH-60M Blackhawk helicopter assigned to Company C, 1-150th Assault Battalion on the Kanawha River during a joint-agency swift water search-and-rescue operations training exercise led by the WVNG's Army Interagency Training and Education Center (AITEC), Nov. 15, 2019, in Dunbar, W.Va. (Photo Credit: Edwin Wriston)

The West Virginia National Guard (WVNG) joined forces with more than 20 local, state and federal agencies for an all-day search-and-rescue training exercise on the Kanawha River Nov. 15.

More than 150 first responders and volunteers took part in the training, gaining critical knowledge and hands-on experience with emergency response command-and-control coordination, boat rescues, dive team rescues and helicopter hoist operations.

The exercise scenario involved the mock collision of two large vessels on the Kanawha River, an industrial barge and a large civilian stern-wheeler pleasure craft, resulting in about 30 casualties requiring rescue and medical treatment or recovery. Responders and volunteers broke into teams focused on their specialties.

Members of the Charleston Fire Department and Charleston Police Department dive teams located and recovered sunken mannequins in the murky waters.

The West Virginia Swift Water Rescue Team, (WVSWRT) comprised of members of the WVNG and the Clendenin and Glasgow, West Virginia volunteer fire departments and other local and statewide first responder agencies, located and retrieved mannequins from the riverbanks.

WVSWRT responders and volunteers also participated in helicopter hoist operations, being lifted from the chilly waters of the Kanawha River by a UH-60M Blackhawk helicopter operated by the West Virginia Army National Guard's Company C, 1-150th Assault Battalion.

The U.S. Coast Guard Marine Safety Unit Huntington provided overall operational security and safety for the exercise.

The teams recovered mannequins and moved them to a central medical staging area, where members of the Kanawha County Emergency Ambulance Authority conducted decontamination and medical triage before directing the "victims" to medical facilities.

The last group of participants maintained overall operational control and communications and ensured the exercise followed proper National Incident Management System (NIMS) and Incident Control System (ICS) protocols required for all Federal Emergency Management Agency accredited exercises.

By: National Guard
www.nationalguard.mil

Next generation unmanned system unveiled

Next-generation unmanned system that could be used to protect the UK's future warships

The new system is similar to a water-borne drone. At 13 metres long, the vessel swims around a naval task force, while being remote controlled from a rig. The systems can be used to identify threats such as mines or collect intel on enemy ships.

The kit was put through its paces where it protected HMS Argyll in a harbour force protection. The system, attached to PAC24 rigid inflatable boat, navigated the river bed, detecting possible threats and feeding information back to HMS Argyll.

The demonstration was observed by Defence Secretary Ben Wallace.

“MAST-13 is pioneering the future of Unmanned Surface Vehicles for our world-leading Navy. The development of unmanned technology is vital for success in modern warfare, going beyond the capability of traditional ships to attack and defend in uncertain environments.

“As more advanced technology and new threats continue to evolve, collaborative technology development ensures we are constantly pushing the boundaries to give our armed forces the best capabilities possible.”

The new system has been unveiled as part of the Maritime Autonomy Surface Testbed (MAST) 13, a programme developed by the Defence Science and Technology Laboratory (Dstl) in collaboration with L3Harris. The purpose of MAST 13 is to further understanding of how Unmanned Surface Vehicles (USVs) can be used in defence.

USVs could offer a potent capability for the Naval fleet; increasing protection and information for the UK’s powerful war ships by detecting threats and operating beyond the visual line of sight.

Admiral Tony Radakin CB ADC, First Sea Lord and Chief of the Naval Staff, said:

“I am extremely excited about the technology developed for MAST-13 and its potential to enhance Naval capability. This builds on our existing autonomy capabilities, including the state-of-the-art Maritime Autonomous Platform Exploitation (MAPLE) software integration system developed by Dstl and industry partners.

“I look forward to seeing the further developments in sensor and countermeasure technologies that this could enable, and the increased reach and lethality this will bring to our ships.”

MAST-13 will be demonstrating its capabilities alongside PAC24 – an unmanned autonomous vessel funded by NavyX, the Royal Navy’s innovation fund announced earlier this year.

Alasdair Gilchrist, Programme Lead for MAST at Dstl, said:

“This has never been more relevant thanks to a global technology trend towards systems with higher levels of autonomy. This could buy us increased ‘sea control’. Harnessing autonomy will help us increase capability at affordable cost and in a faster time frame.”

Working with UK firm L3Harris (formerly ASV Ltd), MAST-13 was built utilising MOD’s core S&T Budget. Dstl will continue the concept development programme through a series of work packages aimed at supporting the Royal Navy through fast integration technology that the Navy can incorporate into their operations.

Positioned as an autonomy and lethality accelerator, NavyX, brings together the Royal Navy, Royal Marines, scientists, industry and engineers, working together to develop unparalleled new capabilities in far more rapid timescales than traditional procurement. By collaborating on innovative technologies, Dstl and the Navy are pushing the development of advanced maritime autonomy and potent unmanned systems.

By: Ministry of Defence
www.mod.gov

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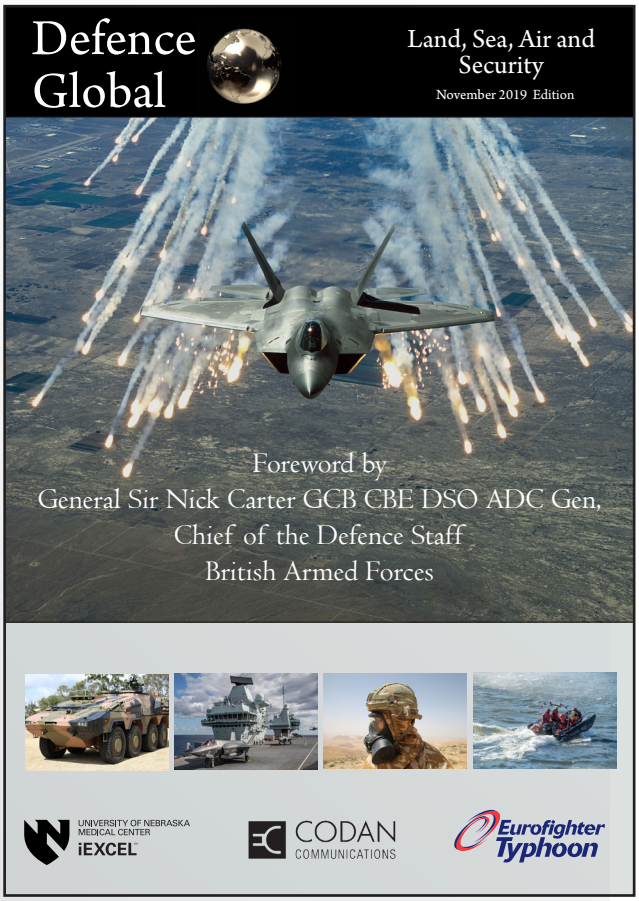

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