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AUTUMN | WINTER 2018

THE QUESTION OF
THE DAY
Should ethics change
with technology

TOMORROW'S
TRAILBLAZERS
Catalyst success for
four new start-ups

A WHOLE
NEW WORLD
It's time to open
up to export

ARE FRIENDS ELECTRIC?

Should we jump onboard
the electric vehicle bandwagon?



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Something to
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the next issue of SO, contact:
parknews@science-park.co.uk

SO...

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The Escape (the-escape.co.uk)**The University of Southampton Science Park Limited**
2 Venture Road, Chilworth, Southampton, Hampshire
SO16 7NP, United Kingdom**SCIENCE-PARK.CO.UK****Tel:** 023 8076 7420**Email:** enquiries@science-park.co.uk

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Welcome to SO

Many businesses view the autumn as a critical trading period. Fresh from summer breaks, it's a time to launch new initiatives, to gain momentum and to make an impact half way through the financial year before what is becoming a widespread seasonal shutdown in December.

But this year is different. It's different because the UK is heading into unknown territory in just a few months' time following our departure from the EU. Businesses that may have otherwise invested in staff, research and development and other growth strategies at this time of year, may well be holding back until economic frameworks and likely outcomes are more clearly signposted.

There is a third option of course and that is to be creative. As innovators, it's something we're used to doing.

It's a time to launch new initiatives, to gain momentum and to make an impact

The task now though is to apply creative thinking, not just to our product and service development, but also to our business models.

VivaMOS is a great example of this – read CEO Dan Cathie's story in this issue's @Gamechangers. The Institute of Export & International Trade article, A New World Order, on thinking globally has valuable advice, as does Talent Spotting which discusses how to make better recruitment decisions in uncertain times. If You Build It, Will They Come? takes the idea of creativity literally, exploring the importance of having a strong brand in the innovation arena – and how to create one.

In September, we welcomed new businesses to Catalyst, our incubation centre for start-ups and early stage businesses. Despite the diversity of the sectors in which they plan to operate, the founders of these companies will be pushing their creativity to the limit as their business plans are scrutinised, challenged and enhanced while they work through the programme. One thing they all have in common is ambition and we wish them luck as they begin their business journeys. Read more in Tomorrow's Trailblazers.

So, although not usually regarded as a time of new beginnings, autumn seems to be seeding new shoots of enterprise. I hope that some of the articles contained in this issue generate ideas for collaborative working and the advancement of new concepts for you too.

P Birkett

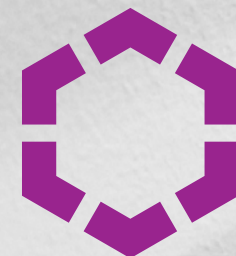
Peter Birkett
CEO, Southampton Science Park.
science-park.co.uk

what?

- SO sees the future differently
- SO connects
- SO asks questions
- SO engages, informs, inspires
- SO celebrates success
- SO shows how USSP shapes society
- SO makes science and technology social
- SO shines on South Coast excellence
- SO where could it take you?

Inspiring events

The centre of the universe? We like to think so! It's certainly where connections will be made, ideas will gather pace and boundaries will be surpassed. Axis, a new conference and events venue, is now open.



AXIS

MEETINGS | CONFERENCES | EVENTS

Axis, Southampton Science Park's self-contained conferencing and events suite, is now available to book, offering an inspirational space to host large scale meetings, workshops and exhibitions.

Suitable for delegations of up to 200 people with flexible layouts, Axis is complete with a reception/breakout area, cloakroom and WCs. Technology-enabled, it is equipped with programmable lighting, high bandwidth hard-wired and WiFi internet access, built-in projectors and screens and a wireless ClickShare system enabling delegates to share materials quickly and easily.

An inspirational space to host large scale meetings, workshops and exhibitions

This brand new facility extends the benefits that the Science Park already offers meeting organisers in terms of a welcoming environment, excellent transport links and catering support. It is positioned conveniently close to the entrance to the Science Park, just minutes from the M27 and M3 with free visitor parking provided. Travelling visitors may like to benefit from accommodation at the Chilworth Manor Hotel, just a short stroll away.

Axis is available for organisations located both within and outside the Science Park. Enquire at www.science-park.co.uk or by calling 02380 763 805

Organisations looking for less space may be interested in one of our many meeting rooms. Please contact us to discuss your requirements or book online at www.science-park.co.uk

Like to talk?

We would like to offer businesses and organisations booking Axis the opportunity to hear from the visionaries based here at Southampton Science Park. If you have an inspirational story or a unique perspective and enjoy public speaking, email the team with your ideas.



**CATALYST**

TOMMO ROW'S TRAIL BLAZERS

Zhonglun Cai, Damian Gardiner, Mark Applin, Jim Wicks and Anoop Pillai all see the future differently. Their visionary ideas captured the imaginations of the Catalyst Centre judging panel and they were invited onto the programme this autumn with the aim of fast-tracking their business development.

Catalyst is an intensive programme of high-level mentoring and commercially focused peer group workshops designed to turn ideas into businesses with real world impacts. Here's how the 2018 Catalyst cohort plan to make their mark.



C Squared Visions

Founder: Zhonglun Cai (otherwise known as Jack!)
www.c2visions.com

What's the big idea? C Squared Visions has created a fast, highly secure, cloud-based system to give manufacturing organisations complete visibility of their production line processes and outputs. With both web-based and desktop user interfaces, it delivers an optimised view tailored to a range of stakeholders' needs.

Who will benefit? Any automated manufacturing organisation could use this technology but initially the focus audience will be medical device manufacturers.

Why is this important? Manual quality control in a production environment can result in variable efficiency and quality standards, both of which potentially impact cost, productivity and profit.

Jack says: "My company is still in the start-up phase with some angel funding. As a principal engineer previously, I decided to apply to Catalyst to give me greater insight into business development and operations to complement my technical ability to develop products."

I was excited and honoured to be accepted onto the programme. It proved to me that we have a business case rather than just an idea. Key to our development will be getting the balance right between developing a product and delivering what customers need while making it profitable."

There is a real buzz and excitement around new companies and it's fantastic to be a part of it!



Optomel

Founder: Dr Damian Gardiner
www.optomel.com

What's the big idea? Optomel has developed radically new optical filters that have the potential to revolutionise any technology that is based on photonics. Flexible, conformable and scalable to very large volumes, the company's products will enable various industries to venture into new applications and expand markets.

Who will benefit? The core customers are likely to be established companies that use and manipulate light in their systems and products. These include those involved in the manufacture of diagnostic devices, imaging systems (specialised cameras), LIDAR, augmented and virtual reality, laser protection and so on.

Why is this important? The photonics industry is an unsung hero – so many applications rely on the use of light which we take for granted, not least the internet and many machines that save lives. The industry contributes almost £13bn to the UK economy alone. Optical filters underpin everything from diagnostic devices in doctors' surgeries through to drone cameras, satellite imaging, autonomous cars and environmental monitoring – in fact, almost any application that manipulates light needs a filter.

However, traditional sophisticated optical filters require very complex processing; they are extremely expensive and have limitations on their performance so that, even in high volumes, some applications render them simply uneconomic. Our approach uses self-organised materials to create similar optical effects but with a simpler, non-vacuum process, meaning that filters can be produced more economically, on a greater scale and with a wider variety of uses.

Damian says: "My background is in the research and development of molecular materials for photonics and, most recently, the commercialisation of new technology for new and varied applications. Optomel is my second business, formed just this year, but it's already a very exciting time and we're growing rapidly. We've secured our first customers and are exploring market opportunities to refine the offering."

The key challenges for us are the amount – and the varied nature – of the work to be done. One day, I could be pitching to customers, the next preparing prototypes or marketing. As a techie by nature, it's really tempting to get stuck into the latest R&D challenge but I need to make sure we never lose the voice of the customer – without their insight into the need that we are meeting, the business will fail.

I felt great to be accepted onto the Catalyst programme. Southampton Science Park really is a natural home for Optomel and Catalyst is excellent for technology businesses. The weekly workshops have already proved to be really helpful discussions with the other participants and the mentors. There is a real buzz and excitement around new companies and it's fantastic to be a part of it! By the end of the programme, I would like Optomel to be viewed as a truly scalable, high volume opportunity: one which simply wasn't possible with existing technology and one that will make a significant difference to people's lives."



Signly

Founder: Mark Applin
www.signly.co

What's the big idea? Signly radically improves access to essential printed information for deaf sign language users. It does so by augmenting print with a layer of sign language on the user's own device: simply open the app, point your device at the Signly-enabled printed material or barcodes and signed content will appear as if by magic. This smart layer of signed or spoken filmed digital information animates, translates and invigorates the user experience as well as making essential information accessible.

Who will benefit? All organisations that produce consumer content and deaf sign language users. In Europe alone, there are 750,000 deaf sign language users.

Why is this important? Many deaf sign language users consider sign to be their first language and English second. Often experiencing lower literacy levels, which can be as low as those of eight/nine year olds, this group is effectively excluded from accessing information in print, online and face-to-face. For example, an undiagnosed deaf three year old knows about 25 words, compared to 700 words for a hearing child.

Signly is already being used by Network Rail and Shakespeare's Globe and it's on trial with Lloyds Banking Group. It has also been a finalist for multiple awards including: the European Social Innovation Competition 2017, Best Financial Inclusion or Outreach Initiative at the Financial Innovation Awards 2017 and the Jodi Awards 2017. This autumn, Mark was named as one of 50 New Radicals by the Observer and the Guardian.

Mark says: "Having worked in the corporate digital arena for 17 years, I often pondered how innovation could make life better. Whilst I do not have a career background in access and inclusion, I do have a passion for communication, digital problem solving, inclusive design and boundless energy and enthusiasm for change!"

Self-funded so far, the next steps are to find investment and a large technical partner to realise our ambition to create a global platform. I also need to build a team and transition the business towards being deaf-led. Oh yes, and we need to build a whole ecosystem too!

I did a little dance round the office (no witnesses to that fortunately) when I was informed that I was joining the Catalyst programme. I hope that by the end of the process I will have a robust, documented strategy, a decent product roadmap and I'll be starting to pitch to potential partners."



YouSeq

Founders: Jim Wicks & Anoop Pillai
www.youseq.com

What's the big idea? YouSeq manufactures high quality consumables for DNA sequencing applications based on Next Generation Sequencing (NGS) technology but with a simplified experimental work flow and unparalleled customer support to effectively deskill the process.

Who will benefit? A wide range, including biomedical scientists specialising in personalised medicine, molecular biology laboratories, diagnostic laboratories and pharmaceutical companies.

Why is this important? The current NGS consumables market is US\$3.6bn, dominated by big multinational companies charging premium prices for their products. The technology is rapidly being used for diverse applications and the market is growing at 20% each year. However, NGS workflow is currently considered to be cumbersome and it requires high level scientific training. Our solution is expected to have a big impact on the product experience across biomedical research and development.

Anoop says: "This is our second business. Both Jim and I were Directors of PrimerDesign, a successful biotech company which we grew to revenues of over £5m with 140 distributors in over 100 countries across the globe. We're currently actively working on market positioning and product development with a view to starting selling by March 2019. We have also recruited our first employee to accelerate our launch strategies and operational capabilities."

We were really excited and thrilled to be told we were coming to Catalyst. Having an open plan office and working with the other companies on the programme will be a great experience. We can share good practices and support each other to achieve our objectives.

Key challenges for us will be to achieve recognition as a reliable high quality manufacturer and supplier of NGS products, establishing commercial channel partners and building a robust team to meet our ambitious growth plans. By the end of the programme we would like to have generated sufficient market interest to fuel our future product development and growth plans."

vivaMOS is a spin-out from Rutherford Appleton Laboratory (RAL). Founded just three years ago, the company has achieved a multi-million pound turnover, won several awards and moved premises three times to accommodate its growth.

The master juggler

We sat down with Dan Cathie, the company's Chief Executive, to find out how he and his team have achieved so much in so little time.

Dan, give us a little insight into your career to date. "I studied semiconductors and microelectronics at the University of Southampton, well renowned for its expertise in this area. After graduating, I went on to work at Philips Semiconductors, also in the city at the time. Not only did this give me an excellent insight into microelectronics, but it also opened up a wonderful opportunity to study an MBA and relocate to upstate New York. I discovered that management was what I really wanted to do so, on my return to England, I ran a large scientific

glassblowing facility in Manchester before being invited to RAL to look into the viability of what is now vivaMOS as a commercial enterprise."

While I knew we had a strong technical advantage with our technology, I knew we could create further differentiation through our business model

Tell us about your market and the problems that VivaMOS technology seeks to solve.

"vivaMOS specialises in the development of high-end large-area CMOS image sensors with a unique combination of high-speed, high-resolution and low-noise performance for a wide range of X-ray applications.

The original idea came out of Rutherford, part of the UK Science and Technology Facilities Council. The image sensors group there believed they could build on the same technology used in mobile

phones to change the way that sensors are used in X-ray applications. The image sensors that form the basis of camera capabilities on today's smartphones have developed at an incredibly fast pace. With each iteration the imaging capabilities are better, faster and cheaper.

What we've done is to use this same core technology but on a much larger scale, creating the ability to provide higher quality live video images with lower doses of radiation, superior resolutions and at much faster speeds. There are multiple applications for this technology. In the medical arena, for example, this capability has significant benefits for healthcare providers in terms of better decision making, greater success rates, fewer repeat hospital visits and ultimately budget savings. It also means better outcomes and lower doses of radiation for patients.

The technology was licensed from RAL and I was employed to take it forward as a commercial operation. I took on our first employee and moved the business out of the government research laboratories in Didcot to Southampton. We now have 12 staff and are actively selling to customers in the UK and internationally, turning over £2m last year."

Southampton Science Park was a good decision – it's been very supportive at enabling our growth

Why did you move the business to Southampton? "While I knew we had a strong advantage with our technology, I knew we could create further differentiation through our business model. Our commercial approach is based on creating very strong long-term partnerships with both suppliers and customers so that we can deliver exactly what customers need by optimising the product for them. This involves mastery of many subjects and a culture of close working relationships.

Southampton has a great deal of expertise when it comes to microelectronics and semiconductors, both through the University and businesses based here. I knew that this local network would

deliver both the connections and talent needed to drive our business forward. While we don't manufacture in-house (we outsource to carefully-selected local suppliers), we do develop the process and methods here because quality is fundamental to our offering and we need to retain tight control – location is key to this.

I looked at a number of locations but Southampton Science Park was a good decision – it's been very supportive at enabling our growth. We started in a small wet laboratory and then moved into office space with a small development lab. We've since outgrown that and have taken on new premises at 3 Venture Road, part of the new conference centre building. Here we have offices, test space and laboratories so we're now excellently set up to grow."

vivaMOS has won a number of awards: Emerging Technology Company, Best Up-and-Coming Company, Best Innovation and Technology and recently New Business of the Year. How important are these accolades? "Awards won't win us business but they are still incredibly important as they recognise our points of difference in the market. As a start-up, you spend a lot of time working to convince potential customers of your credibility and recognition like this goes a long way in this respect. For us, they also demonstrate, not just the quality of our technology, but the quality of the business: it's not just what we do, it's how we do it."

What do you plan to do to capitalise on your success to date? "We're already doing it! We're doing a lot of R&D with the aim of widening our product portfolio which will enable us to address additional, but still targeted, market needs."

And the ultimate goal? "None of the Board feels a need or desire to exit. Our aim is simply to exploit and build on this great technology to create a successful business which offers real value for shareholders and which changes lives around the world."

Looking back, what have you learnt from your entrepreneurial journey that you'd like to share with those who may be about to start out on theirs? "I don't really feel like an entrepreneur – I'm just doing what I enjoy – which is running a business! However I guess I've got two points.

Firstly, focus. What do you want to do and why are you trying to do it? If you have a clear focus you'll be more efficient and the quality of your work will be higher. You'll also get a lot more satisfaction and enjoyment out of working.

And this leads me to the second point which is balance. I am fully committed to growing a highly successful business but I also believe that you work to live, not the other way around. Work is a fundamental part of your life so it needs to give you enjoyment and satisfaction and this will enable you to make the most out of your home life. Working hundreds of miles from home with a family of six children and commitments as a school governor and with a charity, my life involves a lot of juggling and getting the balance right is key to this. You have to make compromises. As much as I enjoy work, I have to stop sometimes. In fact it's often when I'm not working that the best ideas come to me!"

REIMAGINED

Virtual Reality. Augmented Reality. Mixed Reality.
What's the difference and, if you're not into gaming, does it matter anyway?
Here's your instant expert guide to re-envisioned reality.

What is it?

Most people are familiar with the concept of virtual reality (VR): pop on a headset and inbuilt software will transport you into an interactive virtual world in a flash. Augmented reality (AR) works much the same way but with one big difference. Rather than transport you into a fictional world, it 'augments' your real world by overlaying images onto what you actually see around you. Engaging, immersive and potentially addictive (who wouldn't want to escape a soggy grey Sunday afternoon?), AR headset functionality can include voice commands, surround sound, gaze tracking and gesture inputs to create an ultra-realistic experience. And finally there's XR or 'extended reality': a term being increasingly used to cover all kinds of digitally altered reality encompassing VR, AR and MR (mixed reality). As technology comes to market and boundaries are gradually erased, it's likely that this term will be increasingly used.

Why is it important?

Like it or not, AR – much like VR before it – is marching into our everyday lives. There were less than one million VR users in 2014 but, just four years later, there are more than 150 million.

The market is estimated to reach US\$26.8 billion by 2022 fueled by both software and hardware sales. Businesses across all sectors are quickly looking to develop mobile AR strategies to stay ahead of their competition.

How can it be applied?

Snapchat and Messenger introduced AR facial recognition introducing millions of people around the world to its capabilities and encouraging them to experiment. However, it's not currently the consumer market that is driving the staggering market growth: although the creative industries are steadily jumping

on the multi-sensory opportunity that AR offers, tech innovators are increasingly finding ways to make it increase efficiency – as well as entertain.

AR is changing the art world by enabling artists to fuse physical art with digital content and galleries to create almost unimaginably rich entertaining and educational experiences. A recent exhibition at the Queens Museum in New York for example, used AR to educate the public about climate change. 'Wake and Unmoored' designed by artist Mel Chin, made visitors feel as though they were under the ocean with ships sailing over their heads as a result of rising sea levels and unchecked climate change. Museums and galleries worldwide will undoubtedly follow.

In retailing, leading brands are already investing in the development of AR software to further personalise customer shopping experiences. Ikea, for example, uses the technology to allow customers to scan their room and see furniture in 3D in that room. From there, they can reposition, experiment with colour, sizes and models to ensure that they achieve the look they want before even setting foot on an Ikea escalator. It's easy to see how food retailing, overlaid with AR product aisle locations, pricing, health and nutrient information, and even recipes could assist shoppers right now. Advertising that follows suit is a given.

When it comes to travel, American Airlines has developed an AR prototype which overlays detailed information over real-time surroundings, helping passengers to navigate their way to their departure gate, duty free shop or restaurant. Underground and overground train stations with live arrivals and departure information could have an immediate impact on public transport users in a similar way.

Where will it go from here?

The simultaneous development of hardware and software is critical to the evolution of AR. Until headsets become widely available and affordable to the masses, it is likely to remain niche for personal use or deployed as a service in public spaces. In the usual chicken-and-egg scenario, until there are sufficient AR apps why would any individual or organisation invest in the hardware?

While AR on mobile devices is beginning to be used, the focus is on wearable tech with many players working fast to bring AR glasses to market first. This will make AR a more seamless experience and, perhaps, signal the beginning of the end of smartphones.

As is often the case, Apple is leading the way. Apple AR Glasses are rumoured to be launching in 2020 following its acquisition of a company that specialises in making thin and light lenses for augmented reality headsets. At the same time, it has responded with the release of ARKit, an AR software development platform for iPhone and iPad. ARKit promises developers an easy way to create captivating AR experiences for Apple consumers.

The AR market is estimated to reach
US\$26.8BN
by 2022

And the user experience? While the technology already lets you see, feel and hear like never before, touch, smell and taste will surely follow. One headset already simulates smell and effects like heat, water mist, vibration and wind.

It's reality – but not as we know it.

OPEN TO EXPORT COMPETITION

DEADLINE TO ENTER: **FRIDAY 25 JANUARY 2019**

The 2018/19 Open to Export Competition is open for entries: a great opportunity for SMEs to boost their international strategies in the year of Brexit.

The Institute of Export & International Trade has launched its annual Open to Export competition – an opportunity for UK SMEs with less than 50 employees to create an export plan and win a cash injection, along with additional support, to help them put it into operation.

Open to Export is designed to help new and inexperienced businesses prepare to sell overseas by giving them vital access to online information, support and advice – at no cost whatsoever. This includes introductory guides to all the key steps of export, market guides and a comprehensive webinar programme.

Companies are asked to enter online using the Export Action Plan tool on OpentoExport.com. This intuitive online planning tool takes you through 5 key steps to building an export strategy in a systematic way, from selecting a market to delivering

products or services to new customers. It is simple to use and works by asking you to complete tasks and set actions, helping you to establish what you need to know and do to start selling overseas. Once you have completed the steps, you will generate a valuable action plan to take to investors and business advisors.

The deadline to enter is Friday 25 January 2019.

Ten shortlisted companies will then be invited to a showcase final at the World Trade Summit for the South of England: this will take place at Southampton Science Park on 27 February 2019.

Since launching the competition we have helped hundreds of SMEs to take their next steps in export

Announcing the competition, Lesley Batchelor OBE, Director General of the Institute of Export & International Trade, said: “We are delighted to now be launching our 10th Open to Export competition. Since launching the competitions in 2015, we have helped hundreds of SMEs both home and abroad to take their next steps in export. We’re now looking forwards to helping UK SMEs to fly the flag overseas.”

OpentoExport.com

In September 2018 the value of exports (EU and Non-EU) was

£32.3 BILLION

source: www.uktradeinfo.com



Step it up

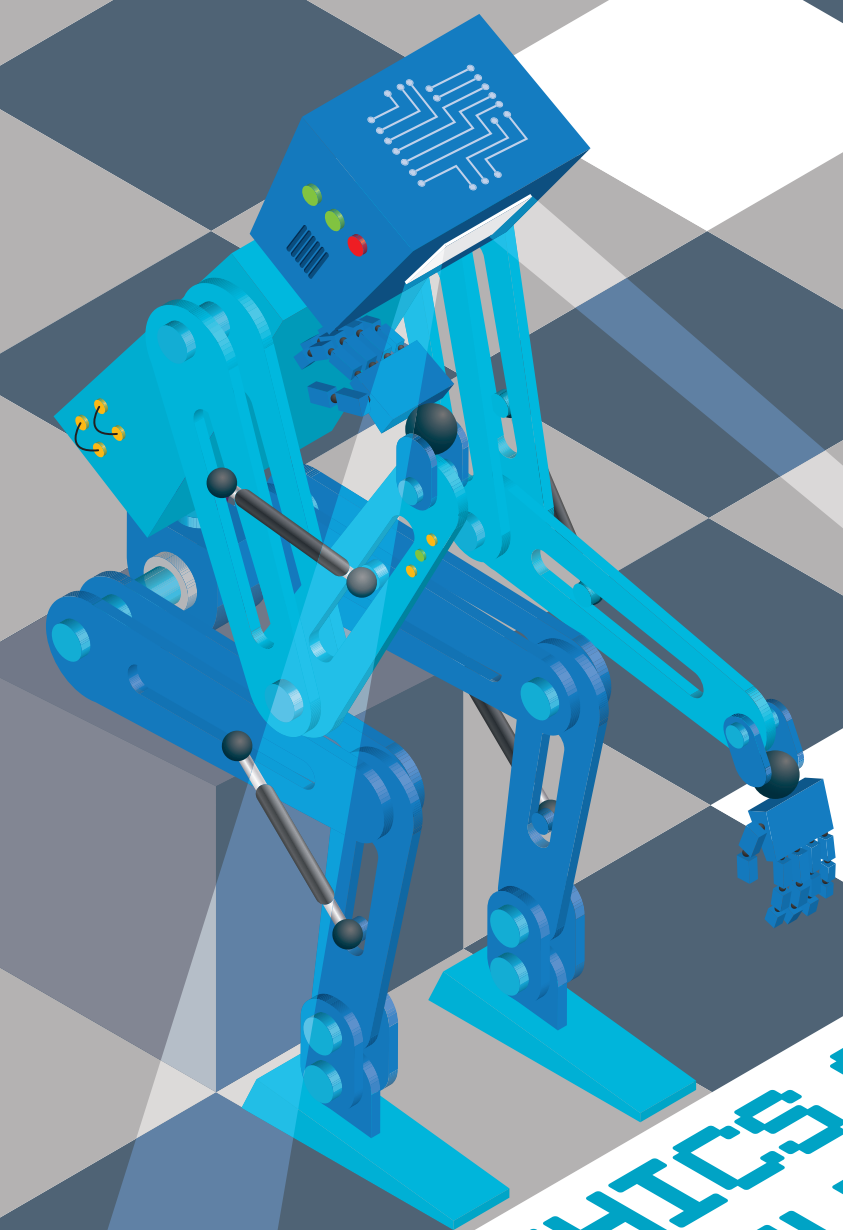
Have you been offered a place in next year's London Marathon? Or perhaps you want to make sure you look fabulous in your new party dress? Or maybe you simply just like to run! Whatever your motivation, Southampton Science Park's 72 acres and surrounds are a great place to train.

Here's a 10k route which'll have you heading for the finish line in record time. If you use Strava, follow the web link to map the route.

10K Route

Approx 10K Run (Road and Trail route): [strava.com/routes/12892782](https://www.strava.com/routes/12892782)

Start at The Innovation Centre. Head out to University Parkway and follow the road through the gate on to Chilworth Drove. Head right and over the M27. Take the first right and follow the road round and past the equestrian facility on your right. After 200 metres, the road becomes a trail path. Continue to run for another kilometre. The path curves to the left. At this point take a left until you reach the edge of the golf course. Follow the perimeter around to the left. At kilometre 4, you'll take a short path through the golf course itself. As you pass the carpark on your left, take a left and head down towards the Avenue. Take a left once you join this and continue back to the Chilworth roundabout. Staying to the pavements, follow the A27 for 2.5 kilometres to the entrance of the Science Park. If you head back to The Innovation Centre now you'll complete the 8K loop. To the 10K route, turn right up the Chilworth Manor driveway. Follow this round and past The Club back onto the Science Park. Take a right down to Benham Campus. Loop around the roundabout at the bottom of the Science Park and make the final push up the hill back to The Innovation Centre for a refreshing drink at Lattes! Congratulations on completing your 10K!



SHOULD ETHICS CHANGE WITH TECHNOLOGY?

THREE VISIONARIES DEBATE THE QUESTION OF THE DAY



Professor Richard IG Holt

Professor in Diabetes and Endocrinology Human Development and Health, Faculty of Medicine, University of Southampton

"Ethics has been defined as 'a set of concepts and principles that guide us in determining what behaviour helps or harms sentient creatures'. Biomedical ethics is founded on four key principles which have endured since the time of Hippocrates: respect for autonomy, non-maleficence, beneficence and justice.

How these principles are applied, however, has changed, even within my own professional lifetime. Ethical concepts are not absolute but based on individual and societal values that evolve with time. Abortion and euthanasia are two areas where attitudes and ethical thinking have changed, at least in some countries.

Ethical concepts are not absolute but based on individual and societal values that evolve with time.

Technological development has allowed modern medicine to do things that our forebears could never imagine – in vitro fertilisation and organ transplantation to name just a couple. Each example brings new ethical considerations. With IVF, is it ethical to manipulate the human genome to prevent genetic disease and what is the status of non-implanted 'spare' embryos? Death was redefined to allow organs to be taken from recently deceased people while the risks to a living donor had to be balanced with the benefits for the recipient.

A description of these ethical issues is beyond this article, but both cases illustrate how ethics has responded to changing technology and will continue to do so."



James Otter

Royal Society Entrepreneur in Residence, University of Southampton

"Ethics are key to maintaining a civilised, sustainable human society. Without ethics and their associated moral and social standards, which are often implemented through laws and religious rules, society comes under strain, often leading to backward progress.

Not surprisingly, ethics have evolved over time and this evolution has been largely driven by technology. Consider the established behaviour in warfare: the protection of heralds and messengers in medieval times, the various codes of honour respected during the Napoleonic period and the Geneva Convention of modern times, which at least endeavours to set out acceptable treatment of prisoners of war.

However, the pace of today's technological change is much faster than this gradual evolution of ethical standards.

Some would argue that the major technological breakthroughs over history and up to the 1960s are fire, agriculture, wheels, ocean going ships, steam power, electricity and the invention of the silicon chip. However in the last two decades these changes have been joined by a fleet of major changes which include low cost computing, mobile telephony, the internet and gene editing.

Ethics change and adapt to emerging technologies, but in to-day's fast changing world ethics are not keeping pace with the changes. This can be seen in current phenomena, such as internet trolls, populist and authoritarian politicians decrying the need for 'experts', emotional reactions to GM crops and gene editing, and some would also include the Brexit referendum and an increasing tolerance of massive social inequalities.

As responsible citizens we should always all ensure that we are making our own contribution, however modest, to maintaining civilised, ethical standards. This is even more important in these times of tectonic social, political and technological change."



Frank Ratcliff

Associate Director of Industry and Enterprise, Wessex Academic Health Science Network

"The immediate response has to be 'no'. Surely 'right' and 'wrong' were the same when new technology meant a better stone axe?

But technology gives us new situations, and new dilemmas. Before we can relax whilst a driverless car takes us for a weekend away, someone will have to programme that car to make a choice when things go wrong; that may mean choosing who to hit in a no-win moment. That's an ethics question, not a programming question.

Surely 'right' and 'wrong' were the same when new technology meant a better stone axe?

Similarly, new situations will arrive in healthcare. We cherish clinical confidentiality, but we want the best treatments. If better treatments could come from a machine learning what had worked before, across a whole population, would we be comfortable donating our clinical data to help strangers? And in the field of genetics and genomics, would you take a diagnostic test for a condition that might affect you in the future? Would you want to know? Would you share the result, or even the test, with siblings or children who might also be affected by your result?

The principles of what is 'right' or 'wrong' may not change with new technology. But how ethics are applied, by whom, when, and for whose benefit will have to be publicly debated as new technologies shape the decisions we have to make.

These views are my own."

READY TO MOVE?

At Southampton Science Park we give companies firm footholds on which to grow and prosper and we work with them throughout their journey. We currently have opportunities for new companies to move into our high quality office space in Epsilon House and Gamma House.

Epsilon House & Gamma House

Epsilon House and Gamma House are two storey office buildings occupying a central location within the Science Park campus. The ground floor foyers provide access to the open plan ground and first floor office suites. The accommodation has been finished to a high standard including recent upgrading of the buildings' fabric, raised floors and integrated heating systems. Male, female and disabled WCs are provided on each floor, with the ground floor also providing shower facilities. Epsilon House also benefits from a community kitchen on the first floor. Both properties are set within attractive landscaped surroundings with the benefit of car parking.

Leases that flex with business needs? Tick. Accessible yet inspirational location? Tick. Vibrant entrepreneurial community? Tick. Access to a world class graduate talent pool? Tick. A prestigious address that speaks volumes around the world? Tick. Get in touch to find out more.

Key features

- Fully refurbished open plan accommodation
- Good natural light
- Modern communal kitchen on first floor (Epsilon House only)
- Site security and CCTV
- Fast broadband
- Superb range of on site facilities

Gamma House	Sq m	Sq ft
Ground floor office suite	356	3,830

Epsilon House	Sq m	Sq ft
D1	74	796
D2	87	936
E1	109	1,173
E2	46	495
O	108	1165
P	71	765
S	47	510

Find out more

02380767420
enquiries@science-park.co.uk
science-park.co.uk

ARE FRIENDS ELECTRIC?

With transport responsible for over 20% of energy-related carbon dioxide emissions globally (and an expectation that this will reach around 50% by 2050), policy makers see cleaning up the car industry as the solution to one of our biggest environmental challenges. But will jumping onboard the electric vehicle bandwagon deliver on all it promises?

More than

150,000

plug-in cars currently registered in the UK

It's forecast that
54%
of all new vehicles will
be EVs by 2040

Electricity will be the dominant
form of fuel for all new cars sold
in the UK as early as 2027

EVs in the Fast Lane

From cabs and buses to rickshaws and bikes – and even Formula E racing cars – transport is becoming increasingly plugged in. Bloomberg New Energy Finance recently estimated that there are already four million electric vehicles (EVs) on roads around the world, half of which are in China. It forecasts that EVs will account for 54% of all new vehicle sales globally by 2040.

Alongside Norway, the Netherlands, France and Germany, the UK is one of Europe's top EV markets: in May 2018, there were more than 150,000 new registrations for plug-in cars here, compared to just 3,500 five years ago. Electricity is expected to be the dominant form of fuel for all new cars sold in the UK as early as 2027.

There are four key elements driving people to switch on to electric vehicles.

1. Firstly, there is legislation, reflective of the government's obligation to cut emissions by 80% before 2050 in accordance with the 2008 Climate Change Act. £1bn has been set aside to support the take-up of Ultra-Low Emission Vehicles (ULEV) including financial incentives in the form of generous purchase grants for individuals and tax rebates for company fleet owners. Even the most devout petrol heads will be forced to succumb by 2040 when registering new petrol and diesel vehicles will be prohibited. The financial incentive clearly works: China has exempted electric vehicles from purchase taxes since 2014.
2. Second, there have been technical advances in car design that have gone a long way to allay consumer concerns around battery life and driving range on a single charge. Compared to petrol or diesel cars, most EVs have a relatively short driving range of around 150 miles but this is improving with each iteration. Replacing liquid electrolyte batteries with solid state materials is the key to holding more charge.
3. Next, there has been a major push towards creating an effective charging infrastructure. By January 2018, the UK had more than 14,000 public charge points (up 44% year on year) and 99% of motorway services are now able to cater for EVs. The technology here is continually improving too. The latest high-power charging systems can charge at around 350kW – which gives 190 miles off a 20 minute charge.

The public charging system alone will not suffice though – the infrastructure will need to encompass domestic and workplace charge points as it is expected that most drivers will charge their cars overnight at home or during the day at work. Business owners and housing developers may need to consider this in their future planning. From a consumer point of view, waking up to a full battery every morning won't cost the earth. Installing a home charger costs less than £300 and, at an average overnight electricity rate of 13p per kWh, fully charging a 30kWh Nissan LEAF will cost just £3.64 and provide a driving range of around 115 miles.

4. Finally, but by no means least, coupled with increased environmental consciousness, there has been a much needed image boost around EVs in the minds of the public. Once the stuff of science fiction with a huge price tag, being unable to afford a Tesla or not having a desire to drive a Nissan are no longer barriers to purchase as premium brands like BMW, Lexus and Porsche all now offer affordable yet classy EV options. Interestingly, these manufacturers have been collaborating on their innovation effort too, working together to create an ultra-fast pan-European charging network.

Government obligation
to cut emissions by
80%
by 2050

Electric vehicles emit
66%
less carbon dioxide than
internal combustion
engine vehicles

Technological innovation already
has the answer to many of these
challenges. The question is: which
businesses will capitalise on the
vast EV opportunity?

Green Means Go

So far so good, but will electric vehicles have the desired impact on the environment?

On the face of it, the benefits of EVs are clear. EVs generate much less air and noise pollution. Virtually silent and releasing no exhaust air pollutants, the many UK towns and cities currently suffering from high levels of air pollution could benefit greatly.

Electric vehicles emit 66% less carbon dioxide than internal combustion engine powered vehicles. Of course, there are emissions associated with the power plants generating the electricity to charge EV batteries but consumers and business owners could offset this by switching to competitive renewable tariffs.

The rollout of smart metering also has a part to play here and indeed, it could offer an income stream through vehicle-to-grid technology, which provides demand responsive services to the power grid. In this way, EVs which are not in use can feed electricity from their batteries into the grid during peak hours, and do most of their charging at night when there is unused generating capacity. When used in combination, these efforts could have a major impact on an individual's or a business's environmental footprint.

When it comes to fuel costs, there's an immediate saving. On average, an EV will cost just 4p/mile in comparison to petrol and diesel vehicles which typically range between 6.5-11.5p/mile. EVs are also a lot cheaper to maintain as they require relatively little servicing, mainly because they have considerably fewer moving parts than an internal combustion engine – no expensive exhaust systems, starter motors, fuel injection systems or radiators. According to Go Ultra Low figures, shifting to an EV fleet could make whole life cost savings of around £1,400 per vehicle per year.

Roadblocks to Progress

While green definitely means go, the electric vehicle market continues to face barriers to growth. While EVs seem a world apart from fossil-fuelled vehicles, many of society's problems will remain unchecked.

When it comes to public health, while there are undoubtedly tangible positive impacts in terms of lower pollution, switching power sources will not solve the problem of sedentary lifestyles,

a lack of physical activity and the impacts of an overweight generation on the individual and the State.

All vehicles require civil infrastructure in the form of roads and parking zones – a planning headache in most cities around the world already way behind the curve in managing congestion. Vehicle-free zones are emerging (in Copenhagen, bikes now outnumber cars in the city's centre and many other cities, including Oslo and Chengdu, are also on their way to being free of cars) but how will the public at large feel about not being able to drive where they wish when they have already 'done their bit' by purchasing an EV?

Charging infrastructure, while rapidly improving, will require significant investment to roll out sufficient charge points to satisfy demand and it's unclear who will pay for this: the car manufacturers or the energy providers. Even China, which has the most public charging stations of any country, is a long way short of its target of 4.8 million by 2020. Few national grids or energy providers are prepared for a scenario in which millions of people all attempt to recharge their car batteries at peak times, like early evening and at weekends.

99%
of motorway services are
now able to cater for EVs

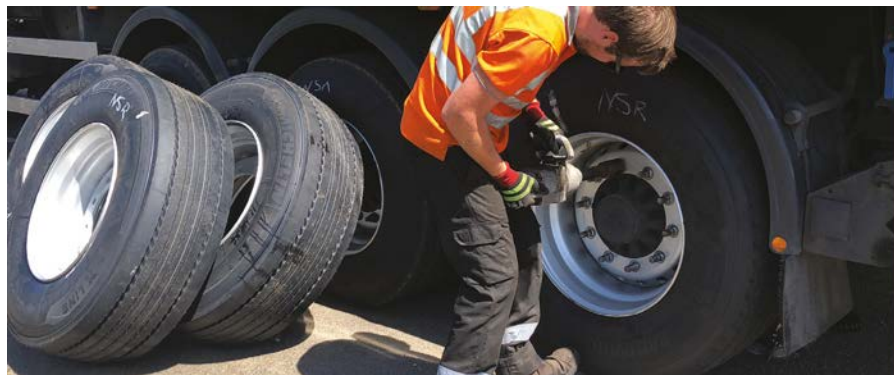
Finally, we must consider the circular economy. The elements used in battery production are finite and in limited supply so there will need to be considerable and fast improvements in battery technology to enable widespread uptake. An environmentally safe way of recycling lithium-ion batteries will need to be developed too.

Technological innovation already has the answer to many of these challenges. **The question is: which businesses will capitalise on the vast EV opportunity?**

What's going on down the corridor?

Bringing together some of the latest news from Southampton Science Park's community of gamechangers.

Dynamon opens ASDA's eyes to fuel savings



Four days of track tests revealed to the retail giant how, by using Dynamon's unique analytics software, it could save fuel by choosing the right tyres for its fleet.

The test at Millbrook Proving Ground demonstrated that tyre choice has a major impact on fuel consumption. An impressive 18.4% fuel saving was measured over 30 minute journeys and a 17% saving was recorded for longer journeys of 1.5 hours and 3 hours.

Dynamon CEO, Dr Angus Webb, said: "Most fleets look for the cheapest tyre price but we set out to show that this purchasing policy often costs significantly more than you might think. Whilst tyres with hard wearing rubber compounds and deep treads last longer, this type of tyre significantly increases fuel consumption, often negating any cost saving.

"Huge cost savings are available from modern tyre technology. However, identifying the ideal tyres for minimum whole life tyre cost, in real-world driving conditions, is not a simple financial choice. Getting the balance right between tyre price and

fuel performance is a complex science and is unique to each fleet operation. It requires a complex analysis of telematics data, tyre performance data, fleet specific tyre damage rates, and price per kilometre (PPK) tyre price – and this is where our analytics software comes in."



A full technical white paper on the track tests is available on the Dynamon website. The company is now working with Asda to optimise its fleet performance.

dynamon.co.uk

Fibercore releases next generation fibres



FIBERCORE has announced the release of two, enhanced-performance PM fibers developed specifically for next generation Fiber Optic Gyroscopes (FOGs).

The two strongest trends in FOG development today are enhanced precision and reduced form-factor – often in the same package. With bias stability figures of fractions of a degree per hour, these new generations of FOG now rival the very best ring-laser and conventional, iron gyros in terms of precision whilst also delivering the fundamental ruggedness and longevity that no other gyro technology can match.

These enhancements are opening up an increasing range of high-precision, high-reliability, applications from compact inertial measurement units (IMUs) for land and air navigation through to ultra-high precision gyrocompasses for ships and submarines.

fibercore.com

Emis Health oversees go live for GP Connect



EMIS HEALTH has been working with NHS Digital on GP Connect and has overseen the system's first deployment in a pilot scheme in Leeds.

GP Connect connects health and care data and supports clinical staff by making medical information held within a patient's GP record available at the point of care. This information is available across care settings including social care, general practice, community, mental health and hospitals. The aim is to improve the patient experience and care by giving clinicians vital information in real time to enable better informed and safer decisions.

Dr Geoff Hall, senior lecturer in medical oncology and chief clinical information officer at Leeds Teaching Hospitals spoke of its impact: "We have embraced GP Connect in Leeds because it helps to deliver truly patient centred care. I have just seen a patient whose GP has diagnosed an advanced pancreatic cancer. No one at the hospital had met him so our records only held results of blood tests and scans but no information on consultations. We had no idea whether he knew his diagnosis or whether his family were aware. The new GP Connect has just had a major triumph. His GP was able to share an understanding of his discussion with our patient. I knew exactly what was going on, what he and his family knew and what he had told his GP he wanted. This is a scenario where having the access to vital information has resulted in better patient care by helping to avoid repeating a potentially emotional and stressful conversation."

In future, GP Connect will also provide access to structured medications and allergy information and will be used to enable more efficient appointment management between practices.

emishealth.com

Materialise collaborates with McLaren

MATERIALISE has created the ultimate eyewear with metal 3D printing, winning a Silmo d'Or Frame Technological Innovation Award for its work for automotive brand McLaren.

materialise
innovators you can count on



Materialise's Alireza Parandian, Head of Global Business Strategy for Wearables, said the award reflects the current industry appetite for 3D printing. "One of the biggest benefits of 3D printing is the design freedom it offers, in other words, the chance to uniquely reflect a brand's DNA using innovative materials, material blends, shapes, finishes and flexibility. For us, the relevance of this for eyewear applications was always clear, which is why we have invested in developing a dedicated offering for this market."

Recognizing originality and quality in the optics and eyewear industry, the Silmo d'Or awards are widely regarded as 'The Oscars of eyewear innovation', with category champions viewed as best-practice, benchmark projects, not to mention trend indicators, for the eyewear market as a whole.

Designer Sébastien Brusset collaborated with Materialise to create the new eyewear range that would reflect McLaren's reputation for precision engineering. He said: "With this range, our goal was always to make the ultimate eyewear that would function and fit perfectly without compromise. That meant creating a frame that could be exactly tailored to the wearer – with contact points adjustable to the individual; a titanium frame for lightness and strength; blending different materials seamlessly for a high end finish. This combination of requirements meant we had to have 3D printing at the heart of our creation. Working with Materialise to optimize design, calling on the shapes and structural fluidity possible with additive processes, we have created a frame that holds and protects lenses perfectly for wearers, while also offering a super high-end, high-performance finish that blends cutting-edge technology with traditional hand-crafting."

materialise.com

Ilika battery funding boost



ILIKA has announced the commencement of its PowerDrive Line project, having attracted funding of £4.4million in aggregate under the UK Government's Faraday Battery Challenge: Innovation R&D.

The collaborative project will develop a lithium based solid-state Stereax battery for plug-in hybrid and electric vehicles, establish a pre-pilot line for solid-state battery cell technology and develop processes for a solid-state materials supply chain. The innovative solid-state technology will enable safer, more energy and power dense cells that will facilitate ultra-fast charging (enabling plug-in hybrid or battery electric vehicle (PHEV or BEV) drivers to charge their cars in 15-25 minutes) and put the UK

on a path to produce materials for the manufacture of solid-state battery cells and packs and in a world leading position to exploit the technology globally.

Solid-state lithium battery technology is widely seen as having the potential to transform the performance and safety of electric and PHEVs. The major benefits of solid-state batteries derive from their use of non-flammable solid electrolyte as opposed to the organic solvent used in current lithium-ion batteries, which is both flammable and has a relatively short useful life. In terms of performance, solid-state lithium batteries offer the prospect of much faster charging times, increased energy density, increased life cycle of up to 10 years, and extremely low discharge leakage.

"We have a strong consortium to deliver this product innovation, with Ilika working together with a global leading automotive manufacturer, the UK's leading automotive engineering consultancy and two of the country's foremost process innovators. We are looking forward to the rapid delivery of a globally significant technology solution," commented CEO Graeme Purdy.

This project is supported by Ricardo, the Centre for Process Innovation, University College London and Honda who will provide essential exploitation guidance and also will conduct functionality testing at their facilities.

ilika.com

As an entrepreneur, getting the right team around you is critical to technological and commercial breakthrough. Here we explore the challenges of doing so and how to get it right first time.

Compared to coming up with 'the big idea' recruiting staff should be a piece of cake. However, in most cases, the toughest decision that company founders face is their first hire. Get it right and it could be the turnkey to success. Get it wrong and it could mean that the company falls at the first hurdle, incurring significant costs and time-to-market delays.

Southampton Science Park is home to two successful recruitment consultancies: Spectrum IT, specialising in IT personnel; and The Chilworth Partnership, focused on financial placements. Both companies are acutely aware that working in the innovation space is quite different from any other.

Ian Cruickshank, Managing Director at Spectrum IT says: "Entrepreneurs can be demanding by their very nature (and prone to changing their minds!) so it is important for us to fully understand their

The Founder of the Chilworth Partnership, Rod Hutchings, agrees: "Recruiting finance professionals for businesses with early to mid-stage growth is the most challenging. Tech businesses tend to be faster moving, faster paced and less structured than a more mature business; many entrepreneurs can't envisage six months into the future, let alone five years down the line! This is often at odds with the accounting profession which, by nature, is risk averse and involves detailed forward planning. It means that working in the technical sphere is more attractive to a certain type of accountant with flexibility, flair and imagination as well as core competence. Flexibility and a really 'hands-on' mindset are essential when recruiting for finance teams in this arena." When it comes to candidates, expectations are equally high. Both consultancies agree that excellent potential for career progression tops the list of candidate requirements. Rod Hutchings continues: "Room for career progression and

Tech businesses tend to be faster moving, faster paced and less structured than a more mature business; many entrepreneurs can't envisage six months into the future, let alone five years down the line!

As the company grows it is important to have working systems, a balanced workload, a good managerial team and an effective process to bring new blood into the business."

He continued: "How a candidate is introduced into a business has a big impact on the success of the placement. Putting the time in to demonstrate products to candidates, explaining to them what the company's expectations are of them and ensuring that they are integrated with their colleagues help to ensure that time spent on recruitment is time well spent."

Hutchings adds: "An entrepreneur should share a collective vision of the future and promote collaboration through flexible working and an excellent work environment. They would be wise to consider an office with an open and collaborative culture to encourage business and personal progression."

For many entrepreneurs, there won't be enough hours in the day alongside competing demands on their time, to work on all of this – can technology help? "Digitalisation has definitely changed behaviours for both businesses and candidates seeking new ways of maintaining their competitive advantage," Hutchings comments. "We have observed an immense change within talent acquisition and we have had to embrace this in order to

"Inevitably there have been advancements in technology used in the recruitment industry from chatbots pretending to be recruitment consultants to AI being used to find 'the perfect candidate' without the need for human interaction," says Cruickshank. "It may sound a cliché, but Spectrum IT considers that recruitment is a people business and every candidate/client has different needs which are best assessed using real friendly knowledgeable approachable people. That said, we would always encourage employers to review a potential employee's social profile to ensure consistency with CVs. There may be valid reasons for discrepancies but we would always suggest exploring anything that causes you concern."

Finally, what should a business owner do if they can't find the perfect candidate? Wait or compromise? "There is no such thing as the perfect candidate!" comments Cruickshank. "There's always a compromise and it is often through flexibility that companies can find a better solution to what they originally thought that they



requirements when looking for suitable candidates. Entrepreneurs based on the Science Park are usually looking for more than a 'shopping list' of skills when recruiting for IT personnel. A typical company will still be in the early stages of product development and so will be looking for candidates who offer more than technical skills so that they can help with development, drawing on their breadth of experience and creativity to problem solve. They may be working in a reasonably autonomous environment and need to be adaptable and cope with different pressures as projects move in unexpected directions."

the ability to voice ideas, contribute to decisions and collaborate effectively in an interesting and fast-moving environment, is what really motivates top candidates. They want to work for companies that have a sustainable business model and the potential for global impact." A flexible working environment and a remuneration package that reflects market rates are also key considerations.

So, with an uncertain journey ahead, how can business leaders plan for effective team growth and make their opportunity attractive to the highest calibre talent? Ian Cruickshank says: "We would always recommend starting the recruitment process just before you need a person rather than when it has already become business critical – rushed recruitment can lead to hires that aren't a good fit for the company and frustration for all parties concerned.

Digitalisation has definitely changed behaviours for both businesses and candidates seeking new ways of maintaining their competitive advantage

secure top talent. Current technological trends include social media, job boards, mobile friendly recruitment apps, applicant tracking systems, AI Technology (to enhance human aptitude and efficiency), Chatbots (technological interaction with candidates) and more. As recruiters, we have to take a proactive approach as we cannot wait for the right candidates to find us. Recruiters have to embrace the digital age and constantly be aware of changing technology trends in order to secure top talent."

needed. Good recruitment decisions will be based on a mixture of a candidate's personal attributes and their technical capabilities. However, if the right candidate isn't out there at the right time, using contract resource may be a good short term option."

Hutchings concludes: "Although it is difficult to measure the exact costs of hiring the wrong employee, you can be almost certain it will affect your business in more ways than just the replacement fee: the real cost could be a year's salary! Furthermore, hiring the wrong employee can lower morale and productivity within the workplace for other team members too. Finding a permanent member of staff should always be considered carefully with a planned and professional recruitment process. In short – never compromise!"

INTERN IN THE HOUSE!

Law graduate **Arun Aggarwal** recently completed a three month internship working in the Southampton Science Park management team office. We interviewed Arun and his boss, **Peter Birkett**, to hear about both sides of the experience.



“

Wholly be present,
ask questions,
be awkward
– and you’ll get
the most out of
wherever you are.

Arun, how did your placement come about?

I graduated in law last year, went on to work full time at the University of Southampton’s Student Union for a year but knew I wanted to broaden my horizons. I already knew that I didn’t want to progress with a career in law: it’s a good basis to work from but I’m more interested in strategy, governance and innovation. I spoke with the enterprise team at the University and considered a number of options for an internship. The Science Park opportunity seemed to offer a lot more and promised to give me greater exposure than the others.

What were your expectations of your placement before it commenced?

I didn’t really know what to expect to be honest. I was very open minded but I wanted to be involved in as much as possible to learn as many new skills as I could. I specifically wanted commercial exposure as I’ve no experience of doing anything in a business environment – it’s very different to university life.

Working at the student union I was at the top of the hierarchy and this gave me an element of surety. I was on safe ground and knew what I was talking about. It was weird opening myself up to learning again but interestingly (now I don’t know what I’m talking about!) I’m able to give an honest and unbridled opinion.

To what extent have these expectations and objectives been met so far? All my aspirations have not only been met, but surpassed! I’ve really been involved as part of the team and done a lot more than I thought I would. I couldn’t think of a place that could have been more supportive of my personal development.

I was given a research-heavy project to work on with the task of delivering a report at the end of it. I found it challenging to focus on one thing as I’m used to jumping around across multiple topics but it’s been good for my personal development.

I’ve also been lucky enough to be invited to sit in on Catalyst business incubation workshops which I’ve found really enlightening and hopefully it’ll give me a good leg-up for when I’m ready to start my own business.

Do you see yourself as a business leader in the future, then?

This is a long term goal. I think I would enjoy the challenge of getting something up and running. I did so on a lesser scale at the university but I’ve become really interested in how to take something from conception to reality: it’s baffling – but interesting! I’ve got lots of ideas but I’ve got a lot to learn to give me a basis to move forward in any career direction.

What has your internship taught you that you didn’t expect?

I’m perpetually interested in people so it’s been amazing to have the opportunity to network here. Talking to people from a variety of backgrounds and at different levels, being around people who are eager to learn – it’s been really good to learn about others’ journeys.

On a practical level, I’ve developed a lot of soft skills like research, time management, self-motivation, project managing and structuring my own work. I’ve even had to teach myself how to write a report!

I’ve also discovered that I prefer the culture of a small organisation but at the same time I know that getting good quality training with a large corporate will give me the grounding from which to diversify.

What advice would you give to other students considering an internship?

Definitely go for it! What I’ve done with my time here has far surpassed expectations. I believe it’s up to you as an individual to throw yourself into whatever you’re doing. I’ve always found this to be the best way. Wholly be present, ask questions, be awkward – and you’ll get the most out of wherever you are.

An Employers perspective

“I was keen to do something positive for student enterprise – I was sure that we could offer an exciting placement for the right individual – so I worked with Sarah Rogers from the Student Enterprise team at the University to find this person. I was looking for a personable individual; someone with good insights and interesting things to say.

Arun has been very engaged with the team across the whole business. We’ve treated him as an employee and enabled him to be involved in workshops, meetings and even spend some time working at one of our agencies. In this way, he has seen decision making in action and been exposed to real commercial situations.

A three month placement is not a long time so, for both parties to benefit, I had a particular project for Arun to complete. I would advise all employers to have a specific goal in mind to make the most of the internship for their organisation, as well as to ensure that the student gets the best possible experience. I asked for a report and a presentation with recommendations and ideas and I am already benefiting from Arun’s fresh insight and being challenged by his proposals.

Of course, one of the great benefits of hiring an intern is that you get to know them and their work and get to see if they will fit into the team if you foresee a vacancy opening up – it’s potentially a fantastic and cost effective way to recruit people.”

Peter Birkett, Chief Executive, Southampton Science Park



Internships are a cost-effective way of addressing issues within your organisation.

You can:

- gain an innovative, outside perspective on a business challenge without high consultancy fees
- benefit from students’ enthusiasm, creativity and up-to-date skills
- receive insightful recommendations
- develop a pipeline of future talent for your organisation

LET THE FESTIVITIES BEGIN!

Wham! and Michael Bublé; the last minute panic to meet the post deadline; midnight mass and hilarious nativities; feverish and increasingly carefree wrapping at 3am; snuggling up to watch the Queen's speech and this year's blockbuster...

However you celebrate, many of us will soon be putting work aside in favour of some quality family time and, with this, various logistical challenges usually arise. Is technology helping us to counter these? Is it still possible to have a traditional British Christmas or has technology changed the festive season forever?

Shopping

Shoppers increasingly look for a less stressful, time-saving experience, price transparency and the convenience of home delivery. The online shopping experience has come a long way and this has boosted shopper confidence and driven online retail growth. Crucially this has been matched by greater reliability and flexibility of delivery services, with warehouse automation, distributed warehousing, better delivery planning and customer-controlled tracking systems.

Customisation continues to be a thing and this has also helped to fuel online purchasing. The global personalised gifts market size is expected to reach £24bn by 2021.

Cards

Greetings cards are big business (we spend £1.7bn each year on them) and at Christmas, the average Briton sends 18 festive cards but this is changing. While still a treasured tradition, more and more of us are choosing to send our greetings via social media and indeed there's a growing trend to ditch the concept altogether. Innovative start-up DontSendMeACard.com encourages us to break with tradition by sending e-cards and donating what we would have spent on cards and postage to charity instead.

Family

Skype has revolutionised family as well as business communications since 2003 but even this could soon be on the wane as augmented reality is more widely adopted. No more trying to gather everyone together in front of a desktop screen – simply pop on our AR smart glasses and loved ones from all corners of the globe will appear in our living rooms.

Gifts

Fast paced innovation means that the gifts we give to each other at Christmas have changed at an alarming rate. Books, CDs and DVDs are becoming a thing of the past thanks to iPads and Kindles, while video games are all downloadable. App-enabled presents are now mainstream and Redletter experiences and gift vouchers are being replaced by redeemable online codes. So long, wrapping paper, ribbons and bows!

The global personalised gifts market size is expected to reach

£24
BILLION
by 2021

Each year we spend

£1.7
BILLION
on Christmas cards

Entertainment

Time has shifted. While 4.30am starts will continue for those of us with young children in the household, almost nothing else is set in stone anymore. The age-old approach of presents, lunch, the Queen's speech, family afternoon film followed by games and left-overs has given way, thanks to the growth of digital broadcasting. UK viewers are no longer tied to TV schedules. More than anywhere else, we're watching TV and films at a time that suits us, on a range of devices, in and out of the home.

Food

There's been a growing trend towards personal indulgence, especially when it comes to food and drink – staying in really is the new going out. As we are tempted by ravishing advertisements to spend more on luxurious foods, the nation's taste buds have changed and we've become more experimental. Food tech is in its absolute element at this time of year! Why have a bog standard mince pie when you can have a salted-caramel or gin-infused delicacy? Or a turkey sandwich presented in a snow globe?

Home

Whilst holograms and AR are supplementing lightshows up and down Britain's streets, home decor may be one area where we're seeing a reversing trend towards tradition. Home made decorations – and even trees – are increasingly popular thanks to the continuing crafting boom.

This festive season, are drones and dashcams still going to cut it with the techies in your household? And what about the technophobes? Surely everyone likes a new gadget, right? If you want to get ahead with your festive shopping here are some ideas to get you started.

Evo App-Connected Coding Robot

Ideal for the budding genius
Little bot, big tech. Meet Evo, the multiple award-winning mini robot that develops STEM skills by unleashing the ability to code, two ways. Evo is app-connected and grows with you from beginner to master coder.
£90 www.ozobot.com



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GIFT GUIDE

Bluetooth Beanie

Ideal for the street savvy one
Wearable tech that's actually practical. Bluetooth beanie hats, with concealed speakers and microphone, combine warmth with cool tunes.
£30 www.soundbot.com

**Furbo Dog Camera**

Ideal for the furry one
Leave Fido at home without feeling bad. This app-driven piece of kit incorporates an HD WiFi cam to livestream video to keep an eye on furry friends and dispense treats for good behaviour from afar.
£200 www.furbo.com

**Fire 7 Tablet with Alexa**

Ideal for the box-setter
Hot hot hot. The next generation of Amazon's Fire tablet (thinner, lighter, longer battery life, better display) but this time, Alexa is built-in for quicker access to information and entertainment and the ability to connect with other Fire and Echo users.
£50 www.amazon.co.uk



Alexa, order me a...

Fitbit Aria Wireless Smart Scale

Ideal for the fit one
Thought Fitbits were sooo last year? Think again with this smart scale which connects wirelessly to Fitbit wrist tech to help track progress and manage health plans.
£120 www.fitbit.com

**Grillbot Automatic Grill Cleaner**

Ideal for the one down under
No more stuck-on bits of goodness knows what. This BBQ cleaning robot is the ultimate piece of kit for those who like to dine alfresco any time of year and not miss out on the beer.
£109 www.grillbots.com

**Polaroid 3D Pen**

Ideal for the creative one
2D is so BC. 3D pens open up endless possibilities to bring ideas to life by creating and assembling amazing 3D models.
£30 www.polaroid3d.com

**Fingerlings Monkey**

Ideal for the little one
Forget Hatchimals and LOL dolls. This year it's all about cute little interactive primates that respond to sound, motion and touch with over 40 animations and sound effects that are sure to delight.
£15 www.fingerlings.com



A NEW WORLD ORDER



Lesley Batchelor OBE,
Director General of
The Institute of Export
& International Trade

With Brexit imminent, Lesley Batchelor OBE, Director General of The Institute of Export & International Trade, discusses how companies can brace themselves for the different outcomes that Brexit may cause.

A survey by the Chartered Institute of Procurement and Supply (CIPS) in September suggested that in the event of a no-deal Brexit, delays of just half an hour at UK ports and the Irish border would risk one in 10 British firms going bankrupt.

The survey consulted 1,300 UK and EU-based supply chain managers. These are people we often work closely with at The Institute of Export & International Trade, and though leaving the EU will cause headaches for many of our exporters and importers – particularly should no deal be agreed – we've been keen to point out that the challenges of tougher border controls, import tariffs and other potential barriers to trade can be navigated with the right preparation and skills.

The CIPS survey showed that around a quarter of British companies are planning to stockpile goods and components for the fear of delays and shortages, with 4% already doing so. This is a good idea, but there's so much more that companies can do now to plan and prepare for Brexit.

Here are a few key areas that companies should be planning for now:

Trading Under WTO Rules

As has been reported throughout the debate about Brexit, a no deal situation would mean that the UK would suddenly be trading with EU countries on WTO rules, as well as 3rd parties the EU has preferential trade deals with like Canada.

Trading with the EU under WTO rules would mean new tariff codes being implemented and therefore some goods requiring duty to be paid that hasn't previously been required for UK businesses to pay – as part of the single market, and also through preferential trade agreements already in place for the EU, like the one with Canada.

It shouldn't be forgotten that we already trade with many of our biggest export markets in this way, including the USA and China. Nonetheless, no-deal would no doubt increase the cost and administrative burden on the UK's exporters.

These are all costs and resources that can be planned and accounted for – as many companies exporting to the USA, for instance, will already know. In time the UK may sign new trade agreements with countries like the USA and China, reducing the costs and administrative burden for exporting to these particular countries.

A quarter of British companies are planning to stockpile goods and components for the fear of delays and shortages post-Brexit

In the short-term though, companies who have only ever mostly exported to the EU will need to adjust their international pricing models to factor in added costs, and ensure they know the processes involved in identifying their goods' tariff codes and the duty payable for these codes within the WTO rules, and identify the time and resource needed to ensure they do all this compliantly and efficiently.

Rules of Origin

Another key element of trading internationally is rules and proofs of origination. To explain, 'rules of origin' are how customs authorities classify where an exported product has originated. The rate of duty that importers are required to pay when bringing

goods into a country depends on three elements: the type of goods (which is classified by a 'tariff code'), the country the goods are being imported into, and where they are judged to have 'originated' from – i.e. the origin.

Currently, the rules proving origin for importation into the UK are currently defined within the EU relationship to the WTO. UK businesses, in order to classify their goods for the reduction of duty payable when importing, currently need to understand the rules the EU sets with the WTO for third party countries, or within separate preferential trade agreements, such as the one it has with Canada.

Outside of the EU, the UK will have its own rules and tariffs, and UK businesses will be required to meet EU rules in order to move goods onto the continent

Potential barriers to trade can be navigated with the right preparation and skills

at reduced rates of duty (payable by the importer). Considering that many goods are manufactured, assembled, and given added value in multiple countries – these all being proof requirements for origin – due to increasingly international supply chains, the creation of a new UK origin category could have a significant impact on our exporters and importers.

A good sold by a UK company that is currently said to have EU origin, because it is produced through a supply chain involving multiple EU countries, will no longer have this EU origin, and therefore won't have the duty reductions that EU origin goods can have. The question is whether many of our exporters' goods will even be proven to have UK origin, given the proportion of many UK business' production lines that take place in the EU. As such, potential future duty reductions arranged between the UK and other countries, in new preferential trade agreements, may not even be applicable for companies who have production lines that are deeply embedded in the EU and therefore aren't able to prove UK origin.

Companies will therefore need to start planning how they can domesticize some of the manufacture, assembly and value-add contributions towards their end-goods in order to prove UK origin, as otherwise they will not reap the potential long-term benefits of Brexit.

Other Considerations

Further to this, there is continuing uncertainty around various other business requirements when selling internationally that are currently governed through the UK's membership in the EU and the various European agreements and conventions it is currently part of. These include things like intellectual property, VAT, export controls, licenses, and more.

While the long-term effects of Brexit are unknown at this stage, any jolt to the trading climate is going to have implications on businesses and throughout their international supply chains.

A key thing to remember though, is that the world will go on and businesses will continue to want to work with each other, even if over borders. By planning and learning about how exporting is done in multiple situations, companies can brace themselves for the different outcomes that Brexit may cause.

That's why companies should definitely look to use services like those provided by The Institute of Export & International Trade. Through our training, qualifications, and technical helpline, you can equip yourselves with the skills, knowledge and support network you need to export successfully, whatever the situation.

www.export.org.uk

IN FOCUS

Mambo-Tox

Mambo-Tox provide ecotoxicology research services for the agrochemical and chemical industries, for regulatory purposes. Their comprehensive services include evaluating the effects of chemicals on non-target arthropods, pollinators and soil invertebrates.

Part of their offering (as seen here) is sequential testing programmes with key indicator species to demonstrate the inherent toxicity (or lack of it) of plant protection products and biocides, when used in the environment.

www.mambo-tox.co.uk

Research



NEWS FROM

UNIVERSITY OF Southampton



Greening Africa

A study led by University geographers has shown the greening up of vegetation prior to the rainy season in Africa is more widespread than previously understood.

Using 16 years of satellite imagery compared with meteorological data, the team examined when plants in the continent began and finished their green period of growth in relation to the onset and the conclusion of rains. The study revealed that 80% of natural vegetation greens up across the continent before the beginning of the rainy season, compared to just 4% during the rains.

The results contradict the widely held view that rainfall drives the onset and end of the vegetation growing season across Africa and pose the question: what environmental cues are initiating vegetation growth when rain isn't a factor?

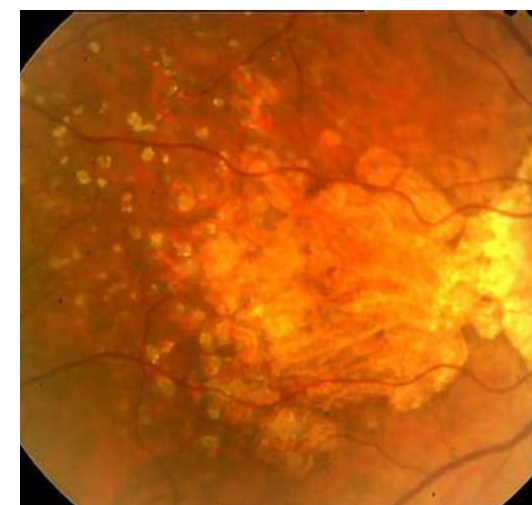
Several theories have been suggested for what drives plants to green up, other than rainfall, including: climatic memory mechanism, day length, temperature, air humidity and plants' physical attributes, such as their ability to tap reserves of nutrients or deep root systems which access underground water sources.

Seeing blind

A five-year research project led by Andrew Lotery, Professor of Ophthalmology in the University's Faculty of Medicine and consultant ophthalmologist at Southampton General Hospital, will use state-of-the-art imaging to predict which patients with early age-related-macular-degeneration (AMD) are at more risk of blindness.

AMD is a very common cause of blindness with 200 million people expected to be affected by 2020, increasing to nearly 300 million by 2040. It is a complex, inherited, and diverse disease that affects the macula – the central retina that is responsible for detailed central vision. Doctors currently don't know who will develop the sight-threatening stage of the disease; some patients progress slowly, or not at all, while others quickly deteriorate.

Understanding more about why AMD develops will enable better prevention, screening, and individualised patient strategies as well as potentially leading to the development of new treatments.



Medieval miracle

University researchers are helping visitors to the Welsh borders follow in the footsteps of a medieval outlaw and explore the historic route of a remarkable pilgrimage. The launch of a new trail, taps into resurgence of interest in pilgrimage routes and 'old ways' in the British Isles. It brings together new research, the latest digital technology and medieval history to offer an immersive and engaging experience of the past.

The project was inspired by a journey made by William Cragh in 1290. Cragh was a supporter of a rebellion against the local Norman Lord, William de Briouze, who then captured him and sent him to his death. However, Cragh showed signs of life after his hanging and eventually fully recovered – seemingly and miraculously rising from the dead!

Local people understood this as a miracle of St Thomas of Hereford, a deceased Bishop of the town. Cragh then set off from Swansea to Hereford on a pilgrimage, together with Lord William who had tried to execute him, to give thanks at the shrine of the saint.

Professor of English and Director of the project, Catherine Clarke, commented: "It must have been the most awkward road trip of all time. But this weird and wonderful story of Swansea's hanged man is a brilliant way into the strange and fascinating world of medieval England and Wales."

Deep impact

The University of Southampton contributes £1.3bn annually to the Hampshire economy and £0.9bn to the city of Southampton specifically. On a national scale it contributes £2.5bn to the economy, according to a recent economic impact assessment report.

The report highlights the wider impact of the University through its supply chains and networks. For example, it reveals that whilst the University directly employs around 6,000 staff, it supports the employment of over 14,000 in the city.

The University's President and Vice-Chancellor, Professor Sir Christopher Snowden, said: "The University of Southampton's impact reaches beyond the staff we employ and the talented students we educate. Through our education, research and enterprise activities, we also contribute to improvements in health and quality of life for people in the region, as well as more widely nationally and internationally."

DIRECTORY

81G Blue

E: hello@81g.org
T: 0845 303 0819
W: www.81gblue.co.uk

aap3

E: info@aap3.com
T: 023 8076 2800
W: www.aap3.com

Aareon UK

E: uk.bids@aareon.com
T: 024 7632 3723
W: www.aareon.co.uk

AccelerComm

E: info@accelercomm.com
T: 023 8011 8091
W: www.accelercomm.com

Ascend Technologies

E: info@ascendtechnologies.co.uk
T: 023 8026 6122
W: www.ascendtechnologies.co.uk

Atelier Studios

E: hello@atelier-studios.com
T: 023 8022 7117
W: www.atelierstudios.com

Avonglen

E: enquiries@Avonglen.com
T: 023 8076 2570
W: www.avonglen.com

Building Engineering Management

E: m.dorgan@bemanagement.co.uk
T: 07876 350529

C Squared Visions

E: info@c2visions.com
W: www.c2visions.com

Cascoda

E: info@cascoda.com
T: 023 8011 1797
W: www.cascoda.com

Century Link

T: 0845 000 1000
W: www.centurylink.com

Chilworth Partnership

E: lynne@chilworthpartnership.co.uk
T: 023 8011 1813
W: www.chilworthpartnership.co.uk

Chilworth Technology

E: info@chilworth.co.uk
T: 023 8076 0722
W: www.chilworth.co.uk

CRITICAL Software

E: info@criticalsoftware.com
T: 023 8011 1339
W: www.criticalsoftware.com

Device Access

E: info@deviceaccess.co.uk
T: 023 8011 8300
W: www.deviceaccess.co.uk

Dynamon

E: info@dynamon.co.uk
T: 023 8098 5410
W: www.dynamon.co.uk

EMIS Health

T: 0870 053 4545
W: www.emishealth.com

Englyst Carbohydrates

E: enquiries@englyst.co.uk
T: 023 8076 9650

Fibercore

E: info@fibercore.com
T: 023 8076 9893
W: www.fibercore.com

Filament

E: andy.feltham@filament.uk.com
T: 020 3176 1267
W: www.filament.uk.com

Fresh Relevance

E: hello@freshrelevance.com
T: 023 8011 9750
W: www.freshrelevance.com

Grant Thornton UK

E: gtsouthampton@uk.gt.com
T: 023 8038 1156
W: www.grantthornton.co.uk

Gresham Tech

E: info@greshamtech.com
T: 020 7653 0200
W: www.greshamtech.com

HiLight Semiconductor

E: sales@hilight-semi.com
T: 023 8097 0330
W: www.hilight-semi.com

Horizon Power & Energy

E: enquiries@horizon-pe.com
T: 01962 217007
W: www.horizonpowerandenergy.com

Humaware

E: info@humaware.com
T: 01730 269725
W: www.humaware.com

i2O Water

E: info@i2owater.com
T: 023 8011 1420
W: www.i2owater.com

Ilika Technologies

E: info@ilika.com
T: 023 8011 1400
W: www.ilika.com

iMeta Technologies

E: enquiries@imeta.com
T: 0845 241 4145
W: www.imeta.com

India Business Group (IBG)

E: a.singh@theindiabusinessgroup.com
T: 0844 313 3133
W: www.theindiabusinessgroup.com

Inflowmatix

E: info@inflowmatix.com
T: 07801 715636
W: www.inflowmatix.com

ITDev

E: info@itdev.co.uk
T: 023 8098 8890
W: www.itdev.co.uk

Jacobs

E: contactus@jacobs.com
T: 023 8011 1250
W: www.jacobs.com

Karoo Design

E: info@karoodesign.com
T: 023 8011 1586
W: www.karoodesign.com

Kelda Technology

E: info@keldatechnology.com
T: 0333 433 0783
W: www.keldatechnology.com

Korusys

E: enquiries@korusys.com
T: 0844 504 1680
W: www.korusys.com

Made & Worn

E: support@madeandworn.co.uk
W: www.madeandworn.co.uk

Mambo-Tox

E: info@mambo-tox.co.uk
T: 023 8076 2580
W: www.mambo-tox.co.uk

Marine South East

E: admin@marinesoutheast.co.uk
T: 023 8011 1590
W: www.marinesoutheast.co.uk

Materialise UK Southampton

E: info@orthoview.com
T: 023 8076 2500
W: www.orthoview.com

Meda Technologies

E: martin.adams@meda.co.uk
T: 020 3287 8744
W: www.meda.co.uk

Merck Chemicals

E: reception.chilworth@merckgroup.com
T: 023 8076 3300
W: www.merck-chemicals.co.uk

MicroGem

E: info@microgemplc.com
W: www.zygem.com

Multiple Access Communications

E: enquiries@mac ltd.com
T: 023 8076 7808
W: www.mac ltd.com

Nine23

E: enquiries@nine23.co.uk
T: 023 8202 0300
W: www.nine23.co.uk

nquiringminds

E: info@nquiringminds.com
T: 023 8115 9585
W: www.nquiringminds.com

Oat Services

E: ar@oat.co.uk
T: 023 8076 7228
W: www.oat.co.uk

One Pension Consultancy

E: Duncan.Revolta@onepc.co.uk
T: 023 8076 2590
W: www.onepc.co.uk

Optomel

E: info@optomel.com
W: www.optomel.com

oXya UK

E: info-uk@oxya.com
T: 023 8011 9830
W: www.oxya.com

Peter Hall

E: peter@peterhall.org.uk
T: 023 8011 1366
W: www.peterhall.org.uk

Photonics & Analytics

E: info@photonics-analytics.com
T: 023 8000 2087
W: www.photonics-analytics.com

Pivotal

E: info@pivotal.io
T: 020 3740 7410
W: www.pivotal.io

PointCloud

E: info@pointcloudnet.com
W: www.pointcloudnet.com

Promega UK

E: hilary.latham@promega.com
T: 023 8071 7319
W: www.promega.com

PT Solutions

E: info@ptslimited.co.uk
T: 023 8011 1844
W: www.ptslimited.co.uk

Renovos

E: enquiries@renovos.co.uk
W: www.renovos.co.uk

Searchlight Security

E: enquiries@searchlightcyber.co.uk
T: 023 8098 1303
W: www.searchlightcyber.co.uk

Semantic

E: incoming@semantic.co.uk
T: 023 8011 1540
W: www.semantic.co.uk

Senseye

E: hello@senseye.io
T: 0845 838 8615
W: www.senseye.io

Signly

E: hello@signly.co
W: www.signly.co

SJK Scientifics

T: 023 8076 7954

SKIPJaq

E: info@skipjaq.com
W: https://www.skipjaq.com

Spectrum IT Recruitment

E: contactus@spectrumit.co.uk
T: 023 8076 5800
W: www.spectrumit.co.uk

Swedish Biomimetics 3000®

E: info@swedishbiomimetics3000.com
T: 023 8017 1468
W: www.swedishbiomimetics3000.com

Taicaan

E: info@taicaan.com
T: 023 8076 3796
W: www.taicaan.com

Tekever

E: info@tekever.com
T: 023 8097 0650
W: www.tekever.com/en

The Invisible Assistant

E: hw@theinvisibleassistant.co.uk
T: 07917 682816
W: www.theinvisibleassistant.co.uk

The IT Innovation Centre

E: info@it-innovation.soton.ac.uk
T: 023 8059 8866
W: www.it-innovation.soton.ac.uk

Tidal Harness

E: info@tidalharness.com
W: www.tidalharness.com

Tonic Analytics

E: info@tonicanalytics.com
T: 023 8098 2122
W: www.tonicanalytics.com

TrackBack

E: enquiries@trackback.net
T: 0844 470 1701
W: trackback.net

TrouDigital

E: info@troudigital.com
T: 023 8098 1110
W: www.troudigital.com

U4Global

E: info@u4global.com
T: 023 8076 0909
W: www.u4global.com

Utonomy

E: Info@utonomy.co.uk
T: 07787 575487
W: www.utonomy.co.uk

Valkyrie Technology

E: info@valkyrietechnology.com
W: www.valkyrietechnology.com

Vantia

E: info@vantia.com
T: 0117 916 7693
W: www.vantia.com

VivaMOS

E: dan.cathie@vivamos.co.uk

VivoPlex

E: enquiries@vivoplex.com
T: 023 8011 1555
W: www.vivoplex.com

Wessex Academic Health Science Network

E: enquiries@wessexahsn.org.uk
T: 023 8202 0840
W: www.wessexahsn.org

Wessex CLAHRC

E: wessexclahrc@soton.ac.uk
W: www.clahrc-wessex.nihr.ac.uk

Wessex Institute

E: info@netscc.ac.uk
T: 023 8059 5586
W: www.nets.nihr.ac.uk

Wood Group

T: 023 8011 8800
W: www.woodgroup.com

Xim

E: laurence@xim.ai
T: 07803 950356
W: www.xim.ai

Yellow Dot Nursery

E: hello@yellowdotnursery.co.uk
T: 023 8076 0593
W: www.yellowdotnursery.co.uk

Youseq

E: hello@youseq.com
T: 0333 577 6697
W: www.youseq.com

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E: bepositive@zenergi.co.uk
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We do this by fostering a visionary, entrepreneurial culture; by providing flexible yet high quality laboratory, office and meeting facilities in an award-winning healthy and inspiring workplace; by enabling access to a world class talent pool at the University of Southampton; and by facilitating collaborative working at all levels.

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