

2016 / 2017

TECHNOLOGY

The Parliamentary Review

A YEAR IN PERSPECTIVE

■ FOREWORDS

The Rt Hon Theresa May MP

The Rt Hon Karen Bradley MP

Julian David

■ HARDWARE, NETWORKING & INFRASTRUCTURE REPRESENTATIVES

SAS Global Communications

Dalycom

Excitech

NRG IT

Cybertronics UK

i-movo

Arena Television

Techbuyer

Agilitas

Xpertex

Location Sciences

Port-P

Cambridge Pixel

CER Communications

Brand Communications

■ FEATURES

Review of the Year

Review of Parliament



The Rt Hon Theresa May MP

Prime Minister

This year's *Parliamentary Review* follows a significant year in British politics. It was a year in which our economy continued to grow, as the Government followed its balanced plan to keep the public finances under control while investing to build a stronger economy. It was a year in which we began to deliver on the result of the EU referendum by triggering Article 50 and publishing the Repeal Bill, which will allow for a smooth and orderly transition as the UK leaves the EU, maximising certainty for individuals and businesses.

And, of course, it was a year in which the General Election showed that parts of our country remain divided and laid a fresh challenge to all of us involved in politics to resolve our differences, deal with injustices and take, not shirk, the big decisions.

That is why our programme for government for the coming year is about recognising and grasping the opportunities that lie ahead for the United Kingdom as we leave the EU. The referendum vote last year was not just a vote to leave the EU – it was a profound and justified expression that our country often does not work the way it should for millions of ordinary working families. So we need to deliver a Brexit deal that works for all parts of the UK, while continuing to build a stronger, fairer country by strengthening our economy, tackling injustice and promoting opportunity and aspiration.

In the year ahead we will continue to bring down the deficit so that young people do not spend most of their working lives paying for our failure to live within our means. We will take action to build a stronger economy so that we can improve people's living standards and fund the public services on which we all depend. We will continue with our modern Industrial Strategy,

deliver the next phase of high-speed rail, improve our energy infrastructure and support the development of automated vehicles and satellite technology, building a modern economy which creates the high-skill jobs of the future.

At the same time, work needs to be done to build a fairer society – where people can go as far as their talents will take them and no one is held back because of their background. So we will continue to work to ensure every child has the opportunity to attend a good school. We will continue to invest in the NHS and reform mental health legislation, making this a priority. And we will work to address the challenges of social care for our ageing population, bringing forward proposals for consultation to build widespread support.

So this is a Government determined to deliver the best Brexit deal, intent on building a stronger economy and a fairer society, committed to keeping our country safe, enhancing our standing in the wider world, and bringing our United Kingdom closer together. We will continue to put ourselves at the service of millions of ordinary working people for whom we will work every day in the national interest.

“This year's *Parliamentary Review* follows a significant year in British politics”



The Rt Hon Karen Bradley MP

Secretary of State for Digital, Culture,
Media and Sport

This year is the 25th anniversary of DCMS. We started life as the Department for National Heritage, becoming the Department for Culture, Media & Sport in 1997. Last month we changed our name again.

This change reflects the way our remit has developed. Digital technology is central to our lives. 80% of adults use the Internet every day and 70% are active on social media. So we have rebranded as the Department for Digital, Culture, Media and Sport (DCMS).

Digital is enabling new levels of engagement with our nation's cultural and creative output, opening up collections and live performances previously restricted to metropolitan audiences, by bringing them straight to people's phones.

Just as digital is helping people access culture in new ways and more widely, so cultural content is driving people towards digital and the adoption of new technologies.

This marriage of world-beating content with cutting-edge technology is not only crucial to our future economy – the UK's creative industries are now worth a record £84.1 billion – but to our nation's general well-being.

Culture and creativity have a vital role in social mobility and improving life chances. Time and again we see how nurturing a talent can transform someone's life. Yet everyone must first be inspired – by a sports match, by a concert, or by a museum exhibition. Digitisation is opening up access on an unprecedented scale.

Even the smallest and most remote organisations can market their work to national and international audiences.

As we negotiate the details of our departure from the EU, digital communications and cultural content are vital in showing the world we are open, outward looking and worthy of investment. It is through our cultural output that we show the best of our heritage and of who we are today – and it is via digital that we reach the widest audience. It is only fitting that we are now named the Department for Digital, Culture, Media and Sport.

“The marriage of world-beating content with cutting-edge technology is crucial to our future economy”



Julian David

CEO of Tech UK

The UK currently enjoys a digital economy that is the envy of many countries. Digitally intensive businesses account for 16% of UK output, 24% of exports and over three million jobs. Digital is also creating jobs nearly three times faster than the rest of the economy, pay 44% more than the national average and are more than twice as productive as non-digital jobs. As we review the year to date, the UK is in a clear position of strength on which we must build. However, to build on our heritage and remain a global force in technology, we must focus on our key priorities.

We must get the right Brexit deal. There are implications for skills and talent; access to finance; international data flows; and challenges in leaving the single market and customs union. A comprehensive deal is unlikely within the two-year negotiation period and the UK needs a meaningful transition period that allows time for the new immigration, customs, regulatory and investment arrangements to be put in place.

Domestically, the industrial and digital strategies can support a future powered by technology and innovation. The Government must recognise the importance of digital adoption in unleashing the UK's economic potential. Boosting investment in research and development (R&D) and making the UK attractive, to start and scale a high-growth business will be paramount to the UK remaining a global tech hub.

Building a smarter state through digital transformation will protect our public services amid rising public sector debt and demands on usage. Investment will unlock the next wave of digital government; improve expertise within the Civil Service; address barriers to innovation in health and social care; and drive innovation in the defence supply base.

People need the skills to thrive in a digital future. Domestically, younger generations must be equipped with world-class digital skills; untapped sources, such as the female population, should be encouraged to choose technology; and a clear policy on the future of work and lifelong learning should be created. The UK must also remain open to international talent as increased restrictions on migration could hamper the UK's growth.

People, and businesses, in the UK must be protected online. The UK needs to build on its strong cyber security credentials by investing in public sector cyber security; protecting end-to-end encryption; enabling small and medium-sized enterprise (SME) investment in cyber security and ensuring citizens have the tools they need to stay safe online.

In addressing the priorities outlined above, we have the collective opportunity to harness the power of digital transformation and deliver an economy that works for everyone.

“We have the collective opportunity to harness the power of digital transformation”

Return of the Two Party System

The BBC's Andrew Neil gives his take on the state of Parliament following the June 2017 general election.

It was a year in which politicians learned not only of the power of a referendum to overrule the will of Parliament – but of its power to change the party system in which they operate. Nobody saw this coming. But, in retrospect, perhaps we should have, since we had the fallout from the Scottish referendum to guide us.

In the autumn of 2014 the Scots voted 55%-45% to remain part of the United Kingdom. That was supposed to settle the matter of Scottish independence for a generation, until some Scottish Nationalists began regarding a generation as no more than a couple of years. But in post-referendum elections to Holyrood and Westminster, it also recast the Scottish party system.

Remember, Scotland had been one of the first parts of the UK to throw off the British two-party system and replace it with a multi-party choice of SNP, Labour, Tory, Green, Lib Dem and even UKIP. But as the constitutional issue took centre-stage – and remained there even after the referendum – Scottish voters coalesced round a binary choice: for or against independence.

Thus was a new two-party system born of a centre-left Nationalist party (the SNP) and a centre-right Unionist party (the Scottish Tories). The other parties have not been completely obliterated, especially in Holyrood with its peculiar voting system. But by the general election of 2017 Scotland had become a battle between a dominant

Nationalist party and a resurgent Tory party representing the Union. Two-party politics was back north of the border.

So we should have been prepared for something similar when Britain voted 52% to 48% to leave the European Union in the June 2016 referendum. At the time, we remarked on the power of referenda to overrule both the Commons (where MPs were 65% pro-EU) and the Lords (probably 80% pro-EU). What we did not see was how the Brexit referendum would reconfigure English politics just as the Scottish referendum had redrawn Scottish politics.

So we were taken by surprise for a second time. In this year's general election – perhaps the single biggest act of self-harm a sitting government has ever inflicted on itself – almost 85% in England voted either Conservative or Labour. The English had not voted in such numbers for both major parties since 1970, when the post-war two-party system began to wane – and declined in subsequent elections to a point where barely 65% voted Tory or Labour, encouraging some commentators to think the decline terminal.

The referendum, however, reversed the decline. The Brexit vote ended the schism on the Eurosceptic Right as UKIP voters returned to the Tory fold; and those on the Left of the Greens and the Lib Dems flocked to Jeremy Corbyn's more 'Red Flag' Labour offering. So, as in Scotland previously, two-party politics was back with a vengeance in England too.

But without one crucial element. Our historic two-party system regularly produced one-party government for the life of a Parliament. But our new two-party system has produced a hung Parliament with no party having an overall majority. This knife-edge parliamentary arithmetic means the smaller parties may be down – but they are not out.

The Conservatives need an alliance with one small party (Ulster's DUP) to be sure of a majority. Even then, with the Tories and Labour divided over Brexit, no majority on any issue will be certain and on many votes the smaller parties will be pivotal in determining many outcomes.

So politicians return from their summer recess to a great parliamentary paradox: the two-party system has resurrected itself but rather than bringing with it the stability and certainty of the two-party politics of old, almost every major vote in the months ahead will be uncertain and unpredictable – and politics will be peculiarly unstable. Power will rest in Parliament. Government will be able to take nothing for granted. No vote will be in the bag until all the votes are counted. Westminster will have a new lease of life – perhaps even a spring in its step. Our democracy might be all the better for it.



Neil believes two referendums have redrawn the map of British politics.

Cyber security



The WannaCry attack on NHS systems has forced policymakers to consider new measures to combat ransomware threats

Governments, institutions and companies are hit by cyber-attacks all the time, but it wasn't until the WannaCry outbreak in May we truly understood how an online threat can become very real indeed.

WannaCry was a ransomware attack. That means data is encrypted and isn't unlocked until the victim pays the attacker, usually in virtual currency Bitcoin (though we have no indication that anyone successfully had their data returned after paying). There was no evidence that WannaCry was targeted at the NHS – such is the indiscriminate nature of the attack it is likely that the attackers simply sought to cause huge disruption.

As is typical in these cases, establishing where an attack may have come from is difficult and almost forever inconclusive – though most experts have pointed the finger at either China or North Korea, two countries with immense cyber attack resources, private and state backed.

The lesson taken from WannaCry, which targeted old versions of

Windows, was to keep computing networks up-to-date. While an individual PC can be upgraded to new versions with relative ease, doing this at a large organisation like the NHS is incredibly costly – though not, it must be argued, as costly as being the victim of a huge cyber attack.

As if it were needed, another reminder of how vulnerable systems around the world are came just a month later, with another ransomware attack using many of the same techniques as WannaCry. The code was dubbed NotPetya as it was similar, though not identical, to an earlier strain of that name.

The attack spread in much the same way as WannaCry, using surprisingly widely-used Ukrainian accounting software as its attack vector – i.e. the way in. This method, coupled with the fact the ransom-paying part of the attack didn't even work, led many to consider that this may have been a Russia-backed attack on the Ukrainian infrastructure which has been subjected to relentless cyber attacks over the past few years.

Both WannaCry and NotPetya used vulnerabilities that had first been discovered by the US National Security Agency (NSA). The NSA stockpiles weaknesses in popular software to use as hacking methods for the work it conducts. Many security experts and companies strongly disagree with this practice, arguing that if the US Government has found something that affects major products it has a duty to report such flaws to the makers of the software. Experts reason that if the NSA finds a flaw then criminals, too, may be aware of the backdoor – and so the only way to be safe is to close it for everyone.

Should the NSA's tools ever be leaked, as they were at the beginning of 2017, it could lead to a wave of attacks before computers can be upgraded and secured. The source of the NSA tool leak is as yet unknown, but analysis of WannaCry and NotPetya showed that at least some of the code had been adapted from NSA's work.

Politically speaking, perhaps the most damaging hack of the past year was one of the least sophisticated. A simple phishing attack – where targets are tricked into thinking an email is genuine – opened the door to an adversary accessing the Democratic

National Committee (DNC) email servers. Almost 20,000 emails ended up being published by Wikileaks, which highlighted discussions that showed the DNC working against the Bernie Sanders campaign in favour of eventual nominee, Hillary Clinton. The hack was claimed by 'Guccifer 2.0' – an unknown hacker, or group of hackers, US agencies believe was working for the GRU, Russia's military intelligence service.

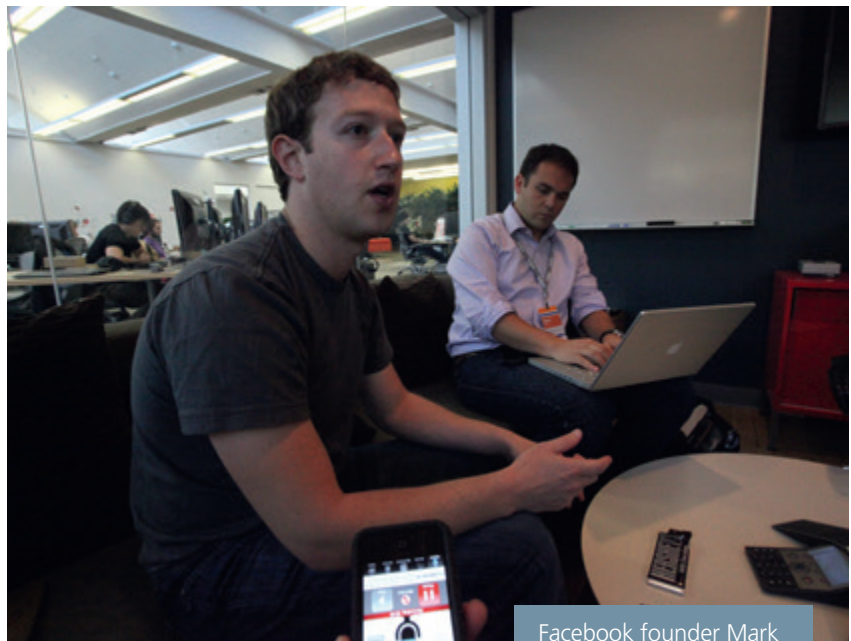
In the post-mortem that followed Donald Trump's election win, the e-mail dump was considered a key factor in Clinton's loss.

Facebook and fake news

Many people believe Mark Zuckerberg, who has spent 2017 travelling to every state in the US, is gearing up for a run for high office. He insists that's not the case, and that he simply wants to learn more about the country that's home to around 200 million of his users.

The truth may lie somewhere in the middle. While Zuckerberg may not be running for president, his trip is surely politically motivated. When Donald Trump became president, everyone began to ponder Facebook's role in distributing 'fake' – or at the very least extremely misleading – news to millions of people.

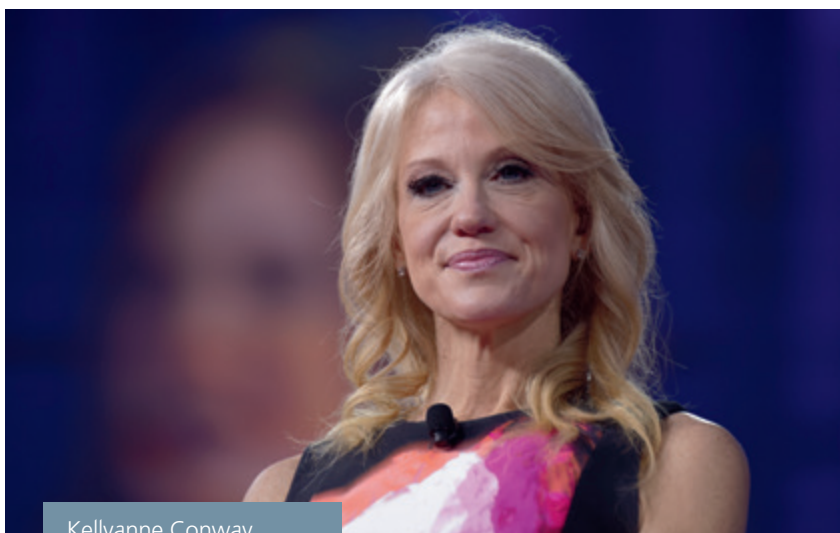
Everyone, that is, except Zuckerberg himself. The suggestion that fake news impacted the election in any meaningful way, he argued on stage in November, was 'crazy'. Soon he'd backtrack, announcing new efforts to work with fact-checkers to control the flow of bogus information. And then, finally awakening to the implications of his own creation, he packed his bags and went out to meet users beyond his own bubble.



Facebook founder Mark Zuckerberg came under intense pressure to take action against fake news stories on the social media network

In just a few short weeks the term 'fake news' was hijacked beyond any usefulness.

As the now President Trump was telling CNN's White House reporter 'you are fake news', the term was morphing to mean 'opinionated or disagreeable' rather than inaccurate. It meant no single news organisation, big or small, is seen as being trustworthy by both sides of America's bitter political divide.



Kellyanne Conway, Counselor to US President Donald Trump, has tried to defend the administration's much derided reliance on 'alternative facts'

Facebook's role in fixing the problem is complex, and to be frank, one the company does not want to have to deal with. Some argue that it should acknowledge that it is a media company, which would then have both the right and obligation to put in place greater curation over what is shared. Facebook is desperate to avoid such a stance. As they see it, its job is to provide a neutral tool to share what people want. If the public chooses to share certain things then that's up to them (within reason).

That said, the company has made some notable changes. It now attempts to show alternative viewpoints under shared articles, whereas before it would show only similar views on the assumption you're more likely to click on something with which you agree.

The Trending Topics box, found on the right-hand side of the screen, was originally curated by humans.

However, the team was accused of being pro-left after a leak suggested they were being told to favour certain publications over others. In particular, right-wing news site, Breitbart, was routinely taken off the Trending Topics area. Facebook reacted by firing the human team, and instead allowing an algorithm to do all of the work. Of course, this isn't perfect either – it wasn't long until people realised Facebook's algorithm was not smart enough to spot some instances of fake news. That fallout provoked calls for Facebook to hire humans to boot out false stories, at which point the circle was complete. The controversy over Trending Topics, a relatively insignificant part of the Facebook experience, highlights just how thankless a task Facebook faces.

Perhaps unfairly, other social networks haven't faced the same level of criticism over their algorithms and practices. Twitter, famously, has been president Trump's communications medium of choice, however unwise that may have so far proven to be. With some of his personal attacks, Trump has routinely pushed the Twitter terms and conditions to their limits – though few people expect Twitter Chief Executive Officer, Jack Dorsey, will ever go as far as to suspend the president's account. On the flipside, however, debate (and a lawsuit) now rages over whether Trump should be able to block users – it is argued that not being able to see and reply to Trump's tweets amounts to a violation of their First Amendment rights.

Mixed reality

This year has seen a lot of progress made with both virtual reality – where you're taken to a whole new world via a headset – and augmented reality, which overlays imagery onto the real world in front of you.

These two fields are becoming increasingly blurred, with some applications blending both virtual and augmented worlds into one arena – be it for gaming, business or social networking.

And thus, it's easier now to refer to the entire sector as simply Mixed Reality – MR – an aspect of computing that shows great promise in a wide variety of use cases.

One company leading the way with MR is Microsoft. Its HoloLens device is currently available to developers for \$3,000 but is expected to be more widely available (and affordable) soon.

HoloLens looks like a pair of enormous sunglasses. It overlays images into your normal field of vision. Early prototypes offered a tiny box showing graphics that measured just a couple of inches across, in low, grainy quality. But within two years the device has improved immensely, and it now almost covers the wearer's entire field of vision. Furthermore, the improved power means images appear far more solid, enhancing the sense that the object is real. Sophisticated motion tracking, which does not require any external hardware, allows the user to walk and move around the virtually-enhanced landscape and the digital additions will react accordingly.

When Microsoft began to show off HoloLens it did so by sharing a demonstration of Minecraft, the block building game played by more than 100 million people around the world.

But more recent applications have emphasised the device's potential for industry. NASA scientists are able to walk around Mars using genuine imagery taken on the Red Planet. Surgeons are able to overlay information about patients directly onto the bodies on which they are operating. Schools and universities use the device to enable students to walk around 3D models, such as scientific diagrams or ancient buildings.

Microsoft is not the only company working in this space. MR headsets from companies such as Meta and Magic Leap offer the same functionality in different ways. Meta, for example, does



Famous astronaut Buzz Aldrin experiences a 'visit' to Mars using the Microsoft HoloLens mixed reality headset

much of its computing power externally from the device (meaning a computer is needed to power the machine), while Magic Leap, still in development, has been seen to require a backpack containing extra hardware – though it's unclear if that's going to be what the company ends up releasing to the public.

Predictably, the key barrier to truly immersive MR is cost. Which is why a more basic application of it, via smartphones, has already seen more adoption.

Last summer's smash hit game *Pokémon Go* introduced consumers to basic augmented reality gaming – where characters would appear in 'real life' as seen through a smartphone screen. Building on that success, Apple announced in June that it had created ARKit – a software suite and platform that made it easier for developers to create apps which used augmented reality. The demonstrated application showed the creation of a medieval world atop a normal kitchen table. It came to life as a short film, produced by a new AR Studio led by Lord of the Rings Director, Peter Jackson.

More simple – though perhaps more ingenious – was an augmented reality (AR) app that replaced the need for a physical tape measure. The iPhone's camera was able to detect an object



Pokemon Go is one of the first universally available augmented reality games, and met with a massive audience

and its shape and allow the user to move down and 'roll out' the tape measure to learn its length.

Over the past decade, the success of the smartphone has had many interesting knock-on effects to industries that seemingly had no direct link. For example, once smartphones came with a strong light as standard, sales of torches plummeted. It is expected that ubiquitous AR could have much the same effect.

A boom in smartphone powered AR also has big implications for machine learning and artificial intelligence. The prospect of mass data gathering is unprecedented and its utility incredibly far reaching.

Snapchat – the image-messaging app that has morphed into a publishing platform and social network – was an early pioneer in using AR to amuse its users. When taking a selfie, the software

can automatically detect facial features and expressions. Turn the camera the other way and it can spot tables or floors and apply objects to those areas. The use for it right now is flippant – turn your face into a bunny with big ears – but it means the company is slowly feeding itself information about the world around us, allowing the physical world to be mapped and sorted in much the same way as Google did with the World Wide Web.

Also doing major work in this area is Facebook. In April, at the network's developers conference, founder, Mark Zuckerberg, made AR the focus of his keynote announcement, declaring that the camera is the next big computing platform. Like Snapchat, most of Facebook's AR offering is about gimmicky fun, but all the while it is creating an unprecedented database of images that will power a wave of machine learning.

Naturally, Google is also investing massively in augmented and mixed reality – though it is forgoing the playfulness of Snapchat and Facebook and instead focusing on practical application. It's Project Tango initiative, which uses two separate cameras on a smartphone to better understand depth, has been used to map the inside of shops to direct shoppers to specific items. On the street, Google uses AR to display information about buildings – much as you would see if you were using Google Maps on your computer.

Voice

There's no shortage of new computing interfaces currently claiming to be the next major platform – but in 2017, really only one dramatically new way of using computers enjoyed genuine commercial success: voice.

Now available outside of the US, Amazon's Alexa, against many

analysts' expectations, is leading the market for voice-activated assistants. This is in part due to its prominence on the homepage of the world's largest retailer, but also thanks to the sophistication of its voice recognition and the depth of its 'skills' that allow it to control different devices or provide different types of information.

For example, Ford released Alexa-enabled cars in 2017, providing a set-up that allowed drivers to start their car up remotely with a voice command – designed for those days when you want to turn your car on and warm it up before you get in. Once in the car, passengers can fire questions at it or issue commands like ‘find me the nearest coffee shop’. Cars have offered voice control before, but it’s the integration with Amazon’s machine learning and artificial intelligence (AI) that makes Alexa-enabled cars a step change in smart voice control.

In May, Amazon followed up the Amazon Echo and Echo Dot – the two devices that offered the Alexa assistant – with the Amazon Echo Show.

That device divided critics, mainly due to a function that would allow people to remotely switch on a contact’s camera and peer into the room in which Alexa was set up. Billed by Amazon as a seamless, natural way to communicate with loved ones remotely, others saw this as a terrifying prospect for invading one’s privacy. Regardless, Amazon’s Assistant is the stand-out success in this sector.

But that early lead is under direct threat from Google. Its similar device, Google Home, should (in theory) be smarter, backed as it is by Google’s unrivaled expertise in AI and its enormous web of linked information.

Google has another advantage too – the Android operating system. It gives Google the opportunity to integrate its voice assistant into every Android smartphone in a manner which Amazon will not be able to achieve with Alexa, even if it were to release a full-featured Alexa app (it hasn’t yet).

These assistants are designed to help you coordinate your day, which is why most analysts expect Google to

eventually win out over Amazon, simply due to the depth of data to which the company has access – such as schedules within Google Calendar.

In June, Apple announced it would be joining Amazon and Google in putting a smart assistant in the home. However, its approach was different – its HomePod device, which will be twice the price of both Amazon’s and Google’s devices, is being billed as a music device with voice control rather than an all-out home assistant.

The distinction is important. Apple considers music to be the primary use for these assistants. Excelling in that key function is very possibly a safe strategy. Then again, it could be argued that Apple’s reluctance to trumpet the voice assistant element is due to one awkward fact: Apple’s Siri voice assistant is severely lacking compared to its rivals.

Siri has been integrated with the iPhone since 2011. But despite arriving, with great fanfare, well before Alexa or Google’s voice assistant (which it just calls ‘Google’), Siri has been woefully slow to develop into a useful tool.

In September 2016, Apple attempted to widen the appeal and potential of Siri by allowing third-party developers to integrate Siri commands into their apps. Few did, with complaints that Apple was being too restrictive in what it allowed developers to do with the assistant.

Voice assistants don’t yet have a so-called ‘killer app’ that tempts people to change or upgrade their device, and so the poor performance of Siri has not hampered Apple in any meaningful way – yet. But as time goes on Apple’s dearth of personal data (which it often cites as a point of pride, user privacy speaking), could become a significant problem for the company.

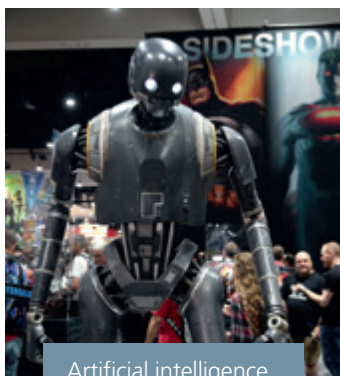


Amazon’s Echo is the leading voice-activated assistant in the UK and US, utilising the Alexa system



Siri, the voice-activated assistant for Apple products, remains popular, but is threatened by a lack of applications compared to rivals

AI, ML and Autonomy



Artificial intelligence has long been the preserve of science fiction, but major steps have been taken to make it a reality

Out of laziness more than anything there has been a blurring between the use of the term artificial intelligence (AI) and machine learning (ML). Though both contribute to similar goals, they are distinct.

Machine learning says: feed a computer a billion images of dog breeds and you can teach it how to identify dogs based on what it has learned. Artificial intelligence says: tell a computer the basic principles of a dog breed – floppy ears, maybe – and it will spot dog breeds without the necessity of being taught first.

Right now, many of the products and functions being described as ‘having AI’ are in fact machine learning projects. Google’s AlphaGo experiment, covered in last year’s *Parliamentary Review*, was a good example. Google taught a computer how to be a grand champion at the fiendishly difficult board game, *Go*, by loading in millions upon millions of moves. Its AlphaGo machine conquered more top (human) players in 2017.

Such an application may seem trivial, but the underlying technology has enormous potential. In January, researchers at Stanford University found that computer software had become as good at recognising skin cancer as trained doctors. The hope is that such computing power could be built into smartphones to greatly increase early diagnosis of many types of visible disease.

Another great goal of machine learning and AI is autonomy; specifically, autonomous vehicles or, as others prefer to call them, self-driving cars. In December the long-time leader in this field, Google, announced it

was to create a separate company out of its self-driving division, called Waymo. Waymo’s goal would be to seek out commercial opportunities for autonomous hardware and software that could start making money for Google’s parent company, Alphabet.

The autonomous vehicle space is increasingly hectic. Most major car makers – such as Volvo and Ford – are investing heavily in the sector. Uber has its own self-driving division which it hopes will offer the company a self-driving fleet to ferry people around cities – one which would remove its only major expense right now: the human driver.

But with this growth has come controversy around governance. Uber backed down from its stand off with California motoring regulators who said the company did not have the correct permits to test self-driving vehicles on city streets. The Trump administration is building country-wide rules for carrying out the tests, mindful that the inevitable accidents that will occur will create enormous public backlash against the concept even if, statistically speaking, self-driving cars are already safer than humans.

In the UK, much of the policy discussion has been on insurance issues – such as who should be liable if an autonomous vehicle causes an accident. Insurance should cover self-driving accidents in the same way it treats human accidents now, Government proposals suggested, though if a human modifies the car’s software, or neglects to keep it up to date, they could be personally liable instead.

Elon Musk

It’s been an extraordinary year for Elon Musk, whose day-to-day responsibilities continue to grow both in number and

ambition. As Chief Executive of Tesla, this year has been about ramping up the company’s production capabilities

in order to meet the intense demand for the Model 3, the company's first 'affordable' electric car. In this context, affordable means \$35,000, minus various incentives and tax breaks handed out to buyers of clean energy vehicles.

As *The Parliamentary Review* goes to print, Tesla is currently valued more highly than Ford – a company that has been making cars since 1903 and in 2016 sold 7 million vehicles. Tesla, in comparison, managed to roll a mere 80,000 cars off its line – and posted a yearly loss of almost \$900 million.

But the company's market value stems from the belief that Musk – who was reportedly sleeping at the company's factory while it worked on extra production efficiency – can do enough to get hundreds of thousands of cars out of the door and cement its place as the leader in electric vehicles.

In July, Musk tweeted a picture of the first mass-production Model 3. Drivers would be taking them off his hands by the end of July and he said he thinks the company will be able to produce 20,000 cars every month from December 2017. He needs to – Tesla's stock, considered drastically overpriced by some, relies heavily on Musk fulfilling the hundreds of thousands of Model 3 orders.

You'd think, then, that the 46-year-old would have little time for anything else. On the contrary, Musk was busy plotting the creation of the world's largest lithium-ion battery. It will contribute to the power grid in South Australia and will be more than double the size of the current largest cell. And, in typical Musk fashion, he promised South Australia's Premier, Jay Weatherill, it would be completed within 100 days of the contracts being signed or Tesla would do the work free of charge. The deadline will be up in mid-October 2017.

Meanwhile, Musk is busy laying the ground work – literally – for yet another new firm. The Boring Company does precisely what it says: it bores. Holes. Big ones, eventually, but starting with a small one in the car park at the headquarters of SpaceX, Musk's space exploration company.

Its ambition has quickly escalated. A concept video showing cars being dropped down from the street into a vast network of underground tunnels was designed to show off Musk's vision – though few gave it much credibility.

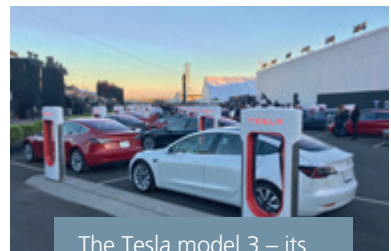
More confusion – and some mockery, it must be said – arose when Musk tweeted in July that he had been given 'verbal Government approval' to drill a tunnel from New York to Washington DC. It would combine the work of The Boring Company and yet another of Musk's endeavours: Hyperloop. Hyperloop is a vacuum-powered transport method that would fizz riders along at speeds of around 700mph (in theory, at least – tests are still ongoing).

An underground Hyperloop, using tunnels made by The Boring Company, could provide a revolutionary new transport method on the US East Coast and elsewhere. But the suggestion that Musk had somehow been given Government approval on such a project was ludicrous, and gently tracked back by the White House.

Speaking of SpaceX, it was another impressive year for Musk's space exploration efforts. In June, the company managed back-to-back successful landings using re-used boosters. That feat, on its way to being perfected by SpaceX, greatly reduces the cost of space travel. The firm has managed 13 landings with re-used rockets so far. And to top it all off, in March, Musk launched Neuralink – a company that would invest in technologies that connect the brain directly with computers.



Elon Musk is admired, and sometimes ridiculed, for his vast scientific and business ambition



The Tesla model 3 – its most affordable electric car yet – has seen staggering demand in the US

SAS Global Communications



Our portal flags 95% of problems pro-actively, pinpoints application issues and predicts capacity problems



Our innovative 4G Rapid Site Deployment service connects sites to the corporate network in just two days

We run our customers' corporate data networks. Our innovations connect their new sites faster, make their applications faster and give them better service and lower cost than they've had before. We're making them more successful and we're winning more business. This is how we do it.

Most customers need help with very similar challenges

We serve large- and medium-sized business customers, often global but mostly UK-based. We design, deploy and support the networks, the applications and the infrastructure on which they run their businesses. Most are burdened by five key problems that we solve to make them more successful:

Delivery – Corporate networks are complex to deliver. Network providers with manual processes take months to deliver, creating disruption and cost.

Performance – Companies want to be right-first-time and fast, so they build applications to digitise their processes. Many struggle to make applications work well over their networks, wasting time for hundreds of staff.

Service experience – Network providers are notorious for delivery errors, slow changes, unfixed problems and billing errors. This makes the network painful and costly to run.

Skillset – Companies buy managed services to avoid hiring skilled resources but sometimes the provider does not have skills they need urgently. For example, when network performance problems are traced to a database design or server configuration, many providers struggle to fix them.

FACTS ABOUT SAS GLOBAL COMMUNICATIONS

- » Founded 1989, and based in Horsham
- » £19 million turnover
- » We support mid-sized and enterprise customers in the UK and globally
- » We provide managed networks, applications and infrastructure
- » Multi-award winning
- » We help IT teams become heroes

“31% of mid-market companies think they have application performance problems. We built tools to fix these”

Cost – Most businesses pay too much for their network. Culprits include lower supply costs that are not passed on and cheaper technologies or designs that are not suggested.

We spent 10 years and £15 million innovating to provide that help.

We are an SME that invests like a large enterprise. We relentlessly innovate to give customers a Wide Area Network (WAN) whose delivery, performance and cost will help them win. Market-changing innovation is rare in our industry because it takes long-term commitment and an intimate understanding of complex needs.

For years we’ve researched what customers really need and then invested long-term to build and refine it, delivering five key innovations. We have:

- » Created an ultra-fast, ultra-reliable service to connect business sites in two days using multiple 4G connections
- » Built a world-beating monitoring system that finds 95% of issues proactively and helps solve them
- » Built a skillset pool that customers use for problems they cannot solve themselves

- » Built an end-to-end digital business with fast, agile processes that make complex services simple and pain-free
- » Created a methodology to wring every pound from network costs, committing to help customers save every year.

Here are some examples of how this innovation helps UK businesses to succeed.

New sites can take six months to connect. We aim for two days.

A six-month delay for new sites ruins agility, especially when delivery slips unexpectedly. When a circuit is delayed or a disaster strikes, businesses need help immediately, not in a few months.

We built an award-winning Hybrid WAN solution. Rapid Site Deployment bonds multiple 4G connections into one fast, reliable connection that we link into our customers’ networks within two days! We use SIMs from multiple providers to create faster, more resilient connections.

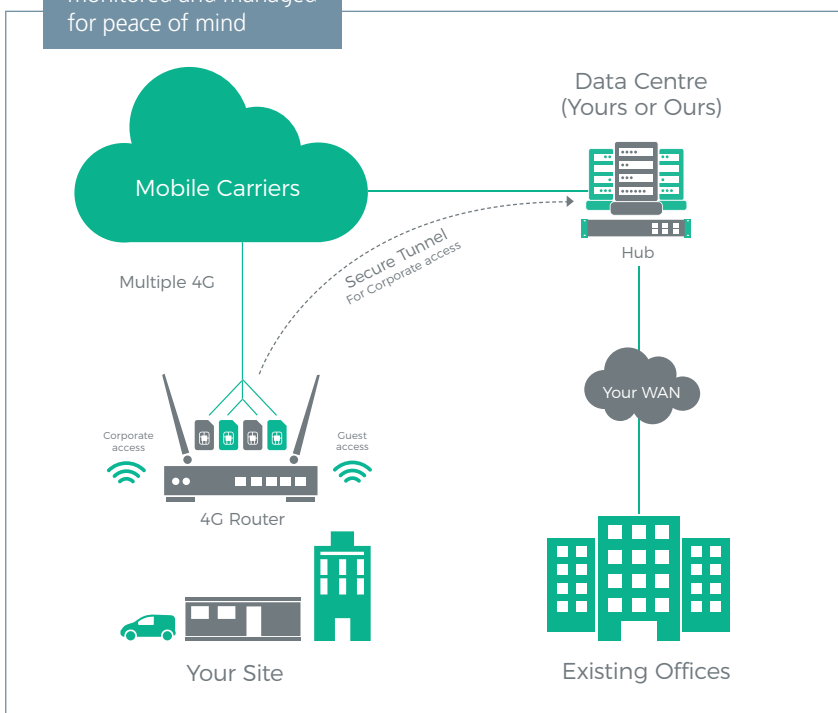
No-one wants to learn new skills when they’re dealing with a catastrophe, so we do everything – even the monitoring – helping customers relax. For planned deployments we use this alongside fixed circuits to expedite deployment.

31% of mid-market companies think they have application performance problems. We built tools to fix these.

Software that runs slowly over the network is a huge problem for business. Since 70% of problems turn out not to be caused by the network, people waste time fixing problems – throwing money at inappropriate fixes such as greater bandwidth.

Improving performance requires that you monitor everything, not just the network. You need to look at the whole path of an application across your IT and you need application as well as network and IT skills. Most mid-sized businesses don’t monitor well enough to trace problems and don’t have the skills to correct them anyway.

We bond multiple SIMs from multiple providers to give speed coupled with great reliability – monitored and managed for peace of mind



We built a Next Generation Monitoring system with the most advanced reporting in the industry. We created an applications practice that offers application audits and Critical Path Monitoring services. We retain scarce skills in our Service Excellence team, which drops in to help trace and fix intractable problems.

We manage network, infrastructure and application performance together, to create a great experience for the users.

Most businesses could save 25% on their network so we innovated to help them do it.

Most businesses pay too much for their WAN. Supply costs decline year on year, but network providers don't pass on savings unless under pressure. Often they offer more speed, not less cost. Only a third of companies use the annual price review clause in their contract so they don't free up funds to spend on growth.

We've innovated to stop that. We've worked out how to access multiple cost savings in UK networks and taken the bold step to share that information. We publish a guide and we offer free help. We promise to help customers take advantage of market cost reductions every year, not just at contract end. We have saved many customers 25%. Our record is 47%.

Many customers need skills adjacent to the service they are buying, so we built a model to give them that.

We built a Service Excellence team to offer multiple skills that customers cannot justify retaining themselves. Here are two examples:

- » We provide application performance audits to tackle intractable issues; monitoring, interpreting and helping to fix them. We fix many problems where it is not the network at fault and where our analysis of the application code, the database design or the server configuration saves the day
- » Construction and road building projects need high-performance

networks for short periods. Fixed circuits take months to deliver with costs often unknown while bidding for the contract. Our experts host meetings at the site with the client and BT Openreach, allowing plans, costs and timescales to be set out before building contracts have been won. We supply 4G connections in two days, including WiFi and on-site IT setup, and migrate seamlessly to permanent circuits once delivered. This is great for projects such as the A14 extension.

We're making an impact on industry

Everyone benefits from a strong UK, so we are pleased to help UK plc by passing on knowledge and services, in particular via innovative services for network providers. For example:

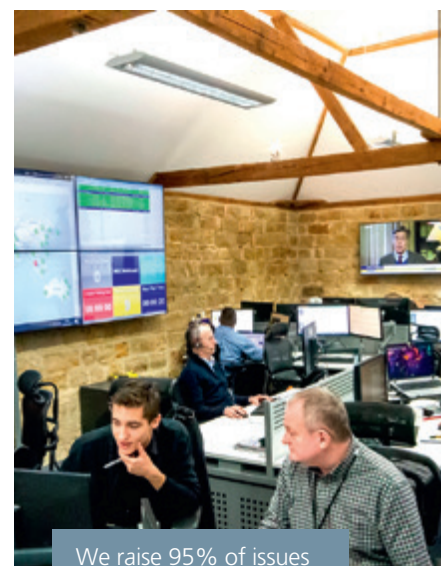
- » One major network provider used our managed service to jump-start its offering
- » Another uses our monitoring to augment its service
- » Others use our two-day Rapid Site Deployment service when their customers need new sites fast
- » We freely publish cost reduction advice and we keep network providers honest because we're proactive at reducing customer costs
- » We've created a new standard for performance and cost using hybrid networks that blend services from all the network providers.

» WHAT NEXT FOR SAS?

We help IT Teams by innovating relentlessly, gaining hundreds of delighted customers, multiple awards and 15% year on year growth for the past 10 years.

The next five years will see more innovation:

- » Our hybrid networks, using software-defined networking (SDN), will give the best performance and price by blending all the network providers.
- » Customers will enjoy hyper-speed network roll-outs, transitioning seamlessly from our multi-SIM, 4G technology once permanent circuits are delivered.
- » By using only network providers that trade digitally, we will dramatically increase right-first-time delivery and speed of change for customers and we will take over network billing to banish billing blues forever.



We raise 95% of issues proactively and fix 75% on the first call

“Most businesses could save 25% on their network so we innovated to help them do it”

Excitech



Excitech is an Authorised Training Centre offering a range of courses delivered by experienced application specialists and consultants



Excitech provides technology services and solutions for the construction sector

Employing over two million people, and contributing £100 billion in economic output, the construction sector is a key contributor to the UK economy¹. Large construction projects, however, typically take 20% longer to finish than scheduled and are up to 80% over budget². With the global construction market expected to grow 70%³ by 2025, digital transformation plays a key role in driving out inefficiencies and ensuring the ongoing competitiveness of the industry. Technology is fundamentally changing the way we plan, build and maintain our buildings and infrastructure today.

Founded by Adrian Atkinson in Enfield, North London, in 1985, we employ over 130 people, generating revenues in excess of £31 million. In the last four years, our revenues have grown over 78%. Our purpose is to provide technology solutions to the construction sector, supporting the complete project life cycle from the manufacture of building products through to design and construction, building handover and maintenance.

We were one of the first partners of Autodesk (the leading supplier of computer-aided design (CAD) software) helping architects, engineers and construction companies transition from paper-based draughting to the then new 2D software AutoCAD. Like any new technology, companies had to invest in understanding how to implement and use the new tool so we focused on providing training, support and advice to help them.

¹ House of Commons Library, Construction Industry, Statistics and Policy Briefing Paper, 6 October 2016.

² Imagining construction's digital future, June 2016, McKinsey&Co.

³ HM Government, Digital Britain, Level 3 Building Information Modelling – Strategic Plan.

FACTS ABOUT EXCITECH

- » Founded in 1985
- » Privately owned
- » Annual Turnover £31 million+
- » Based in Enfield
- » 3,200 customers across the UK
- » 130 employees
- » Technology partnerships with Autodesk, Microsoft, Dell, HP
- » Construction Computing Channel Partner of the Year 2016
- » #39 on The Sunday Times BDO Profit Track 100, 2016
- » #88 on CRN Top 100 VARS in the UK, 2016
- » www.excitech.co.uk

Over the years the software and the models it creates have incorporated increasing levels of intelligent data that has the potential to deliver significant increases in efficiency for the construction and maintenance of buildings.

Collaboration is the future

Historically, the construction sector has been represented by disparate industries, with minimal collaboration and sharing of data. Commentators within the industry have, for some time, realised that the building project lifecycle from conceptual design through to construction, handover and management could be significantly more effective if companies shared and co-ordinated data more effectively. The name given to this way of working is Building Information Modelling (BIM).

In 2011, the Government mandated the use of BIM on all public sector projects. The deadline for achieving this was April 2016 and a programme of measures was introduced to reduce costs by up to 20%.

BIM is not a product or single technology; it is a collaborative way of working, underpinned by digital technologies which support more efficient methods of designing, creating and maintaining building assets. BIM embeds product and asset data into a 3D model that can be used for effective management of information throughout a building project lifecycle.

Early BIM at Excitech

We were delivering BIM before BIM was recognised as a methodology. We had a team of nine consultants working on BAA's Terminal 5 construction project, implementing common design and co-ordination standards, policing and managing design data during the design and collaboration stages of the project, and capturing asset data for management of the T5 assets (asset examples would be anything that requires maintenance like boilers, pumps, air conditioning units etc.).



Example of a 3D visualisation depicting internal building services

3D modelling software

We are Autodesk's largest Platinum Partner in the UK. Its flagship product that supports the BIM methodology is Revit.

Revit is an intelligent database modelling system with variations for architecture, structural and building services engineering (electrics, plumbing, heating and ventilation). It provides a modelling engine that allows co-ordinated design between architects, structural engineers and building services engineers, each one able to superimpose their designs onto the existing co-ordinated model. This minimises clashes and re-work, reducing costs and minimising the risk of mistakes.

Revit has the ability to retain asset information for every entity within the model, allowing accurate costings, visualisation, scheduling and downstream maintenance.

While Revit is focused on the construction of buildings, Autodesk's infrastructure technologies are Civil3D and InfraWorks. These provide a similar level of co-ordination and data capture but are aimed at civil engineering (roads, rail and bridges etc).

More than just software

The file sizes and the need to share very large data sets across multiple locations mean that the IT and networking infrastructure has to be capable of supporting these challenges. Workstations and laptops need to be of the highest performance and capacity,

“The building project lifecycle could be significantly more effective if companies shared and co-ordinated data more effectively”

» SERVICING THE CONSTRUCTION SECTOR FOR THE NEXT 30 YEARS

Since we began, we have strived to bring new technologies and processes to the construction sector, helping businesses take advantage of the latest advances. We are proud of the fact that many of our early customers still remain customers today, with many of them having been with us for over 20 years. We don't build ordinary relationships with our customers; we build partnerships that stand the test of time.

Our branding takes references from nature to illustrate what is unique about our customer relationships

and document management has to be capable of managing multiple iterations of, in some cases, many thousands of files across many companies on a single project.

As a result, we developed expertise in providing support, advice and solutions in the areas of IT and document management to deliver a complete service for an effective CAD and modelling environment.

Lifetime management of a building

BIM is becoming increasingly essential in ensuring that facilities managers receive accurate digital information to populate their management systems, enabling them to understand the characteristics of their buildings and estates faster and more accurately than before.

We have a specialist team providing a range of Computer Aided Facilities Management (CAFM) solutions for managing both space and asset data for buildings.

Operational development

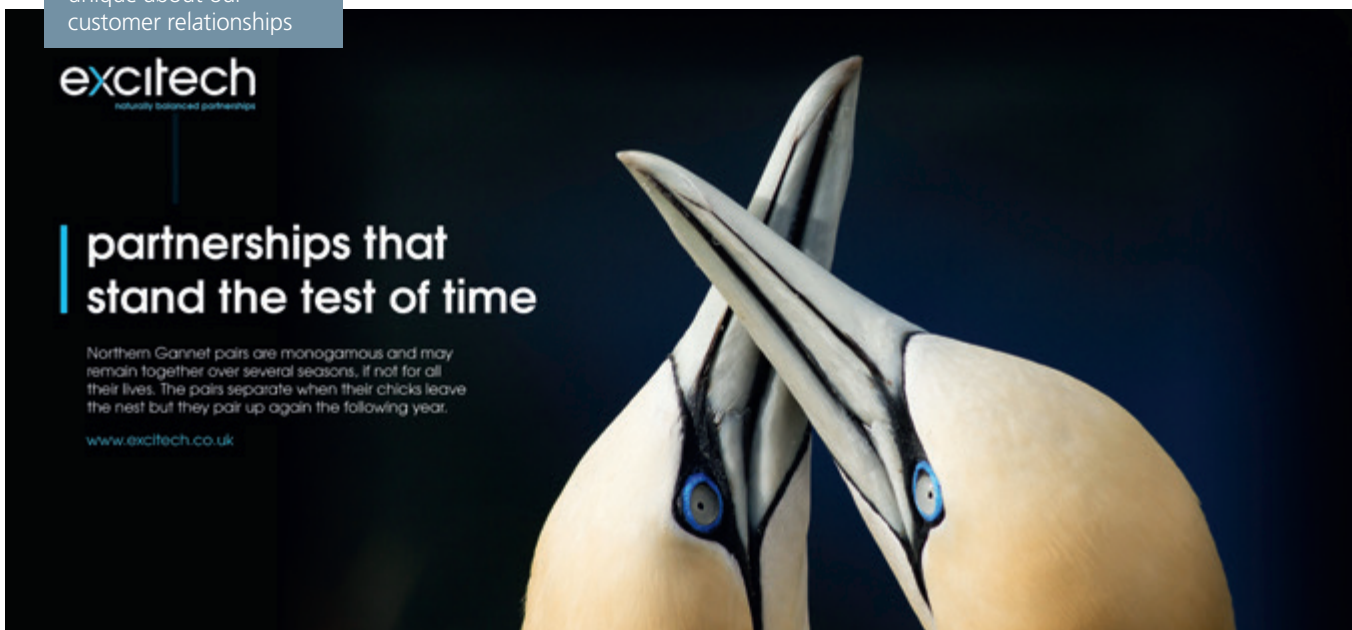
Adopting new software, workflows, standards and processes is challenging for any organisation. Our primary objective is to help our customers maximise the return they get from

their technology investments. Whether it's bringing new people on-board or enriching the skills of existing staff, we help our customers maximise the impact of their design tools and nurture a motivated and productive workforce.

We offer a comprehensive range of training courses delivered by industry-experienced application specialists and consultants. We follow up after training to make sure users are comfortable with their new skills and we provide complementary technical support with every training course so there's always someone at the end of the phone to help.

We also offer a state-of-the-art learning and development solution called Pinnacle Series, from Eagle Point Software. It helps users become more productive in the way they use Autodesk software by providing easy-to-follow workflows, access to digital training content, helpful tips and tricks, and an online chat support facility.

Our training is further complemented by a team of experienced project consultants who work with our customers to develop and implement the underlying processes, collaboration standards and workflows necessary to realise the benefits of BIM adoption.



Brand Communications



Martin Kendrick, Chief Executive Officer of Brand Communications

The aim of Brand Communications is to provide businesses with secure 'go anywhere' connectivity, whether fixed, wireless, mobile or any combination thereof. The world is now 'always on' and customers expect that level of availability – whatever their business – along with performance, reliability and total security. Brand's solution is based around a wire-speed Virtual Private Network (VPN) with security 15 times that of Internet banking.

Independent analysis, including that by leading analyst group Gartner which recently completed a review of VPNs, has recommended Brand for any high security or mission critical application. Government sources have agreed that Brand, which supports multiple operating systems, is one of the strongest VPNs available for the Android smartphone platform.

Applications that also form part of the platform include Voice over Internet Protocol (VoIP), tracking, mapping, vehicle management, lone worker management, mobile device management and driver performance metrics. The technology is also being deployed in contemporary automotive developments such as extended vehicle telematics and securing driverless cars.

The Brand solution supports VLAN-based topologies and cloud computing, such as Azure and Amazon Web Services (AWS). Notably, it removes the need for many of the AWS chargeable access tools, making Brand-based installations more seamless, more secure and easier to design. Customers include government, military, utilities and all UK police forces, which is a true validation of the security of the solution.

FACTS ABOUT BRAND COMMUNICATIONS

- » Established in 1991
- » UK technology success story
- » Proven solutions supplying utilities, government, military first responder, enterprise and telecommunication networks
- » Global leaders in secure mobile connectivity
- » First to deliver WiFi on trains
- » First to deliver Elliptic Curve Cryptography
- » www.brandcomms.com



Police and Home Office demand Brand's highest levels of security

“You could effectively say I've run a technology company that is powered by common sense!”

WINNER AWARDS

- » Best Corporate Mobile Data Application
- » Mobile Information Management Project of the Year
- » Mobile Communications Product of the Year
- » Best Product of Networks Telecom

The application of common sense

Technology is a strange beast. Many technology companies have, over the years, looked to create and develop technology for its own sake. At Brand, we've always recognised that our technology has a business mission whatever that business is, from Formula One to government, the Brand technology should simply improve it. Brand products have been described as 'pure innovation with a difference': it is technology that really works, and delivers tangible benefits to our customers.

We take what we call a common sense approach to technology: its application to an extensive knowledge base and decades of experience creates technology that produces business benefits, notably in the areas of software-defined networks, fixed and mobile network design, wide area communication and security. These are some of the most fundamental architectural cornerstones of modern IT.

As Chief Executive Officer (CEO) of Brand Communications since its outset in 1991, and twice runner-up in the Ernst & Young Entrepreneur of the Year awards, you could effectively say I've run a technology company that is powered by common sense! This extends beyond our product development.

We have always maintained our focus on business enhancement; understanding that customers need a supplier with total stability and an absolute empathy with their business needs and drivers.

This approach might be at odds with the venture capital (VC) funded startups in the US, who literally have billions thrown at them. What is excluded from this conversation, however, is the huge percentage of those startups who fail in their early years. A business cannot afford to be left with a critical technology component that is now no longer supported or developed.

The other key component to this common sense approach is honesty. I am not the only CEO of an IT company that can scan a dozen technology product websites and come away completely clueless as to what is actually being offered! This is where marketing overtakes development – the company itself doesn't actually know the *raison d'être* for its technology.

Being honest with yourself and your customers leads to the development of technology that rewards their faith in spending that hard-earned budget with you. Put another way, if you wouldn't buy into that technology yourself, then why should you expect someone else to?

The same level of honesty applies to managing business levels and expectations. Expanding rapidly through excessive investment, just to please the market analysts, and then being forced to maintain that growth level regardless of profitability, ultimately only leads in one direction and it's not up.

The cyber security challenge

Just when you thought cyber security couldn't get even more in the public eye, this year has already seen an unprecedented number of well-documented, high-profile cases.

We have the potential re-emergence of Cold War rivalries, the conversation tapping, and alleged interference with election voting. The question is, even

before we get into the politics versus industry debate – and Ransomware, for example, is a major industry in its own right – there’s also the basics of common sense and pragmatism versus tick box mentality to examine.

There are technologies in existence that can prevent the kind of attacks we’ve seen this year on the NHS, governments and large corporations globally. In many cases, the issue is not inadequate security technology provisions, but simply bad housekeeping, compromised protocols such as SSL and IPsec and poor security management.

Politics versus common sense in security – the back door issues

A story emerged this summer involving the European Parliament potentially enforcing end-to-end encryption on all forms of digital communications, as an extension of personal privacy. A ban on back doors into encrypted messaging apps like WhatsApp and Telegram is also being considered.

Unsurprisingly, there are many parties looking to ensure this does not happen. However, logic dictates that end-to-end security must be allowed to exist free from intermediate back doors. The value of ‘legal intercept’ and back doors needs to be considered from a systems point of view, not political, and how that capability can lead to bigger issues than legal intercept aims to mitigate.

The WannaCry ransomware was born out of the ‘bad guys’ obtaining the tools or capabilities generated by the so called ‘good guys’. If you create a back door, it is only a matter of time before malicious parties will discover it and cause major compromise. Brand’s Apollo solution, unlike many other VPNs, is a Layer2 VPN, a virtual private MPLS network that can isolate its traffic from other co-existing traffic, thereby acting as the common sense mediator between security and politics.



The security and communication challenges we face in a connected world will continue to grow

The Internet of Things (IoT) – meaning anything from kettles and toasters to house door lock systems that can be operated via the Internet – simply gives the ‘bad guys’ a whole new world of potential back doors (in some cases literally.) to exploit. Everything therefore needs to be considered as a system and not a component in isolation; A may not be able to talk to C, but if A can talk to B and B to C then the system can be compromised.

Quantum Encryption, the next major step forward in computing security, will be impossible to hack, so strategies should be set today to deal with the ‘bad guys’ based on the fact that legal intercept is probably not the answer – back doors offer more potential for compromise than they offer good intelligence.

At the end of the day, which is the most costly? Don’t compromise the integrity of the encrypted data with government-initiated back doors but instead target the source and destination of that encrypted data. A military commander would not spend time trying to decode enemy messages when under fire, but instead would target his efforts at hitting the site with the most traffic and stopping the communication in its tracks.

“Don’t compromise the integrity of the encrypted data with government initiated back doors”

Cybertronics UK



Saranj Nijjar, Managing Director



Cybertronics UK, based in Reading

Cybertronics UK, with a turnover of £800,000, was originally set up as a consultancy, designer and supplier of telecommunication products. Its telecommunication business relies on products being supplied as fully tested and spans several countries including Germany, the USA, France and Italy. It was found that when faulty products were encountered there was a lack of companies able to supply the high level of quality required for their repair.

FACTS ABOUT CYBERTRONICS UK

- » Established in January 2000
- » Based in Reading, Berkshire
- » Repair, reuse and recycling solutions
- » Highly-skilled engineers
- » Global customer base
- » www.cybertronics.co.uk

This presented an opportunity, requiring a new way of thinking so we could supply products that could be covered by our own warranty. We needed engineers with the technical skills to analyse circuit boards without circuit diagrams.

These engineers required the ability to adapt to different products and different technologies and not only to identify faulty components but to also have the skill to replace them. Removing and replacing parts can often require a few thousand connections within a square centimetre, so this calls for considerable expertise.

As the market for product suppliers became more and more saturated, we decided that the future of Cybertronics lay within the repair industry. This required a niche set of skills and considerable investment in test and repair equipment, which was constantly evolving as technology advances. Cybertronics is able to repair datacoms and networking equipment which is the heartbeat of the financial and IT industry. The need for these repairs arises all over the world with strong demand coming from Holland, Germany and Austria in particular. Some products arrive from as far away as Australia, since repair facilities are limited in most countries.

Cybertronics are based in Reading and provide backup to 24 hour maintenance companies, where a rapid turnaround is needed as replacements for faulty products need to be in place as soon as possible. Demand can arise for any maintained product, 24 hours a day, 365 days a year. One customer with 24 hour contracts for product replacements, which need to be on site within four hours, is Smart Capital Technology (SCT). SCT covers contracts all over the UK and Europe. Its requirement covers a wide range of products, which need to be repaired, defaulted and tested very quickly so that they can be in place for the next fault call on the contract.

The repairs service offered is covered by a full warranty on all our products, customised according to individual requirements. This is fully backed by ISO 9001 certification, giving traceability on all products as soon as they are received on our premises. Being a small company gives us the flexibility to change and adapt as demand arises from customers which, in an ever-evolving industry, can be regularly. All of this is controlled by our customised software, which can be changed and modified as we require, to suit our needs.

Recycling

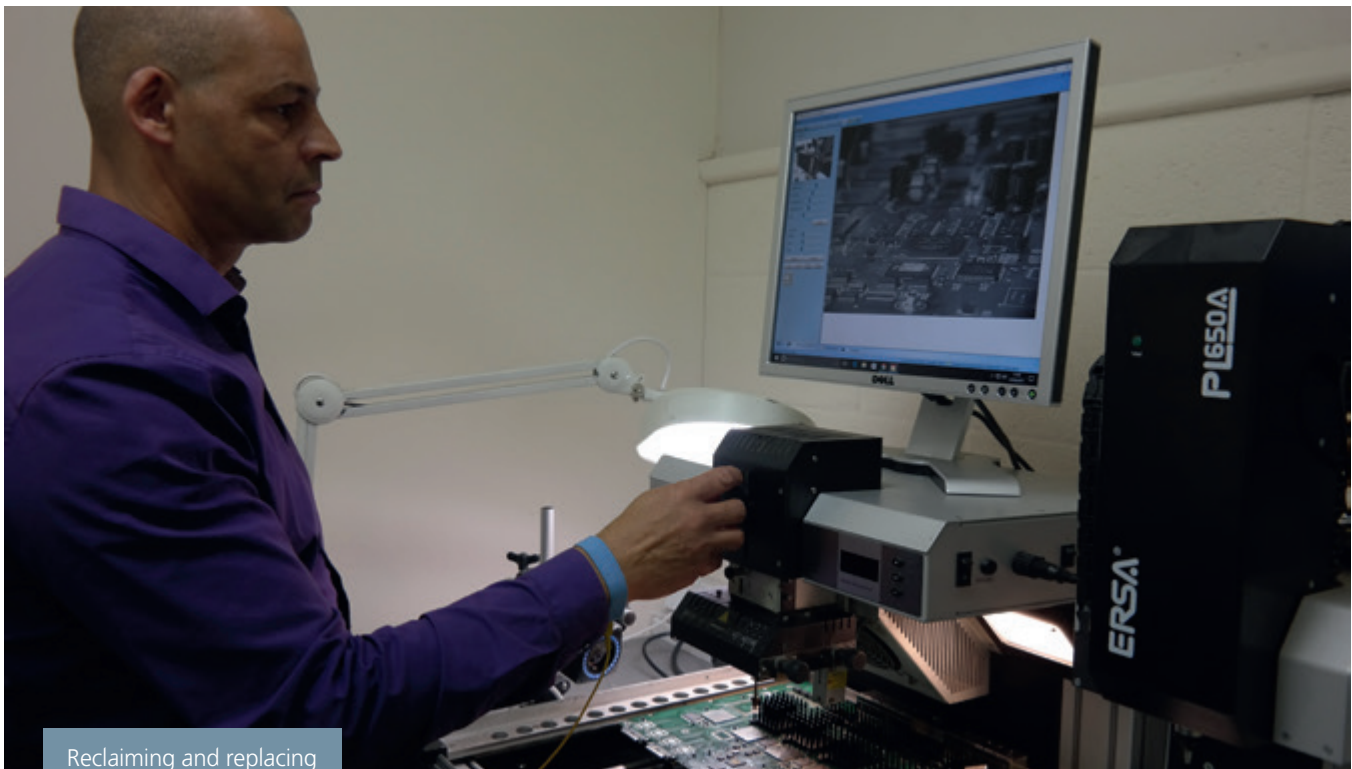
How do we stop so much wastage occurring in the modern world of the throw-away society? Electronic waste dumped into landfills or recycled without care can damage the environment, with heavy metals diffusing into the ground, water and soil. Components such as batteries can also produce toxic chemicals which are released into the environment. With fast-moving technology and innovations occurring at an ever-increasing pace, the pressure to keep up with the latest gadgets is resulting in constant updating of technology products, leading to more wastage of our precious resources.

Electronic wastage is growing rapidly in both developed and developing nations. This effect is amplified in the corporate world, as the need to stay ahead of competitors becomes a necessity; faster networks and more effective communications are key to this. The need to recycle and reuse salvageable materials is vital in any environmental policy and fundamental in building a sustainable world for future generations.

“The flexibility to change and adapt as demand arises from customers”



Testing repaired modules in test chassis



Reclaiming and replacing
BGA IC components

“At the forefront of providing repair, reuse and recycling solutions”

Most technology products used in computing and networks require precious metals, as well as some rare earth metals within components and circuit boards built within their structure. Most of these resources are expensive to mine and there is a finite supply, so it is crucial to be able to find solutions to enable us to reuse or recycle these products.

This was a problem faced by one of Cybertronics' repair customers. This customer had a large inventory of surplus products which were no longer required due to the expiry of contracts. Although initially appearing to be a daunting task, further analysis deemed this to be a perfect fit within the business as it would enable us to repair, reuse and recycle these

products. Highly-skilled engineers, reflow equipment and the software structure were already in place. Cybertronics was able not only to either rebuild and reuse products, or the components within products, for our repair services, but also break down circuit boards and other parts in order to extract metallic or plastic constituents for recycling.

In this example, we were able to offer an answer to our customer which not only solved its environmental problems but was able to save them considerable costs of storage and also provide some financial return on its waste.

Cybertronics has thus evolved into a company at the forefront of providing repair, reuse and recycling solutions to all sectors of industry. We are highly trusted by our customers, and our aim is not only to provide innovative answers to problems faced by these companies but also to enable efficient, sustainable and environmentally-friendly means of dealing with wastage.

» CERTIFICATIONS

- » Environmental agency T11 exemption certification. This allows you to repair, refurbish or dismantle various types of so that the whole WEEE item or any dismantled parts can be reused for their original purpose, or dismantled parts can be recovered
- » ISO 9001 Certification – Management controls and procedures creating traceability of all products within the organisation
- » Registered as tier one waste carrier, broker and dealer

Arena Television



Live Premier League Coverage



Aerial Filming in Ultra HD

Arena Television is the name behind approaching 1,000 hours of mainstream television broadcast to British viewers every year. Arena is at the forefront of delivering Ultra High Definition, the new generation of programmes to the people of Britain.

We cover everything from Premier League football and Six Nations rugby to Trooping the Colour and the Glastonbury music festival. No UK broadcasters own the resource to cover this type of event. Arena has a market share of approximately 23% and is the larger of two British owned companies that service the sector. We also hold all television helicopter news contracts.

For more than 25 years Arena has been providing outside broadcast (OB) facilities to all the major UK broadcasters, while remaining a privately owned British company.

Broadcasters outsource all multi-camera production facilities to companies like Arena. In turn we supply the equipment and crews needed to televise events that take place outside of a TV studio. These typically range from sport and concerts through to ceremonies and natural history.

Arena's fleet of mobile outside broadcast vehicles travel throughout the UK and beyond capturing images seen in homes all over the country, with our aerial filming team capturing news and general footage from the sky. Our aim has always been to provide the best technology to broadcasters so that they in turn can deliver high quality programming to the people of Britain.

KEY FACTS BOX

- » A British owned and run business
- » One of four key players in the market
- » Produce content for all UK Broadcasters
- » A fleet of over 25 outside broadcast vehicles
- » Home of the BBC News and Sky News helicopters

“IP will become the future standard for outside broadcast”

In 2015 BT Sport pioneered the launch of Ultra High Definition (UHD) in the UK. At that time there was an existing method of capturing and transmitting UHD however Arena wanted to ensure that its own solution would meet the needs of the growing format for years to come. We began exploring emerging technology that would provide a powerful and future-proof solution. The result was a partnership with Grass Valley, an established broadcast equipment manufacturer, who had already begun to unveil a number of HD-IP solutions for its worldwide clients.

The new technology would move signals around using Internet Protocol, a well-known tool for homes and businesses but a complete change from the traditional technology used in broadcasting for decades. Broadcasting UHD involves moving vast quantities of data from the broadcasting location right through to the viewer. We believe IP will become the future standard for outside broadcast and be adopted in coming years throughout the industry.

In anticipation of UHD, development of our new outside broadcast vehicle “OBX” began in 2014. OBX would be the first of three Ultra HD trucks built in succession to provide cutting edge technology to the UK’s outside broadcast market. It was agreed the project would ride the wave of the new technology coming to market from Grass Valley. This involved replacing the technology used by the television industry from camera all the way to the very televisions and mobile devices used to watch the content.

Grass Valley’s proof of concept testing utilised technology from Cisco, the world leader in IP based switching and routing technology. Grass Valley and Cisco announced a global strategic alliance to offer customers integrated broadcast solutions. Arena felt that Cisco was the natural choice for the IP switch given Cisco’s market leading position and understanding of delivering mission-critical infrastructure in dynamic environments like an OB truck.

OBX Mobile TV
Production Vehicle





Sound Mixing in Dolby Atmos



Cameras ready to televise in Ultra HD

This emerging UHD technology is a powerful solution that is now providing television four times the resolution of existing HD. The beauty of Arena's design is that it launches UHD while still providing HD pictures in a process known as simulcasting. OBX is the first of three identical trucks built by Arena and was embraced by BT as a UHD / HD simulcast solution.

On Saturday the 10th September 2016 OBX was deployed at Anfield for BT's Premier League coverage of Liverpool v Leicester. The match was successfully broadcast in UHD with both Dolby 5.1 and Dolby Atmos and in HD with Dolby 5.1. The combined OB which included an on-site studio show used 28 cameras of which the cornerstone was the new Grass Valley LDX-86N.

Arena's second UHD truck "OBY" began work on Sky's coverage of Rugby Union in October 2016 and this contract includes England international matches at Twickenham.

Arena considers that OBX and OBY are by far the world's most advanced OB trucks and is delighted to be able to showcase their capability on the Premier League for BT Sport and Rugby Union for Sky. The high profile nature of these broadcasts illustrates how vital our technological innovation has been in delivering the television of the future to the people of Britain.

Arena also holds contracts with the BBC and ITV, both of whom will benefit from the introduction of our third new UHD truck "OBZ".

We would like to take the opportunity to thank our staff, whose professionalism and dedication make Arena's success possible. Implementing new technology requires a drive and focus that our hard-working team has sustained throughout the roll-out of our UHD solution. The recognition by the Parliamentary Review reflects the productivity of a team that we are all privileged to be a part.

» TECHNICAL TERMS BOX

- » UHD: four times the resolution of HD and a higher frame rate
- » HDR: a brighter picture with more detail in the bright and dark areas
- » IP: a future-proof and flexible internet protocol for moving data
- » OB: a mobile TV studio used to provide multi-camera event coverage

» SAMPLE CREDITS BOX

- » The Olympics
- » The FA Cup
- » BBC Springwatch
- » The Royal Variety Show
- » The Voice

Agilitas



Shaun Lynn, CEO, Agilitas



Agilitas provide IT services on behalf of their channel partners to some of the UK's leading businesses

Agilitas is the leading European innovator of customer driven IT services. It is passionate about delivering first class IT services on behalf of its channel partners that include the likes of SCC, ATOS, CDW, Daisy and IBM, to ensure they remain the partner of choice for their end user customers.

KEY FACTS ABOUT AGILITAS

- » CEO: Shaun Lynn
- » Based in Nottingham, 72 staff
- » Founded in 1990 as Computer Parts International Limited
- » £7.7 million, £1.3 million EBITDA
- » Customers served across 26 countries
- » 2015 – rebranded as Agilitas following a management led buyout

For over 25 years Agilitas has been helping the major IT manufacturers, resellers and managed service providers extend their technical capability and improve service performance to their customers.

Agilitas, based in Nottingham UK, delivers first class IT services within the datacentre market across server, storage and networking technologies, throughout 26 countries and to over 12,500 locations across Europe. These services include hardware maintenance, professional services, technical training, remote technical support, product repair and specialist field engineering.

Delivering essential services

The company is focussed on ensuring that every aspect of a network infrastructure within a business is taken care of. The highly experienced Agilitas team is available 24/7, 365 days a year, to guarantee that customers remain operational regardless of the issue. Agilitas supports this with an extensive remote and field-based technical team, detailed knowledge of vendor technologies & logistics management, and a primary focus around service and the customer.

Agilitas assists with:

- » Strategic IT services to manage server, storage and networking datacentre technologies
- » Providing a trusted, service-centric partner
- » Increasing service performance and customer retention
- » Expanding the geographic reach and technical skills of resellers
- » Multi-vendor support contracts

The future of the technology market

We are looking at a considerably different technology market than as little as two years ago. New ideas and innovations have entered the market and the Brexit announcement has meant significant price fluctuation across various areas – causing many to look at what new opportunities separation from the EU could bring.

Within this environment, Agilitas has looked to lead and better understand market changes, launching a series of investigative reports under their ‘Channel in 2020’ initiative.

At Agilitas we’ve looked to understand what we can expect to happen to our industry in 2020. Focusing on three areas; People – Technology – Finance, Agilitas’ research has revealed some interesting trends that are likely to be of significant value to driving growth in the technology sector.

People

There has been continued concern around people and skills across the technology sector over the past few years. Successive government ministers have discussed the importance of STEM education to drive the next generation of technology entrepreneurs and experts.

Interestingly, in our survey of IT resellers, managed service providers and independent IT providers there

was a confident outlook, with 75% expecting the skills gap to change by 2020, and 64% believing it will be resolved or reduced.

The trend contrasts sharply to arguments suggesting we are running out of talent. It seems that rather than resting on their laurels, many in the IT industry are confident of making positive changes to reduce the gap.

The research also looked to understand what can be done to reduce the skills gap, revealing that fostering high quality technical skills is a key priority. Forty-seven percent see a lack of internal training as the key reason for a continued skills shortage in 2020, and around two thirds (62%) view training of existing staff as key to reducing the gap, suggesting talent development is a key focus.

The research highlights a clear need for companies to focus on upskilling existing staff. We’re already seeing a growth in government backed apprenticeship schemes such as the new apprenticeship levy, focussed on supporting the next generation of talent, but the challenge between now and 2020 is the extent to which we can improve existing skillsets to meet new challenges.

Technology

Part two of the research looked at technology and where we can expect to see growth in the next few years. Interestingly, despite the rise of the cloud, two thirds of IT channel leaders are confident that hardware will continue to make up an important part of their revenue streams in 2020.

“75% expecting the skills gap to change by 2020”

Join the discussion at
www.thechannelin2020.com



THE CHANNEL IN™
2020



IT resellers expect to be selling 35% more multi-vendor solutions

“IT based revenue streams will be even more Operational Expenditure (OPEX) based by 2020”

A major focus of the research was innovations. When asked which of the following technologies do you think will experience the greatest sales growth by 2020, 25% of respondents identified artificial intelligence (AI), 18% Internet of Things (IoT), 16% DevOps, and 20% 3D printing.

The results partly support and also contrast much of the rhetoric around technology change that we've heard in recent years. There is a clear appetite for innovation.

Disruption is also a major theme in the report, with much of the research examining technology support contracts and how these are managed and operated. IT resellers expect to be selling 35% more multi-vendor solutions, with just 20% believing single solution driven operations will be a business priority by 2020. This suggests that there will be a lot more opportunities for innovative new technology companies to disrupt and compete against more established incumbents for a greater market share.

Finance

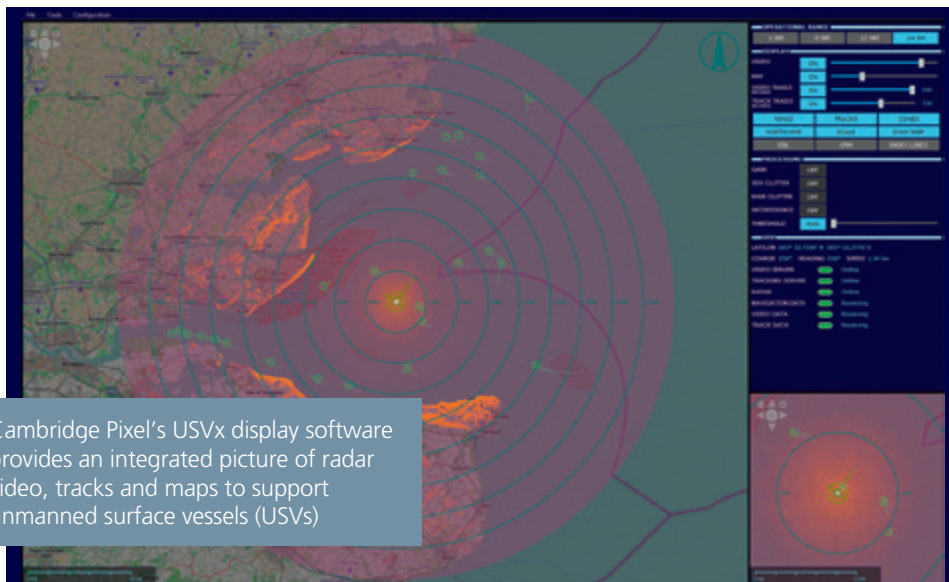
The third part of the investigation looked at finance and growth. It was pleasing to see a positive outlook –

with almost half of those we surveyed expecting the IT channel to grow between now and 2020. The results are supported by Office of National Statistics research, suggesting that the technology industry has helped to drive GDP growth post the vote to leave the EU.

The research also examined what future contracts will look like, revealing that the majority agree that IT based revenue streams will be even more Operational Expenditure (OPEX) based by 2020. This is predominantly due to how users are now consuming IT through an 'always-on' society where 'on demand' services have become the standard. IT services are expected to see the biggest contract shift from Capital Expenditure (CAPEX) to more efficient OPEX models (30%). The leaders surveyed also revealed that they expect software and hardware support services to provide some of the strongest new revenue streams in 2020.

It is particularly encouraging to see such confidence in times of turbulence. It reflects a growing trend we're experiencing within the industry: a bold, innovative and dependable attitude from leaders.

Cambridge Pixel



Cambridge Pixel's USVx display software provides an integrated picture of radar video, tracks and maps to support unmanned surface vessels (USVs)



David Johnson has a background in software and image processing and has been working with radar systems for over 20 years. Cambridge Pixel's specialist technology is now deployed in over 40 countries around the world

Cambridge Pixel celebrates its tenth anniversary in 2017, in what will be a record year of export sales for the business. A specialist provider of software components for radar processing and display, the company has achieved steady year-on-year growth over ten years, with exports now accounting for over 70% of business to customers in over 40 countries.

Cambridge Pixel develops specialised software that processes radar signals to extract information and create radar displays. It's a niche market and we have grown to become the world's leading supplier of this technology. The products find application in a wide range of market segments from military naval systems, including the Royal Navy and the US Navy, to air traffic displays, commercial ships and security applications that use radars for intruder detection. Our software finds application in the world's most advanced ships, but then also helps to guard fish farms from intruders with big nets.

Starting out

Evolutions in technology create opportunities to do things differently. When we started, computer graphics cards were being developed to meet the demands of computer gaming. We were able to exploit these cards to provide high-end data processing capabilities at low cost. Gone was the need to design special hardware products for radar display: software replaced hardware and Cambridge Pixel was born.

The early-stage challenge of a small technology company, whose principal market is the military, is credibility. Having the right product is step one and opens the

KEY FACTS ABOUT CAMBRIDGE PIXEL

- » CEO: David Johnson
- » Headquarters: Cambridge, UK
- » Founded: 2007
- » Company: private
- » Employees: 10
- » Export: 70% to over 40 countries
- » Turnover: £3 million

“Our software finds application in the world’s most advanced ships, but also guards fish farms from intruders with big nets”

door for discussions. But step two is whether a long-term military programme can commit to a product from a new-on-the-block company. Obvious questions have to be asked, due diligence performed and contingencies planned for, but these are all solvable if the product offers compelling benefits in terms of cost, performance or flexibility.

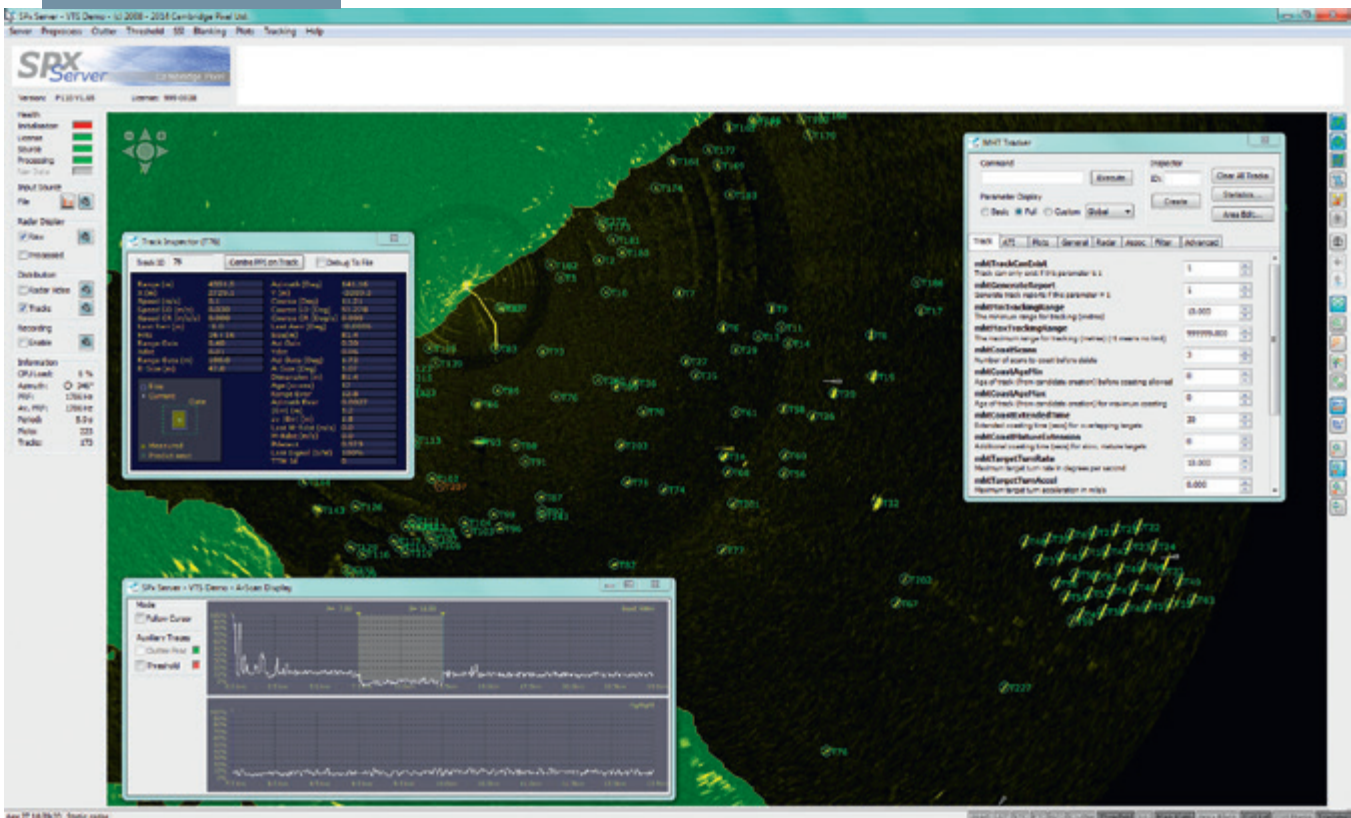
Cambridge Pixel’s first customer was a US system integrator providing radar display technology to the US Navy. We are still working with the same customer ten years later. A successful partnership with BAE Systems in the UK allowed us to supply our products for the T45 class ships and we are pleased to be associated with the new Queen Elizabeth Aircraft Carrier due for commissioning later this year and the new state-of-the-art T26 frigates. The successful relationship with BAE Systems was critical to Cambridge Pixel growing exports in similar naval markets. It was a statement of credibility that BAE had selected us for the Royal Navy and this served as

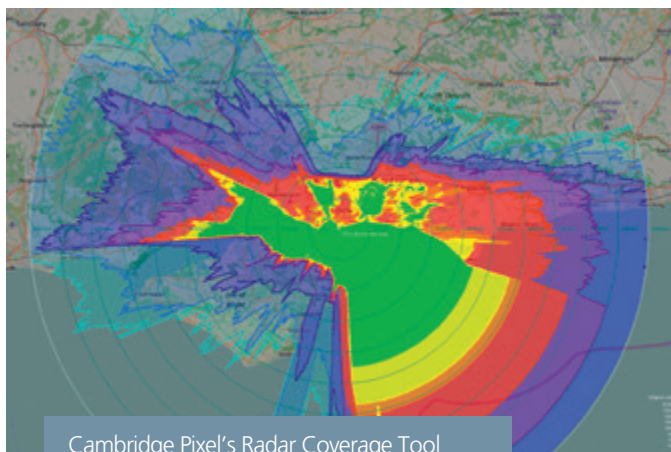
a springboard to similar business with South Korea, India, Indonesia, China and Singapore, in addition to Europe and the US.

Exporting success

Cambridge Pixel won the Queen’s Award for Export in 2015, reflecting our success in developing significant overseas business. Export brings its challenges for a small high-technology company, but we recognised early on that it was essential for growth. A key factor in our success has come from the tailoring of our business approach to meet the needs of different markets. Some customers are looking for a black-box solution, meaning the product takes an input, delivers an output and what happens in the middle is hidden. In other situations, customers want to adapt and tailor the solution. We observed that some markets were hungry for technology transfer, where local companies, especially in developing countries, wanted knowledge as well as a product.

Cambridge Pixel’s SPx Server software provides advanced target tracking capabilities to automatically acquire and track targets ranging from small drones or RIBs through to fast-moving agile air targets





Cambridge Pixel's Radar Coverage Tool provides a visualisation of where a radar can see, allowing an appropriate location to be chosen for coastal surveillance



David Johnson and Richard Warren started Cambridge Pixel in 2007. The UK Royal Navy's T45 ship (background) is one of the platforms that has benefited from Cambridge Pixel's technology

Our approach was to tailor the offering so that customers could expand and enhance what we provided, thereby providing a degree of local content to the final solution. We achieved this by preserving our intellectual property, but giving customers sufficient inside-knowledge for them to customise the products to meet local needs. It's a compromise solution, where a customer might not have the expertise to build a complex solution but nevertheless wants to customise as the first step to acquiring knowledge.

The German Mittlestand model defines many attributes of Cambridge Pixel's business. Being small means being responsive and listening to customers. All businesses claim to be customer focused but words and practice are different. Our customers appreciate the here-when-you-want-us service that we aim to supply, although with our customers in time zones all over the world that is sometimes a challenge. We want to be seen as an extension of our customer's organisation, so that an engineer sitting in Lockheed Martin or BAE Systems can engage with Cambridge Pixel's engineers as if they are part of the same team. It isn't uncommon for us to be asked technical questions that don't even relate to the product we have supplied – happy to help.

Future radar

Although radar has been around for over 75 years, changing needs and threats bring new challenges and opportunities. Investing in new products and ideas is essential for any business to thrive and selecting the right export markets, where there is both opportunity and access, is critical.

Looking to the future, security applications provide a fertile ground for new radar technologies. New radar sensors are being developed to provide early detection of security threats, including monitoring political borders or searching the sky for drones with malicious intentions. Cambridge Pixel has recently developed enhancements to its target tracking software to look for very small targets in high clutter situations – detecting threats early means more time to act. It's important to keep evolving and inventing. Even for a highly-specialised company, we remain vigilant to the subtle shifts in the niche in which we work; expectations change, technology evolves, opportunities arise. It's a dynamic situation and that keeps the business interesting. With the uncertainties of what Brexit will bring, identifying and developing the right export markets goes hand-in-hand with developing the right products. Success means getting both right.

“Our customers appreciate our 'here when you want us' service”

i-movo



David Tymms, CEO i-movo



Secure Digital Vouchers

i-movo IN NUMBERS

- » £300 million total value of transactions processed to date
- » More than 20 million transactions processed to date
- » 4 million + UK consumers and households have used an i-movo voucher
- » 80,000+ retail locations enabled for i-movo transactions
- » Nearly 1,600 campaigns since launch
- » 125 customers in consumer goods brand owners
- » 117 customers in banking, utilities, government, telecoms
- » 30 customers in magazine and newspaper publishing
- » 14 industry award wins in 2015 and 2016

Paper vouchers and coupons have existed for over a hundred years. Many families reduce the cost of the weekly supermarket shop with them, while loyal newspaper readers use them to buy their paper every day at a discount. In addition, they play a vital role in delivering benefits to citizens in need: child nutrition and energy credits are two such examples.

With two colleagues, I founded i-movo in London in 2003 to create a secure digital voucher system as ubiquitous as the paper it sought to replace but as instant as digital. The key issue lay at the point of redemption, combatting the risk of unauthorised creation and distribution of perfect forgeries of the 'digital money' we had in mind was essential.

It is important to remember that vouchers represent financial value and are accepted as a form of payment between customers and retailers. As a result, they are settled by the issuer paying the retailer, often with the help of a specialist voucher-clearing house.

While paper vouchers are widely accepted by retailers, they are often produced without adequate security. As a result, in the past, issuers have been hit by significant levels of fraud and theft.

Paper vouchers are also unpopular with retailers. On average they are counted and sorted 3.5 times before being submitted for settlement, after which they may wait several weeks or even months for reimbursement.

Finally, the paper voucher clearing process works at 19th century speeds in terms of delivering critical information back to the issuer regarding who is using the vouchers, where and when.

The concept of replacing paper vouchers with digital is not new. In particular, using mobile phones for this purpose has been suggested since the introduction of the devices themselves. As a method, it has never really taken off due to the inherent risks opened up by digital.

Distribution using digital channels poses huge risks without robust checks at the retailer accepting them. It is easy to make multiple, perfect copies of any digitally-distributed voucher and each illicitly duplicated one represents a potential loss to the issuer. An uncapped, uninsurable financial liability is the result.

We soon realised that utilising retailers' existing payment systems to perform a check on voucher validity was the way forward both to address the failings of paper and manage the risks of digital. Consequently, we developed a method using the standards governing credit and debit cards worldwide to process our new payment method.

A UK patent for our design was awarded in 2007. This has subsequently

been granted in Australia and New Zealand, where we have recently established a presence. More recent grants for the USA and South Africa have followed.

Implementing the system meant establishing relationships with companies supplying payment services to retailers who we wanted to accept our vouchers. We have now integrated to epay, Payzone and PayPoint creating a 'virtual' i-movo network of over 80,000 retailers without needing to own or manage a single piece of hardware in these shops.

In terms of coverage, our service is currently available within one mile of 99.1% of the UK urban population and, in rural areas, to a similar percentage within five miles. We are now extending our reach further by integrating it directly to the till systems used by retailers.

The process we have developed has resulted in some interesting developments, far removed from the consumer goods vouchers that were the original impetus for establishing the company. This increase in scope has been against a backdrop of changing and increased regulation; consequently, i-movo has been accredited as a 'Small Payments Institution' by the Financial Conduct Authority since 2012.

“The way forward to both address the failings of paper and manage the risks of digital”



» THE VOUCHER
VALUE CHAIN

An **issuer** is a manufacturer, newspaper publisher, government agency or other entity that issues a voucher to a citizen or consumer

Citizens or **consumers** use them to pay for goods and services or claim cash payments due to them at retailers

Retailers accept them as payment and claim the value back from issuers

i-movo mobile
voucher



Making 'crisis payments' to vulnerable citizens

Together with PayPoint, i-movo operates a system now used by more than 100 local authorities for making emergency cash payments and granting energy credits to some of society's most vulnerable citizens.

Prior to the reforms introduced by the Government in 2011, these so called 'crisis payments' were made by cheques that take three days to clear (assuming the citizen had access to an operable bank account) or, in some limited cases, cash sums that proved troublesome for authorities to manage economically.

The Quick Credit Voucher (QCV) system developed on behalf of PayPoint by i-movo enables cases to be assessed quickly and the citizen issued with an emergency payment voucher for cash or energy, directly to their mobile phone. In both cases, the citizen can get immediate access to the benefit with a visit

to one of 28,000 retailers with PayPoint facilities.

Such retailers are typically open seven days and for up to 80 hours a week, making the service convenient and accessible. The re-cycling of cash in retailers' tills into the local economy benefits both the immediate area and reduces retailers' banking charges.

Read all about it

The precipitous decline in newspaper sales since the millennium has been exhaustively chronicled with various theories circulated on the measures publishers need to take to survive. What is clear, however, is that a mass switch to 'online-only' news distribution does not make enough income for publishers to support extensive news gathering and quality journalism.

Although all publishers have been affected by the reduction in print sales, those who have converted a significant proportion of their readership to subscription sales have fared better than those who have not.

The management of these subscription schemes has necessarily depended on the use of paper vouchers with all the inefficiencies described earlier. Also, paper vouchers are only viable to produce on a 'one-size-fits-all' basis and cannot offer readers a variety of subscription options tailored to their preferences.

Publishers increasingly want to make it easy for a reader to try and buy newspapers in a manner of their choosing. i-movo has supported innovations by the Financial Times, The Guardian, Trinity Mirror and Telegraph Media Group that seek to do exactly this and preserve printed newspapers as a principal source of diverse and informed comment.

“The service is available within one mile of 99.1% of the UK urban population”

Location Sciences



Dan Francis, Chief Strategy Officer, Location Sciences

Location Sciences is a location intelligence company, headquartered in London. Location Sciences uses precise mobile location data to inform businesses how effective their products, services or advertising are. For example, it can tell advertisers whether their on-line advertising spend drove people to their physical stores (or their competitors), or the demographic makeup of consumers who were exposed to their Out-of-Home advertising campaigns, it can inform governments and agencies how the UK population moves and travels, or can help retailers or land owners plan or measure consumer movements – all to a preciseness not seen before.

The market for location data didn't exist even a few years ago, but today industries such as mobile advertising routinely use consumer location (as reported by their mobile phone) as standard practice for verification and attribution purposes. This market has reached a significant scale, and the technology owned by Location Sciences is well-positioned to fulfil the need for far greater accuracy and accountability.

Location data is white hot. Data scientists can look at it and now accurately pinpoint where consumers are, how long they're staying in one place, where they've moved to next, and derive all-important insights for brands and advertisers as well as other types of businesses.

At the heart of all this data is the mobile phone. Four out of five UK adults now have a mobile phone – equivalent to 37 million people, as reported by Deloitte in their 2016 mobile consumer survey. It has overtaken laptops as the most popular device for getting online and has transformed the way we communicate.

FACTS ABOUT LOCATION SCIENCES

- » Mobile data and location intelligence company
- » Part of Proxama Plc (Aim:PROX)
- » Location Sciences Business launched September 2017
- » Headquartered in London with offices in Norwich
- » Employs 46 members of staff
- » Google certified Location Service Provider first of only three in the world

“Advertisers spent £3.8 billion on mobile ads in the UK last year, with more than a third (38%) of ads now based on location”

Superfast 4G mobile broadband is allowing us to shop, bank, watch TV more quickly and more reliably than ever before. Our mobiles have now become the hub of our daily lives. The app economy is also booming and significantly, and with up to 40% of apps using location within them for consumer functionality, precise data collection has never been so ubiquitous.

Advertisers spent £3.8 billion on mobile ads in the UK last year, with more than a third (38%) of ads now based on location – e.g. targeting people who have been in or are in a particular location. Location Sciences is almost unique in that it can tell brands (and their agencies) whether these ads were effective or not, i.e. did the consumer who saw your advert actually go to your store based on the impact of an online advert? Furthermore, we can tell the brand exactly when, how long or whether they went on to a competitor store. Using very precise GPS and beacon technology, we can even tell which aisle or concession they were in.

Bridging the gap

In essence, Location Sciences enables companies to bridge the gap between

the digital and real world. It makes a precise connection between a consumer’s mobile phone and their movement paths throughout the day in the physical world. Location is used as a proxy for what they do and how they interact.

The company’s Chief Executive Officer, John Kennedy, says ‘Online advertising finds it difficult to prove its impact on physical world sales. We are helping solve that problem by using location data to precisely validate that it was the online advert which directed the consumer to a store or place.’

Location, location, location

Using mobile geo-location and having the UK’s largest network of Bluetooth beacons, Location Sciences can collect unique anonymised and permission-based data from handsets via exclusive partnerships with app providers such as National Rail Enquiries. It aims to have four million consumers providing billions of precise location data points by the end of 2017.

Location Sciences is also one of only three companies in the world and the first in Europe to be certified by Google as a Location Services

Data showing consumer movement through London. Source: VU.CITY®





Location Sciences technology makes a precise connection between a consumer's mobile phone and their movement paths throughout the day

Provider, so that it can offer attribution services and experiences based around Google's services. Examples of brands using the Location Sciences services are Coca Cola, Samsung, MasterCard, and NET-A-PORTER.

It's not just the advertising industry that can benefit from this new intelligent data set. Government agencies and their suppliers are using this vast and precise data set to study how people move around large cities, retail hubs, stadia and transport hubs. For the first time, they can see the flow of people both minute by minute and over the year. Even financial services can use the data to help track fraud, prove hedging strategies or plan new products and services.

Growth plans

'This is the next generation of data which will provide a step change in the advertising sector in attribution and verification. However, it's the new products, sectors and businesses

that can now take advantage of this location intelligence that we find particularly exciting,' continues Chief Strategy Officer, Dan Francis. In the near-term, Francis says Location Sciences is already expanding across the UK and then will seek to replicate its model overseas.

New breed

Location Sciences is one of a new breed of mobile data companies alongside Placed, Cuebiq and Foursquare. It provides insights and data products that couldn't have existed even five years ago.

Location data now allows brands and advertisers to accurately track the paths of millions of consumers and provide unique insights around which businesses can build whole new products and services.

Location Sciences will be at the heart of a new and massive industry of location intelligence.

“Location Sciences is one of a new breed of mobile data companies”

NRG IT



Mike Hurst, Founder and Managing Director of NRG IT Ltd



Laptops awaiting processing, ranging from the latest 7th generation, high specification, touchscreen hybrids to the older 2nd generation gaming rigs

NRG IT Ltd is a privately-owned company promoting the importance of refurbishing electronic equipment which has been supplying refurbished computers and monitors across the UK and parts of Europe for over a decade. Based near Wimborne in Dorset, it is dedicated to making high-quality computer equipment affordable to people unable or unwilling to pay the premium that comes with purchasing the latest technology.

FACTS ABOUT NRG IT

- » Established 2002
- » Privately owned, self-funded company
- » Dell Registered Partner
- » Sells to trade distributors, direct to businesses and home users
- » WEEE registered and regulated
- » Microsoft Partner
- » Based near Poole, Dorset

I started the company in 2002 with just £2,000, specialising in the repair, refurbishment, sale and distribution of Dell monitors, PCs and laptops to both trade and online retail customers. It is now turning over nearly £2 million per year.

We have worked hard to build strong relationships with our suppliers, the main one being Dell. These relationships have allowed us to source high volumes of both manufacturer-refurbished products and faulty customer returns. We then thoroughly repair and test the customer returns and subsequently remarket both the manufacturer-refurbished products and those we refurbish ourselves to both the trade and the public at competitive prices.

Selling refurbished equipment sounds easier than it is. In reality there is a stigma attached to the term refurbished. In most people's eyes it stands for used, worn and unreliable and, although that can be true, when referring to the associated technology sold here at NRG IT refurbished actually means high quality, long life and low cost all backed up by our strong NRG warranty.

Of course, we all understand that for prospective customers to put their trust in a small company like ourselves, we have to excel with our customer service ethic. We genuinely believe in treating our customers fairly, even if that means on occasion taking a financial hit ourselves.

We have been proving this ethic in a number of ways. Ten years ago our primary route to the retail market was selling on eBay. eBay is renowned for being notoriously difficult to keep free from negative feedback from unsatisfied customers. However, since we started we have accumulated over 11,000 satisfied customers maintaining a 100% positive feedback score. We also prove our customer service ethic by having an independent online review facility, allowing genuine customers the opportunity to give real feedback about their experience.

Everyone at NRG IT firmly believes that if there is an issue with a product that we have put our name to it is down to us to resolve the issue as quickly as possible in order to retain repeat business. Provided the customer is happy, they will return or tell a colleague, friend or family member. The net result is increased long-term business.

Refurbishment is not an easy task but with enough effort can be rewarding. In our case we receive products in all states of repair, from perfect working order to cracked, broken and unrepairable. We then have to use our expertise to repair, recover and grade as much as is viable before resale. The remainder we begrudgingly have to give up on and designate as waste to be ethically recycled on a materials level.

Where we have been fortunate is the way in which the internet has allowed us to reach the people that want our products. Often these products are quite specific pieces of equipment and

only appeal to specialists. Previously, finding those audiences was a difficult task but, with the prevalence of the internet and with the right marketing approach, we have been able to be in the right place at the right time to attract their attention and facilitate the sale with as little fuss or intrusion as possible.

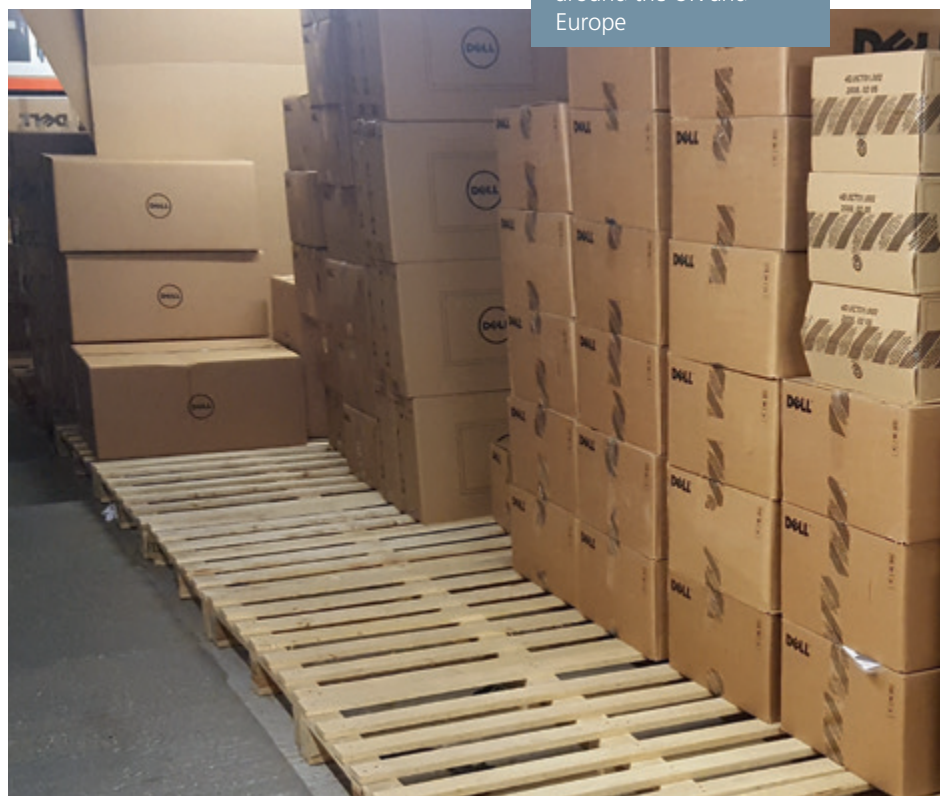
Our staff are all aware of the positive impact we have on the environment from the recycling perspective. If companies like us didn't exist, the faulty products returned to manufacturers would end up as landfill at a faster rate, increasing the negative impact on the environment.

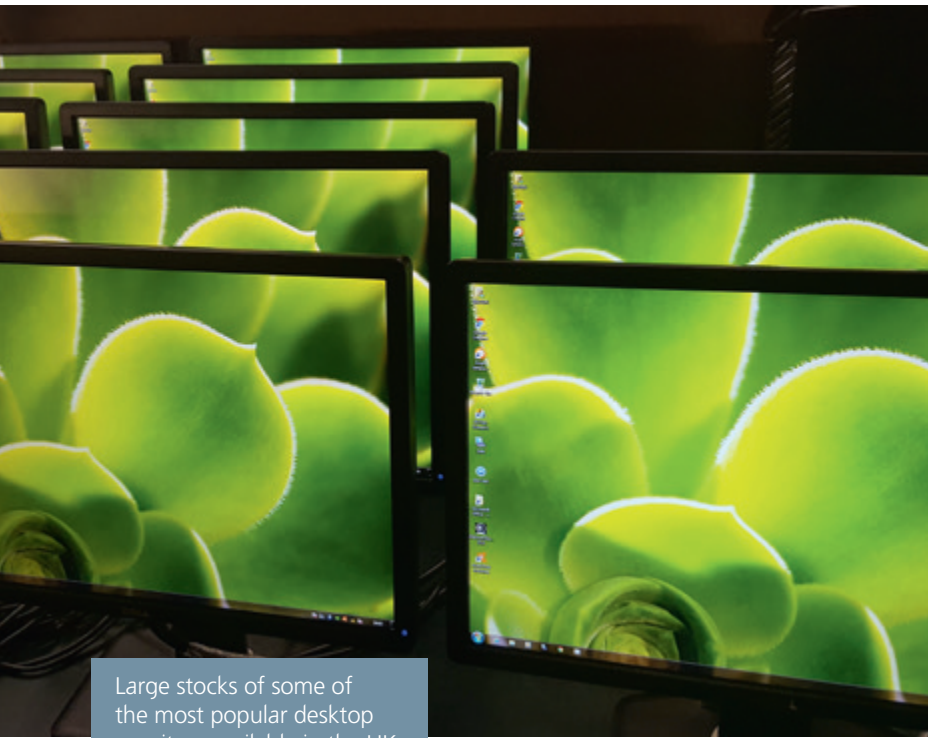
We are proud to be able to reintroduce many of those potential landfill items back into the population for another few years before reaching that inevitable destination.

A few years ago we applied for the relevant applications in order to attain the right environmental exemption permits. This allows us to handle what is classed as 'Waste Electrical and Electronic Equipment' under the

“Although the specific details are confidential we get to see our refurbished stock being delivered to a wide range of society, from multi-million pound, blue chip businesses right through to silver surfing home users”

Trade deals ready to be dispatched to our various customers around the UK and Europe





Large stocks of some of the most popular desktop monitors available in the UK ready for next business day delivery



Regular contact with Dell to ensure senior staff hear about the latest opportunities as soon as they become available

“We see the potential in every piece of technology we get through our workshop. The longer we can keep this kit usable the better it is for everyone ”

Environmental Permitting Regulations 2010. Ultimately it is in our own interest to reintroduce as much of our stock as possible back into circulation in order to achieve a healthy and sustainable business model.

The key to our success has been, and always will be, having the right staff with the right mind set. Our business is not one of simple box shifting. The complexities involved with diagnosing a faulty monitor are relatively limited but the complexities of a malfunctioning PC or laptop are vast. Finding the right skillsets has been challenging. We are constantly thinking of ways to innovate, finding ways around the hardware problems and constant software updates that can introduce gremlins to, or even disable, a PC or laptop.

NRG IT has been a challenging venture for a number of reasons. We wanted to remain self-sufficient and not be beholden to backers or investors who are not necessarily as conscientious as we are. This has meant raising the capital ourselves, which inevitably takes longer than other routes. The

biggest recent external factor affecting our ability to turn a profit has been the US exchange rate and the associated fluctuations. We have certainly noticed the down turn of the pound versus the dollar since the Brexit news, and, that because some suppliers need to achieve target recovery percentages measured in US dollars, we are achieving a lot less bang for our buck.

Technology has been through a steep development curve over the past couple of decades. Display screens have become bigger and thinner, and computers have become faster, smaller and more powerful. In recent years we have started seeing the focus of that change, with more of a drive towards doing more with less. Of course it means that our engineers have to keep up to date with that development curve but ultimately we are dealing with equipment that does a similar job to that of a model from two years previous but does it using far less energy, which can only be good news for the environment and future generations.

Dalycom



Work any time, any place, on any device



Amanda Daly, Managing Director

Dalycom's aim in life is to sell, install and help businesses of all sizes make most of the cloud and converged technology, which facilitates the use of multiple technologies on a single device. Founded in Leicester 30 years ago, the family-run company has transformed its operations over the past five years by moving away from traditional telecommunications and data to concentrate on cloud-based technology and collaboration.

Meeting the needs of a changing market

Communications play a big part in modern-day operation. Thanks to the sophistication of the latest cloud technology, whatever device you're using, whether it's a laptop, a smart phone, desktop or a tablet, we are always connected.

The internet space is constantly changing with high-speed and dedicated broadband products. One single broadband can now prioritise voice whilst still offering high-speed data availability, saving businesses from having two separate broadband supplies. 4G and imminent 5G with speeds up to 10Gb mean mobiles can now be used as an alternative to dedicated broadband, too.

The roll out of the 21st century broadband, supported by the government means access to high-speed data is not exclusive to the large corporates or big cities. It is now readily available to the SME market which is helping to change the landscape of business communications and provided access to a full range of cloud solutions, from voice, data storage, Wifi and collaboration software.

FACTS ABOUT DALYCOM

- » Established over 30 years ago
- » Over 100 years' worth of collective industry knowledge and expertise
- » Forward thinking
- » Our core values prioritise respect for clients and staff
- » Partner with market leaders
- » Diverse portfolio means we can tailor solutions for each client



Matthew Daly,
Chairman

What is cloud based-technology? Replacing on-premise telephony, server and data equipment with a monthly user subscription that is provided over the internet.

What is convergence? All forms of voice, data and video together.

What is the Internet of Things? The connection of devices to the internet.

What is ethernet? Dedicated high-speed internet service to business premises.

At Dalycom we want our customers fully to understand the value of the cloud and convergence. Not only regard to the immense capital savings the technology brings, but also with the efficiencies in terms of usage. Why waste time trying to contact someone if you already know they are away from their desk?

Property and space is now becoming a luxury. Why invest in more office space when technology can help bring a workforce together virtually? Easy, scalable, homemaker-friendly applications lend themselves to better employer and customer experiences. Dalycom offers businesses a way to make staff more productive and connected, whilst driving down costs.

Time can be saved by screen sharing and chat from one device. In the past we would have required several applications to perform this task, making collaboration clumsy and

difficult. Now all we need, in some instances, is an end-user web browser. There is nothing to download and it is available on any chosen device. This reduces overheads on landline charges and rentals, which is good news following recent increases in prices. We can now simply log in and join in on conversations and messages with minimum end-user charge.

Is the cloud secure?

Our UK data centres provide high levels of security (ISO27001). Conversations remain private between those that are part of the group and all transmitted data is encrypted.

Part of the reluctance to using the cloud and collaboration software is the fear of security. Keeping data as safe as possible is an absolute pre-requisite for all businesses, whatever their size and operation, and our systems are reassuringly secure.

“Technology can help bring a workforce together virtually”



» KEY ADVANTAGES TO USING CLOUD-BASED SERVICES

- » Cost savings: working in the cloud is more current, more affordable and removes the need for expensive on-premise hardware.
- » Flexible working: being able to access files on the go or while working from home allows staff to work more flexibly.
- » Improved customer satisfaction: increased flexibility enhances business relationships by making companies more contactable and better able to assist customers.
- » Cost effective collaboration with customers and suppliers: virtual meetings are a great way of bringing together people in multiple locations to discuss projects or even edit documents as a group.
- » Secure: data is backed up to highly-secure data centres in the UK



By encouraging more employers to switch to the cloud, we've helped a lot of businesses re-think their approach and attitude to risk management. It's heartening to know that, thanks to our systems, businesses will be able to access their data from anywhere and carry on as normal even if disaster should strike.

Dalycom increasingly sees cloud-based technology as core to its business and is determined to remain in the vanguard as the cloud evolves.

Under the leadership of Matthew and Amanda Daly, Dalycom has 'turned the business on its head', so that 40% of its operations are now in the cloud, rather than traditional on-premise equipment; a trend that is set to continue and grow. By 2020 we expect to see around 85% of our business coming from the cloud, especially as the Internet of Things (IoT) is set to grow at an alarming rate, with virtually every device somehow being linked to the internet.

We help many smaller companies and owner-managed businesses to save money, while enhancing their

efficiency. With costs as low as £30 a month, even start-ups operating on a shoestring can afford to use the cloud. We want to get businesses cloud-friendly and ready for the change in our industry.

The future

When it refocused its business five years ago, Dalycom was aware it was taking a big financial risk.

Hosting cloud services does not generate the upfront revenues associated with installing hardware and running a premises-based IT function, so the move could have gone horribly wrong.

However, Dalycom's belief in the cloud, and its commitment to helping other businesses prosper through taking advantage of the latest technologies, has served it well.

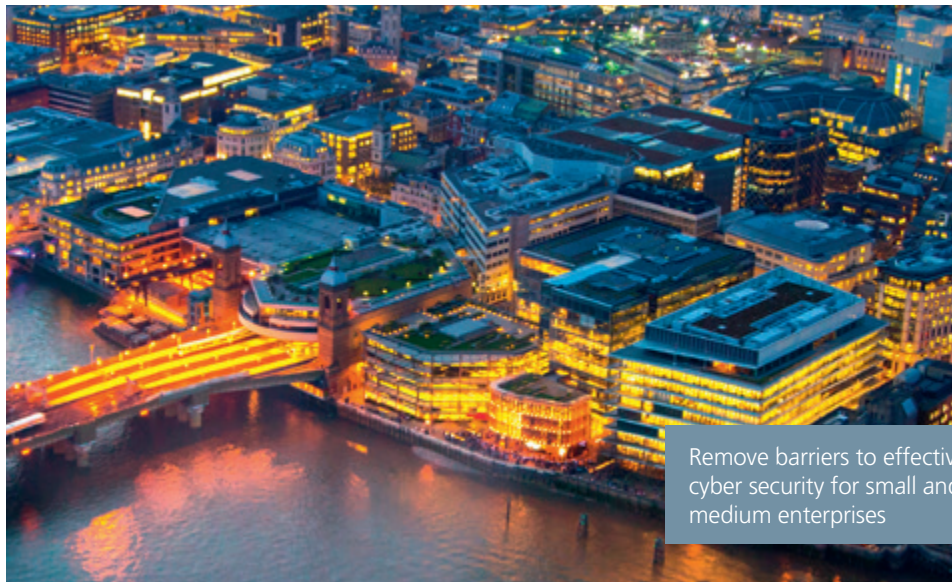
This will allow Dalycom to continue to broaden its horizons, while, at the same time, ensuring other businesses are enjoying the full benefit of this exciting, cost-effective technology.

“We want to get businesses cloud-friendly and ready for the change in industry”

Xpertex



Joel Sweeney, CEO



Remove barriers to effective cyber security for small and medium enterprises

The key driver for small businesses is not just to win one contract and deliver it successfully, it is to win the next one and the next one and the one after that. They must compete with larger companies which boast a raft of certifications and have the back offices to help them gather the statistics that many organisations seem to insist upon when tendering for more favourable contracts.

FACTS ABOUT XPERTEX

- » CEO: Joel Sweeney
- » Established Xpertex in 2005
- » Turns over £6 million
- » Xpertex is an IT Systems Integrator specialising in the provision of highly secure, cyber threat resistant solutions in both the public and private sectors
- » In addition to designing, deploying and supporting the Enterprise Infrastructure Architecture, we also advise and define operating models, policies and ways of working

As a result, cyber-security is often well down the list of critical business priorities. Conscious of headlines about hacking and the vulnerability of companies with vast budgets (such as the recent disclosure from Yahoo) an SME may think that there is nothing they can really do with the funds available to them so they consign cyber-security to their 'nice to have' wish list.

This makes SMEs very vulnerable. Firstly, they may be hacked and this could result in losing intellectual property, customer data, and the ability to function on-line. Secondly, they could become an unwitting piece in the organised crime jigsaw, perhaps where their IT is compromised and then used for Distributed Denial of Service (DDOS) attacks, or their systems used to facilitate money laundering or other orchestrated cyber-crime.

In a positive step, the UK Government has recognised this dilemma and has made it possible for some SMEs to access funding which can help them comply with the Cyber Essentials initiative and with the new General Data Protection Regulations (GDPR). This, however, also presents some problems. The advice the SME procures may push it towards solutions which apparently provide a short-term

comfort blanket but which increase through-life cost, inhibit growth and may even expose it to greater business risk.

Many SMEs recognise the importance of protecting their own, and their customers' data. Ensuring that they can recover from local (perhaps malicious) data loss, compromise or breach, it may seem attractive to put data into the Cloud (see box). This raises two issues. Firstly, where exactly is the data? Has it crossed into a jurisdiction where it should not be? If it needs to be erased, for instance for Data Protection Act compliance, has it been erased completely? How can there be certainty that it is protected and inaccessible to others, including the owners of the Cloud storage?

Secondly, although Cloud storage providers seem to offer good initial value with attractive pounds per TerraByte (£/TB) of storage, as requirements grow this value can diminish. If the SME decides to move to another Cloud storage provider, it may discover that it is not easy to switch. The difficulty may be so great that the SME is effectively locked into a provider that no longer delivers the value that the initial deal suggested.

In addition to the lure of Cloud storage, Software as a Service (SaaS) subscriptions can seem highly attractive. A subscription may provide access to a bundle of computer applications for which most businesses traditionally purchase licenses. This removes the headache of ensuring

license compliance but introduces a different problem. Typically, a business may have purchased software to manage customer relationships, projects, finances and payroll. The SaaS subscription package, however, may not interface with these. In this instance the SME is then locked into another range of SaaS offerings which replace these. These it has to source from a limited pool of vendors. The costs of these additional SaaS offerings tend to be confusing and escalate very rapidly; this is termed 'ladder pricing'.

For SMEs concerned by the lock-in issues or the lack of control associated with SaaS subscription services, the alternative of in-house IT with the necessary back-up and disaster recovery capability and low system maintenance overheads may seem attractive but difficult to comprehend and implement. If that is coupled to an appreciation that expert help is needed to obtain such a solution, the SME then needs to find an affordable IT partner that can still address the problem it originally faced; having a secure, cyber-threat resilient capability.

Back to square one, it appears. In an attempt to buy a tactical solution, such as Office 365 or Google Apps, the SME will discover similar challenges when it attempts to expand business beyond the limitations of the services purchased. Whether these issues are those of inter-operability or appropriate licensing, the result is often an increase in costs.



Marcus Trott, Director and co-owner of Xpertex

» THE CLOUD

This is the term used to describe the provision of some form of IT functionality that is not contained inside a user's home or business. For example, data was traditionally kept on hard drives in local computers but now it can be kept in the data warehouses owned by Cloud Data Providers. The Cloud now also provides subscription software and some security.

» SOFTWARE AS A SERVICE

Software as a Service is often merely seen as a 'rent or buy' OPEX or CAPEX decision. It should be more than that. Critically, the questions of interoperability with other packages and integration with other services need to be answered. Only then can the true cost and benefit, or otherwise, be quantified.

» CYBER-SECURE
SUPPLY CHAINS

SMEs are present in many supply chains, so cyber-security should be as important to the chain members as the SME itself. Whilst a lowest common standard approach to cyber-security is a positive step, more should be encouraged to enable the end-to-end security of a chain, and this is not a tick-box exercise of ISO compliance.



It is hardly surprising, therefore, that SMEs give cyber-security a low priority: it all appears too complex with no way forward that provides some long-term cost certainty and business growth flexibility.

Fixing this is, in principle, not that difficult.

1. Make procurement smarter.

Instead of asking for a plethora of ISO certifications that divert the attention and internal investment funds of SMEs that feel compelled to go down the certification path in order to compete for favourable work, ask SMEs to sign up to the standards that the buyer has and, in procurement, ask them how they will do that. Armed with their answers, properly assess whether that would work using procurement brain power rather than tick boxes.

2. Enable SMEs to put a higher priority on cyber-security. Liberated from the need to chase ISO certifications, the SME can now be challenged about how it has practically addressed cyber-security. The SME will be able to devote more time to cyber-security matters and have funds at its disposal (otherwise spent on the ISO chase) that can

be used to undertake specific risk assessments of its business rather than rely upon generic assessments or unsubstantiated (media-driven) fears.

3. Understand when Cloud and SaaS are good and when they are not.

Armed with an understanding of the business and cyber risks that actually apply to individual SMEs, the SME also becomes a smarter procurer. Able to balance the benefits and draw-backs of Cloud and SaaS, the SME can actually create a meaningful IT, cyber and business strategy with a series of steps that are under their control, and the consequences of which they can plan and anticipate.

No longer is the SME locked in to a Cloud or SaaS provider with bewildering ladder pricing. No longer is the SME prevented from employing applications and tools that can benefit their business but are incompatible with the application subscriptions. No longer is the SME growth constrained by boxed MS Office or Google Apps packages. The danger of being an unwitting piece in the organised crime puzzle can be closed. Their data, and that of their customers, is protected. The SME can flourish. Three simple steps.

“Effective cyber security is not a ‘tick in a box’ exercise”

Techbuyer



Techbuyer's warehouse in Harrogate stocks over 150,000 products



Kevin Towers, founder and Managing Director

Founded with just two people in 2005, Techbuyer has successfully navigated rapid growth, global expansion and a dismal economic climate to become a world leader in the buying, selling and refurbishing of corporate IT hardware.

Now with more than 90 staff, distribution centres worldwide and offices in the UK, Germany and the United States, Techbuyer has undergone rapid growth. Founder and Managing Director, Kevin Towers, credits this success to the knowledge and technical expertise of Techbuyer staff and the inclusive, forward-thinking environment which has been central to the company's strategy.

A sustainable alternative

As IT budgets across the corporate world are squeezed, there is growing acceptance of used corporate IT hardware as a highly-effective alternative to buying new equipment. When Kevin Towers founded Techbuyer, then known as Pinnacle Data, the focus was on selling new IT hardware; buying and selling used equipment was a side-line and not central to company ambitions. Before long, however, he recognised a rapid rise in demand for used equipment and decided to shift the focus to reusing, recycling and refurbishing IT instead; providing customers with premium brand products at market-beating prices.

Rapid growth supported by local grant

Needing to expand and reluctant to risk imposing a long commute on the workforce, Techbuyer contacted Leeds City Region Enterprise Partnership (LEP) regarding available grants. Following a clear and simple application process, Techbuyer received a considerable grant designed for businesses looking to grow. Designed for small businesses looking to grow, this funding supported Techbuyer in securing the ideal

“During the economic crisis, we made the decision to specialise in used equipment and saw net sales rise significantly”

Kevin Towers, founder and Managing Director

FACTS ABOUT TECHBUYER

- » Based in Harrogate, North Yorkshire
- » Offices in the UK, United States and Germany
- » Strong focus on customer service
- » Industry-leading IT specialists
- » Brands stocked include HP, Dell, IBM and Cisco

“Our sales team have the technical know-how to offer responsive, tailored solutions within impressive response times, and demand for this type of support continues to grow ”

Chris Pooley,
Sales Director

premises in the local area which, in turn, helped almost triple its workforce to 90 members of staff; far exceeding the grant condition of creating five new jobs in the local area.

In-house excellence

Sustained growth has made it possible for Techbuyer to invest in innovative internal IT systems, market-leading testing and storage facilities and a growing network of offices overseas. These, along with specialist teams, have helped almost double productivity and speed; the number of hard disk drives data-wiped per week, for example, now averages almost 2,500.

Through a policy of recruiting locally, training at all levels and creating a progressive company culture, Techbuyer has achieved impressive staff retention rates and a global reputation for service excellence; a policy that has provided Techbuyer with the confidence to offer a three-year warranty on all products – setting it apart from market competitors.

Instant access to real-time stock and pricing information

What started as a basic spreadsheet for managing stock items has been developed into a responsive, innovative

database system which enables Techbuyer to advertise products to maximum benefit on websites worldwide. Updated in real time, Techbuyer’s detailed database makes it possible for sales staff to guarantee timescales for delivery and, by linking to the company website, provides customers with instant access to accurate information on Techbuyer’s stock of more than 150,000 products.

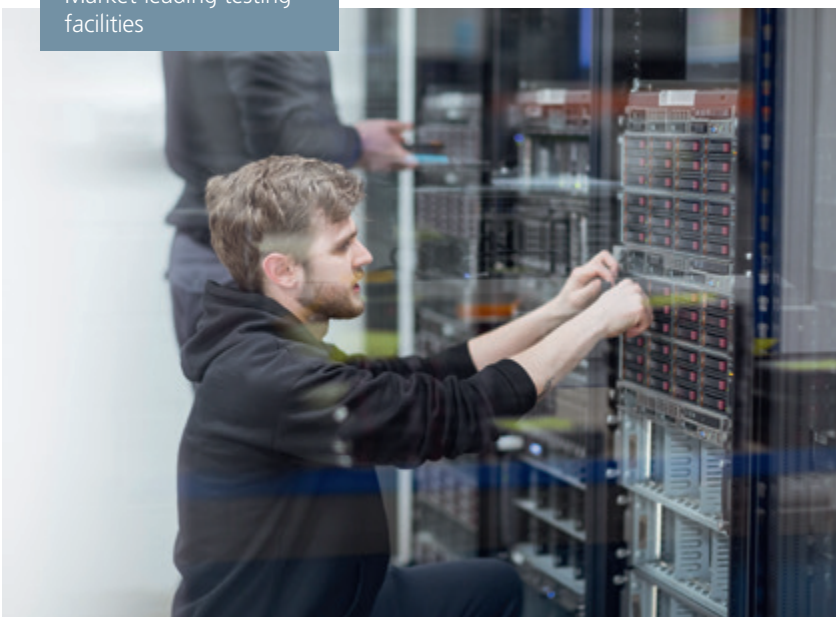
Customers first

With 94% of clients returning for future sales, customer service excellence is central to the company culture of Techbuyer. Every single member of staff can improve customer experience and is empowered to make intelligent decisions, rather than being driven by a set of rules that may not take account of changing circumstances. When selling anything other than brand new goods, consumer confidence in your team and product is essential.

The reliability and speed of Techbuyer’s service explains its popularity among maintenance companies, which are under increasing pressure to meet their own obligations to sustain service levels. By using multiple couriers and offering an extended hours service, Techbuyer can ship later than competitors, ensuring customers get their products faster; often on the same day – or the next day.

Torbay Council has been a frequent customer of Techbuyer for many years – receiving free, tailored advice within minutes of each enquiry and next-day delivery. Techbuyer’s certified, refurbished IT equipment delivers the exact same functionality and level of support as a new solution for a price that can be up to 80% lower than the recommended retail price; allowing the council to make significant savings on IT equipment without compromising on quality.

Market-leading testing facilities





Techbuyer employs industry-leading specialists

“We have worked with Techbuyer for a number of years and have consistently received a professional service and competitive prices. The company has proven very responsive and is frequently the first one we speak to when any new requirement arises ”

Steve McCollum, Network Analyst, Torbay Council

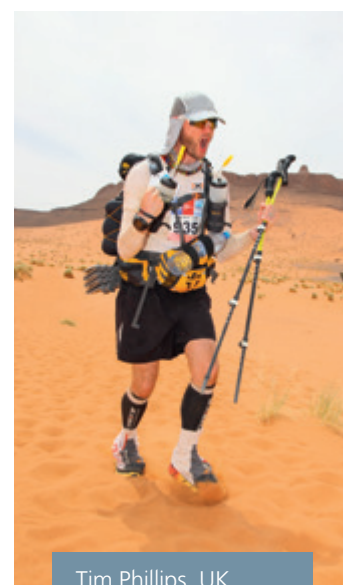
Exciting times ahead

With a new-look, multi-currency website, rapidly-expanding offices overseas and the recent acquisition of server and PC memory specialists, Memory Dogg, Techbuyer looks set to continue to excel in its field. Managing Director, Kevin Towers, recognises that the trust Techbuyer has earned is the company's most valuable asset and work is underway to build on Techbuyer's consultancy services to offer supported, complete installations.

Sharing success

As a company which tries, wherever possible, to employ local talent and contribute to the local and wider

community, Techbuyer has been very active in sharing its success with charities, both in the UK and abroad. Last year, as part of The Rainbow Fund charity fundraising initiative, Techbuyer donated two Vital Signs Monitors to the Woodlands Children's Ward, and the Special Care Baby Unit at Harrogate District Hospital. Monthly donations to St Michael's Hospice, where Techbuyer is an official patron, are supplemented by generous sponsorship of employees who frequently take part in events on behalf of the Hospice; most recently the Knaresborough Bed Race and the 2017 Marathon Des Sables, a gruelling six marathons in five days through the Sahara Desert.



Tim Phillips, UK Business Development Manager

Techbuyer have multiple stock locations in the UK and USA



CER Communications



Professional account management with friendly and personal customer service



Superfast fibre connectivity

FACTS ABOUT CER COMMUNICATIONS

- » Independent communications company which provides specialist voice and data solutions to a wide variety of UK businesses
- » CER are constantly improving clients services, while effectively identifying cost savings for our customers
- » Established in 2006
- » Average turnover of £1 million per year
- » Authorised partner of BT since 2012

Working to find the most cost effective telecommunications solutions for business customers, CER Communications has established itself as an independent force in the specialist voice and data solutions arena. Its owner, Carl Edwards, believes the company has thrived by partnering with BT and setting itself apart from larger competitors.

CER Communications was established by Carl Edwards and two other specialists within the telecommunications industry, with over 50 years of experience in this field. We identified that there was a significant need for specialist client account management in the telecommunications industry.

It is an unfortunate reality of business that very often businesses don't review their bills with the scrutiny they ought and are often unaware of the options available to them to be able to implement cost reductions.

We saw an opportunity for greater customer benefits by analysing a client's communications setup and reviewing the most effective ways to save them money on their bills, either on their telephone lines, mobile solutions or internet and data connections. Our service prides itself on reviewing all of the customer's information and as a result we are able to identify, not only the best cost savings but also potential service improvements to aid an ongoing better and more cost effective service.

A personal service

Being a small company has always worked in our favour, as it allows us to offer a more personal service to each company with which we work. We believe this to be crucial in retaining existing clients and an enormous benefit to newly-recruited

customers. It is often a significant downfall of larger companies as they do not have the capacity to offer a personal touch when managing copious amounts of client accounts.

At the heart of our mission statement is the commitment to be readily available at all hours to deal with any issue one of our customers may have. For any service to promote a personal service ensuring availability at all times is our key value. Our service covers regular office hours and we have a policy that, when we are out of the office, there is always a member of the team on call over evenings and weekends. Past occurrences have seen one of our team arrange the fixing of a business's faulty data connections and filing the compensation claim for the downtime within a two-hour period – all achieved while some of our team attended a weekend barbecue.

Building our reputation

In the eleven years we have been operating, CER has grown from strength to strength. The scope of the industries we serve is also growing. We have recently started working in the healthcare sector, where some NHS trusts are among our main clients. The scope of an NHS trust, and larger-sized businesses in general, represent attractive cost-saving opportunities. It is an unwritten rule that the larger the size of an organisation, the less monthly bills are scrutinised for the best value for money. This is an expanding area of our service and one which yields significant positive results.

Available services

Our legacy is in telephone calls and lines through BT and this is the area where the vast majority of customers deal with us initially. However, work with customers has grown following an initial period of assisting them with

telephone bills, expanding to mobile phones, telephone support systems and data networks, for instance. Commonly repeated business is a testament to the service provided by CER Communications; client retention is consistently high and we frequently receive positive feedback. Often, an individual leaving to join another business will reach out to us and ask for our services later on down the line, demonstrating the impact our service can have.

Partnerships

We work very closely with a wide range of telecommunication suppliers and we are one of a small handful of officially authorised BT business partners. This has benefitted our cause greatly, as it allows us access to their systems and products while also adding value to CER's operation.

“Personal service ensuring availability at all times”

Adapting to, and engaging with, evolving technology





Video conferencing using hosted telephone

“Business is thriving year-on-year and going from strength to strength”

This partnership has been ongoing since 2012 and, while it hasn't led to rapid growth, it's resulted in a constant growth – it's been a massive positive for the company.

BT is very selective about with whom it partners and how they go about doing business, so from this perspective, this is very much an endorsement for us. Other key partnerships also exist, allowing us to offer a flexible range of options to the customer. These include leading industry providers such as Virgin Media and Vodafone and customers can be made aware and steered down those routes if needs be.

Succeeding in times of austerity

With the range of existing agreements in place with clients, complemented by our solid industry partnerships, CER Communications Limited has identified that its business is thriving year-on-year and going from strength

to strength during times when competitors are struggling to sustain their business.

There will be many opportunities to keep us busy over the next few years. From an industry perspective, advances in the number of businesses using cloud-based technology, while the anticipated launch of the 5G mobile network will also have a tangible impact on the telecommunications industry.

Whether it's £20 a month off a small business's monthly phone bill or more substantial savings for a larger company running into thousands of pounds, there are many opportunities in the marketplace for companies to make savings by applying a greater level of diligence to their outgoings. In the coming years, CER would like to be recognised as a one stop shop for companies to go to and help them to achieve this.

Port-P



Birmingham location of Port-P



Not only have joint owner-directors Mark Paget (left) and Aaron Harte (right) worked together for more than 20 years, they are also best friends, a fact that helps keep our core values of trust, respect and the desire to 'do a good job' as central to the Port-P ethos today as when it opened for business in 1994

Port-P designs and installs computer systems for UK businesses and institutions to keep their data safe – either on-premise, in the cloud or by customising a hybrid of the two. Working from locations in Birmingham (pictured above), Manchester and London, we serve several hundred clients across the UK, providing traditional on-premise server, storage and network solutions as well as evaluating how existing applications can benefit from being migrated to the cloud.

We recognise that our clients need IT that can grow and shrink in line with their workforce and prevailing economic conditions. In addition, many organisations increasingly need the flexibility to commission extra resource for short-term 'bursts' of traffic or transaction volume, such as when working on new projects or providing development servers for new systems.

Staying up-to-date over the past two decades with the latest technology innovations and deciphering the pros and cons of the myriad of solutions, vendor offerings and licensing models has been challenging. That is why we invest heavily in staff training and external accreditations from the world's leading IT suppliers. Our biggest asset is our people, many of whom have worked with us for more than a decade.

Indeed, the current average length of service is over 9.5 years. This means that our clients benefit from working with a stable and cohesive team. Of course, it also means that we get to know our clients, their systems, their likes and dislikes and deliver a client experience that is unparalleled in the sector.

FACTS ABOUT PORT-P

- » Formed in 1994
- » Owner managed
- » £12.5 million turnover
- » Offices in Birmingham, Manchester and London

» WHAT OUR CUSTOMERS SAY

- » 82% of our clients rate their account managers as 9 out of 10 or higher
- » Our clients say that they like the relationships that we've built with them; they say they love our service levels, and appreciate our fast response times and accuracy of delivery.
- » 'Trust', 'honesty', 'authenticity' and 'professionalism' are words our clients use to describe us.

Survey conducted March 2016. 146 clients were questioned via telephone and email. The results were analysed using thematic analysis.



» WHAT IS CLOUD COMPUTING?

In the simplest terms, cloud computing means accessing and storing data over the internet instead of on your computer's hard disk drive. If you use an email service such as Gmail, Hotmail or Live, you are already using cloud computing.

On-premise or cloud?

Many of our clients are becoming increasingly aware of the advantages of having their standard applications such as Microsoft Office, SharePoint and Outlook in the cloud to optimise budgets, minimise management and simplify procurement and provisioning. All you need to start is your desktop, laptop, tablet or phone and an internet connection. Because the software is running in a secure, centrally managed data-centre, you simply connect to the internet to access your applications without having to worry about software updates, upgrades or server licensing. Port-P can help manage migration from desktop to cloud and we can help optimise security as well as providing ongoing management. For example, you may want everyone in

your organisation to be able to see a company policy document but only want a select group of individuals to be able to edit the document. In addition to standard desktop applications, we are starting to see an explosion in interest in moving bespoke business platforms, such as customer relationship management (CRM), database and accountancy systems, either fully off-premise or partially into the cloud.

Azure is Port-P's preferred cloud platform as it is a logical extension to Microsoft Office 365. Azure allows our clients to run bespoke applications from a virtual machine (VM) standpoint and to develop custom web applications that can easily integrate online. Azure also extends Office 365 with custom mobile application support. For those organisations running Active Directory with Office 365, Azure allows you to take that hybrid active directory infrastructure and extend it, providing single sign-on to thousands of third-party commercial software applications outside of the Microsoft ecosystem.

Port-P is not, it should be emphasised, tied to any single manufacturer – we work with our clients to identify the best solutions for specific needs rather than promoting any particular brand or technology.

Our youngest member of staff is Pascal, a wire-haired dachshund who lives with joint owner-director Mark Paget. Responsible for security as well as stress management, he tends to visit our offices a couple of times a week where he loves finding a warm spot to nap, chewing on network cables and getting lots of fuss and attention. His staff profile is also our most visited web page!





Where possible we reutilise existing IT assets to minimise costs and maximise value. Error management is crucial to our service ethos and we strive to reduce all errors to a minimum. Ultimately, despite all our technical expertise and accreditations, our core

values of trust, respect and the desire to 'do a good job' remain at the heart of the business and are the reason why Port-P has continued to thrive and grow over the past generation to become one of the UK's leading independent IT solutions providers.

“Our biggest asset is our people, many of whom have worked for us for over a decade”

» SURVIVING CATASTROPHE : KEEPING YOUR DATA SECURE

Port-P provides IT solutions that allow business owners, shareholders, stakeholders and IT directors to sleep at night in the knowledge their data and systems are safe, by:

- » Lower backup and recovery times, reducing the risk of data loss and ensuring peace of mind
- » Creating a readily scalable and flexible storage infrastructure with higher utilisation, supporting data growth for the foreseeable future
- » Increasing system availability and disaster recovery capability, protecting business continuity
- » Providing a reliable, scalable and manageable IT infrastructure, safeguarding the production of essential safety systems
- » Supporting a shift to a more efficient converged infrastructure, eliminating siloed storage and servers
- » Utilising existing IT assets where possible, to minimise cost and maximise budget

Review of Parliament

A snap election

On the 19th April 2017, having repeatedly insisted that she had no intention of calling a snap election, Prime Minister Theresa May sprung a complete surprise when she summoned the press to Downing Street to announce she would seek a Commons vote to go to the country on June 8th 2017.

The announcement, made as Parliament returned from its Easter break, had the force of a thunderclap in Westminster. Quite unexpectedly, MPs and parties were plunged into election mode.

The immediate effect was to turn what were now the two remaining Prime Minister's Question Times of the Parliament into de facto leader's debates – especially since it was made clear that Theresa May would not take part in the kind of televised debates held in the 2010 and 2015 elections.

The Prime Minister stated her case: 'There are three things that a country needs: a strong economy, strong defence and strong, stable leadership. That is what our plans for Brexit and our plans for a stronger Britain will deliver... The Right Hon. Member for Islington North (The Labour Leader, Jeremy Corbyn) would bankrupt our economy and weaken our defences and is simply not fit to lead.'

To Conservative jeers, Mr Corbyn counter-attacked: 'She says that it is about leadership, yet she refuses to defend her record in television debates. It is not hard to see why. The Prime Minister says that we have a stronger economy, yet she cannot explain why people's wages are lower today than they were 10 years ago or why more



Prime Minister Theresa May sought to strengthen her position before negotiations with the EU began

households are in debt. Six million people are earning less than the living wage, child poverty is up, and pensioner poverty is up.'

The two leaders traded more accusations with Theresa May warning that ordinary working people would face higher taxes and lost jobs under Labour while Mr Corbyn claimed the Prime Minister's priority was 'tax giveaways to the richest corporations while our children's schools are starved of the resources they need to educate our children for the future'.

Brexit emerged as one of the Prime Minister's main campaign themes: 'every vote for the Conservatives will make me stronger when I negotiate for Britain with the European Union. And every vote for the Conservatives will mean we can stick to our plan for a stronger Britain and take the right long-term decisions for a more secure future for this country.'

Later that afternoon, the Commons voted to call an early election, by 522 votes to 13.

The Queen's Speech



The Queen's Speech announced the government's legislative plan for the coming Parliament

What a difference. Theresa May and Jeremy Corbyn's final Commons confrontation before the election had seen the Conservatives limbering up for a triumphal campaign which would culminate in the inevitable smashing of their Labour opponents. When the diminished, battered band of Conservative MPs reassembled, minus their parliamentary majority, for the state opening of Parliament on June 21st, they were chastened and uncertain, while euphoria gripped the occupants of the Labour benches.

When they came to speak in the traditional debate on an address thanking Her Majesty for the Queen's Speech – the new Government's legislative programme – the dynamic between the two main figures had changed completely. Mr Corbyn seemed a far more confident, assertive parliamentary performer, relishing the opportunity to throw back the taunts that had been hurled at him during the campaign.

A Government which had warned that he could only gain power in a 'coalition of chaos' with the SNP and the Lib Dems had been forced

to negotiate for the support of the Northern Ireland Democratic Unionists ... and as the first debate of this new Parliament began, that support had not been secured. Mr Corbyn could not resist the open goal. To triumphant Labour laughter he noted that 'the latest coalition may already be in some chaos'.

'Nothing could emphasise that chaos more than the Queen's Speech we have just heard: a threadbare legislative programme from a Government who have lost their majority and apparently run out of ideas altogether. This would be a thin legislative programme even if it was for one year, but for two years – two years? There is not enough in it to fill up one year.'

That was a reference to the Government's decision to declare a two-year Parliamentary Session – a procedural move intended to ensure ministers could push through vital Brexit legislation in time for the exit date in March 2019. Mr Corbyn mocked the Prime Minister for dropping a series of election promises that had not found favour with the voters: means-testing the winter fuel allowance and replacing the triple lock on pensions among others.

On Brexit, Mr Corbyn stuck to Labour's careful positioning in favour of a deal with the EU 'that puts jobs and the economy first'. He called for full access to the single market and a customs arrangement that provided Britain with the 'exact same benefits' as now. And in his final flourish he warned the Prime Minister that Labour were now 'not merely an Opposition; we are a Government in waiting, with a policy programme that enthused and

engaged millions of people in this election, many for the first time in their political lives. We are ready to

offer real strong and stable leadership in the interests of the many, not the few.'

Grenfell Tower

The fire that destroyed Grenfell Tower, a social housing block in the London Borough of Kensington and Chelsea, seemed to some to crystallise the issues that had driven the 'Corbyn Surge' in the General Election just days earlier.

Accusations about the neglect of social housing tenants, chronic under-investment and official incompetence were flying, even while the pall of smoke still hovered over the capital and the horrific images of the blaze were replayed on TV.

So potent was the symbolism that it became intertwined in the debates on the post-election Queen's Speech - but the Government also committed to keep MPs informed about the aftermath, the efforts to identify casualties in the wreckage of the tower, to re-house and assist those who had lost their homes, and to set up a public inquiry.

So it was that the Communities Secretary, Sajid Javid, came to the Commons on July 3rd to announce £2.5 million had been distributed from the special £5 million fund set up to help the residents. Mr Javid said the public inquiry and the criminal investigation had to be allowed the space to follow the evidence wherever it took them, and everyone should be careful not to prejudice their work. Responding to the Labour MP, David Lammy, who had lost a family friend in the fire, he added that although it was for the judge to determine the scope of the inquiry, he expected it to be 'as broad and wide-ranging as possible'.



Tributes for the Grenfell victims came from across the country

Mr Javid also dealt with the key issue of the authorities' inability to say exactly how many people had died: 'There has been much speculation about who was in Grenfell Tower on the night of the fire, and it is vital that we find out. The Director of Public Prosecutions has made it clear that there will be no prosecution of tenants ... who may have been illegally sub-letting their property, ... There may have been people living in flats that were illegally sub-let who had no idea about the true status of their tenancy. Their families want to know if they perished in the fire. These are their sons, their daughters, their brothers and their sisters. They need closure, and that is the least that they deserve.'

The Government was also taking urgent action to avoid another tragedy in buildings with architectural cladding similar to that which appeared to have been a factor in the Grenfell fire.

Last rites on the Brexit Bill



David Davis, Secretary of State for Exiting the European Union since July 2016

Back in March, when an election seemed a distant prospect, parliament's main focus was on the European Union (Notification of Withdrawal) Bill. This Bill, which would give Theresa May the authority to begin the UK's divorce from the European Union, was forced on the Government after a Supreme Court ruling that Parliamentary approval was required to begin the process.

Despite fears that the Bill could be watered down or even reshaped to reverse the Referendum verdict, it passed through the Commons unscathed. All attempts to amend, or add, to its 136 words were voted down. Predictions of a major rebellion of up to 50 Conservative Remainers proved unfounded, and only a handful defied the party whip.

But when it moved on to the House of Lords, where there is no Government majority and a large concentration of pro-EU peers, the Bill was amended twice.

One change guaranteed the rights of EU citizens living in the UK, and the second promised Parliament a 'meaningful vote' on the final Brexit deal. That meant the Bill had to return to the Commons because both Houses of Parliament must agree on the final wording of legislation.

After much debate, MPs rejected both Lords' amendments, the Bill was sent back for immediate consideration in the House of Lords, where David Davis came to watch his Junior Minister, Lord Bridges, call on Peers to drop their opposition. And while the Liberal Democrat, Lord Oates, did urge Peers to continue defying the Government, support for the amendment melted away, and the attempt to throw it back to MPs was once more rejected, as was the attempt to keep the 'meaningful vote'. The final form of the Bill was settled – and it was sent off for the Royal Assent, un-amended.

Article 50 is triggered



Theresa May meets with European Council President Donald Tusk in Downing Street

The passage of the European Union (Notification of Withdrawal) Act cleared the way for the Prime Minister to act

on the Referendum verdict and formally trigger Britain's departure talks with the EU.

She was greeted by cheering Conservative MPs when she announced, on the 29th March, that the process had begun: 'A few minutes ago, in Brussels, the United Kingdom's permanent representative to the EU handed a letter to the President of the European Council on my behalf confirming the Government's decision to invoke Article 50 of the treaty on European Union. The Article 50 process is now under way and, in accordance with the wishes of the British people, the United Kingdom is leaving the European Union.'

She added that she wanted to build a close partnership with the EU: 'We want to continue to buy goods and services from the EU, and sell it ours ... Indeed, in an increasingly unstable world, we must continue to forge the closest possible security co-operation to keep our people safe. We face the same global threats from terrorism and extremism.'

Jeremy Corbyn warned against leaving without a trade agreement: 'the Prime Minister says that no deal is better than a bad deal, but the reality is that no deal is a bad deal.'

He said the debate had now moved on to what a post-Brexit Britain would be like: 'There are Conservatives who

want to use Brexit to turn this country into a low-wage tax haven. Labour is determined to invest in a high-skill, high-tech, high-wage future ... Labour will not give this Government a free hand to use Brexit to attack rights and protections and to cut services, or to create a tax dodger's paradise.'

The eurosceptic Conservative, Jacob Rees-Mogg, quoted the Elizabethan hero Sir Francis Drake: "There must be a begynnyng of any great matter, but the conteneuing unto the end untyll it be thoroughly ffynysht yeldes the trew glory' ... I wish my Right Hon. Friend good luck and good fortune in her negotiations until she comes to true glory and is welcomed back to this House as a 21st century Gloriana.'

A terrorist attack on Parliament

On the afternoon of March 22nd, as MPs were engaged in a routine vote of the Pensions Bill, a man drove his car into pedestrians just outside, killing two people and injuring dozens more, before stabbing to death a police officer who was guarding the gates to the Houses of Parliament, and he was then shot dead himself.

The sitting of the Commons was suspended and MPs were held in their Chamber for several hours, before being escorted away. When they returned the next day, they began with a minute of silence. Then the Speaker opened proceedings by expressing 'our heartfelt condolences to the families and friends of the victims of this outrage. A police officer, PC Keith Palmer, was killed defending us, defending Parliament and defending parliamentary democracy.'

The Prime Minister was heard in silence as she updated MPs: 'Yesterday, an act of terrorism tried to silence our democracy, but today we meet as



The attack on Westminster was one of several terrorist attacks in the UK during the year

normal, as generations have done before us and as future generations will continue to do, to deliver a simple message: we are not afraid, and our resolve will never waver in the face of terrorism. We meet here, in the oldest of all Parliaments, because we know that democracy, and the values that it entails, will always prevail.'



PC Keith Palmer, who died trying to stop the attacker, was given a full police service funeral, and praised for his heroism

She gave an account of the previous day's events and ended by declaring that the best response to terrorism was to act normally: 'As I speak, millions will be boarding trains and aeroplanes to travel to London and to see for themselves the greatest city on Earth. It is in these actions – millions of acts of normality – that we find the best response to terrorism: a response that denies our enemies their victory, that refuses to let them win, that shows we will never give in; a response driven by that same spirit that drove a husband and father to put himself between us and our

attacker, and to pay the ultimate price; a response that says to the men and women who propagate this hate and evil, "You will not defeat us." Mr Speaker, let this be the message from this House and this nation today: our values will prevail.'

The Labour Leader, Jeremy Corbyn, said people should not allow the voices of hatred to divide or cower them – adding that PC Keith Palmer had given his life defending the public and democracy.

Watching impassively in the crowd of MPs standing at the Bar of the House, in the area across the Chamber facing the Speaker's Chair, was the Foreign Office Minister, Tobias Ellwood. He had tried to save PC Palmer's life by giving him mouth-to-mouth resuscitation. Many MPs took a moment to exchange a word with him as they passed or pat him on the arm. And many of those who spoke over the next hour praised his actions.

Tributes and thanks came from all the Party Leaders – the SNP's Westminster Leader, Angus Robertson, the Liberal Democrats, Tim Farron, and the DUP's, Nigel Dodds.

The Conservative MP, James Cleverly, had served with PC Palmer in the army spoke movingly and implored the Prime Minister to 'posthumously recognise his gallantry and sacrifice formally.' Theresa May promised that she would.

President Trump

This year more than most, US politics had a bearing on our own. Not only were many MPs looking across the Atlantic for a trade deal and an enhancement of the 'special relationship', following the decision to leave the EU. But the American people themselves had managed to

outdo the British electorate when it came to delivering the most surprising democratic decision of 2016.

As recently as January 2016, a small number of MPs had gathered in Westminster Hall to debate whether or not Donald Trump should be banned

from entering the UK altogether. His comments about Muslims, among others, had led to an online petition for him to be considered a ‘hate preacher’ and therefore banned from British soil. Even those who supported the motion knew there was little chance of such a ban being implemented. But few would have suspected that, just 13 months later, Parliament would be discussing the appropriateness of a state visit from President Donald Trump.

One of the first acts of the new US President was to order a blanket ban on people from a list of Middle Eastern countries travelling to the US. In the Commons, the former Labour Leader, Ed Miliband, and the Conservative, Nadhim Zahawi, joined forces to ask the Speaker for an emergency debate – and it was held that day.

Mr Zahawi, born in Iraq to Kurdish parents, arrived in the UK as a nine-year-old refugee from Saddam Hussein’s regime. He is now a British citizen, but because he was born in Iraq, he believed he came under the Trump ban.

He told MPs his place of birth already meant he had been required to go through an interview at the US embassy, to secure the right to travel to America, under rules imposed by President Obama. But the new restrictions were much tougher.

The US Government has since clarified that people with British passports will not be affected by the ban, whatever the country of their birth, but Mr Zahawi still thought the ban was ‘wholly counterproductive’. He described how it was already being used by pro-Islamic State social media accounts as ‘clear evidence that the USA is seeking to destroy Islam. They have even called it the “blessed ban”’.



Nadhim Zahawi MP strongly criticised the Trump administration’s travel ban on certain Muslim countries

Labour’s Yvette Cooper, who chairs the Home Affairs Select Committee, was ‘deeply worried’ that the Government had already invited the new President to make a state visit to Britain: ‘It will look like an endorsement of a ban that is so morally wrong and that we should be standing against.’

The Conservative, Sir Simon Burns, disagreed: ‘I think it is absolutely right that the British Government continue the work of the Prime Minister to build bridges with President Trump so that we can, through engagement, seek to persuade him and to minimise or reduce the danger of his more outrageous policies ... I believe that very little would be achieved by cancelling a state visit to which the invitation has already been extended and accepted.’

The emergency debate was on a formal motion that MPs had ‘considered’ Donald Trump’s travel ban, so no call for a policy change was voted on.

Acknowledgements

Images in this publication have been reproduced courtesy of the following individuals/organisations:

Ransomware | Flickr | Christiaan Colen
Hillary Clinton | Flickr | Lorie Shaull
Mark Zuckerberg | Flickr | Robert Scoble
Kellyanne Conway | Flickr | Michael Vadon
Travis Kalanick | Flickr | GES 2016
Eric Holder | Flickr | AFGE
Buzz Aldrin | Flickr | NASA Kennedy
Pokemon Go | Flickr | Paintimpact
Margrethe Vestager | Flickr | European Conservatives and Reformists Group
Google HQ | Flickr | Guiseppe Milo
Jeff Bezos | Flickr | Jim Mattis
Donald Trump | Flickr | Gage Skidmore
Amazon Echo | Flickr | Crosa
Siri | Flickr | Krlis Dambrowski
K-2SO | Flickr | Gage Skidmore
Self-driving car | Flickr | smoothgroover22
Elon Musk | Flickr | Steve Jurvetson
Tesla | Flickr | Steve Jurvetson

Westminster Publications is grateful to Mark D'Arcy and Dave Lee for their contributions to this publication.

COPYRIGHT © WESTMINSTER PUBLICATIONS 2017

All rights reserved by Westminster Publications. No part of this publication may be reproduced, stored or transmitted in any form or by any means without prior written permission from Westminster Publications. Westminster Publications warrants that reasonable skill and care has been used in preparing this publication. Notwithstanding this warranty Westminster Publications shall not be under liability for any loss of profit, business, revenues or any special indirect or consequential damage of any nature whatsoever or loss of anticipated saving or for any increased costs sustained by the client or his or her servants or agents arising in any way whether directly or indirectly as a result of reliance on this publication or of any error or defect in this publication. Westminster Publications shall not in any circumstances be under any liability whatsoever to any other person for any loss or damage arising in any way as a result of reliance on this publication.

