SPOTLIGHT ON:
TECHNOLOGY INNOVATION

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In recent months, there has been quite a bit more debate than usual about the economy and so I am particularly pleased to announce the results of a recent study that we commissioned to look into the overall economic benefit we impart to the UK.

Raytheon’s aggregate GDP footprint in the UK was £743 million; it supported 10,300 jobs through its suppliers and supply chain management; and over the past 10 years it has spent some £180 million on R&D. These key findings, which are discussed in detail in the feature article on pages 4-5 of this newsletter, cement our position as a global player with significant impact on the British economy.

Operational sovereignty and long-term value creation is a key characteristic of both the 2015 Strategic Defence and Security Review and how Raytheon approaches its ongoing contribution to the UK. Being part of Raytheon Company gives us access to many world-leading technologies and a technology development methodology which we call reachback. This is by no means simply a case of importing technology from the U.S., as we actively adapt it for UK requirements. In the process, we benefit from considerable U.S. investment and create enduring capabilities for the future.

With the RAF’s Sentinel fleet we have a really good example of the reachback methodology and the creation of sovereign capability. The government’s recent £131 million contract award to continue our Sentinel programme means that we will deliver the UK’s vital surveillance and reconnaissance capability into the next decade.

Industry at all levels, academia and government must work collaboratively to create the right environment for the UK to prosper. We must exploit our competitive advantage in order to drive overseas trade growth, as well as inwards investment, into the UK. During our Technology Conference we will discuss this theme in relation to our technology innovations and delivering the best capabilities to our customers in the defence and commercial markets.

Richard Daniel, Raytheon UK
RAF Awards Raytheon UK £131 Million Contract to Continue Sentinel Surveillance Aircraft Programme

The Royal Air Force (RAF) has awarded Raytheon U.K. a £131 million extension of its contract to manage support services for the Sentinel surveillance aircraft programme. The award extends the contract to 2021 and will sustain some 160 jobs.

Under the contract, Raytheon will optimise the design, modification, configuration management and support aspects of Sentinel at RAF Waddington and at Raytheon’s facility in Broughton, Wales. Harriett Baldwin, Minister for Defence Procurement, said: “Sentinel aircraft provide vital intelligence to our Armed Forces, giving them the ability to make decisions that helps keep Britain safe. As part of our £178 billion equipment plan, and backed by a rising defence budget, this new support contract will sustain 160 jobs across the UK and demonstrates the very tangible benefits which Defence is bringing to the nation’s economy.

Supported by the Welsh Government, Raytheon UK has also invested in a new hangar at Broughton to ensure that its Airborne ISR for Intelligence Surveillance and Reconnaissance continues to provide end-to-end, design-to-flight-trials capability for improved operational availability. The new investment will allow Raytheon UK to undertake export work as well as to optimise Sentinel support, resulting in considerably reduced time and cost of 8C deep maintenance checks.

“The Sentinel fleet is well-recognised for the outstanding contribution it has made to military and surveillance operations around the globe over the past nine years,” said Richard Daniel, chief executive officer of Raytheon UK. “As well as creating new jobs in Broughton, the extension of the Sentinel fleet will support several hundred highly-skilled jobs within Raytheon and its supply chain, while maintaining world-leading expertise in the customer community.”

The full range of Raytheon’s technical support for the Sentinel fleet includes fleet management, maintenance planning, maintenance service, technical and engineering services, obsolescence management, air vehicle integrity, supply and procurement service, training, design service and overarching service management. The Sentinel R Mk 1 fleet is a key C-ISTAR asset for the UK’s armed forces and delivers unparalleled situational awareness.

Raytheon UK’s extensive heritage in the delivery of complex ISR solutions to customers worldwide allows it to build and exploit its significant skills and knowledge in the development and integration of world-leading sensor technologies on to airborne platforms. Looking to the future, Raytheon UK’s Airborne Solutions team believes that Sentinel R1 technical innovations will ideally place it to help bridge the gap in transatlantic maritime patrol and fulfill NATO’s capacity needs.

‘Strider’ delivers high accuracy, 3D positional awareness in GPS-denied environments

Raytheon UK has developed, Strider, an innovative positioning and navigation system that provides outstanding real-time 3D positional accuracy in the absence of Global Navigation Satellite System (GNSS) signals (such as GPS) and augments them when present.

Easy to integrate, Strider runs on an open interface. It also has emergency service (e.g. police, fire service and first responder), medical and commercial applications. The two-part solution comprises a Strider Location Service App (running on any iOS, Android or Windows Mobile device such as a mobile phone or tablet) and an extremely low-SWAP Boot Mounted Unit (BMU). The BMU is currently a self-contained and sealed sole-inserted ‘puck’ but will ultimately take a form configured to match customer requirements for fitting to (or into) any boot, shoe or trainer. The Strider Location Service App communicates with the BMU via a wireless connection and provides full, high accuracy and resolution 3D position and navigation data to any application that requires it.

“Devices and systems that use GNSS protocols, such as GPS, are not very accurate, particularly in urban environments, and they are typically augmented by signals from phone masts and wi-fi hotspot positioning,” explains Roy Donelson, Raytheon UK’s Managing Director, Defence. “With Strider we have introduced a form of ‘position fusion’ which, even with GNSS at full strength and data from comms networks contributing, helps pinpoint the user with amazing accuracy and resolution. In addition, GPS ‘denied’ environments are becoming increasingly common and Strider enables positional tracking to a high level of accuracy when no GPS signal or other GNSS systems are available.”

The Strider concept and development work to date were born out of the 2014 SME partnership advancing Raytheon Knowledge (SpaRK) research and development competition.
As trumpet-blowing goes, Raytheon UK’s newly published economic prosperity report plays a dramatic quodlibet. Entitled The Economic Contribution of Raytheon to the UK, the report by Oxford Economics examines how Raytheon’s activities in the UK impact the country economically. And the results are compelling:

The company provides economic value through a wide range of channels: the economic impact assessment encompasses the operational activities of Raytheon UK, the expenditures of its parent company with suppliers in the UK, and the domestic research and development (R&D) activity undertaken by the company. Drawing on 2015 data, the company’s aggregate GDP footprint in the UK was £743 million; it supported 10,300 jobs through its suppliers and supply chain management; and over the past 10 years it has spent some £180 million on R&D.

These key findings show that Raytheon and Raytheon Company (as an enterprise) contribute significant value to the UK.

Gross Domestic Product (GDP)
Raytheon UK’s direct impact is spread across its core sites in England, Scotland and Wales, but is most notable in the devolved regions of Wales (airborne solutions integration) and Scotland (complex weapons, silicon carbide technology and integrated power systems) through Raytheon’s technology centres. Almost half (48 percent) of the company’s UK GDP impact is attributable to its Scottish operations, while its English sites accounted for another 44 percent, and the remainder linked to its Welsh facilities. Raytheon UK’s core business sites are stimulating regional economies and local communities, injecting millions of pounds’ worth of consumption spending each year.

When taking into account the three ‘aggregate’ strands of impact (i.e. the impact of Raytheon UK’s operations on the UK, the impact of Raytheon Company’s global operations on the UK and the additional contribution to GDP due to spillover benefits), the company’s £743 million contribution to the UK’s GDP was greater than the direct GDP of the UK’s entire iron and steel industry,
High Productivity
Owing to the high-tech and capital-intensive nature of Raytheon UK’s activities, high productivity is at the core of its business. With average direct GVA (gross value added) per FTE (full-time equivalent) worker of £128,100 in 2015, Raytheon UK’s workers are among the most productive ten percent of the British labour market. This is achieved through the company’s sustained investment in its skilled workforce and the provision of high-value jobs in R&D, engineering and design. Raytheon directly and indirectly supported 10,300 jobs during 2015; this is equivalent to around eight percent of the aerospace workforce, or around a quarter of the pharmaceuticals industry’s direct employment.

Exports Growth
Raytheon UK is a significant exporter of goods and services, with exports typically accounting for 50-60 percent of revenues. The company’s 2015 exports were £168 million and having trended upwards in recent years, non-UK sales are expected to continue rising boosted via large and growing military and commercial sales to external markets. According to the report, exports in 2018 are set to triple relative to those seen in 2009.

Investment
Each year, Raytheon invests millions in new markets, innovation and spiral development of existing technology through partnerships with niche SMEs or by sponsoring academic research. These investments deliver significant benefits for the British economy.

Through funding R&D into innovative cutting-edge technologies, partnering with SMEs and universities and investing in the competitiveness of the UK supply chain, Raytheon UK is advancing the UK’s science and engineering skills base to the benefit of wider society. Technology reach back, through its U.S. parent, is crucial to this and allows Raytheon UK to deliver value to the MOD and other customers, as well as support UK military capability.

Supply Chain
Raytheon plays a significant role in the UK’s supply chain, supporting more than 300 SMEs and some 400 active suppliers. Raytheon UK’s R&D investment activity is generating more knowledge and intellectual property for British businesses. One such initiative is its annual SpaRk (Small to medium-sized enterprise Partnerships Advancing Raytheon Knowledge) competition (see page 10). Under SpaRk, the company has provided 15 financial grants to SMEs and universities totalling £800,000 in the past three years. This investment has supported and raised technology readiness levels in domains such as micro-electronics, power and control, cyber and defence intelligence.

The establishment of productive technology and development partnerships with SMEs and academia, combined with a globally competitive supply chain, are key to Raytheon’s ongoing delivery of advanced capabilities and solutions that are enhancing and focusing its customers’ missions. To that end, the company is supporting high-tech sectors – including aerospace, defence and cyber security supply chains – with hundreds of millions’ worth of procurement spending.

Raytheon has emerged as the industry leader in developing cyber resilience. Through its cyber security eco-system approach, Raytheon UK partners with domain experts, academia and SMEs to develop the latest in network defence technologies protecting today’s most sophisticated computer networks against cyber-attacks. Raytheon UK’s vision is to emulate the agility of this eco-system – the first of its kind in the UK – in the defence sector.

Tax Contributions
In context, Raytheon UK’s aggregate tax contributions are sufficient to cover the average gross salaries of 5,300 primary school teachers, 5,400 social workers, 4,100 police officers or 2,100 doctors.

This impact, across the three dimensions explored in this report, demonstrates the extensive value that Raytheon provides to the UK. Beyond the financial value it represents for the MOD, or the operational value its cutting-edge systems provide for the UK’s military, it also makes important economic contributions. Moreover, as a leading global player in a crucial export sector, with investment intensive and innovative manufacturing centres throughout the UK’s regional economies, it is well placed to continue making substantial contributions to the British economy into the future.

Open for Business: Raytheon Showcases £25M Investment at Kao Park HQ (continued)

Rt Hon Robert Halfon MP for Harlow praised Raytheon for placing Harlow on the map for advanced technology. “Raytheon is an incredible example of how businesses, technology, jobs and apprenticeships are coming back to our town. I am hugely grateful for the continued investment and support for Harlow from this company and I look forward to working with them for many more years to come.”

Hosted by members of Raytheon UK’s leadership team, Mr Norman and VIP guests were given a short tour and demonstrations/presentations of some of Raytheon’s key Defence technology innovations — GroundEye™, Strider, GPS & Anti-Jam – and its STEM programme. Richard Daniel, Raytheon UK’s chief executive officer, said: “The new facility gives us tremendous potential and will become our main technology centre in the United Kingdom for the design and development of some of the nation’s most advanced defence capabilities.”

Completed in July 2016, Raytheon UK and Arrow Electronics are the first global high-tech occupants of the Kao Park Science and technology business campus and data centre.

Local Councillor Tony Durcan, Portfolio Holder for Regeneration and Enterprise, commented: “The fact that these two major international companies want to stay in Harlow and expand their UK operations here shows what a great place Harlow is to do business and the huge potential that is being fulfilled at the Enterprise Zone. We hope that many more organisations will follow in the footsteps of Raytheon and Arrow Electronics.

“In addition, the opportunities for new job creation and skills development are really exciting for the local community, and something which is a big priority for the Council.”

The transfer of Raytheon UK headquarters from The Pinnacles in Harlow is a marker of the company’s growing investment in technology, design and innovation. Says Daniel: “For Raytheon, it is about growing indigenous capability in research, design and development and leveraging our own investment in science and engineering.”
A new breed of quiet, wearable generators promises to give more range and freedom to soldiers, first responders and commercial users who are increasingly dependent on power-hungry electronics.

Modern soldiers carry a wealth of rechargeable battery-powered equipment, including satellite phones, personal radios, GPS systems, infrared vision systems and night-vision goggles. But those tools frequently need charging.

Enter Raytheon’s innovative Portable Power Generator (PPG). This compact, lightweight, fully soldier-portable solution generates a regulated 28V DC current and can quietly burn a variety of low-thermal-profile, including diesel, kerosene and ‘smokeless’ JP8 aviation fuel. It can also be fitted to vehicles to provide extra power or a "silent watch" ability, in which the vehicle’s engines are turned off.

Originally conceived as a military solution for soldiers, the commercial application for Raytheon’s power generators is far-reaching.

“Accident and emergency service first responders, construction engineers, site workers and even outdoor leisure enthusiasts could also benefit from our power solution, giving them easy access to electrical power on the move," said Kyle Milne, programme manager with Raytheon UK’s Integrated Power Solutions business unit. The PPG is also in keeping with the company’s SWaP-V philosophy to reduce size and weight whilst also increasing power and delivering value for money.

Raytheon unveiled the PPG technical demonstrator at the Special Operations Forces Industry Conference in May 2016. The company is now collaborating with key UK-based technology partners to develop a 3kW proof of design. This latest model houses an intelligent power management system and is anticipated to provide up to 12 hours of power at full load, depending on the operating environment.
Behind the Technology

The system interfaces with a simple stop/start button, controls and monitors the fuel flow from the PPG’s two detachable tanks, manages an on-board battery – used not only to start the unit but also to provide short-duration boosts to the combustion-generated power – and drives an LCD that shows output voltage, output current and engine temperature.

Production versions of the power management system will also have CAN bus, to allow for easy integration with a vehicle’s management systems. Demonstrator PPGs optimised for different loads are also scheduled for production.

“Completion of the prototype power management system, currently being used to validate key functions of the PPG, marks a significant milestone and we’ve received great support from our suppliers,” said John Kennedy, head of Raytheon UK’s Integrated Power Solutions business unit.

“The generator is a prime example of IPS’ integration capabilities and our understanding of harsh environment applications,” Kennedy said. Designed with two detachable fuel tanks to support rapid refuelling for continuous operation, the PPG’s electronics will manage fuel consumption by automatically switching between tanks. The unit will also have an internal battery to provide a short-term power boost if there is a need for more kilowatts than is being generated by the engine. The battery will also maintain a 28V DC output, under load, for a few minutes if both tanks run dry.

Future Milestones

The next project milestone – the 3kW proof-of-design build – is planned for customer trials in early 2017. This will be followed by a proof-of-manufacture build, most likely offered as a generic "off-the-shelf" unit rated at 3kW.

This 3kW unit will undergo rigorous testing to meet military standards as well as expected field and vehicle applications. A 5kW variant is also feasible since the PPG’s electrical architecture is both modular and scalable. However, users could also connect multiple PPGs in parallel to increase the power output.

“Generators of an equivalent electrical power output are much larger and heavier than our solution for generating power in the field, and we’ve already received requests from one customer for PPG trials within a military vehicle,” Kennedy said. “Our PPG is pushing the design envelope in terms of the electrical power that can be generated by such a compact and lightweight unit.”

Raytheon is a leader in power management systems, from semiconductor fabrication to modelling of aircraft power architectures.

The company offers a wide range of resilient and pre-qualified smart power subsystems as well as components for land, naval, air and space applications. The UK’s Ajax Scout Vehicle, the F/A-18 jet, the Sentinel and the International Space Station are among the platforms carrying the company’s products.
Raytheon UK’s strategic partnerships with Lancaster University and the University of Gloucestershire will help plug the cyber security skills gap by mobilising a new generation of crime-fighting cyber heroes able to defend organisations against nefarious online plots.

The UK is one of the leading digital nations but the benefits of the digital era come with a steep price; cyber attacks and cyber crime have quadrupled in recent years, and by 2019 it’s estimated losses from cyber-related crime will exceed US$2 trillion.

With these figures escalating, today’s organisations require a new generation of digital defence experts ready to face these global threats in the rapidly changing environment. Trying to prevent all manner of cyber threat is no longer considered realistic and has led to governments and businesses seeking ways to withstand attacks while continuing to operate effectively.

Raytheon has emerged as the industry leader in developing Cyber resilience, and is using its expertise and experience to help government, academic organisations and industry do the same.

In November, the company signed two strategic partnership agreements with the Universities of Lancaster and Gloucestershire to fund deep research and student bursaries in cyber security.

The bursary programme is part of Raytheon UK’s involvement in two government-supported initiatives – Cyber First, a student bursary scheme and Cyber Invest, which supports cyber research. Both initiatives are inspired and led by GCHQ as part of the government’s National Cyber Security Strategy and the National Cyber Security Centre, the latter of which provides next-generation cyber security incident management.

Through Cyber First, Raytheon UK has committed to support up to ten bursaries per year, whilst with Cyber Invest the company will provide £100K each year on Cyber research funding over a four-year period (2016-20).

**Supporting the University of Gloucestershire**

Raytheon UK is providing three £3,500 third-year undergraduate bursaries at the University of Gloucestershire (with a specific focus on funding female students) plus £50,000 for cyber security research through Cyber Invest.

Raytheon has been working closely with the university since the company opened its Cyber Innovation Centre in Gloucester in 2015. Raytheon was heavily involved in supporting the design and delivery of the university’s recently revamped cyber security curriculum and regularly provides guest speakers on cyber for student events and activities. Raytheon is also part of Gloucestershire’s Cyber Advisory Board, helping with the design of its new Berkeley Cyber Centre.

Stephen Marston, Vice-Chancellor at the University of Gloucestershire said: “We are delighted to be able to formalise our strategic working partnership with Raytheon. One of our key priorities is to give our students access to leading companies in the field in which they would like to pursue a career on graduation. This partnership not only gives our students the opportunity to gain first hand, real world experience, but also helps equip them with the skills and opportunities to secure a graduate job with a company like Raytheon.”
“This latest announcement consolidates both the University’s and Raytheon’s joint commitment to train and nurture cyber talent for the future and equip them with the skills to meet a priority business need in the rapidly growing area of cyber security.”

Supporting Lancaster University

At Lancaster, Raytheon will fund three bursaries, enabling students to study for the university’s Master’s degree in cyber security over the next three years. The agreement includes a £65,000 investment in cyber security research for the first year with additional funding over the following years to a total of £150,000. This funding will support a long-term programme of two PhD students delivering a doctoral research programme as part of the Government’s Cyber Invest Scheme. The programme will look at future security issues associated with the ‘Internet of Things’ and ‘industrial control systems’.

“Lancaster University is at the forefront of helping supply graduates equipped with the relevant skills and experience, and investments such as this from leading companies like Raytheon are a significant step towards helping to meet future industry demands.”

Professor Peter Atkinson, Dean of the Faculty of Science and Technology at Lancaster University

The agreement with Lancaster builds on previous partnership working including: joint participation in the first cyber security camp run by the Cyber Security Challenge UK in 2012 and joint participation in events with Government ministers. Raytheon has also supported a number of Lancaster R&D projects and sponsored MSc students in both Data Science and Cyber Security disciplines.

Raytheon UK’s managing director, Intelligence & Security, Rob Crook says: “Raytheon UK is delighted to be expanding its existing ties with Lancaster University and the University of Gloucestershire by committing to an ongoing bursary and research programme. These partnerships aim to build awareness of cyber careers, narrow the talent gap and ensure the UK is equipped to tackle future cyber threats.”

Supporting Government

Raytheon UK has long facilitated raising awareness of career opportunities for talented young people in the cyber security industry, and addressing the national cyber security talent shortage. The successful bursars were downselected after being set specific technical challenges and asked to respond with a one-page project outline. They were also interviewed by senior managers within Raytheon UK’s Cyber team to whom they presented their projects.

The company hopes its bursary programme to fund students on the innovative, GCHQ-accredited, university cyber courses will ensure the recipients are best prepared for the working environment. And that this in turn will aid their path towards future careers in cyber security and data science. As part of the package, each student receives a conditional job offer which ties in with Raytheon’s plan to recruit four cyber graduates in the next economic year.

Commenting on the partnership with his constituency’s university, Richard Graham MP for Gloucester said: “Cyber, nuclear and marine power are all fast-growing sectors in which Gloucestershire leads and it is absolutely right that the University of Gloucestershire is teaming up with Raytheon to help the development of skills for this vital national capability.”

Championing Diversity in Cyber

Raytheon champions the development of the next-generation of cyber workforce, through community relations and other initiatives, so that the UK can operate confidently in the cyber domain.

While industry, academia and government are now putting a lot of effort into improving cyber education and training across the whole academic sector, the UK still has a shortage of cyber security experts, particularly females.

Raytheon’s sponsorship of the Cyber Security Challenge has allowed the company to support several girls schools, including Gloucestershire, with cyber programmes. This is one of the company’s many STEM initiatives to address the gap. Raytheon UK Chief Executive Richard Daniel says: “As in other global regions, the UK needs more cyber specialists, particularly female cyber engineers.

We are delighted to be cementing our commitment to these academic institutions and look forward to long and mutually beneficial relationships.”

“As our economy continues to adapt to the challenges of the 21st Century cyber security will become more and more important. It is therefore extremely encouraging to see the growth of cyber talent in the UK. I am delighted that students from Lancaster University are playing their part in addressing one of the biggest challenges that we will face as a country going forward. I wish the partnership between Lancaster University and Raytheon every success in the years to come.”

Cat Smith MP (Shadow Minister for Youth) Member of Parliament for Lancaster & Fleetwood

Growth and Investment

Raytheon UK’s commitment to knowledge and cyber defence is unequivocal, exemplified by the company’s proven ability to safeguard and protect today’s complex IT networks. Says Daniel: “Nurturing and securing future cyber talent is the key to ensuring our company maintains a strong force of employees with the advanced technical capability to fight back against such criminal attacks.”

In November 2016, Chancellor Philip Hammond announced a £1.9 billion investment known as the National Cyber Security Strategy. Its aim is to work with government departments, education establishments and industry to defend the increasing threat to personal data and critical national infrastructure — such as power grid networks and air traffic control — from cyber attacks, as well as train more cyber security experts.

“Lancaster University is at the forefront of helping supply graduates equipped with the relevant skills and experience, and investments such as this from leading companies like Raytheon are a significant step towards helping to meet future industry demands.”
Raytheon UK is pleased to announce the winners of this year’s SpaRk (Small- to Medium-sized Enterprise Partnerships Advancing Raytheon Knowledge) Competition.

The Technology Partnership plc (TTP), Plextek and Original Perspectives Limited (OPL) have been announced winners of Raytheon UK’s annual SpaRk competition. Each company will receive up to £50,000 grant funding for projects that fall either within Raytheon’s airborne solutions or cyber business areas.

The competition focuses on strengthening engagement and collaborative relationships with UK small- to medium-sized enterprises (SMEs) and universities for the development of innovative technologies. “It’s a flexible business model that gives UK SMEs the opportunity to develop technology with the possibility of it being incorporated into Raytheon UK products or services,” says Dr. Peter Langsford, an engineering fellow within Raytheon UK’s Defence team.

TTP’s cyber-based SpaRk project is about characterising information networks, in particular mature and legacy networks. The project focuses on identifying what information and behaviour can be inferred from purely passive data collection methods. This information is typically associated with low-level network management protocols (ARP, DHCP, ICMP) – but there is an increasing use of multicast service discovery management protocols and methods.

Commenting on the award, TTP’s Tim Palmer said: “Our defence and cyber-related activities are based upon generating innovative responses to difficult and often somewhat loosely defined ‘challenges’, typically within very short timescales. The SpaRk cyber challenge was a strong match, both to our technical capabilities and also to our ways of working.”

The subsequent funding will provide the opportunity for TTP to build upon its existing background / know-how to rapidly generate a proof of principle concept demonstrator for Raytheon.

PLEXTEK
Plextek’s ‘stage one’ airborne solutions project is tasked with reducing the cost and complexity of using varying equipment fits in an aircraft. The project will investigate the feasibility of using Surface Waves to provide a flexible, lightweight means of connecting equipment and sub-systems within an aircraft.

Surface Waves are electromagnetic waves that are confined to propagate along a specially treated surface, potentially providing an alternative to bespoke wiring between sub-systems.

Electronics consultancy Plextek has a long-standing relationship with Raytheon UK and it views the SpaRk initiative as a way of broadening its engagement within the wider organisation. “Working with Raytheon UK provides us access to domain experts, for example within Force Protection, to assist defining project aims and user requirements. Further, we realise that should the research deliver against its aims, Raytheon UK are in a strong position to mature and exploit the technology to market,” says Peter Doig, Plextek’s Business Manager, Defence.

OPL
Building on work done under their stage one project last year, OPL are investigating the scope for increasing the usable bandwidth of antenna structures by using metamaterials.

Metamaterials are artificially produced materials that, in this case, have electromagnetic properties not found in naturally occurring materials. It is hoped that the resulting wide bandwidth antennas will simplify the fitting of new equipment to aircraft to allow them to perform new roles.

“Raytheon has a range of requirements for different equipments and antennas to work as a seamless solution with easy interchange capability, access and knowledge of platforms and their requirements as well as access to complex problems requiring novel solutions. “Original Perspectives have knowledge and experience of designing novel antennas such as hyperband antennas, knowledge of how RF interacts with complex platforms in a range of specialist environments. Combining these different skill sets produces a good team to address key issues from different perspectives this allows both parties to gain an advantage in their respective fields and produce greater knowledge for future programmes. The technologies being addressed could be applied to a range of other wider interests across Raytheon,” says Director of OPL, Jim McNiff.

Launched in 2013, the SpaRk competition has awarded more than £700K to SMEs to date. Congratulating the winners, Raytheon UK’s Chief Executive Officer Richard Daniel said: “When we launched SpaRk four years ago, our ambition was to build strong collaborations with small businesses and universities for mutual benefit, and I am delighted to say we have done just that.”
Raytheon UK Showcases Next-Gen Solutions at DVD 2016

Raytheon UK exhibited at the Defence Vehicle Show from 7-8 September where it demonstrated the latest technological innovations and developments in the company’s mission critical solutions portfolio including Strider™, Hydra™ and GroundEye™. Raytheon experts also demonstrated the company’s APNT Hub concept that provides for Accurate Position, Navigation and Timing in the total absence of GPS/GNSS (Global Navigation Satellite System) signals.

- **Strider™** is a boot-mounted, micro GPS Denied Position and Navigation system that uses several innovations to give outstanding (relative) real-time 3D positional accuracy, even in the complete absence of a GPS/GNSS signal.

- **Hydra™** is an advanced Mobile Ad Hoc Networking (MANET), software-defined, multi-functional device designed to support the unique demands of tactical C4I. It replaces multiple devices to reduce dismounted SWaP requirements whilst combining advanced RF, signal processing and communications capabilities in a low-cost, flexible and adaptable footprint.

- **GroundEye™** is a modular, non-invasive tactical manoeuvre support capability for the real-time detection, confirmation and diagnosis of Explosive Ordnance (EO) hazards, Improvised Explosive Devices (IEDs), mines and other buried/concealed threats.

Raytheon UK Co-Sponsors Schools Aerospace Challenge

Raytheon UK co-sponsored the Schools Aerospace Challenge (24 to 29 July) which saw 16-18 year olds challenged to design a military transport aircraft using the SABRE (Synergetic Air-Breathing Rocket Engine).

Twelve teams of three were selected from UK-wide entries to attend the Aerospace Engineering Experience, a week-long residential course at Cranfield University which included lectures from guest speakers including a test pilot and the RAF. The students were also able to investigate a staged crash site in a ‘day in the life’ of an Aircraft Accident Investigator activity, visit the Airlander 10 – the world’s largest aircraft, go indoor skydiving and take a flight in the Cranfield Jetstream aircraft – a flying engineering laboratory.

The week culminated in the teams pitching their transport aircraft designs in a two-minute ‘Dragons Den’ style brief to judges. The resulting three finalists were Team Aerospike from Bablake School in Coventry, Team Dragons from 1054 (Llanelli) Squadron ATC and Team Venture from Hills Road Sixth Form College in Cambridge. They will present their projects in front of a distinguished audience of experts at an awards ceremony taking place at London’s prestigious Institution of Mechanical Engineers.

The Numbers: Farnborough 2016

Raytheon hosted more than 950 guests during 700 meetings encompassing 70 delegations from 30 countries during the Farnborough Airshow (11-15 July). One of the largest airshows in the world with 1,500 exhibitors, Raytheon’s pavilion featured an immersive cyber demonstration, TX Trainer cockpit simulator and a weapons rack displaying the company’s full range of capabilities.

STEM (Science, Technology, Engineering and Maths) ambassadors from Raytheon UK supported Futures Day – attended by more than 7,000 students – by manning the Raytheon UK demonstration truck and speaking about their experiences working in the world of aerospace and defence.

UPCOMING EVENTS

**Jan 25**
Raytheon UK Burns Night, London

**Jan 23-25**
Defence Geospatial Intelligence, London

**Jan 23-26**
International Armoured Vehicles, London

**Feb 1-2**
MEA (Aviation Power), France

**Feb 19-23**
IDEX, Abu Dhabi, UAE
A WORLD OF INNOVATION

Raytheon innovations help customers in more than 80 countries protect people, secure information, defend infrastructures — and make the world a safer place.

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