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Partner News

Save our seas

IET challenges young entrepreneurs

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Welcome to Partner News

This edition

For any enquiries, please refer to pages 38-39 for contact details.

Mark Organ IEng MIET, **Head of Membership**

Welcome to this issue of Partner News, the magazine for our Partners, by our Partners. In this edition we showcase a few of the initiatives we are embarking on as well as some of the excellent work our Partners are doing in industry, academia and the MOD.

In June, we welcomed the Mayor of London, Sadiq Khan to Savoy Place where he launched his plans for a major expansion of London's electric vehicle charging network. Turn to pages 4-5 to find out more about the plans and why they are so important.

We also highlight the Summer Partnership Event which was held in July in celebration of 10 years of Academic Partners. A record number of guests attended the event to hear a fantastic line up of speakers, turn to page 7 for the details. We also broke the record for the most people ever on the roof terrace!

Earlier in the year, I was lucky enough to attend the inaugural REME Engineering Awards Ceremony to present the IET Award for the Best REME First Line Unit. This event was introduced as part of the REME's drive to encourage professional recognition, something which is close to my heart and we fully support at the IET.

This summer, the Women's Engineering Society (WES) announced the winners of its Top 50 Women in Engineering: Current and Former Apprentices, which showcases female talent across the sector. One winner was Laurie-ann Sutherland Smith from our Enterprise Partner Musk Process Services. You can find the details of Laurie-ann's achievement on page 21.

If you have any comments or would like to submit an article, please contact **partnernews@theiet.org** or tweet us **@TheIET** using the hashtag **#IETPartnerships**.

Mark Organ
IEng MIET
Head of Membership

News

Mayor sets out plans for London's electric vehicles

The Mayor of London launched his plans for a major expansion of London's electric vehicle charging network at IET London: Savoy Place this June.

To tackle the twin dangers of London's toxic air crisis and climate change, the Mayor of London, Sadiq Khan, has brought together the public and private sectors to deliver the electric vehicle (EV) infrastructure Londoners need. This includes commitments by businesses and retailers to transform EV charging provision in London over the coming years.

The London EV Infrastructure Delivery Plan follows the mayor's establishment of the world's first electric vehicle infrastructure taskforce, bringing together representatives from business, energy, infrastructure, government and the London boroughs. The past year has seen more than 140 organisations contribute to the work of the taskforce.

London is at the forefront of the zero-emission revolution with more than 20,000 electric vehicles, 1,700 electric taxis and Europe's largest electric bus fleet. This plan builds on Transport for London's successful rollout of over 175 rapid charge points across the city and a growing network of over 1,100

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lamppost charging points delivered by boroughs in residential areas. This has been complemented by the rollout of the world's first ever Ultra Low Emission Zone, enforcing tough new emission standards in central London which are helping drive companies to electrify their fleets.

An electric revolution
Currently, the rollout of the charging infrastructure is in line with the demand for electric vehicles, but London needs an electric revolution. This plan estimates the number of charge points required in the next five years, based on different scenarios for the growth of EVs and looks at how this can be delivered with less public subsidy and without installing points which are underused or outdated.

Making it easier for Londoners to make the switch from diesel to electric cars is a key part of reducing toxic traffic emissions and realising the mayor's ambition of becoming a zero-emission city. The taskforce, along with other industry partners, will help drive forward a number of initiatives including:

- Installing the next generation of ultra-rapid charging points at London petrol stations later this year.
- Delivering five flagship charging hubs, with the ability for multiple cars to quickly be charged in one place. The first of these hubs will be operational in the heart of the Square Mile by the end of 2019.
- A new 'one-stop-shop' for Londoners to request new charging infrastructure from their local authority in areas of high demand led by London councils.
- Expanding electric car clubs and bringing more vehicles to market.
- New online smart tools to ensure London's energy grid continues to keep pace with demand and to help unlock private sector investment.

A public health crisis
"London's air is so dirty and polluted that it amounts to nothing less than a serious public health crisis," Khan said at the plan's launch, held at our London headquarters. "It breaches legal limits and blights the lives of Londoners, resulting in thousands of premature deaths every year. We're also facing a climate emergency that threatens the long-term security and wellbeing of every Londoner.

"We need to reject the fossil fuels of the past and embrace an electric revolution in London's transport. To truly transform the quality of our air and to tackle the climate crisis, London must move away from petrol and diesel cars towards zero-emission vehicles. I want London to lead the world in this ambition, with all new cars and vans on London roads to meet these standards by 2030, not 2040 as the government is proposing.

> We need to reject the fossil fuels of the past and embrace an electric revolution in London's transport.

"To make this vision a reality we must ensure all Londoners have access to the essential infrastructure required to run and maintain an electric vehicle. This is a massive operation and can only be achieved if the public and private sector come together."

Radical growth in EVs
The plan outlines how London is on track to deliver the necessary infrastructure for a radical growth in electric vehicles, which estimates show could increase from around 20,000 today to over 330,000 by 2025. This will be driven by a combination of new low-emission regulations, a supportive policy at all levels of government and a decrease in the cost of electric vehicles.

"Engineers and technologists will play a vital role in the delivery of this plan – it's a very exciting time for engineers who will be at the forefront of carbon-free transport," notes Colin Herron, a member of the IET's Manufacturing Policy Panel and Managing Director of taskforce facilitator Zero Carbon Futures. "With the current shortage of engineers, we need to consider how we recruit and retain the next generation of engineering talent and upskill the current workforce."

Find out more about the London EV Infrastructure Delivery Plan online by visiting tv.theiet.org/?videoid=13236.

London currently hosts 25 per cent of the UK's electric vehicle charge points – more than any other UK region, with 2,400 public chargers spread over 1,200 locations. Its rapid charging network far exceeds major cities such as New York, Madrid and Amsterdam and the city is now recognised as one of 25 capitals around the world accounting for half of all electric vehicles.

News


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Heriot-Watt
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News

Academic Partners celebrate 10 years of collaboration

On Thursday, 20 June we held our annual Summer Partnership Event at our headquarters, IET London: Savoy Place. Over 170 attendees from our Academic, Corporate, Enterprise and MOD Partners joined us to share best practice and celebrate the 10th anniversary of our successful Academic Partners programme.

CEO Nigel Fine opened the event by outlining the importance of partnerships and how they provide improved access to industry-leading knowledge, events and people. He went on to highlight some of the most important moments from our community over the last 12 months.

Mark Organ, Head of Membership, then spoke about how the Academic Partnership programme began and how it's evolved since its creation in 2009. He also mentioned a few of the ways in which the IET Partnership and Development team facilitate links between our extensive partnership community, such as providing industry speakers for our university-based professional skills lectures.

Next to speak was Dr Peter Bonfield, Vice-Chancellor of the University of Westminster and IET Deputy President. Peter highlighted the discussions he's been holding with industry and academia about further ways they can work together with the IET to ensure engineering competence throughout the industry.

A look back at the last 10 years
We invited a selection of academics from universities across the UK to speak about their experiences of the Academic Partners programme. First up was Dr Misha Filip from the University of Portsmouth; one of our very first Academic Partners back in 2009. Dr Filip spoke about the technician registration programme the university has in place to support students during and returning from industrial placements in attaining either EngTech or ICT*Tech* professional registration.

Another of our very first Academic Partners was Manchester Metropolitan University, and Deputy Head of Electrical and Electronic Engineering, Margaret Fowler, took to the stage next. Margaret spoke about why Manchester Met decided to become an IET Academic Partner, noting the value it has given the university through industrial advisory boards, placements and accreditation.

Finally, Tim Bodley-Scott and Ersel Oymak from University College London (UCL) spoke about the UCL East project (the university's largest expansion since it's inception 200 years ago) and the importance of strategic alliances between industry and academia.

Here's to the future!
The event closed with an extensive networking session and guests were able to enjoy the 180-degree view of the River Thames from our impressive roof terrace.

"We launched Academic Partners at the start of the 2009/2010 academic year, creating a formal platform to increase the IET's engagement with students and support the academic community," says Mark Organ, IET Head of Membership. "I am extremely proud of the team and how successful IET Academic Partners has become.

"We will continue to support our partner organisations while continuously evolving the platform to suit the needs of our community. Here's to the next 10 years!"

> "We'll continue to support our partner organisations while continuously evolving our platform to suit their needs."

All the photos from our event can be viewed online at bit.ly/2T7r7KP.

Please save the date for the Winter Partnership Event, which will be held at IET London: Savoy Place on Wednesday, 18 December.

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Life on Mars

Children believe 'planet hopping' may be a solution to Earth's environmental problems.

With the 50th anniversary of the moon landing recently taking place, research has found that children are looking to space just as much as their grandparents were back in 1969, but for very different reasons. Nearly two thirds (61%) of children are worried about environmental damage to the planet, with 49% believing we will have to look to space for somewhere to live in the future.

Research we conducted amongst children aged six to 16 and their parents shows over half (61%) of children believe climate change issues could mean humankind will leave the planet. In fact, 'planet hopping' might happen sooner than we think, with 48% of children saying a human colony on Mars will be established in their lifetime, while 59% expect that they will be able to visit space on holiday in the future.

'Futureproofing' our children
Worries about the future of Earth are not solely confined to children as 66% of parents admit they are 'future-proofing' their children to ensure they have the engineering skills required to tackle a future threatened by climate change.

In fact, over a third (37%) of parents say they would like to send their children to an extracurricular activity such as a mathematics, coding or science club, with STEM activities proving more popular than music and drama lessons.

Children are also becoming more interested in STEM-based subjects, with our research showing that 33% of under 16s would now consider a career in engineering. The idea of living on another planet in the future has played a key role for nearly half (46%) of children's interest in engineering and technology.

YouTuber, footballer or engineer?
Engineering is now the third most popular profession children would like to work in, with 15% saying it would be their preferred career behind being a YouTuber (18%) or footballer (17%). In fact, of all the careers available in engineering, 16% of children said space exploration would be the number one field they would want to work within.

To help inspire more kids to get into engineering, the IET and Beano teamed up to launch a competition asking children aged six – 13 to re-design an item they couldn't live without in space. The winner was selected by a panel of judges from the IET, aspiring astronaut Sophie Harker and the editor of the Beano.

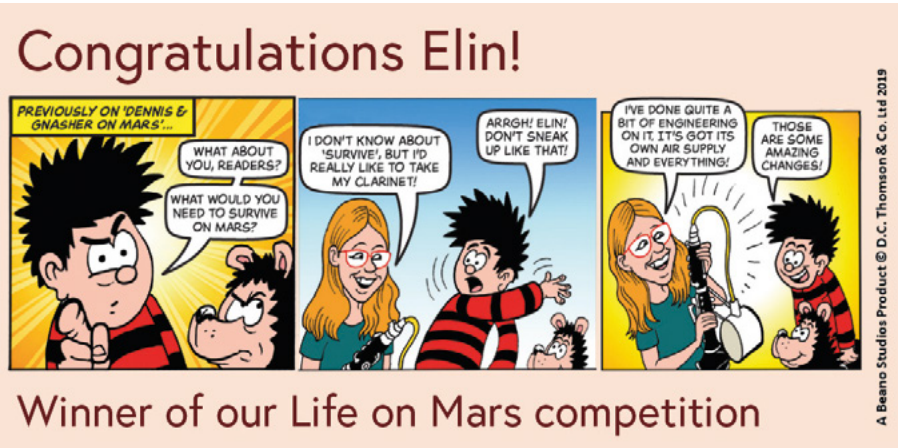
The winner was named as 11 year-old, Elin, an aspiring astrophysicist from Worcestershire who designed a clarinet that she meticulously modified to work in space.

The clarinet was developed into a 3D prototype and sent a distance of 30km to the edge of space where it experienced temperatures as low as -63C before hurtling back to earth at speeds of over 150mph. The clarinet was launched in Ashbourne, Derbyshire and landed over 90km away near Scunthorpe, North Lincolnshire.

Elin attended the launch and saw her design head up above clouds to become the first clarinet in space. The Beano illustrators also transformed her into a cartoon character starring alongside Dennis and Gnasher, which will feature in the 4th September edition of the comic.

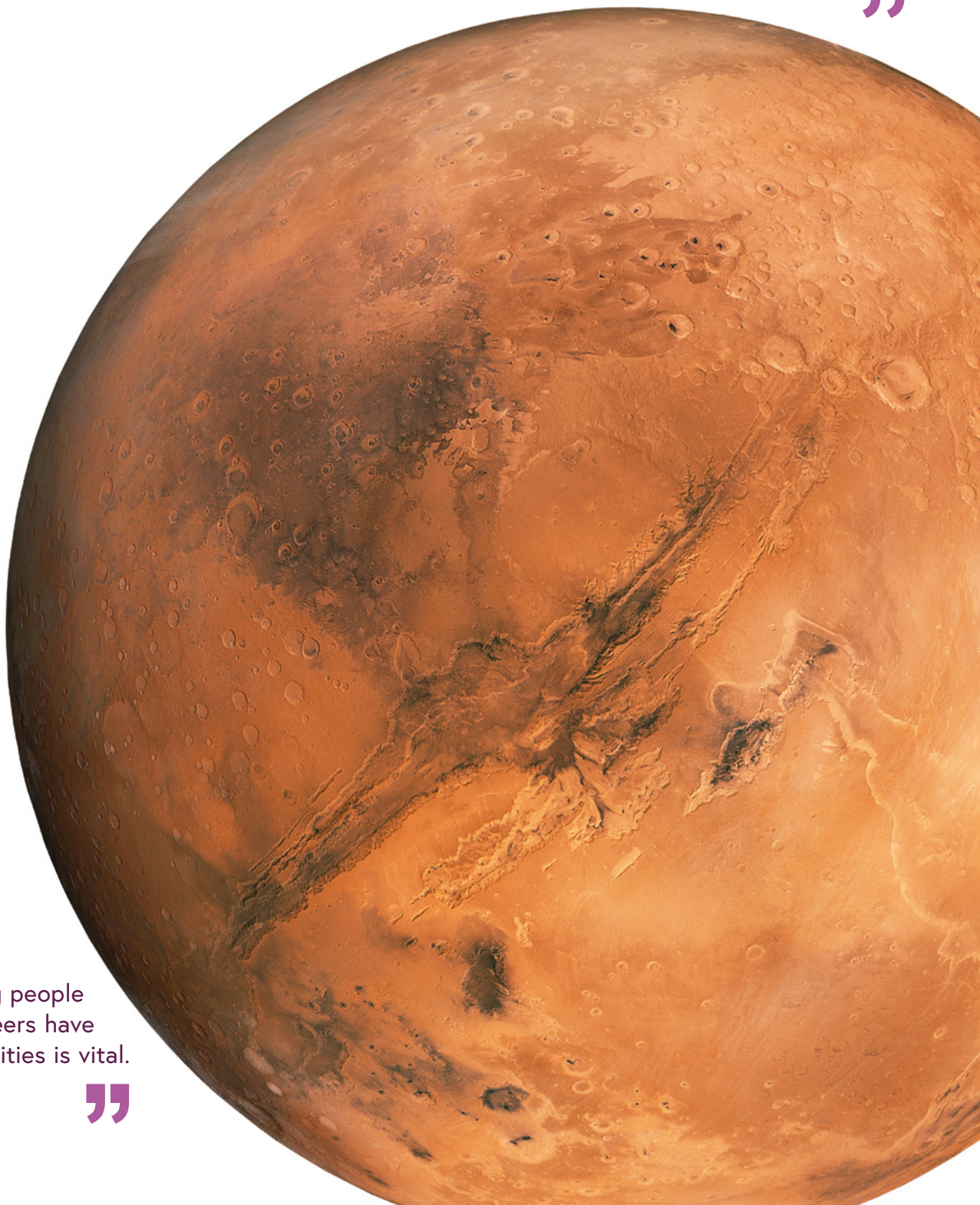
"I was so excited to hear I'd won the competition!" Elin said. "I love everything about space and my dream job is to become an astrophysicist. I love playing my clarinet and would want to take it to space with me – but I realised I wouldn't be able to play it while wearing a space helmet. To make it work in space, I designed it to have an air supply tank which would blow air through the instrument, I also added an amplifier to make sure I can hear the instrument due to the change in air pressure and gravity.

"It's amazing that my clarinet design is the first in space! It was really inspiring to attend the launch and learn from the engineers on site."



News

> The future of space exploration will require the ingenuity of as many young people as possible with the right skills.



> Showing young people that STEM careers have infinite possibilities is vital.

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IET challenges young entrepreneurs to save our seas

The IET Global Challenge encourages young engineers around the world to address a real-world engineering challenge.

Last November we launched our latest Global Challenge competition, which called for young entrepreneurs aged 18-35 to develop an innovative solution to help clean up the estimated 18 billion pounds of plastic waste that enters our oceans each year.

In addition, approximately four trillion cigarette butts have made their way into the waters, leaching hundreds of toxic chemicals and adding to the biggest global threat of our generation.

Partnering with Greenpeace and the GreenSeas Trust, we set two very different challenges, with teams needing to solve one of them to be in with the chance of working with organisations that can make a real difference.

Reduce plastic use

The Greenpeace challenge required teams to think of ideas for reusable packaging designs or new approaches that enable supermarkets to dramatically reduce the need for packaging in the first place.

According to Greenpeace, our oceans are slowly turning into a 'plastic soup', with part of the problem being single-use plastic. This means our oceans are quickly filling up with plastics that will take hundreds of years to break down.

Cleaner beaches

The GreenSeas Trust wanted teams to tackle the trillions of cigarettes currently in our waters – the number one item found on beach clean-ups. Teams were challenged to create a remotely controlled all-terrain machine that can move up and down the beach, picking up cigarette butts from the surface of the sand and collecting them in a chamber or hopper.

Once the entries were submitted, the judging panels, which included two Enterprise Partner representatives, had the unenviable task of deciding who the finalists were.

"I was honoured to be asked to judge this competition and a huge well done to all who've taken part," says Chris Downs, Comau's Joining and Process Manager, Body Assembly. "We're now on the second round of judging and the entries have been really interesting; some teams used highly complex solutions while others were really simple ideas."

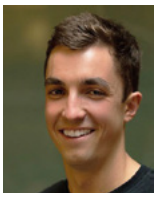
"After becoming an IET Enterprise Partner I felt being a judge in this competition was a great opportunity to get involved with the IET and a global issue," continues Craig Burton, Deputy Engineering Manager at Cepac. "It's been good to observe the engineering solutions which the teams have put together. There has to be a winner in all competitions, but one idea alone will not cure the issues we're facing and therefore it would be great to see a number of these good ideas put into action."

The winning teams from both challenges will be announced this September. They will receive a £500 cash prize, trophy and an all-expenses-paid trip to attend the IET's prestigious Innovation Awards ceremony, where their winning solutions will be showcased.

News

Introducing 2019's IET Postgraduate Award winners

Every year the IET awards five postgraduate scholarships and prizes to outstanding research students. Here are the winners of this year's awards...



IET Postgraduate Scholarship for an Outstanding Researcher
£10,000 to Oliver Vince

Oliver is a PhD student at the University of Oxford's Institute of Biomedical Engineering, researching drug delivery systems and biomedical ultrasonics. His work focuses on combining antibody targeted microbubbles and therapeutic ultrasound to deliver chemotherapy drugs directly to microscopic tumours in the brain.

He plans to continue this research as a collaboration between the Institute of Biomedical Engineering and the Sunnybrook Research Institute in Toronto. The combination of Oxford's Engineering expertise with Toronto's clinical experience presents a truly unique opportunity to develop the world's first targeted therapy for microscopic, early stage brain tumours.

Hudswell International Research Scholarship
£5,000 to Shaimaa Azzam

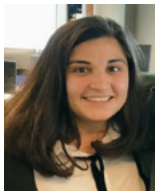
Shaimaa is a PhD student at the School of Electrical and Computer Engineering, Purdue University, USA. Her PhD research is in the field of optics and photonics, investigating nonlinear light interactions with optical materials and devices for applications such as lasers and all-optical computing.

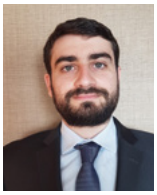
Shaimaa is hoping this will be part of next-generation computing technologies with increased computing power and reduced energy.

Leslie H Paddle Scholarship
£5,000 to John Sandford O'Neill

John is a PhD student studying soft matter photonics at the Department of Engineering Science at the University of Oxford. His research is on laser-based 3D printing techniques for liquid crystal materials, enabling new applications in switchable photonics and soft micromechanical systems.

This scholarship will allow John to develop his novel fabrication technique for use in soft microrobotics and artificial muscle applications and establish new international collaborations, expanding the reach of his research.





IET Postgraduate Prize
Two awards of £2,500 to Saumya Jetley and Ioannis Ierides

Saumya has been studying machine learning and computer vision at the University of Oxford's Department of Engineering Science. Her research programme is Machine Learning and Computer Vision.

Ioannis is an experimental postgraduate researcher in the organic semiconductors and nanostructures group at University College London.

Funding increase
"The calibre of all applicants is extremely high and I'm delighted that the IET has agreed to increase the funding for postgraduate awards," says Professor Jan Sykulski, Chair of the Postgraduate Awards Panel.

"From 2020 we will have more money available, with a top award of £10,000, two awards of £5,000 and four of £2,500. This funding will be available to IET members wishing to expand their research undertaken as part of their registration for PhD or EngD programmes and will be awarded on a competitive basis. I have no doubt they will have a real impact, especially on early career researchers."

> The calibre of all applicants is extremely high, and I'm delighted that the IET has agreed to increase the funding for postgraduate awards.

Applications for our postgraduate awards reopen this autumn, with the deadline for applications 2 April 2020. Check our website to find out more: theiet.org/postgradawards.

MOD

Sultan engineers show their support for INWED 2019

Engineers and technicians at HMS Sultan recently came together to show their support for International Women in Engineering Day (INWED).

Probationary Leading Engineering Technician Marine Engineering Rachel White.

Founded in 1919, the Women's Engineering Society (WES) is a professional, not-for-profit network of women engineers, scientists and technologists offering inspiration, support and professional development.

INWED is an annual festival developed and coordinated by WES to celebrate the achievements of women in engineering and inspire younger generations. Set up in 2014 as a UK event – but now international – it takes place on 23 June: the anniversary of the foundation of WES.

Transform the future
This year the theme for INWED was 'Transform The Future'. As the home of the Defence College of Technical Training's Defence School of Marine Engineering and the Royal Naval Air Engineering and Survival Equipment School, HMS Sultan's primary function is to supply the fleet with engineering officers and ratings of the highest standard.

At any one time the establishment delivers training to over 1,300 Royal Navy and Royal Fleet Auxiliary personnel, providing them with the skills to operate, maintain, diagnose and repair the very latest in technology anywhere around the world.

The Royal Navy is passionate about developing skills for life, offering some of the country's top engineering apprenticeships and accelerated undergraduate engineering apprenticeship schemes.

Accelerated training
Among the apprentices from HMS Sultan showing their support for INWED19 was Probationary Leading Engineering Technician Marine Engineering Rachel White. Rachel is one of the most recent recruits to join the Royal Navy's Marine Engineering General Service accelerated apprenticeship scheme; a fast-moving course made up of theory-based training and exams.

"Prior to joining the Royal Navy, I studied maths, further maths and engineering. This gave me a basic understanding of the subjects, which made me eager to learn more," she says. "What I love about engineering is the element of problem-solving. I've really enjoyed working at HMS Sultan on the theory side, but I'm also looking forward to going out to a ship and to put this theory into practice. I'm really proud to be part of INWED and I'm hoping that this event will encourage more young women to follow a similar career path."

> "I'm hoping INWED will encourage more young women to follow a similar career path."

MOD

REME holds its inaugural Engineering Awards Ceremony

Report by **Lt Col (Retd) DW White**, SO2 Engineering Assurance, RHQ REME.

The inaugural REME Engineering Awards Ceremony was held this April in the Princess Marina Officers' Mess in Lyneham. This event was developed out of a desire to formally celebrate the Corps' engineering and professional achievements.

Introduced as part of our drive to encourage professional recognition, to focus on our role as the Army's professional engineers and to lift the ambition of our soldiers and officers to value their professional skills and knowledge, the winners were announced over an awards lunch.

Commanders ES and other appropriate OF5s were asked to coordinate attendance with the direction of the new Corps Colonel, Colonel Andy Rogers ADC, who was recently elected to the IET's Membership and Professional Development (MPD) Board.

Above: Colonel REME opening the event.
Right: LCpl Glennon, 2 YORKS LAD, receiving the IET Award for the Best REME First Line Unit from Mark Organ, Head of Membership, IET.

"[This event] is not just for those who've been nominated for an award," he said. "This should be a celebration of technical achievement across the Corps this year and I would expect all areas to be represented and mark the occasion."

Invitations were also sent to professional engineering institutions, worshipful companies and defence contractors.

The lunch was attended by 150 guests in total, including the Master General and the Master of the Worshipful Company of Turners. Colonel Rogers opened the lunch and the various awards were then presented between courses. The event was concluded by the Master General who recommended that the REME Engineering Awards Ceremony should officially become an annual event.

Babcock International Group kindly offered to sponsor the entire event as well as provide prizes for the recently introduced REME Apprentice and Apprentice Champion awards. It would be no exaggeration to say that without the support of Babcock the event would not have been the resounding success that it was. I would also like to thank all the other individuals and organisations that offered their support and provided prizes.

> “This should be a celebration of technical achievement across the Corps throughout the year.”

Academic

Academia and industry collaborate on 3D printing degree module

The Dyson School of Design Engineering has worked with industry to develop a skills-focused additive manufacturing degree module.

Academic

Rendering of a prosthetic hand developed by MEng student Lois Liow.

Aimed at Year 3/4 MEng engineering students, the Design for Additive Manufacturing module breaks new ground with its skills-focused syllabus. Led by Dr Connor Myant and Dr Ajit Panesar from Imperial College London's Dyson School of Design Engineering, the module takes a subtly different approach to teaching students about additive manufacturing, or as it's more commonly known, 3D printing.

Dr Myant and Dr Panesar were determined to offer a module that focused less on the technology available right now, and instead provided students with the theory and skills necessary to work in design engineering in the future. A number of industrial partners have been involved in the development of the module and have visited Imperial College London's Dyson School of Design Engineering to speak with students.

"Understandably many students, and even staff, are keen to try out a range of new technologies as soon as they become available, however all the industry trends point to the fact that our students are graduating into a world in which there is no one-size-fits-all approach," says Dr Myant. "I hope students completing this module leave it with a greater sense of how to 'add value' to their design proposals – is 3D printing the right route or are there associated technologies that could prove more economically viable or could curb the amount of problems encountered?"

The module proposal was created at the same time as Imperial developed its ambitious learning and teaching strategy, which sees all Imperial departments taking a fresh approach to the way they teach, by offering authentic learning experiences. Learning opportunities such as those in the Dyson School are a key part of preparing students for a life after university.

Developing prototypes

As part of this module, MEng student Lois Liow developed ERYX, a conceptual anthropomorphic robotic prosthetic hand with varying material stiffness. The hand is made in the image of a real human hand, with rigid bones, flexible ligaments and compliant skin to replicate its feel.

The multi-material design allows the hand to be fabricated as a single print, removing any need for assembly that would otherwise be needed for conventional robotic prostheses.

Lois has been prototyping with 3D printers for a number of years, but has never had the opportunity to learn the theory and mechanisms behind different 3D printing technologies.

"There's been a lot of hype around 3D printing recently and having used a range of printers before, I thought the module would be an interesting experience," she says.

"One of the most challenging tasks facing engineers is having to select the best-suited technology for a specific design or application. Not only does the module cover this, but it also teaches how to optimise and adapt the design for greater benefits, which may not be possible with traditional manufacturing methods."

> It's vital that the next generation of engineers have the skills and knowledge to unleash the true potential of additive manufacturing.

Putting theory into practice

Andrew Triantaphyllou, from the Manufacturing Technology Centre, has been involved at various stages of the module's development.

"Our industrial members have highlighted knowledge in additive manufacture as an important requirement for the next generation of UK engineers. It is vital that they know about this rapidly evolving technology and are trained in the new design processes required for its optimal use.

"I was happy to provide an industrial viewpoint to Dr Myant when forming the blueprint for his module. It's great to see that academia understands the importance of partnering with industry to insure that industry's interests are covered."

Autodesk's Steven Parkinson was also involved in the module's development.

"Additive manufacturing is set to be a major UK industry sector in the near future. It is vital that the next generation of engineers have the skills and knowledge to unleash this technology to its true potential," he says. "Additive manufacturing can open new design spaces previously unavailable in traditional manufacturing. However, to do this engineers need to push design software beyond traditional technical drawings into advanced 3D modelling and computational techniques such as optimisation and generative methodologies, complex geometric forms and automated design processes."

Academic

Loughborough student wins Telegraph STEM Award for defence technology

Engineering student's idea could revolutionise military communication.

L-R: Rachel Riley, BAE Systems' Felicity Fashade, winner Nick Cawthra and The Telegraph's Henry Bodkin.

Final year systems engineering student Nick Cawthra won the defence technology category at this year's Telegraph STEM Awards.

Industry sponsors set challenges for entrants to present their solutions – and over 10,000 entries were submitted.

The defence technology category, sponsored by BAE Systems, asked the question: 'How would the armed forces of tomorrow stay connected in the future and what equipment would they need?'

Nick's answer was to develop a blockchain communications system, allowing different sections of the military to communicate without a central authority and creating an almost hackproof network.

In order to reach the final, Nick had to showcase his work to industry experts at BAE Systems. At the award ceremony in London he also went on to present his idea to Jon Hall, Managing Director of Babcock International Group, Alan Tovy and Henry Bodkin from *The Telegraph*, and mathematician and TV personality Rachel Riley.

"I used what I was developing for my final year project as my competition entry, so it was great to be able to present my idea to industry experts and get their feedback. Winning the defence category against so many other brilliant ideas felt great," Nick says.

Cranfield students win Bombora Wave Power Challenge Cup

'Wave Whisperers' win the inaugural Bombora Wave Power Challenge Cup following a weekend of technical and sporting challenges.

Wave Whisperers is a team of four students from Cranfield University, made up of Jackson Makanga, Ibifubara Tamunoibi Green, Francisco Aura-Camarena and Maryamsadat Mohaddes. They scooped the Bombora Wave Power Challenge Cup trophy by beating other competitors from Pembrokeshire colleges as well as engineering departments from Bath, Cardiff, Plymouth, Southampton and Swansea universities. The competition, which was sponsored by the Welsh Government, took place at Pembroke Dock in southwest Wales.

"It was an epic event providing a great opportunity to showcase our innovative skills with real-life engineering challenges around the design, installation and commissioning of a new wave power extractor device, the mWave," says advanced mechanical engineering student Jackson.

Bombora Wave Power is an award-winning ocean energy company committed to providing clean, renewable electricity. Its globally patented mWave can produce environmentally friendly, consistent and cost-competitive commercial scale electricity in coastal regions across the world.

"As well as having fun on the water, ultimately we're looking to inspire the next generation of marine engineers, celebrate the beautiful landscape in which we are fortunate enough to be based and encourage positive engagement and relationships with industry, academic institutions and of course our local community," says Bombora's Commercial Manager Chris Williams.

"We're delighted that students from our renewable energy course were part of the winning team," continues Professor Chris Sansom, Head of Cranfield's Renewable Energy Systems Centre. "Harvesting wave power forms an integral part of the renewable energy technologies that the students study. Working with business to provide a sustainable, secure and affordable energy supply is fundamentally important to all our lives."

Academic

AI offers insight in the battle against heart failure

Retinal scans studied by advanced AI could warn people living with diabetes if they are at risk of heart failure.

A £12m initiative entitled CARDIATEAM aims to develop a system that can indentify early warning signs of heart failure, with the potential to save thousands of lives every year.

Researchers at the University of Dundee will lead the pan-European project, with retinal photographs examined meticulously by state-of-the-art software in a bid to pinpoint potential health issues.

People living with diabetes are particularly susceptible to heart failure and Professor Chim Lang, the university's Head of the Division of Molecular and Clinical Medicine, says that studying the eyes is crucial in identifying warning signs.

The eyes are a window to the heart

"People's eyes change depending on their health. From one image we can evaluate huge amounts of valuable information. Even small changes in the size of a person's blood vessels could give us critical knowledge about the health of their heart," he explains.

"Both diabetes and heart failure are dangerous, but together they are a lethal combination. The mechanisms of how these two conditions interact are not particularly well known and that's what this project is attempting to find out. If we know what the triggers are then we know how to treat it better."

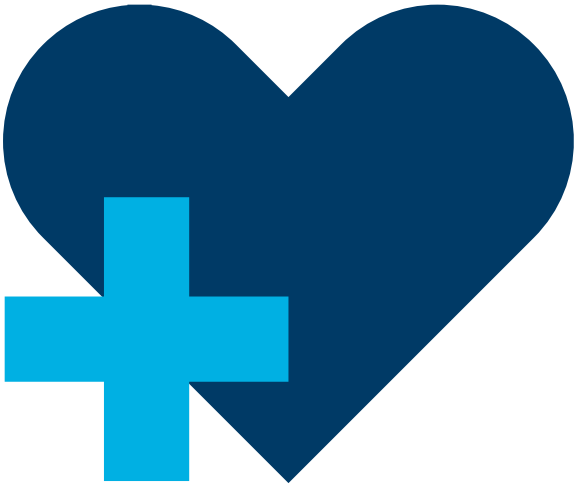
The British Heart Foundation estimates that more than half a million people are on their GP's heart failure register with estimates showing that there are as many as 920,000 people living with the condition throughout the UK.

Pan-European project

CARDIATEAM has been co-funded by the European Union and European Federation of Pharmaceutical Industries and Association. In total, 22 partners from across the continent are involved in the project.

Around 1,600 volunteers will be recruited to supply retinal photographs. These will be analysed by VAMPIRE retinal analysis software, developed by Dundee in conjunction with the University of Edinburgh.

"All diabetics receive retinal screening and the eyes are a window to our heart," continues Professor Lang. "What happens in the eye is a reflection of what is happening throughout the rest of the body. If we can identify any warning signs before heart failure occurs then we could potentially save a huge number of lives."



> If we can identify any warning signs before heart failure occurs then we could potentially save a huge number of lives.

Academic Partners

Correct at the time of going to print September 2019.

Academic

City, University of London signs as new IET Academic Partner

Earlier this year City, University of London became the latest academic institution to join the IET Academic Partner community.

L-R: City, University of London's Hannah Bright-Wood, with Jordan Osborn and Sally Davidson Jones from the IET.

This new partnership enables students and staff within the university's engineering department to access a professional community of engineers and build stronger relationships with industry.

The partnership will further connect the university and its engineering students to the SME community via our Enterprise Partner platform, facilitating research opportunities and practical engineering challenges.

"We're delighted to begin a collaboration with the IET and work together to enhance our students' experience," says Hannah Bright-Wood, Work-Based Learning Advisor at City, University of London.

"We're keen to grow stronger links with the engineering community and look forward to building new networks with both academia and industry. We're sure that our students will benefit from this exciting opportunity."

"We are excited that City has joined the partnership community," continues Jordan Osborn, IET Academic Account Manager. "Its partnership with us demonstrates the value the university places in students being affiliated with a professional engineering institution (PEI) and we'll be working closely to encourage and support students in their journey to becoming professional engineers through closer links with industry."

We actively encourage Academic Partners to develop not only their students, but also their technical staff by providing university-based professional registration support.

We also encourage engagement with the wider engineering and technology community through a varied range of events and increased awareness of opportunities throughout the IET.

Enterprise

Musk engineer announced as one of UK's Top 50 Women in Engineering

This summer the Women's Engineering Society (WES) announced the winners of its Top 50 Women in Engineering: Current and Former Apprentices (WE50).

Now in its fourth year, the WE50 continues to showcase the extensive female talent across the sector. This year its focus was on women currently serving as apprentices or those who'd previously undertaken an apprenticeship.

The 2019 awards attracted a large number of nominations from a broad range of industries. The 50 winners and highly commended nominees came from a variety of sectors including professional services, pharmaceutical, aerospace, facilities management and automotive.

Rising star
One of the winners was Laurie-ann Sutherland Smith, a reliability engineer from IET Enterprise Partner Musk Process Services.

"Laurie-ann is a rising star within the engineering field and an excellent example of how young talent, given the opportunity, training and mentoring can make a major contribution to UK manufacturing excellence," says Wayne Pheasey, Musk's Business Development Director and Laurie-ann's nominee.

Laurie-ann joined Musk in 2008 where she completed an advanced mechanical engineering apprenticeship. She is now working as a reliability engineer employed on some of the UK's best-known manufacturing plants and conducts maintenance improvement projects to bring about a step-change improvement in planned maintenance for critical assets. She recently completed a maintenance engineering and asset management MSc at the University of Manchester.

She has shown great ability and innovation in tailoring best-practise reliability techniques and moulding them into a 'fast-track' methodology to bring about significant improvement in relatively short timescales.

> "Laurie-ann is a rising star within the engineering field and an excellent example of how young talent can make a major contribution to UK manufacturing excellence."

Proud promoter of engineering
Laurie-ann has made a significant contribution to attracting young people to engineering by being involved in initiatives to promote apprenticeships, EngTech registration, STEM careers and women in engineering.

This included producing a strategic proposal and action plan based upon WISE's 10 Point Plan, which she has presented to the Musk Board with the purpose of increasing the gender balance within the business.

Previously Laurie-ann was an appointed board member on the IET's Membership and Professional Development (MPD) Board, acting as the EngTech representative and as the MPD Board representative on the IET's Young Professional Community Committee. She was also a 2011 IET Women Engineer of the Year finalist, and was awarded the Mary George Memorial Prize for Apprentices.

"Laurie-ann is a brilliant example of how an apprenticeship has helped her as an individual and Musk as a business prosper. She is a fabulous role model to encourage more women to consider choosing an engineering apprenticeship," says Wayne proudly.

> We quickly recognised there's a real need for intelligent domain-specific lossless data compression.

Fast forward on data transmission

Oxford Computer Consultants is working with SISP Technologies to commercialise a groundbreaking data compression algorithm, reports **Sally Croft**.

The ability to stream data quickly, cheaply and accurately is increasingly important to both businesses and research applications. Experts estimate that some 2.5 quintillion bytes of data are currently generated every day – and by 2020 that's likely to escalate to 44 trillion gigabytes daily.

A revolutionary new data compression algorithm that will significantly increase data transmission speeds, reduce storage costs and overcome current constraints on bandwidth is being developed by London-based start-up company SISP Technologies Ltd, working with IET Enterprise Partner Oxford Computer Consultants (OCC).

The algorithm was the brainchild of mathematician and financial expert Nicholas Stavrinou, now CEO of SISP Technologies. He shared his idea with software developer Stuart Marlow – now SISP's CTO – who identified its potential application.

Benefits for many sectors

"It's clear we're seeing an exponential growth in big data from sources such as sensors, edge devices and other connected devices, and we quickly recognised there's a real need for intelligent domain-specific lossless data compression," says Nicholas.

"Our algorithm is highly configurable and allows real-time compression across existing networks, with complete retrieval of the material compressed. We believe it offers huge benefits to any markets which depend on smart-sensor derived data, such as satellite and LiDAR applications, as well as in the financial services sector."

With an early prototype written in Visual Basic, SISP approached OCC, which specialises in transforming ideas and research into commercial applications.

"SISP asked us to help them turn their algorithm into a commercial product that they could sell as a service or module," says Rachael Bartholomew, OCC's Head of Client Services. "We worked together to develop code in C and then iteratively improve the algorithm and reach the key performance indicators they wanted in terms of computation speed and ratio.

Squeeze out every last drop

"In some data transmission scenarios, even a tiny difference in the size of a file can make a big difference to your business, so we were keen to use OCC's skills and innovation expertise to squeeze every last drop of compression out of the application."

"OCC has worked flexibly and collaboratively with us and we've felt that they are truly part of our R&D team," continues Nicholas. "An added benefit was that the development work was undertaken by OCC using practices and processes to provide traceability, ensuring both the correctness of the implementation and legal adherence to the patents we are filing."

SISP is now actively negotiating commercial partnerships and hopes to have products available in 2020.

Enterprise

Introducing the Fox-in-a-Box®

Over the past 30 years, Silver Fox has been evolving, developing and manufacturing world-leading labelling products for markets including the energy, oil and gas, power, aerospace, rail, data and telecom sectors.

At the heart of Silver Fox's solution is the so-called Fox-in-a-Box®; made up of everything that's needed to start printing labels.

The software that drives this package offers plug and play thermal printing, saving time and wasted labels. It also automatically updates to the latest release via the web. The same software can also output to any ordinary office laser printer, so the entire range of Silver Fox A4 label types can be printed from the same system.

This professional level software offers graphics, barcodes and QR codes, as well as a host of other useful functionality.

International success
Silver Fox exports its products to many parts of the world. It claims its success in overseas markets – often against stiff competition from the Far East – is due to a number of factors. Including the durability, simplicity and ease of operating its products, the ex-stock delivery of its labels and the way the company works with customers and distributors to ensure they are looked after as part of the Silver Fox family.

Its innovation continues with the new release of its software, which uniquely offers 'roll back' for thermal printing. This reduces label waste each time a user prints a set of labels.

Green credentials
Silver Fox is also unique in another way: through its commitment to the environment. Last year, in part due to its solar panels, it became one of the first carbon neutral manufacturers in the UK.

"It's thanks to the hard work and determination of the whole team that, over a period of years, we've been able to build to this position," says CEO Nick Michaelson.

"However, we don't want to stop there. We're now looking to see if we can become carbon positive. In addition, we're also reviewing how we can reduce our plastic waste."

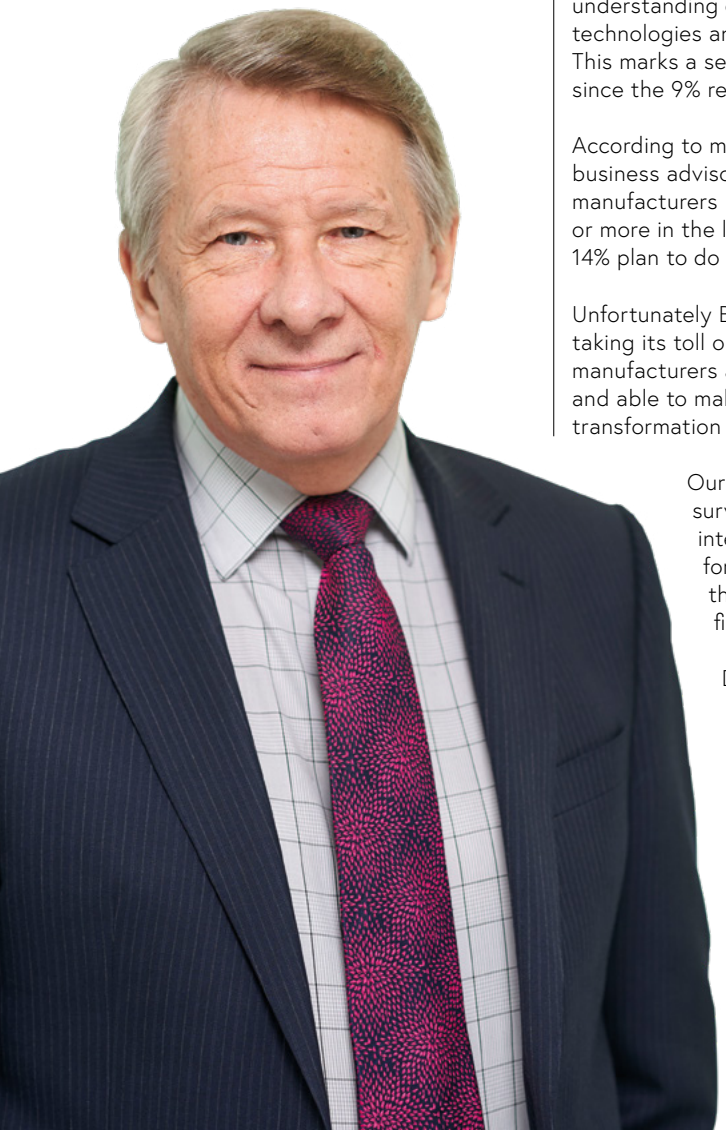
Silver Fox is committed to continuing its manufacturing business in the UK and is currently expanding its team of sales, marketing and manufacturing staff.

As Nick points out, "ultimately the success of our business revolves around the focus and hard work of the whole team. I am delighted to say, we have a great team working here and the results show."

Enterprise

Securing a digital future for UK manufacturing

Tom Lawton, BDO's Head of Manufacturing, shares how digital transformation can help solve manufacturing's productivity puzzle.



BDO's *Digital Transformation Report 2019* shows that almost half (46%) of manufacturers now have a good understanding of industry 4.0 technologies and digital transformation. This marks a seismic shift in attitudes since the 9% reported in 2016.

According to my accountancy and business advisory firm's research, 10% of manufacturers have already invested £5m or more in the last two years, and another 14% plan to do so over the next five years.

Unfortunately Brexit uncertainty is taking its toll on the level of investment manufacturers and engineers are willing and able to make in the digital transformation of their business.

Our Q2 manufacturing outlook survey showed that investment intentions have contracted for four quarters in a row for the first time since the global financial crisis in 2008.

Domestic and export orders are continuing to trend downwards as the artificial boost from Brexit-induced stockpiling dies down. In addition, there is growing evidence that European customers are switching their supply chains away from the UK, while Asian customers balk at the unknowns around future trade agreements.

As a result, investment by the sector is stagnating, and at a time that's particularly significant given that manufacturers need to embrace the fourth industrial revolution (4IR) and digital transformation to secure future growth. We need UK manufacturing to compete on a global stage but are up against countries that are much further ahead in the digital adoption process.

Solving the productivity puzzle

One of the biggest economic challenges facing the UK is our stubbornly low levels of productivity. GDP per hour in the UK increased by just 1.1% between 2008 and 2016, compared with 8.5% in the United States, 7.4% in Japan and 6.5% in Germany.

Investment is crucial to improving UK manufacturing's productivity. When we spoke to manufacturers as part of our report, 85% said that increasing productivity levels was a key benefit to any digitalisation project.

Although a fifth of manufacturers have curtailed their spending plans as Brexit uncertainty takes hold, those that are investing say the benefits transcend the factory floor.

Three quarters (74%) say that digitalisation improves customer relationships, while back-office support functions in marketing, finance and supply chains reap the rewards too.

What is clear is that digital transformation is not all about robots and AI. Major investment will not necessarily

> We need UK manufacturing to compete on a global stage but are up against countries that are much further ahead in the digital adoption process.

represent the best value for money for the typical manufacturer or engineer seeking to digitalise their businesses. Starting small is often where the value proposition is clearer.

More modest first steps can improve productivity without the need to invest millions of pounds. Indeed, investment in cloud solutions (52%), 3D printing for prototyping (46%), modern enterprise resource planning (ERP) and customer relationship management (CRM) software are proving the most popular technologies.

Skills and talent

There is another fundamental barrier for an industry trying to embrace a 'digitally fluent' future – skills. Despite moves to foster digitalisation, UK manufacturers remain hamstrung by the skill set of its current workforce and is calling on the government to take action.

While the government has made some progress with expanding apprenticeship schemes, it has not gone far enough to support the sector, which is such an important part of the UK economy.

Only 21% of manufacturers believe the government is doing enough to help them address the skills gap that currently exists and the vast majority (84%) want them to do more to deliver skills for manufacturing digitalisation.

Manufacturers are expressing genuine concern that the education system is failing to deliver the right STEM talent that will ensure the sector is fit for the future.

To download BDO's *Digital Transformation Report 2019*, visit www.bdo.co.uk/en-gb/manufacturing-digital-transformation-report.

BDO is keen to hear from IET Members about the tools, investment and government incentives they need to support business growth and digital transformation.

To share your views or learn more about BDO, please contact Aman Nirwal at **aman.nirwal@bdo.co.uk.**

Enterprise

TAPPing into a problem – 25 Years of Fundamentals

As Fundamentals celebrates its 25th anniversary, MD **Dr Jon Hiscock**, gives an overview of how the company has gone from 'garage to greatness'.

On the wall at Fundamentals' head office hangs a frame displaying two hand-drawn electrical diagrams with the words 'Does this work – of course it does!'

These sketches were created by Fundamentals co-founders, Chris Goodfellow and my father, Nick Hiscock, to allow two power transformers – installed as standard in every HV substation – to operate and balance in parallel.

The duo developed an electrical control circuit they subsequently named the transformer automatic paralleling package, and TAPP was born.

Having proved that TAPP worked, they presented the prototype to their employer at the time, Southern Electricity. In return they received a large order to build and deploy the TAPP solution across its network.

In 1985 the two colleagues formalised a partnership and Fundamentals was started. To solve a problem, you have to break it down to the fundamentals, hence the company name.

From garage to greatness

To fulfil the Southern Electricity order, the duo set up a production line at the home of TAPP's invention – dad's garage!

The initial TAPP product grew in scale and sophistication and patents were

> "The sky's the limit, but our values remain firmly rooted in the company's humble beginnings."

Enterprise

Nick Hiscock in his garage.

applied. With further development, the more comprehensive SuperTAPP, a tapchanger control device, was launched and Fundamentals quickly became a market leader in the UK and began exporting into Commonwealth regions.

The company was incorporated as Fundamentals Ltd in 1994 and business turnover had grown to £1m in just a few years.

A family affair

I joined Fundamentals in 2004 and a buyout of Goodfellow's 50% share followed. Fundamentals took on more technical staff and made its first acquisition; an electrical contracting business owned by my uncle.

By 2008, payroll had grown to 13 and the company was becoming more involved in tapchanger-related work by virtue of SuperTAPP installation work. Following this, I met MR (Maschinenfabrik Reinhausen) and Fundamentals won the contract to become their agent.

Changing times

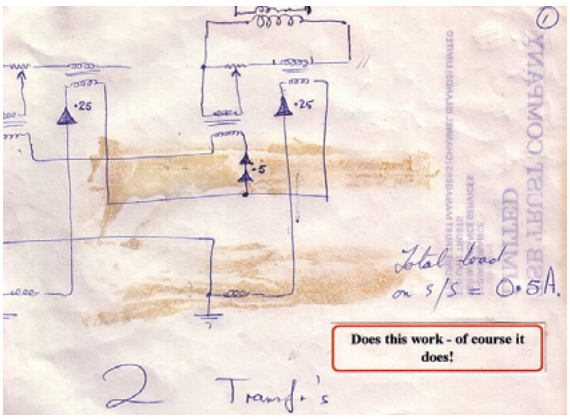
Over the subsequent 11 years, I have witnessed significant change both within the business itself and the power distribution industry generally. Not least, the retirement of my father in 2010 and my own appointment as MD.

For us, aggressive growth has brought a lot of challenges. It's meant growing up: formalising systems, processes, training management and working with client procurement departments and their regulations. We're now under greater scrutiny and having to justify our existence.

We now have over 80 employees including subsidiaries Ferranti Tapchangers Ltd, Powerline Technologies (51% owned) and, most recently, Fundamentals Pty Ltd in Australia, incorporated in 2018. Our growth chart has been pretty serious over the past 10 years – turnover has grown eight-fold which equates to more than 20% year-on-year.

As far as Fundamentals is concerned, the sky's the limit, but our values remain firmly rooted in the company's humble beginnings. I think we're already involved in helping to find solutions to the largest global problem, CO_2, but I want us to do more. It's what we do: solve big problems.

Jon Hiscock with local MP Robert Buckland opening new Swindon facility in 2016.



How it all started – the original design for TAPP.

Enterprise

Condition-monitoring innovators win their third Queen's Award thanks to continued global expansion

High Voltage Partial Discharge recently won the Queen's Award for Enterprise: International Trade – their third Queen's Award in total. Understandably proud of the company's achievements, Commercial Director Rachel Oates discusses how HVPD won the award, and what it means for their future.

At HVPD, we provide market-leading solutions that help to give companies a better view of the condition of their high voltage electrical assets. This enables them to fix or replace their machines based on their condition, improving efficiency and saving money. In a nutshell, that's what we do, and we are trusted by some of the biggest companies in the world like BP, Chevron, Nasa, and CERN.

Specifically, we develop technology that detects something called 'Partial Discharge' in a medium of high voltage asset's electrical insulation. It's still a relatively-young field, which is why, year on year, we invest 30% of our annual turnover into research and development, to ensure we keep our place as leaders in Partial Discharge technology. Our unique solutions have been granted patents in a number of countries around the world, which has helped us to grow internationally. It is for this growth that we were awarded our latest Queen's Award for Enterprise.

As a UK manufacturer, with a 92% export track record, this award is something everyone in the company should be proud of as it is all down to teamwork.

We wouldn't be where we are today if it wasn't for the people that make up HVPD. I've been here since the company was just three years old, and have seen us grow exponentially. We are all passionate about the advancement of Partial Discharge technology in general, and knowledge transfer to our newer members of staff is our ethos. I'm particularly proud of the culture we have built over the years.

Winning this award can only help us to grow even further. We are always looking to break into new markets and industries, and proudly displaying our Queen's Award is such great way to start those all-important conversations about our technology. We call it our Royal Seal of Approval, because that's how it is perceived worldwide.

For anyone looking into applying for a Queen's Award consideration, I would say that the whole process itself can be very beneficial for any business. Compiling the application is an opportunity to reflect on the achievements you have made, and a good way to take stock of the direction you're heading. I would say that you should give the process the time it deserves, and you might get something out of the application itself – as a marketeer at heart, I'd say at least some marketing content! And as for actually winning the award, you can't put a price on being able to wear that prestigious emblem – it opens so many doors for a growing business like ours.

The gentleman holding the scroll and posing with Rachel and our other directors is Vice Lord Lieutenant of Greater Manchester, Paul Griffiths.

L-R: Technical Director Malcolm Seltzer-Grant, Commercial Director & President of HVPD, Inc, Rachel Oates, VLL Paul Griffiths, Director of Systems Development Alex Polley, Business Development and Test Services Director Marc Foxall.

Enterprise

Bacton Gas Terminal, one of Perenco's east coast assets.

Servelec Controls secures Perenco's North Sea assets

Continuous high standards and a focus on safety have led Perenco to extend and expand its support contract with Servelec Controls. This will ensure the oil and gas operator's UK east coast assets continue to operate safely, efficiently and productively.

Servelec Controls has provided service, support and maintenance to many of Perenco's control and safety systems for more than a decade. This track record has cemented the client-supplier relationship as well as given Servelec Controls' expert support team a deep understanding of the clients' assets, systems and needs.

Perenco and Servelec Controls have now extended their agreement for a further two years, covering three onshore sites and 11 associated offshore assets in the North Sea.

24/7 support

Servelec Controls provides Perenco with second-line hardware and software maintenance services. Perenco's own maintenance engineers have immediate responsibility for the systems, with Servelec Controls' Service Hub available at the end of the telephone 24/7/365 to assist whenever required. This is backed up by call-out support should site visits be required.

"Servelec Controls has consistently provided a reliable service – its engineers are highly knowledgeable and have gone above and beyond when we've needed them to," says Perenco's Controls Team Leader, Oliver Tibbenham.

"It has not only kept our operations safe and productive, but suggested improvements when implementing modifications. We therefore want to keep the company on board and even extend the scope of its remit."

Extended scope

The renewal now also includes a managed spares option, which means Servelec Controls holds a supply of critical spare parts specifically for Perenco at its Sheffield site, ideally located midway between the client's sites.

"The service delivered by Servelec Controls is underpinned by an enduring focus on safety, enabled by the use of improved technology, reporting and analysis," says Tim MacLaren, Servelec Controls' Service Delivery Manager. "Our service desk, service delivery management and service management software enable the efficient capture, management, resolution, reporting and analysis of issues, with a specific focus on safety-related system functionality and improvements."

> "The service delivered by Servelec Controls is underpinned by an enduring focus on safety, enabled by the use of improved technology, reporting and analysis."

Legacy and future systems

In addition to the 10-year relationship with Perenco, Servelec Controls also has historical knowledge of the sites, having worked on them under their previous ownership. It therefore has a unique understanding of the various legacy systems in place. Obsolescence management of these systems is carefully balanced by cost-benefit analyses against upgrades in order to deliver the most advantageous solution for the client.

The new contract also includes service provision for a number of future systems, reflecting Servelec Controls' forward-looking approach.

"Continual service improvements are a huge part of how we operate. We hold regular reviews with our clients to discuss progress and plan for any changing operational needs," says Tim.

"We also look to identify potential improvements, both in terms of our service and their systems, in order to best support the client and continue to ensure asset safety and optimised production."

Enterprise

Cambridge Precision acknowledged for outstanding responsible business practice

Cambridge Precision Limited (CPL) is proud to be acknowledged by Parliament as a Responsible Business Champion. This prestigious award, supported by Anglian Water, was launched in 2015 to celebrate those leading the way in responsible business practice.

Corporate Responsibility Minister, Kelly Tolhurst, congratulated all those who had been nominated and particularly applauded those in the top 10 who had made such progress towards sustainability.

Cambridge Precision Ltd, was the only organisation in East Anglia to feature on the shortlist. They received a Regional Award and came 3rd overall in the National list; a tremendous achievement for a niche precision engineering company.

Baroness Greengross said: "Cambridge Precision Ltd, punched well above its weight. It demonstrates that SMEs – as well as much larger companies – can be a powerful force for good. The Parliamentary judges were very impressed by its commitment to achieving rigorous standards in terms of its environmental impact, health and safety; its support for its local community; and its support for suppliers to help them achieve high quality standards."

Tony Murray accepted the award on behalf of Cambridge Precision Ltd. He confessed he was "Blown away to be in such good company as Budweiser and Manchester Airport, and extremely proud to show that an SME can have genuine impact.

"We think big at CPL, and the entire team is ambitious. We want to show that manufacturing and engineering can be forward thinking and this award just confirms we are leading in our field. We work with innovators and technology leaders on world-changing technologies and it is important that we have common values – clean-tech, sustainability, corporate responsibility.

L-R: Kelly Tolhurst, Tony Murray and Jonathan Djanogly MP

I hope that our success inspires others in manufacturing to be ambitious and bold, working towards creating a responsible environment that young people can see as relevant and attractive, with 21st century ethics, technology and practices."

Skills development partnership formed to nurture engineering talent

IN4.0 Group and the IET are working to empower the next generation of digital transformation leaders.

IN4.0 Group is an industry 4.0 training, consultancy and digital transformation services provider based at Salford's MediaCityUK and the University of Central Lancashire in Preston.

The company focuses on nurturing talent to scale businesses through its IN4.0 ACCESS disruptive innovation accelerator programme. Through IN4.0 ACCESS, companies can upskill their future leaders and technical staff to Chartered Engineer (CEng) level, underpinned with a commercial innovation project.

The IET's lifeskills workshops are designed to provide an introduction to key topics relevant to professionals looking to enhance their skill set. These will be incorporated into IN4.0 ACCESS as delegates progress beyond the accelerator and into postgraduate engineer qualifications.

Both organisations share a great desire to empower future leaders, creating the perfect template to succeed in delivering an industry leadership programme across the North West.

L-R: Matt Barber, IET, IN4.0 Group CEO Mo Isap and Matthew Walton, IET.

"Through the collaboration with IN4.0, engineers and technicians will have a clear and structured pathway that is directly aligned to the Engineering Council UK-SPEC," says Matt Barber, IET Senior Partnership Account Manager.

"This ensures all those who take part can graduate with extensive evidence to support not only their technical ability but also the life skills, communication and management competencies needed to be an industry leader."

Corporate

Praising female pioneers

To mark the 100th anniversary of the Women's Engineering Society (WES), Leonardo has released fascinating photos from its archives, which reveal the first women who worked for business.

Opening doors for women

One black and white photo from 1918 shows women working in the Yeovil factory's detail shop while the men were away in the trenches during the First World War. Their story has often remained untold, but Leonardo is keen to acknowledge their contribution, which kept the business moving forward at a time of great change. This change offered women their first chance to access engineering skills, which wouldn't have been available to them had they not been essential to the war effort.

"In researching the lives of female engineers in the UK in the first half of the 20th century, it has become apparent that the defence industries played a huge part in opening doors for women," says engineering historian Dr Nina Baker. "It's important that we demonstrate to girls and young women that, although they as individuals are outstanding, the path they have chosen is no longer exceptional. Women have been contributing significantly in this sector since 1914. The secret nature of the work has often meant that it is hard to know exactly what individuals worked on, but those few whom we do know about were well known and respected."

During World War I over 800,000 women worked in engineering, however the women were expected to return to domestic duties at the end of the war. Many of the women wanted to continue developing their skills and so female pioneers campaigned to retain their engineering status and in 1919 set up WES.

During the Edinburgh International Science Festival, Leonardo's Deputy Head of Electronics, Dr Carol Marsh – who's also a former WES President and current Chair of IET Scotland – joined Nina on stage to talk about the remarkable vision and skills of women in engineering over the past 100 years. They told the stories of fascinating women, many who are unknown to the public, describing their achievements and the influence they've had on our modern world.

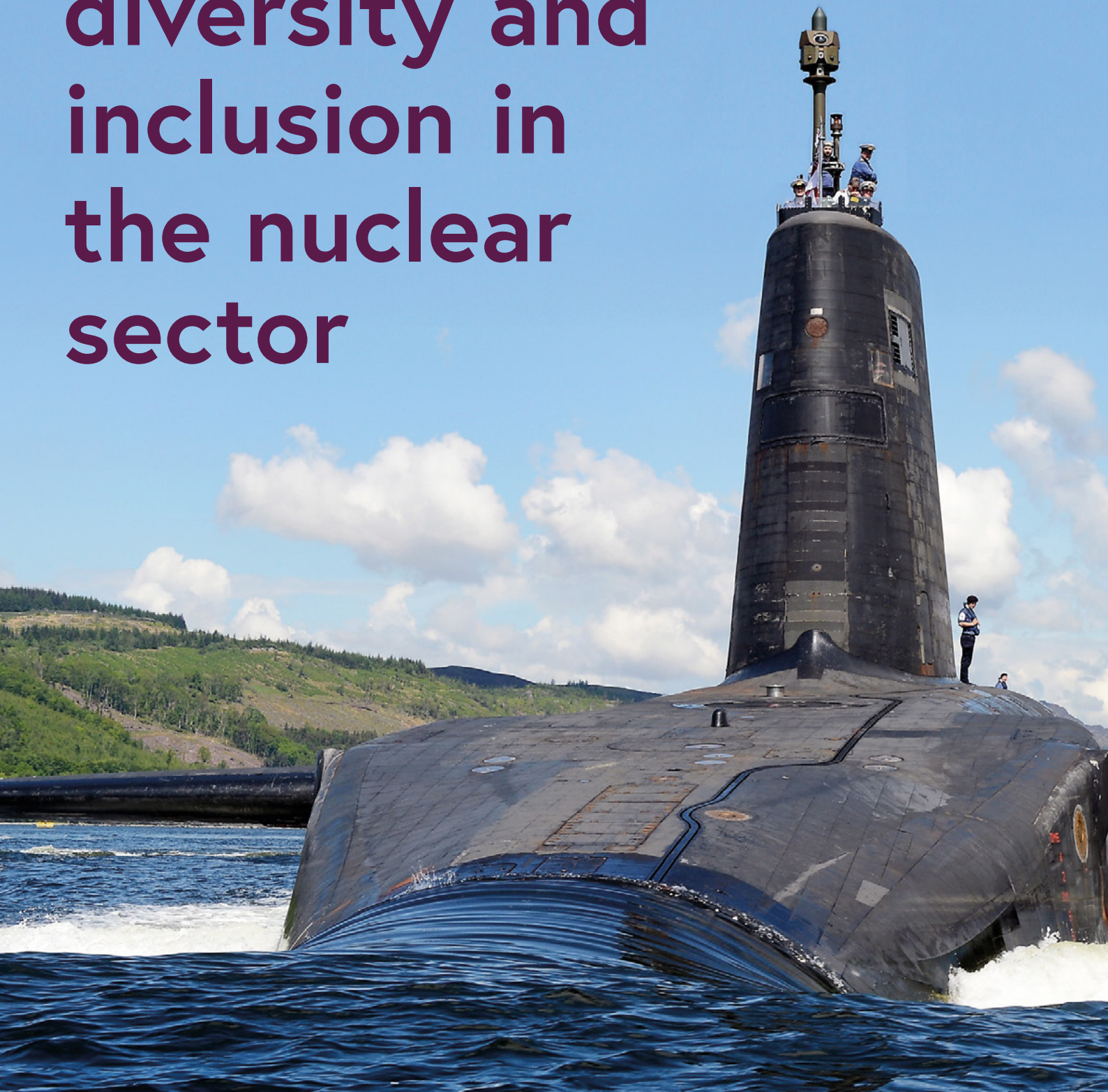
Sharing their stories

The Edinburgh business first built gyro gun sights for Spitfires over 75 years ago in 1943. Leonardo's photo archives confirm that women formed the main workforce of the time, acquiring production and engineering skills that led them to form a solid skills base of female engineers in Scotland.

"It's really important to capture the work of women in engineering and to tell their story. These pioneering women, who fought to be engineers, cleared the path for women of my generation and beyond," Carol says.

Corporate

Promoting diversity and inclusion in the nuclear sector



Corporate

Report by AWE graduate engineers **Hannah Burton, Sunil Dhokia, Sophie Duong, Angus McWilliam,** and **Adam Turnbull.**

For more than 60 years, AWE has supported national security by delivering warheads for the UK's strategic nuclear deterrent. We also support the UK Government by developing innovative solutions to combat nuclear threats.

We are a team of remarkable people achieving extraordinary things. Scientists, engineers and business professionals from a variety of backgrounds work together to deliver our mission and keep our world safe and secure. With some of the most advanced research and production facilities in the world, AWE is a place where you can grow your knowledge with extraordinary challenges, unparalleled responsibility and unique technology.

Supporting the UK's nuclear deterrent
AWE supports the UK's nuclear deterrent programme in a number of ways, one of which is through promoting our talent pipeline to support key skills now and in the future. Graduates and apprentices make up a vast quantity of new recruits, bringing diversity and a wealth of knowledge and skills that AWE helps to develop. Alongside our work in attracting future talent, there are also initiatives and strategies that help shape the direction of the business.

Bridging the gap in knowledge
Paramount to innovation and problem solving, knowledge capture is at the forefront of AWE's priorities, as over 50% of staff have been at the company between 10 and 30 years. The concept of generational diversity is fundamental to retaining, transferring and sharing knowledge to a wider demographic.

As part of this work, AWE has implemented a reciprocal mentoring scheme. This provides a safe and healthy environment in which to learn whilst helping those being mentored to understand AWE's mission. With the mentee providing value to the mentor, it's a clear win-win. Knowledge sharing is encouraged at every level within the organisation, with our nationally recognised and award-winning Skills Academy being one of many examples.

Diversity and inclusion through working groups
Our generational diversity group is one of five working groups designed to support our inclusive culture. Another is gender balance, which is considered all the way through recruitment to promotion and retention. Our membership of Women in Science and Engineering (WISE) has supported this movement, recently improving the company's standing in the WISE Ten Steps focus by 20%.

"I am part of the gender balance working group, which is made up volunteers from across the business," says AWE physicist Josie Coltman. "I joined the group as I have seen first-hand gender imbalance throughout my career and wanted to help create more diverse and inclusive teams throughout AWE by improving the gender balance of those teams."

AWE's disability and neurodiversity working group is a 70-strong collective made up of apprentices through to directors. Monthly meetings, where employees meet and share experiences, have ensured progress towards AWE accommodating a variety of needs.

The group recently worked with colleagues who have responsibility for our site modernisation programme to secure the inclusion of 'quiet areas'; spaces with minimum stimuli to support those who are on the autistic spectrum, and effective disabled access in the latest phase of our estate development. The group plays a vital role in tackling misconceptions around conditions such as autism by highlighting a range of high-profile personalities and showcasing the benefits of a neurodiverse workforce in a high-performing company.

Another group supporting balance and equality is the LGBT+ working group, which established an AWE pride network and is newly registered with Stonewall. Together these working groups introduce real and positive change into the business, leading to a more engaged and diverse organisation.

Continuously improving and encouraging diversity and inclusion
The creation of new working groups also shows AWE's focus on continuous improvement.

Most recently the Black, Asian and Minority Ethnic (BAME) working group was formed. Within the UK defence industry candidates from BAME are underrepresented and recent reports have indicated that those from minority backgrounds face greater challenges in progressing their careers.

> "We are a team of remarkable people achieving extraordinary things. Scientists, engineers and business professionals from a variety of backgrounds work together to deliver our mission and keep our world safe and secure."

A case for change
There is a case for change as diversity of ideas and perspectives that benefit organisations and individuals is much needed. AWE recognises these challenges and aims to ensure wider BAME representation by improving our approach to recruitment. Through engaging with external organisations and bodies, the BAME working group also helps AWE to understand and share best practice.

Whilst there is still a long way to go in terms of diversity and inclusion within the nuclear industry, AWE's working groups are changing opinions, supporting people from all kinds of backgrounds, and enhancing knowledge sharing.

Our commitment to diversity and inclusion will ensure that not only those currently working in the nuclear industry, but also future generations, will have open and progressive attitudes.

Corporate

BAE Systems calls for nationwide effort to develop Industry 4.0 skills

BAE Systems has called for a concentrated effort by industry, government and academia to ensure the UK fully benefits from the digital revolution and Industry 4.0.

According to Nigel Whitehead, BAE Systems' Chief Technology Officer, the defence, aerospace, engineering and manufacturing sectors need to work together and prioritise investment in digital and soft skills, upskilling and supporting supply chains and SMEs.

This is in response to the expected levels of complexity in industrial and business systems and unprecedented demand from technologies such as artificial intelligence.

He also suggests that businesses need to create a more diverse, inclusive and flexible workplace by reflecting different working preferences and lifestyles.

To help address the UK's shortage of engineers, Nigel has called for a nationwide programme of activity to improve the perception of science, technology, engineering and maths (STEM) subjects and careers.

He also advises the engineering industry to consider recruiting more people with highly applicable skills that traditionally are more associated with arts subjects, such as creativity and problem solving.

Future Skills for our UK Business
In a whitepaper titled *Future Skills for our UK Business,* BAE Systems sets out six guiding principles for the development of skills in the UK in an environment of rapid technological change and fierce global competition.

- Create a more diverse, inclusive and flexible workplace for the employees of tomorrow; the UK must attract and retain top class talent.
- Commit to retraining and upskilling; it is vital for innovation and growth that employees continue to learn throughout their careers.

- Prioritise investment in digital, soft and behavioural skills; to give the employees the broad range of technical and people skills needed to succeed in the modern workplace.
- Continue to support suppliers and the SME community so that they can develop skills in the digitally-enabled workplace; successful and innovative partners help the UK economy thrive.
- Continue to improve the perception of STEM subjects and careers; encouraging graduates and young people into a dynamic and rewarding industry.
- Continue to champion vocational training; working with government to ensure training is funded and prioritised.

"I am personally really excited by the opportunities in today's highly connected world and what the future will bring, but we cannot be complacent," says Nigel. "By taking tangible action now and capitalising on the ambition of young people coupled with the UK's traditions and advantages – education, strong legal frameworks, technical innovations and leadership – we can exploit the digital revolution and compete on the world stage."

Corporate

Dave Pickles, Managing Director of Capula.

Capula celebrates 50 years of innovation

Having grown from a six person 'start-up' in 1969, Capula now has 280 employees that develop and implement solutions to enable clients to safely operate and control some of the most strategically important facilities in the UK.

Through the decades Capula's commitment to innovation has the led the way in advanced digitisation. Today its systems control the generation of electricity to meet the energy needs of over 26 million people and protect some of the UK's most critical infrastructure.

A passion for innovation led to the design and build of one of the first programmable logic controllers, LinkOn, as well as a multi-tasking control system called INSTEMATIC, which used bespoke programming language Inscribe.

In the late '80s and early '90s the business began diversifying and became a dominant player in distributed control systems for UK power utilities. More recently, just as markets were starting to become aware of the possibilities of the Internet of Things, it launched OPUS in 2017. Based on PTC's ThingWorx technologies, OPUS connects dispersed assets and data sources, then collates, analyses and acts upon that data to provide true insight and value. The system has the added advantage of being fully configurable within shorter timeframes than would typically be expected in enterprise SCADA systems.

OPUS has broadened the company's reach across the energy sector and beyond, establishing Capula as a digital hub and bringing cost savings to clients and boosting their profits.

"As we celebrate our 50th anniversary, it's fitting that the business is in better shape than it's ever been," says Dave Pickles, Capula's Managing Director. "We're now the systems integration arm of Imtech UK and Ireland, which is owned by EDF Energy and Dalkia and our technologies are far-reaching and widely embedded in major UK organisations."

Having the backing of both Imtech and EDF Energy has afforded the business significant opportunities. OPUS has become embedded within EDF Energy's PowerShift solution and it has also facilitated the energy management and reporting element of Imtech's contract to complete infrastructure upgrade projects for the NHS.

As the UK's energy system is undergoing a transition as it decentralises, decarbonises and digitises, there is increased demand for smarter and more flexible power supplies. To meet future energy challenges, Capula now has an R&D department in its own right, and partners with leading technology companies to adapt new technologies, ensuring innovative ideas are refined, tested and ready for seamless integration into customer projects.

Corporate

BMT Chief Executive appointed OBE for services to maritime industries and diversity

Sarah Kenny OBE, BMT Chief Executive.

Sarah Kenny, Chief Executive of BMT, was appointed Officer of the Order of the British Empire (OBE) in the 2019 Queen's Birthday Honours.

The accolade, for services to the maritime industry and diversity, reflects her long-standing commitment and contribution to the United Kingdom's maritime industries, in addition to her work on STEM and promoting diversity in the sector.

The honour is the latest accolade for Sarah, who was appointed Vice Chair of Maritime UK last December. She is also on the Board of the National Oceanography Centre, the UK Defence Innovation Advisory Panel and a member of the Maritime Enterprise Working Group, In addition, Sarah is also an Honorary Officer of the Royal Navy and an Honorary member of the Royal Corps of Naval Constructors.

"On behalf of the board of BMT, may I say we are thrilled that Sarah has been honoured by the Queen," says Sir John Hood, Chairman of BMT Group. "The award is timely recognition of Sarah's outstanding leadership over many years. We offer her our whole-hearted congratulations."

L-R: The IET's Paul Stephens and Nigel Fine with Aecom's Electrification and Power, Gary Hicks and Associate Director Sri Ram Palakurthi.

AECOM joins the IET's Corporate Partner community

AECOM is a global employer with over 87,000 employees in over 150 countries. Its global network of experts works with clients, communities and colleagues to develop and implement solutions to the world's most complex challenges. Earlier this year it was invited to become an IET Corporate Partner due to its commitment to professional recognition and continuing professional development (CPD) of its engineers and technicians.

AECOM's Professional Head of Electrification Gary Hicks joined IET Chief Executive and Secretary Nigel Fine in signing the official paperwork at IET London: Savoy Place this March. This was followed by the formal presentation of the partnership certificate in June.

"We're delighted that AECOM has signed as a Corporate Partner with the IET. This formal agreement ensures that the company's engineers and technicians will be properly supported in their endeavours to acquire and maintain the skills and knowledge needed to deliver results within their organisation and the engineering and technology industry," says IET Senior Corporate Account Manager Paul Stephens. "It shows AECOM's commitment to professionalism and the development of its engineers and technicians. I'm looking forward to working closely with the company in the future."

AECOM already runs a company-based registration support (CBRS) scheme for its mid-career engineers looking to achieve chartership status, but plans to work with the IET to expand these schemes.

"AECOM takes the lifelong development of engineering excellence very seriously and is delighted to be working closely with the IET to expand this with a series of new CBRS launches are being planned for 2019 throughout the UK and India," says Gary, an IET Fellow. "Paul and I have also been discussing starting a CBRS with my team in Madrid, which is exciting for both organisations as this will be the first positive step into Europe."

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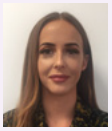

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