

Computer Weekly

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O2 canvasses support from UK Plc to build case for 5G

O2 CEO Mark Evans has written to every FTSE100 chief executive to invite them to participate in the operator's 5G mobile network test-bed trials ahead of an anticipated commercial service launch in 2020. Much of the hype about 5G has been around enhanced consumer mobile services. O2 wants to work with UK companies to better understand the processes and use cases that might benefit from 5G.

Nationwide full-fibre broadband network will cost £30bn

Deploying a nationwide full-fibre, or fibre-to-the-premises (FTTP) broadband network, by 2033 in line with the government's ambitions will cost £30bn under a competitive model. The sum is an estimate of capital expenditure, and excludes connection costs and lifetime operating expenses, according to the government's Future Telecoms Infrastructure Review.

MPs doubt that justice system transformation will be a success

The Public Accounts Committee has published a scathing report on the HM Courts & Tribunals Service transformation programme, saying it has "little confidence" in its success. The ambitious £1.2bn programme to overhaul the courts through the use of technology aims to introduce online services, digital case files and use video technology in court hearings through a common platform.

Enterprise-readiness push is paying off, says Google Cloud

Google Cloud CEO Diane Greene has revealed details of how the firm has doubled-down on its efforts to court the business user community, after analysts said it could take the firm up to a decade to ready its cloud platform for enterprise use. Greene detailed the company's efforts during her opening keynote at the Google Cloud Next Conference 2018 in San Francisco.



Stagecoach set to trial full-size driverless bus

Public transport operator Stagecoach is developing a full-size bus that does not require a driver and hopes to begin testing it in its depots by the end of the year. The autonomous single-deck bus, being developed with bus manufacturer Alexander Dennis and technology company Fusion Processing, will also improve safety when driven manually. The bus will be tested in Stagecoach depots, where it will drive into fuelling stations, the bus wash and will also self-park.

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Web-based vulnerabilities stable

Instances of common web-based vulnerabilities have remained consistent for the past nine years, according to researchers at cyber security firm NCC Group. In particular, the number of cross-site scripting vulnerabilities has remained largely stable.

MPs to investigate progress of digital government

MPs have launched an inquiry into the progress of digital government and the role of the Government Digital Service. The House of Commons Science and Technology Committee is seeking evidence to assess progress on the digital transformation strategy.

M&S to invest in startups

Marks and Spencer is looking to invest in retail tech startups through a new partnership with Founders Factory. M&S will tap into Founders Factory's network of entrepreneurs and startups.

Outsourcing at a crossroads

The government must use its huge influence to shape the public sector services market if it is to get public, economic, social and environmental value from the billions of pounds of taxpayers' money it spends with outsourcing suppliers, says the Public Accounts Committee.

IBM results leave Watson thinking

IBM has reported second-quarter revenues of \$20bn, up by 2% in constant currency compared with the same quarter last year, but it experienced a slight decline in its cognitive business. Cognitive computing, covering the likes of Watson and advanced analytics, is core to many of IBM's strategic initiatives.

Cloud lifts Microsoft growth

Microsoft sales increased by 17% in the final quarter of its current financial year, with cloud sales driving growth. The software giant reported sales exceeding \$100bn for the full year. ■

Barclays to open new tech hub in Glasgow

Barclays is set to double its workforce in Scotland by opening a new campus to house technology teams. Up to 2,500 people could be accommodated in the campus, at Glasgow's Buchanan Wharf.



PETER RIBBECK/GETTY

- › Facebook stock price falls on slowing growth forecast.
- › ERP applications under cyber attack, research confirms.
- › Alphabet shares up after better-than-expected quarter.
- › Government's SME spend down in 2016/17.

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Cyber security is a top priority for aircraft manufacturers, says Airbus

There is a high level of collaboration in the aircraft industry on cyber security, but not all other industries are at the same level, according to an industry veteran at aerospace and defence firm Airbus. [Warwick Ashford](#) reports

Everything the air manufacturing industry plans is considered through the lens of cyber security, but not everyone is up to the same standard across the industry in general, even among suppliers of [critical national infrastructure](#), said Ian Goslin, UK managing director of [Airbus](#) cyber security.

“The level of analysis that is done against every element of our platform development in terms of the aircraft is always considered through the lens of cyber security,” he told Computer Weekly.

SECURITY FROM THE START

This means, said Goslin, that whatever aircraft manufacturers are planning, they will consider the potential cyber security implications from the start.

“That maturity of cyber security consideration should assure the public that aircraft are very safe in terms of cyber security,” he said. “We isolate what we need to isolate, we put in place everything that is needed to protect our aircraft, and we continually review that to ensure it is always up to date.”

This is true across the aircraft manufacturing industry, which is very mature in terms of its approach to [cyber security](#), said Goslin.

**“CYBER SECURITY IS THE ONE
AREA THAT RIVAL MANUFACTURERS
REGULARLY COLLABORATE ON”**

IAN GOSLIN, AIRBUS

“Cyber security is the one area that rival manufacturers regularly collaborate on. Our biggest rival is Boeing, and there is a lot of intellectual property that we each want to protect to gain a competitive advantage.

“But in cyber security, Airbus and Boeing collaborate completely because it is in both our interests to ensure that each of us understands the threat, where it is coming from and if it is being

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Aircraft manufacturers are keen to collaborate on cyber security matters, says Airbus



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launched, because if either of us is compromised, it could have a massive impact on the whole industry."

Like any part of critical national infrastructure, some airports are better than others when it comes to cyber security, said Goslin.

"The best airports are the ones that have recognised the threat, that there is intent [by malicious actors to carry out cyber attacks] and they recognise the financial impact it would have on them as a business, which is what businesses need to do to get the attention of the C-suite," he said. "Putting a risk in the context of a true business impact is really important."

However, Goslin is optimistic that cyber security at airports will improve where necessary. "We are working with several airports, but they are all looking at cyber security carefully and they are growing in terms of their cyber security maturity," he said.

VULNERABILITY ANALYSIS

Where Airbus is working with airports as a [managed security services provider](#), Goslin said the company is applying its experience in vulnerability analysis to find and mitigate potential vulnerabilities in critical IT systems and systems that would

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have an impact on the business if they were compromised or if they failed.

"In summary, aircraft are exceptionally safe in terms of cyber security, while airports are safe and are continually getting better," said Goslin.

However, he said other elements of critical national infrastructure are not at the same level and there is still some work to be done in term raising cyber security maturity levels.

"AIRCRAFT ARE EXCEPTIONALLY SAFE IN TERMS OF CYBER SECURITY, WHILE AIRPORTS ARE SAFE AND ARE CONTINUALLY GETTING BETTER"

IAN GOSLIN, AIRBUS

"There are still organisations that provide critical infrastructure that still do not have a [chief information security officer](#) [CISO], and the biggest challenge for the ones that do have a CISO is to get the c-suite to understand that there is a real threat of cyber attack and that the potential impact is worth considering in terms of the effect it could have on the business."

Airbus, which has a cyber security research facility in Newport and teams based in Corsham and Cheltenham, works closely with the UK's [Ministry of Defence](#). It provides consultancy services

to the military, government and industry on cyber vulnerabilities, particularly those affecting operational technology, which are commonly found in industrial plants and suppliers of critical national infrastructure.

Commenting on the current cyber security threat landscape, Goslin said most organisations face the full spectrum of threat actors, from teenage hackers all the way up to nation state groups.

Airbus is no different, he said, but has a particular focus on protecting intellectual property and ensuring that products are not compromised by cyber attackers.

THREAT IS GROWING

"The threat is large and growing in terms of sophistication, as well as the number of actors who want to tap into the benefits of cyber crime or cyber [hacktivism](#)," he said.

"As a result, organisations need to recognise that they will regularly come under cyber attack, ranging from very obvious attacks to those that are extremely subtle in preparation for potential future attacks."

For this reason, Goslin said it is important for organisations to improve their ability to recognise and characterise external probing of their networks that a state actor could use at some time in the future when it wants to create a maximum impact.

"It is a rich and diverse environment right now, and we need to recognise that there are people who are intent on benefiting from compromising the full spectrum of industry, including critical national infrastructure and government, so it is an interesting time to be in the business," he said. ■

Canada raises banner of AI to promote tech

Toronto focuses on artificial intelligence to draw in international talent and boost IT industry, writes [Brian McKenna](#)

Toronto has gone big for [artificial intelligence](#) (AI). The city and the province of which it is part, Ontario, see a favourable conjuncture, with Brexit and Trump, and an opportunity to rival, if not best, [Silicon Valley](#).

“Canada is having a moment. It is on the world stage,” said Aaron Rosland, a diplomat in the High Commission of Canada, in London, and the official Ontario government representative in the UK.

Indeed, Canada, he said, is a great place for even UK firms to secure access to the European Union, because of the Comprehensive Economic and Trade agreement ([Ceta](#)) set up in 2017. “There is a significant uptick in interest from UK firms because of Ceta, and because it is an entry point to the US, too,” he says.

Rosland was speaking to Computer Weekly at a recent AI summit in London, alongside Daniel Silverman, executive vice-president of Toronto Global, and Jordan Jacobs, a founder of the Vector Institute and co-head of Layer 6 AI at the TD Bank Group, where he is chief AI officer.

Jacobs is a technology and entertainment lawyer by background, and had a spell in television, where his production company partnered with Elton John to produce a music TV show

hosted by Elvis Costello, *Spectacle*. “That featured the best [interview with Lou Reed](#) ever,” he recalled.

But now Jacobs is focused on AI, which he believes to be “the most transformative technology since electricity”.

LEADING THE WAY IN AI

Jacobs co-founded AI startup Layer 6, a “prediction personalisation company that uses [deep learning](#)”, and sold it to Toronto-based TD (Toronto-Dominion) Bank in January 2018.

AI IS “THE MOST TRANSFORMATIVE TECHNOLOGY SINCE ELECTRICITY”

JORDAN JACOBS, VECTOR INSTITUTE

He also co-founded, in March 2017, the [Vector Institute](#) for artificial intelligence, the goal of which is to build on the particular strengths of the University of Toronto in this area.

“The world has moved to AI being the leading edge of the biggest tech companies, the leadership of those comes from

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Toronto," said Jacobs. "Geoff Hinton is the godfather of AI - neural nets and deep learning. His graduate students are the heads of AI at Apple, Facebook, Uber and OpenAI. And many of the Google DeepMind and Google Brain leaders, too. They all come from this small group at the University of Toronto."

[Geoffrey Hinton](#), a British academic, educated at Cambridge and Edinburgh, who is also a long-standing computer science faculty member at the University of Toronto, is an AI pioneer.

"Around Geoff we have built the Vector Institute, and raised C\$230m - half from [the Canadian] government, half from

private companies. The idea is for Vector to be the world-leading centre for research, and the leading graduate school for AI in the world," added Jacobs.

It is affiliated with the University of Toronto, the University of Waterloo, and other Canadian universities.

The concept is to enable young academics to remain on faculty, teaching, while launching and building their own startups. "If you go to Stanford, you'll see the faculty on leave. Vector enables academics not to have to choose [between research and teaching, and commerce]," he said.



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ATTRACTING DIVERSE TALENT

Jacobs contended that Canadian AI talent was now beginning not to leave for Silicon Valley, and many who had previously left were now coming back, because of the higher standard of living in Toronto, and Ontario more generally.

"If your spouse doesn't work in tech, what is there for them to do there [in the Valley]? Or if you want to raise kids in an affordable place, Toronto has more to offer. It's a more inclusive culture, there is more loyalty among employees, and there is a typically Canadian humility about people. There are also more STEM [science, technology, engineering and maths] graduates in Ontario than in all of California," he said.

Jacobs gave the example of Uber, which has moved its computer vision research for self-driving cars to Toronto, under the guidance of [Raquel Urtasun](#), a professor at the University of Toronto.

Silicon Valley and China will be the big ecosystems for artificial intelligence in the decades to come, he believes, and he maintains Toronto can be the third.

Indeed, Valley-based venture capital firms that previously insisted Canadian startups move to California are now doing the opposite, he said, adding that Toronto now has more AI startups than any other city in the world.

"We started the effort for Vector before Brexit and Trump's election. Those political developments have helped us. Toronto is the most multicultural city on earth, so that is attractive to, say, excellent engineering and mathematics graduates from Iran. Those people can't get visas for the US now," said Jacobs.

"To have such diversity in your workforce is a real advantage for companies that want to think global, to have a genuine world view from the get-go. Silicon Valley companies think 'US first,'" he said.

"TORONTO HAS MORE TO OFFER [THAN SILICON VALLEY]. IT'S A MORE INCLUSIVE CULTURE, THERE IS MORE LOYALTY AMONG EMPLOYEES, AND THERE IS A TYPICALLY CANADIAN HUMILITY ABOUT PEOPLE. THERE ARE ALSO MORE STEM GRADUATES IN ONTARIO THAN IN ALL OF CALIFORNIA"

JORDAN JACOBS, VECTOR INSTITUTE

Toronto Global's Silverman added that 51% of Toronto residents were born outside Canada, and in the rest of Ontario it drops down to only 47%. "It speaks well to how Canada is in general, and to our immigration policies," he said.

So, readers of Computer Weekly, shall we pack our cases? ■

› *Canada's tech sector is targeting Europe – does it have what it takes to compete?*

INTERVIEW

How ESTONIA LEADS THE WORLD IN DIGITAL GOVERNMENT

Estonia's former CIO, Taavi Kotka, talks to Lis Evenstad about how to make services work for people, why the skills gap shouldn't be an excuse not to digitise, and the importance of going to the gym



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Estonia is often hailed as a leader in digital government. A small country bordering the Baltic Sea, it may have a small population, but it has big ideas.

In many ways, it is a country of opposites. Estonia's capital, Tallinn, is one of the best preserved medieval cities in Europe, yet it is also one of the most [digitally advanced](#) countries in the world, with all government services fully digital. It was also the first country in the world to launch electronic voting during its 2005 election.

So how did this Baltic state end up as the champion of digital? One of the main drivers behind its digital ambitions, and quite possibly the reason Estonia has done so well, is former Estonian government CIO Taavi Kotka.

Ahead of [e-Health Week](#) in May, Computer Weekly had a chat with Kotka, a former tech entrepreneur who took the reins of Estonia's digital government in 2013, when he became CIO.

SECRET OF ESTONIA'S SUCCESS

Kotka's answer to why Estonia has been so successful in implementing digital government? "If you truly need something, you can actually achieve it," he says.

This is also the reason why some countries, the UK included, are struggling, he says. "All these governments wanting to create a digital government, they might truly want that, but they don't actually need it. Estonia actually needed it. We had a pain, and that's why this e-government or e-society was created."

Kotka says that in Estonia, with its population of 1.3 million, vast forests covering 50% of the country and 2,000 tiny islands,

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something had to be done. "If you have a huge amount of land but don't have enough people to serve other people, you need to push people to self-serve," he says.

In the UK, not having a fully digital government "isn't so bad", says Kotka, and because it is functioning just fine without digital, "you don't have a push to move to digital".

He adds: "For me, it's like a person with a weight problem. So I say I'm fat and I should exercise more, and I talk about it but I never go to the gym. Now, think about it like this: if you don't exercise, you'll be dead. That's the kind of pain we're talking about in Estonia. In the UK, it's more like knowing you should be doing something, but being too lazy to do it."

BUILDING A DIGITAL GOVERNMENT

So how has Estonia done it? A lot of it has to do with trust and willingness to try, says Kotka. "There has to be a certain level of trust, and people need to trust that the government is actually able to make these kinds of changes," he says. "It is also a question about how you approach those problems."

In Estonia, there is an inherent belief in digital, both among residents and government. In health-care, for example, if your doctor

› *Scottish local government's chief digital officer describes the challenges of driving digital change across the country's councils.*

has all the relevant information about your medical history, they can treat you better.

"If you believe that, then it's a question of how to solve that in a way where it's not a privacy issue – and technology allows you to do that," says Kotka. He adds that Estonia has achieved something [the UK](#) is desperately trying to do – all the country's hospitals are connected, so patient data can be seamlessly transferred and accessed by an appropriate clinician.

When it comes to creating digital services, a key focus is often [skills](#), or rather the lack of them – particularly among the elderly, or those from lower socio-economic backgrounds.

SKILLS DIVIDE IN THE UK

In the UK, there is talk of a skills divide, where millions do not have digital skills and 5.8 million people have not used the internet at all, which is said to cost the economy about [£63bn a year](#).

Kotka takes the view that although digital skills are "quite important", it's not as big a problem as it was 15 years ago. In many cases, Estonians are not given a choice on whether to use digital services. But Kotka says this is simply because the country's citizens prefer using digital services, and the government has shut down physical offices because they are no longer efficient.

“THERE HAS TO BE A CERTAIN LEVEL OF TRUST, AND PEOPLE NEED TO TRUST THAT THE GOVERNMENT IS ACTUALLY ABLE TO DO THESE KINDS OF CHANGES”
TAAVI KOTKA, FORMER ESTONIAN GOVERNMENT CIO



Estonia's capital, Tallinn, is one of the best preserved medieval cities in Europe, yet Estonia is also one of the world's most digitally advanced countries

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"It's still a problem, but it's not a huge one," he says. "I have noticed that many western countries, including the UK, are always using this as an excuse not to go to the gym.

"You should solve the problem for 80% and then worry about the 20%. So you shouldn't put the 20% in the first decision. Don't use the skills gap as an excuse not to go to the gym.

"One of the key success elements for e-government is: never try to find a 100% solution that fits everybody. You need to understand that if you start designing your solutions and services for,

say, 85% of the people, you will be way more successful than trying to design everything for 100% of the population."

Kotka points out that Estonia's approach is nowhere near as radical as Denmark's, which has a "digital only" approach.

Estonia has been flying the flag for digital for a while now. It is more than 10 years since the country introduced paperless government meetings, and nearly 100% of the country's population carry smart ID cards to prove their identity when accessing online services.

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Kotka, who has been keeping an eye on what is happening around [digital identity](#) in the UK, and the UK government's development of [Gov.uk Verify](#), says part of the reason it has been rather a struggle is that it's been made into a political matter - a [huge no-no](#), according to Kotka.

"You have to differentiate between engineering questions and political questions, so the UK has made an engineering question a political question," he says.

"You cannot build digital government without unique identifiers, so it is an engineering thing. Don't make it political. As long as you make it political, there won't be any digital government or society in the UK."

E-RESIDENCY PROGRAMME

Estonia's smart ID cards were the forerunner of Kotka's main claim to fame - the Estonian [e-residency](#) programme, which was launched in 2014.

An Estonian e-residency is a transnational digital identity available to anyone in the world interested in administering a business online. In 2015, the country began taking e-residency applications, giving [ID cards](#) to foreigners and giving them access to government services.

So far, there are nearly 40,000 e-residents from 161 countries around the globe, including more than 2,000 from the UK,

with 206 of those having established new companies in Estonia, according to its [e-residents' dashboard](#).

Kotka says Estonia needed to do something to improve the economy and increase the wealth of the country and its people. "You can do that through different methods. You can increase the amount of tourists - which is a big problem for us," he says, because the Estonian climate makes it an unpopular destination.

The second method is through immigration, but again, he says "no one wants to come". The third method is through increasing the country's birth rate, but Estonia has a negative birth rate, says Kotka, "so we had to come up with something new".

Kotka believes Estonia can reach people beyond the country's boundaries. "Why can't we serve people from anywhere in the world

who want to have business in Europe?" he says.

"Those were questions we asked ourselves, and decided to create an e-residency which is not like a visa, or the Schengen Agreement, but allows you to access all our business environment, plus legal, and all of our APIs [application programming interfaces] and services."

For UK companies that want to do business with Europe after Brexit, Estonian e-residency is wide open, says Kotka. Estonia is most certainly open for business. ■

“DON'T MAKE IT POLITICAL. AS LONG AS YOU MAKE IT POLITICAL, THERE WON'T BE ANY DIGITAL GOVERNMENT OR SOCIETY IN THE UK”

TAAVI KOTKA, FORMER ESTONIAN GOVERNMENT CIO

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Trading blows threaten digital economy

Amid the global debate about trade tariffs, prompted by US president Donald Trump's unorthodox economic policies, it is little remarked that the digital economy is largely untouched by the international tariff regime.

In 1998, the World Trade Organisation (WTO) agreed that digital products would remain tariff-free. This is why we can download an e-book from Amazon anywhere in the world, even if the product sits in a US datacentre, without any punitive transfer charges.

Twenty years later, the world is very different and much more interconnected. We're on the cusp of a revolution in manufacturing as [3D printing](#) becomes mainstream. But think of the implications on global trade.

Tariffs exist to protect local businesses. India, for example, will apply import duties to products from overseas to make locally manufactured items cheaper for consumers, thus supporting its own manufacturing base. But if that product was a digital file that defines the item, which is downloaded from the internet onto a 3D printer in India, no tariffs would be applied. That is an existential threat to many indigenous companies in any country that does not have the extensive telecoms and digital infrastructure of more advanced economies.

That is why India and South Africa are calling for the WTO to review the status of digital goods. Their concerns are understandable – but inevitably the US, the EU and China will favour the existing regime.

Think also of the UK after Brexit. The government has rightly identified the [digital economy](#) as an area to expand its global influence outside the EU. Imagine if many of the countries with which we hoped to sign “ambitious trade deals” were to impose tariffs on our digital goods and services – the UK would be forced to reciprocate, potentially affecting many of the e-commerce services we use.

And what if Donald Trump, in retaliation, imposed digital tariffs to protect Silicon Valley? The rest of the world would have to do the same for Netflix. It sounds like an absurd proposition, but is anything really that unlikely in a post-Brexit, Trumpian trade environment?

India and South Africa's proposal will probably be voted down by the developed countries, but it is an indication that the digital economy could become a future battleground in international trade relations. And for the UK, that would be a real concern. ■

Bryan Glick, editor in chief

THE DIGITAL ECONOMY COULD BECOME A FUTURE BATTLEGROUND IN INTERNATIONAL TRADE RELATIONS

HOW TO MAKE SENSE OF DESKTOP AS A SERVICE

Does it make sense to move the desktop to the cloud?

Tim Anderson looks at DaaS and VDI



JULIEN EICHINGER/ADOBE

HOME

If [digital transformation](#) is leading to increasing use of [public cloud](#) providers, what about desktop computing? Does it make sense to move this to the cloud, consuming the desktop as a service ([DaaS](#)) along with everything else?

There is some logic to it. If a business already has data in the cloud, there is an advantage to running hosted desktops with the same provider, to benefit from low [latency](#) between the data and the clients. Users can still get a PC experience via a thin client, but the PC operating system runs remotely on a cloud-hosted [virtual machine](#) (VM).

A number of companies now provide this service, and users can host with large providers such as Amazon Web Services (AWS) or Microsoft Azure, or with smaller hosting companies.

VDI CONCEPT WORKS WELL

The virtual desktop infrastructure ([VDI](#)) concept works well both for office and mobile users. In the office, a thin client appliance provides a robust and cost-effective connection to your virtual desktops, while for mobility and flexibility, you can generally use any PC, Android, iOS or [Chromebook](#) to connect.

Licensing [Windows for VDI](#) is complex and requires Windows Enterprise. Customers with Windows Enterprise and Software Assurance can deploy Windows 7 or Windows 10 via VDI.

Take-up for VDI and DaaS is “still increasing”, according to Charles Barratt, digital workspace domain architect at VMware, who cites a variety of reasons. The pay-as-you-go model, a classic benefit of hosted services, is well suited to organisations that experience seasonal demand variation or employ varying numbers of

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contractors. Security is improved, in that the hosted desktops are in a datacentre and cannot be lost or stolen. If a hosted desktop suffers a malware infection, deleting and replacing the desktop is normally straightforward. [Encryption](#) can be applied across the entire network.

Hosted desktops are also amenable to behaviour analytics, an additional security piece that can detect anomalies in behaviour and apply remediation, such as blocking an IP address or user account.

VMware's [Horizon Cloud](#) is "a control plane that resides in the cloud, with three delivery models", says Barratt. The three models are VMware hosting, Microsoft Azure and on-premise deployment. It is also possible to implement a hybrid system. You can choose per-user or concurrent connection licensing, with the latter more cost-effective if you have a lot of occasional users.

A [virtual desktop](#) can be implemented as a dedicated VM or as a session on a shared server or VM, such as one using Microsoft's Remote Desktop Session Host ([RDSH](#)), which allows multiple users to log on to a single server.

A point of confusion in the Horizon Cloud offering is that the different deployment options vary in what they support. On Azure, for example, only RDSH is supported, although support for virtual desktops and virtual applications is in beta in response to customer demand.

Historically, a virtual desktop solution has been unsuitable for graphic-intensive applications such as computer-aided design (CAD). While there is still a case for local workstations for the most demanding applications, hardware-accelerated graphics are now supported on virtual desktops. VMware Horizon, for example, uses Nvidia Grid technology which shares a physical graphics processing unit (GPU) between up to 16 virtual machines, allowing graphics acceleration.

Another big provider of DaaS is Citrix, whose [XenDesktop](#) can be deployed on-premise or on any of the big cloud providers, including Microsoft Azure, AWS, Google Cloud Platform and Oracle Cloud. Microsoft itself has held back from offering first-party desktop virtualisation on Azure, but has partnered with Citrix to offer XenDesktop Essentials, available via the online Azure Marketplace. Here, the customer buys the Azure infrastructure and Windows 10

Enterprise licences, while Citrix provides XenDesktop management components: Citrix Studio, Director, Delivery Controller and SQL Server. Director is a web-based console that administrators and IT support staff can use for management, monitoring and troubleshooting, including the ability to view and control user sessions. It also provides notifications and alerts.

XenDesktop Essentials is a cut-down version of Citrix Cloud, which adds remote desktop applications as well as Linux

HOSTED DESKTOPS ARE AMENABLE TO BEHAVIOUR ANALYTICS, WHICH CAN DETECT ANOMALIES IN BEHAVIOUR AND APPLY REMEDIATION



VASABII/GETTY

applications and desktops, hosted on your choice of cloud. The heart of the Citrix offering is the technology used to deliver remote desktops and applications to users, called high-definition experience ([HDX](#)). This is really a bundle of optimisation techniques, including compression, network traffic [deduplication](#), smart use of local processing power where available, graphics and multimedia optimisations.

MORE MANAGEABLE AND SECURE

Thomas Berger of Citrix's technical marketing team says a DaaS solution is inherently more manageable and secure than physical PCs. Instead of confidential files being spread over numerous PCs, the data never leaves the datacentre (or public cloud).

Does the trend towards mobile and web applications reduce the need for [Windows desktops](#)? It may do eventually, but in the

meantime, "enterprises have hundreds of thousands of Windows applications", says Berger.

[Amazon WorkSpaces](#) was introduced in late 2013, providing pay-as-you-go Windows desktops on the AWS public cloud. It originally promised a "Windows 7 experience" via hosted Windows Server 2008 R2. Since then, WorkSpaces has been expanded with an option for a "Windows 10 experience" via Windows Server 2016, or actual Windows 7 or Windows 10 desktops for users with over 200 WorkSpaces with their own licences.

There is a wide range of desktop configurations available, with an option to bundle applications including Microsoft Office. The range of VMs available in Amazon WorkSpaces includes a graphics bundle with a Nvidia GPU with 4GB of video RAM, eight virtual CPUs, 15GB system memory and, of course, solid-state drive (SSD) storage.

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Amazon has also introduced Amazon Linux WorkSpaces, a Linux desktop based on the Mate desktop environment. It is priced around 15% less than Windows WorkSpaces, and includes bundled applications Firefox, Evolution, Pidgin and Libre Office.

WorkSpaces can be used with Amazon's own identity provider (IAM) or integrated with Microsoft Active Directory, if you have a VPN or Direct Connect link between your on-premise network and an [Amazon Virtual Private Cloud](#).

Amazon also offers a document storage and synchronisation system called [WorkDocs](#), which works in tandem with [WorkSpaces](#) to provide secure, persistent storage that can be accessed from any computer or web browser as well as within a WorkSpace.

Workspace Application Manager ([WAM](#)) is a complementary piece that lets you package desktop applications into [virtualised containers](#) and deploy them either as optional or required for users. Full control with automated deployment and updates is at extra cost.

Amazon provides its own WorkSpace client for Windows, Mac, Google Chrome OS, Google Android, Apple iOS and Amazon Fire OS. There is also support for the PCoIP protocol, enabling support for thin client devices that use the Teradici Tera2 chipset.

Amazon's VDI solution is characterised by a commonsense approach that is best suited to organisations already using AWS, thanks to integration with other AWS services. It is not suitable

for hybrid deployments because WorkSpaces cannot be deployed on-premise, and although it does support Active Directory and Group Policy, it does not support standard tools such as Microsoft's System Center Configuration Manager ([SCCM](#)).

The DaaS concept is compelling, especially for organisations that are already migrating to cloud-based systems for other aspects of their IT provision. Centralised desktop provision simplifies deployment, improves security, and enables a higher level of intelligence and analytics.

But there are also downsides. Working mainly with remote desktops can get in the way, especially in scenarios where you need to interact with local peripherals. Licensing is expensive, because the cost of DaaS is additional to the cost of the operating system itself, and can be complex.

Some software suppliers have special terms for VDI deployments.

It works best when many users can work with the same desktop image, but less well when there is a wide variety of requirements.

The challenge of keeping systems and applications patched and updated does not go away just because desktops are virtual.

In the context of IT modernisation, DaaS occupies a curious space, living both in the old world of legacy desktop applications and in the new world of cloud services. For some organisations it is a perfect fit, while for others there are better and more cost-effective ways to deploy applications. ■

DAAS OCCUPIES A CURIOUS SPACE, LIVING BOTH IN THE OLD WORLD OF LEGACY DESKTOP APPLICATIONS AND IN THE NEW WORLD OF CLOUD SERVICES

HOW TO USE DEVOPS WITHOUT ALIENATING DEVELOPERS

Enterprise DevOps adoption rests on securing buy-in at all levels of the company, but developer support is not a given. Caroline Donnelly reports



PISHIT/ADOBE

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Breaking down the IT department silos that have historically served to keep software developers and IT operations apart is a difficult, yet critical, stage in any enterprise [DevOps transformation](#).

Much of the difficulty is to do with the fact that it requires bringing together [individuals from two different disciplines](#), with their own ways of working and ideas about what their day job should entail.

Personality clashes can occur, entitlement issues may abound and confusion over who is now responsible for what in the wider software development and delivery chain of command is liable to occur.

All of these things need to be worked through if an enterprise has any hope of creating the productive and efficient multi-discipline [DevOps teams](#) needed to keep it one step ahead of the competition, and agile enough to address the constantly changing needs of its customers.

Being poised and ready to respond deftly to downtime and outages is also essential for enterprises, says Howard Wilson, chief commercial officer of incident monitoring software supplier PagerDuty, which is another area where a smooth-running DevOps team can come into its own.

“In this digital environment, when your website starts having a problem, you can’t afford to have someone over here working on this piece, and someone over there working on another piece, before [putting that work] through three levels of approval,” he told Computer Weekly at the [PagerDuty Connect](#) user conference in London.

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"If you do, it will be three weeks later and you will have lost a whole lot of business. [Digital transformation](#) requires a different way to manage your operations, so you need an environment that moves from work being queued, to work being done in real time, so you can go from working in an environment where work is siloed to where they have to be collaborative," said Wilson.

> CIOs and IT leaders share their advice on what enterprises can do to accelerate the spread of DevOps in their organisations.

OWN YOUR CODE

On the software development side, one of the biggest challenges is getting people used to the idea of having to support the code they write once it enters production, rather than hand off responsibility for that to operations.

This is a process the team at price comparison site Compare The Market had to go through three-and-a-half years ago, when its DevOps push began in earnest, recalls the firm's service delivery manager, Rohit Mathews.

Getting its development team on board with the idea of performing duties more commonly associated with operations proved particularly challenging, he says.

"During that journey, it was quite difficult to get our development teams to support and go on-call and work out of office hours, so it was a [culture shift](#) for us. We had to do it in stages, bit by bit," says Mathews. "That way of working is very different - the development teams were not used to it and it was not something they wanted to go for initially, because they're more interested in writing new code."

On-call work also had a reputation for being onerous and time-consuming, which is something the organisation knew it had to address if it had any hope of getting its developers on board with the idea of joining in.

With the help of [PagerDuty's infrastructure monitoring tools](#), the organisation embarked on an overhaul of its [incident alerting procedures](#) to speed up the time it takes to resolve any issues that arise, and to ensure its developers and operations teams were only disturbed if absolutely necessary.

As part of this process, the organisation analysed the alerts it commonly receives and took steps to classify each one to determine how swiftly they need to be dealt with.

"We wanted the central product teams to understand, 'this is my product, these are the list of alerts I'm getting every day, and these are the high-urgency ones that require a fast response'," says Mathews. "But then there might be other alerts that happen at midnight everyday, but no one does anything about them because they're not relevant, so what is the point in having them go off? Why not remove them, because if people are receiving an alert, it should just be because it's an incident."

Helping developers get over their fear of on-call work, and the potential impact it may have on their [work-life balance](#), is difficult, says Wilson. "If you're on-call and your infrastructure has problems, you're going to be disturbed a lot," he adds.

But that does not necessarily have to be the case. If the infrastructure keeps falling over, that suggests there may be

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technical debt issues [that need addressing](#), which – if tackled – may help minimise the amount of on-call work developers would be expected to do.

TECHNICAL DEBT

If technical debt is less of a problem, taking steps – as Compare The Market has – to ensure whoever is on-call is not being overloaded by superfluous alerts often helps take the sting out of things, and can help make the prospect more palatable for first-timers.

“You have to make sure you clean up that event stream, so people are only being called for something that is a real problem, because a lot of the fatigue people have [from on-call work] is because they’re woken up about something that is not really an issue,” says Wilson.

“Our philosophy [at PagerDuty] is focused on using as much automation and [machine learning](#) as possible to help make it easier for the people who sit at the centre of this, so they can be more effective and bring greater benefit to the organisations they work for,” he says. “Because it means your online environment is more available and more robust, and that has good economic consequences for businesses.”

WHO'S LEADING WHO?

How receptive developers are to this change in their day-to-day responsibilities sometimes comes down to who is responsible for pushing the DevOps agenda in the organisation, says Ben Connolly, head of digital IT at mobile operator Vodafone.



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If it is a grassroots movement driven by the developers and operations staff, that can make things easier, he says, because they will have already bought into the concept.

"It usually starts with the engineers wanting to be more agile, or operations guys wanting to be part of the DevOps movement. That's great, and it often takes off that way, and you do improve and get faster or more iterative," he tells Computer Weekly.

Difficulties may arise if the push to embrace DevOps is coming from the top-down, which is why it is important for organisations to think about how the move is being communicated to the people who will be on the forefront of delivering on it, says Wilson.

Developers do not want to hear their organisation is simply doing DevOps because it is the "[cool or trendy thing to do](#)," he adds, and they will want to know how the move will benefit them. That means emphasising the benefits DevOps stands to bring, in terms of delivering a better experience to the organisation's customers or making better and efficient use of the resources the organisation has.

DEVOPS SEEING RESULTS

With its focus on speeding up the time it takes for new features to enter production, developers in DevOps get to see the

work they do start to benefit users far more quickly, which can be hugely motivating, says Connolly.

"We are reducing the proximity between the developer and the customer, whereas traditionally they're weeks apart, and with [a lot of different teams] between them. In doing that, we're giving developers more exposure to the outcomes that they are producing," he says.

"They take more pride in what they do because they can see the outcomes, which makes them want to do even better," he adds.

The idea is not to turn developers into operations staff. Instead, DevOps seeks to encourage the two groups to work together in a more collaborative way, so the resulting code can enter production with the operations team's requirements around stability already factored into its design. The idea being that

the code will be produced quicker, and will end up being less buggy and more secure.

At [Vodafone](#), Connolly's team has gone from pushing out code changes every six weeks to every day since its DevOps push began, which in turn gives its software engineers more opportunities to innovate and test new features.

"This means they can try something out and see if it works, and one in five might stick and the others will go into the

THE IDEA IS NOT TO TURN DEVELOPERS INTO OPERATIONS STAFF. INSTEAD, DEVOPS SEEKS TO ENCOURAGE THE TWO GROUPS TO WORK TOGETHER IN A MORE COLLABORATIVE WAY

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learning pile - but some of the really cool stuff we're doing has started life that way," he says.

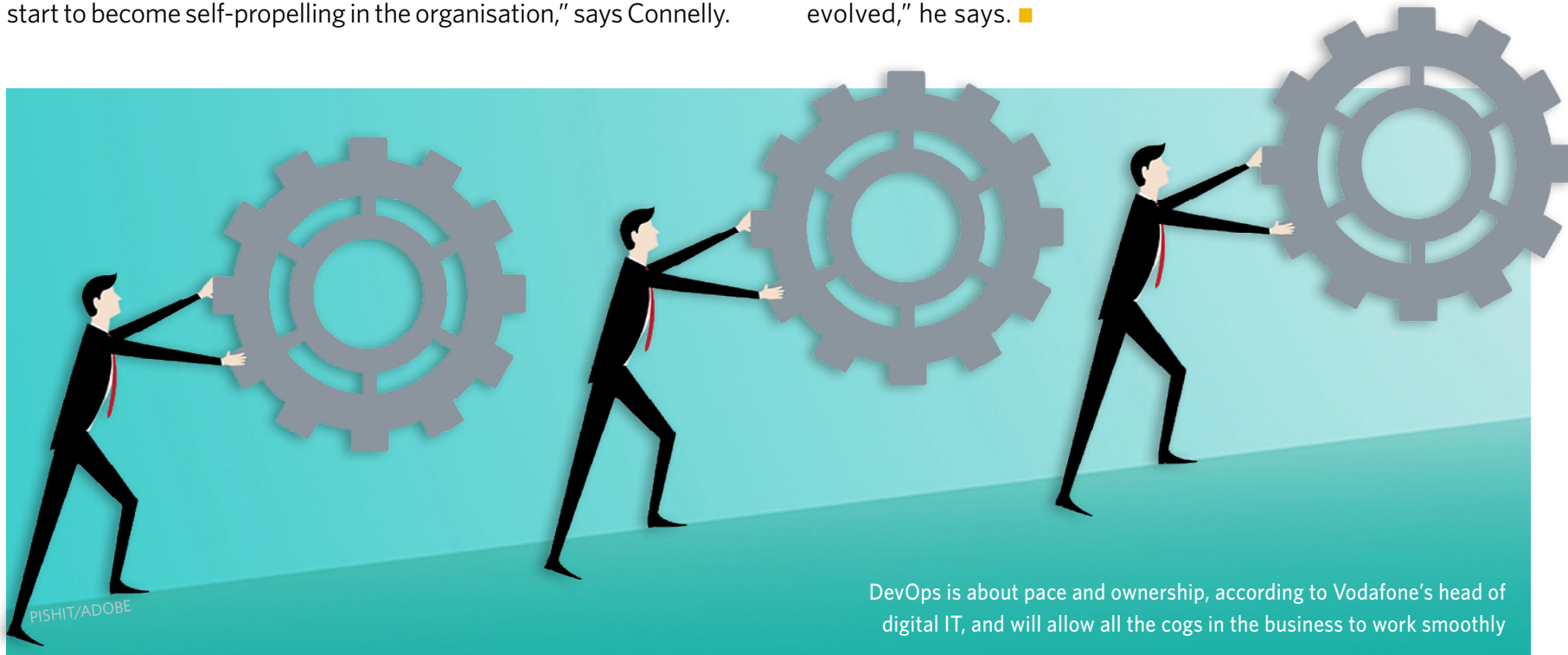
EXERCISING CREATIVITY

Giving developers opportunities to exercise their creativity can prove an enticing prospect to resistant-to-change individuals, and soon becomes second nature to them.

"DevOps is, fundamentally, about pace and ownership, so if we enable those things and let developers do it naturally, then it does start to become self-propelling in the organisation," says Connelly.

And, in organisations where securing buy-in for DevOps at the [grassroots level](#) is still proving problematic, seeing how other groups in the company have taken to the changes can be a powerful motivational tool to developers, according to PagerDuty's Wilson.

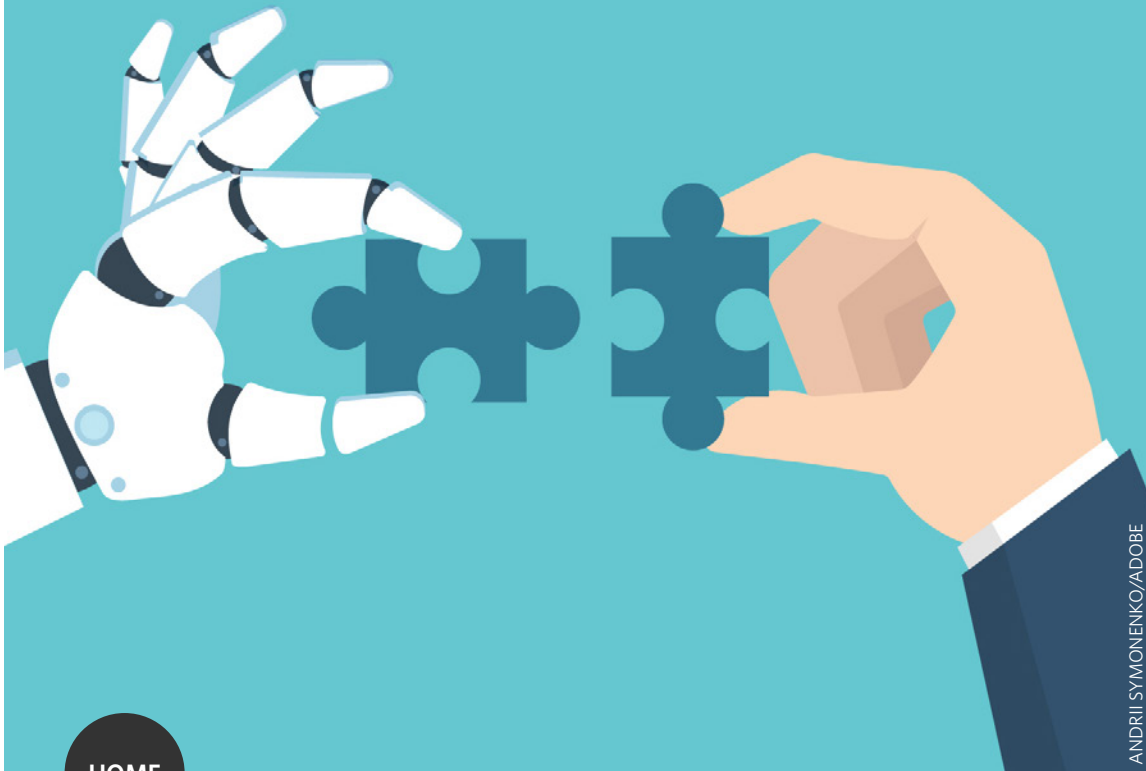
"What happens is that other people see [what's happening], they find it interesting and can see how it is working, and start thinking about what they can do to make it work for them - so take-up becomes viral. That's how the DevOps movement has evolved," he says. ■



DevOps is about pace and ownership, according to Vodafone's head of digital IT, and will allow all the cogs in the business to work smoothly

HOW ROBOT WORKERS CAN AUGMENT HUMAN PRODUCTIVITY

There is much for humans to learn and prepare for to smooth the inevitable coexistence of robots and people in the workplace. Karl Flinders reports



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Human workers need to be ready to change how they work because [artificial intelligence](#) (AI) learns to do things faster, more accurately and at a lower cost – and the risk posed to organisations not adopting the technology becomes greater than the risk of being an early user.

AI platforms will be used to help solve complex problems facing humanity, such as searching for a cure for cancer and building machines that can take people to Mars and beyond, but at the same time, AI is quickly learning to do a great number of more mundane human jobs.

Perhaps it is not as headline-grabbing, but the transformations in how organisations operate will be vital if humans are to push the boundaries of their existence. Whereas machines took over the activities of manual workers during the Industrial Revolution of the 18th and 19th centuries, AI is now doing the same for white-collar professionals – and it goes way beyond basic tasks, extending to those done by knowledge workers.

Even medics are able to [cut out large chunks of their work by using](#) AI. For example, according to the [Annals of Oncology](#) journal, scientists trained an AI tool using 100,000 images of melanoma cancer cells and normal birthmarks or moles. It was then tested using 300 dermoscopic images, and 100 of the most difficult photos from this sample were handed to [dermatologists](#) to assess, so that their conclusions could be compared with the results from the AI tool.

The doctors, more than half of whom had over five years' experience, correctly classified 87% of the melanomas, while the AI identified 95% of the cancer samples accurately. This use of the

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technology frees up time for medics to focus on matters such as beating cancer, rather than just spotting it in its early stages.

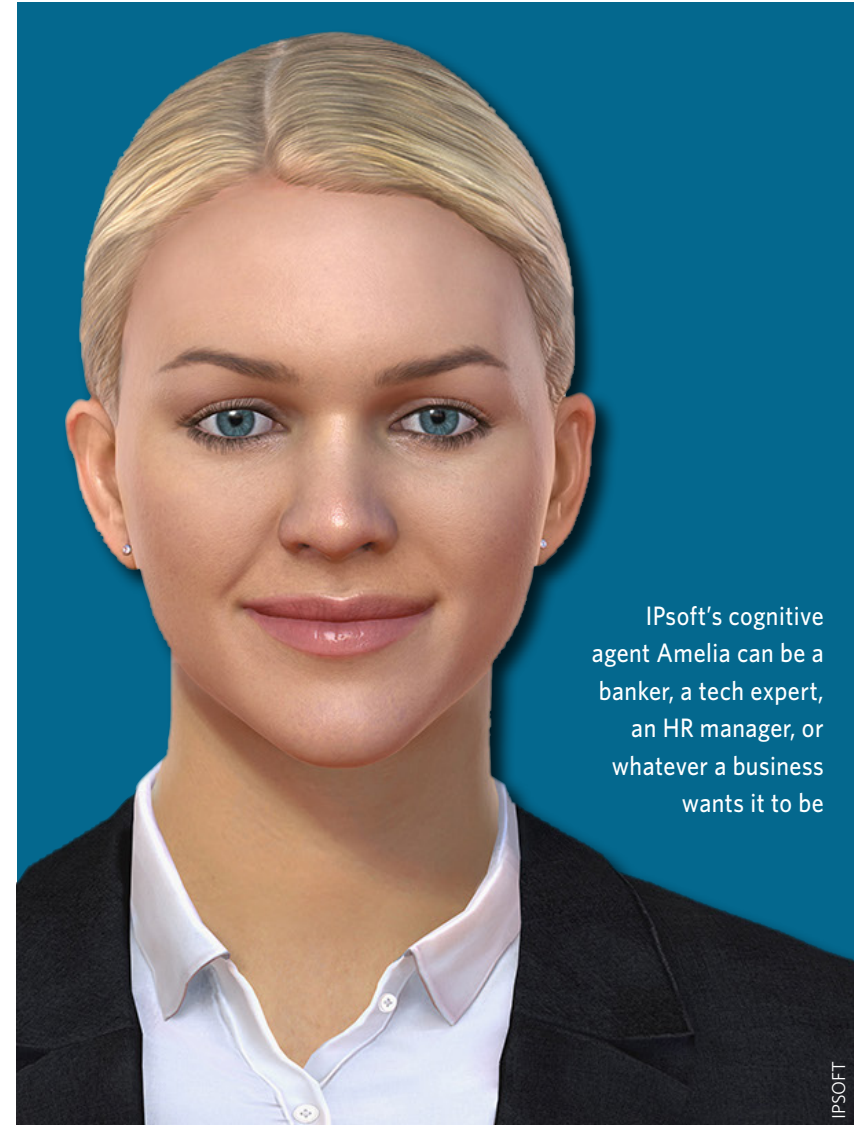
DIGITAL WORKERS WITH SUPERHUMAN ABILITIES

So the digital worker has arrived, and it is clearly more than an automated food-ordering bot. In a large enterprise, imagine a member of staff who can understand and communicate in many languages, turn his or her hand to HR requests and IT helpdesk alerts, working 24 hours a day in multiple locations. Simultaneously, the employee is undertaking an extensive programme of education just so he or she can do more for you.

This technology is available today through platform-based AI that can be trained to be used in whatever way the user wishes. It can never be human, but can make humans superhuman.

One example is IPsoft's cognitive agent Amelia, which can be a banker, a tech expert, an HR manager, or whatever a business wants it to be. The AI platform can now answer questions and solve problems ranging from technical issues to employees' holiday requests described to it in [natural language](#), whether it be verbally or through text. Imagine asking the system why the network has slowed down and being given the answer almost immediately - and an offer to fix it.

This is what Amelia offers, although it is usually the case that Amelia alerts the technician to the problem in the first place. Then, when it's fixed, the technician can ask Amelia to look at his or her diary and find a good time to take a couple of days off. Or Amelia can be a food-ordering interface if a fast-food chain wants to put AI at its front end.



IPsoft's cognitive agent Amelia can be a banker, a tech expert, an HR manager, or whatever a business wants it to be

IPSOFT

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It is the ability to understand natural language, combined with the ability to acquire and retain knowledge, that makes Amelia something like [HAL 9000](#) in the science fiction classic [2001: A Space Odyssey](#). Before going off-script, HAL was monitoring all spacecraft systems, as well as astronaut wellbeing, with communication through voice, and even taking food orders.

TIME AND COST SAVINGS ADD UP

This type of digital worker in enterprises holds the promise of cutting costs and improving productivity dramatically. Gartner predicts that in 2018, 500 million users will save two hours a day because of AI-powered tools. And the financial savings are unprecedented when it comes to automating the tasks of knowledge workers.

McKinsey estimates that the automation of knowledge work will enable the creation of between \$5.2tn and \$6.7tn globally in extra economic value. Bankers, wealth managers and healthcare specialists – not just personal assistants – are a few examples of the roles where chunks of work are being automated through AI. For example, a mortgage can be generated from an application in a matter of hours, rather than weeks, using AI tools that can automatically check what needs to be checked.

All this is clearly not lost on businesses and developers. According to the [McKinsey Global Institute](#), European

organisations spent between \$3bn and \$4bn on artificial intelligence in 2016, investment in North America reached \$23bn, and China spent even more.

[Chetan Dube, CEO of IPsoft and former professor at New York University](#), says: “Never before has a revolution of this magnitude hit the planet in just quantitative terms, not hyperbole. But is this hype, or is this real? Is this *Westworld* – is it science fiction?”

BANKERS, WEALTH MANAGERS AND HEALTHCARE SPECIALISTS ARE A FEW EXAMPLES OF THE ROLES WHERE CHUNKS OF WORK ARE BEING AUTOMATED THROUGH AI

AMELIA IN ACTION

At its annual Digital Workforce Summit this year, IPsoft and its customers gathered to answer some of these questions by sharing their experiences of creating and using Amelia. There was a long list of customers, including Spanish bank BBVA, the UN, insurance giant

AIG and mobile network operator Vodafone. And the attendance of leading scientists was evidence that today's businesses are using technology that was previously only found alongside brains in jars in the laboratories of the world's universities.

But it is no longer the case that you have to be highly technical or scientific to control and develop AI. Simply tell it what you want to be done and it will try to do it and learn from the experience, even if it needs human help to complete it the first time.

The ability to understand and respond to natural language is one of Amelia's selling points. Imagine Amazon's chatbot Alexa

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or Apple's Siri solving complex IT issues or completing important business processes, rather than turning the lights off or explaining Faraday's law of induction and then telling you the capital of the Turks and Caicos Islands.

But starting to use the technology will not be that simple. The accelerated pace of AI's development means it will be a big leap for organisations. But IPsoft's Dube says it is a leap that is less risky than holding back and waiting to see how your competitors do.

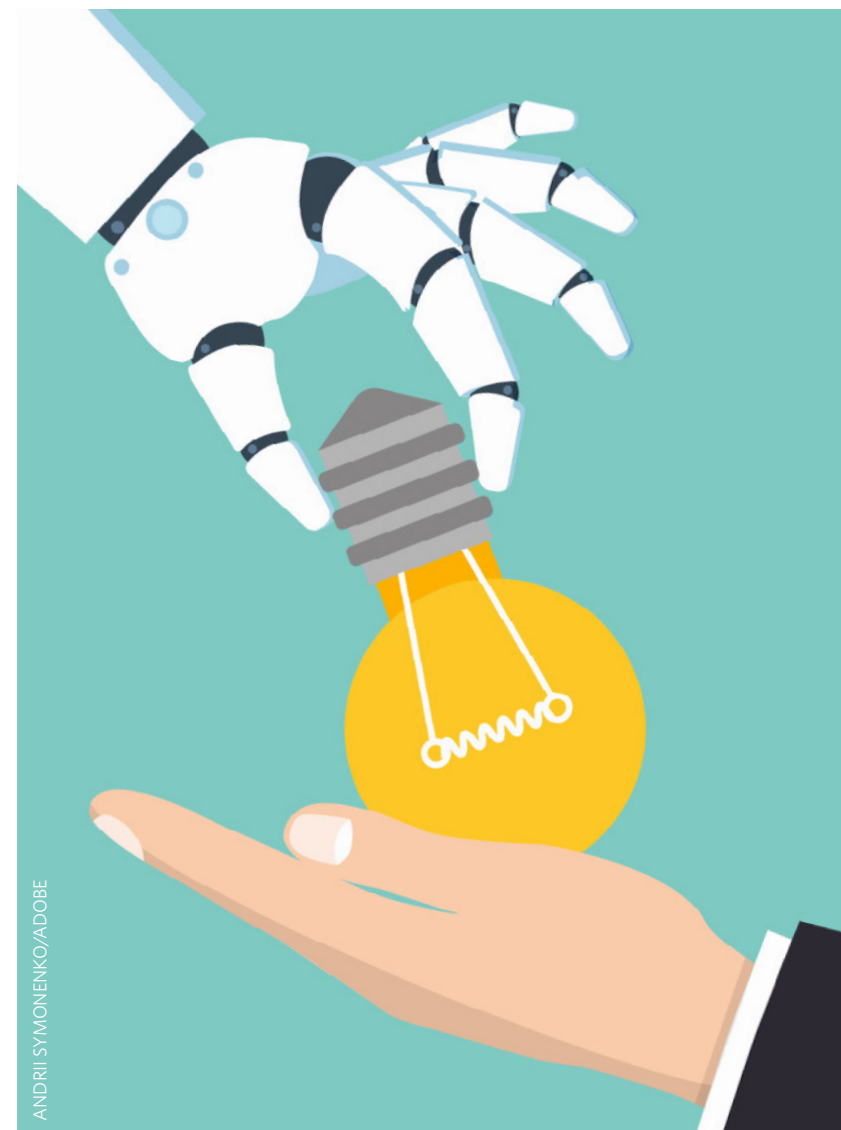
VODAFONE AND AMELIA

A couple of years ago, mobile network operator Vodafone began using Amelia to support its IT services desk. Speaking at the IPsoft summit, Karen Brunet, technology shared services director at Vodafone, said that after early success, the company had created a dedicated team to work with IPsoft to develop the technology further.

This requires a different approach to what many IT departments are used to because, unlike most software, AI does not require programming, but needs to be trained, she said.

Amelia is now available in seven of Vodafone's countries of operation, in three languages. Currently, 58% of contact to its IT services desk goes through Amelia.

"Right now, we have 20,000 chats with Amelia a month, and 53% of chats are completed by Amelia without any human intervention, and in the others, Amelia hands over to a human agent," said Brunet. "We believe that, in the next few months, we are going to increase this autonomy and think we will be closer to 65% completed by Amelia."



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For the business case, the company piloted the use of Amelia on four different journeys through the service desk. Brunet said users should focus the roll-out of this type of technology on high-volume processes: "If you don't have the volumes, you have a nice tech toy, but not the benefits to the business."

The company achieved a return on its investment in Amelia through savings in just 24 months, she said.

All the operations where Amelia was implemented were offshored already, so the impact on internal staff was minimal.

But this might not be the case for other businesses taking up the technology. IPsoft often refers to Amelia as the most human of AI platforms, but what about the humans currently occupying Amelia's future roles?

EFFECTS OF AI ON THE WORKFORCE

Speakers from the US financial industry took the stage to talk about their experiences with AI, and made no bones about its potential to replace people. Three speakers agreed that one-third of the average enterprise workforce could and should be cut immediately when AI is fully rolled out.

Although sentiment might be less severe in Europe, this is a clear direction of travel. In the IT sector, what happens in the US usually happens in the UK some time later. But the speakers said

they expected a further third of workers to benefit from learning to work with AI and expanding their own horizons, while the final third of staff were expected to have roles alongside the AI.

It is disruption of this type that means although AI is already "an unstoppable freight train", as one user at the IPsoft event described it, there is much for humans to learn and prepare for to smooth the coexistence of robots and people.

This is a challenge that IPsoft's Dube recognises: "On one side it's curing world hunger and cancer, and on the other side it's the dystopian final invention."

But the promise of AI creating many new jobs is a positive counter-argument. According to Gartner, by 2020, AI will create more jobs than it eliminates.

Humans have to train Amelia to work, after all, and by freeing up humankind from mundane tasks,

who knows what future roles will be needed? According to a US Department of Labor report, 65% of today's schoolchildren will eventually do jobs that don't yet exist, with software robots as colleagues doing the mundane work.

And coexisting with robots may soon go beyond interaction with software, if one of Dube's predictions is realised. By 2025, he says, people will walk past an android in the corridor at work and not realise it is not human. ■

ACCORDING TO A US DEPARTMENT OF LABOR REPORT, 65% OF TODAY'S SCHOOLCHILDREN WILL EVENTUALLY DO JOBS THAT DON'T YET EXIST, WITH SOFTWARE ROBOTS AS COLLEAGUES DOING THE MUNDANE WORK

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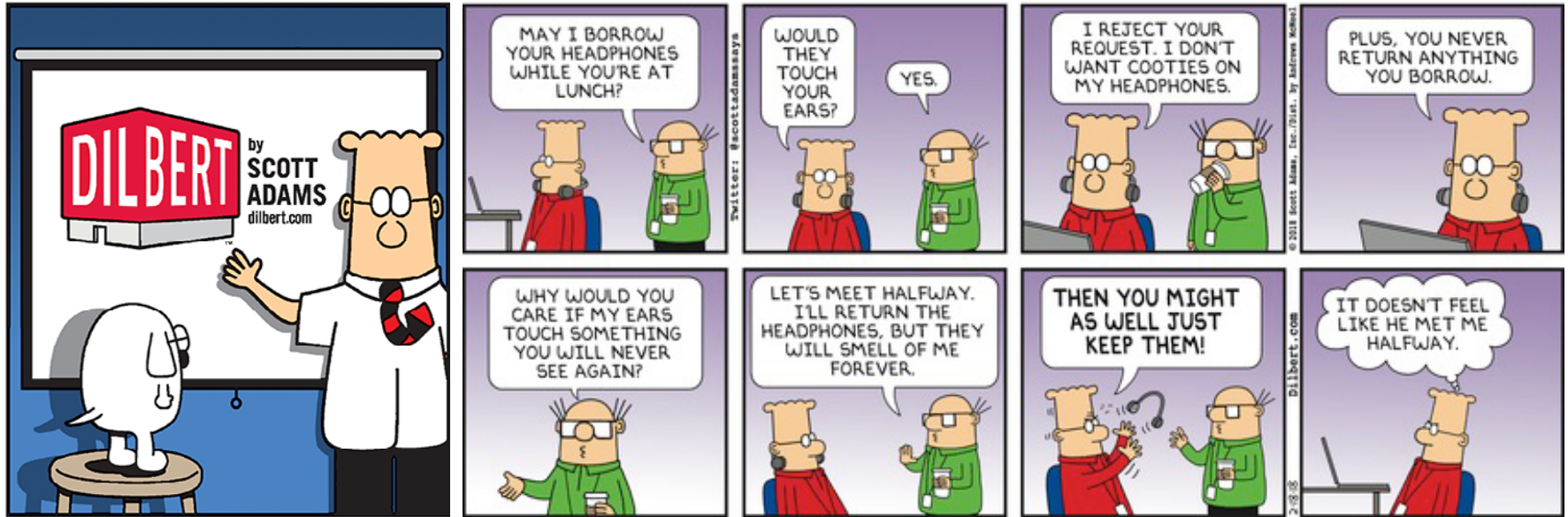
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Kuri curries favour but Bosch favours Currys

Bosch has forced startup firm Mayfield Robotics to [cancel the release of Kuri](#), a home robot that was all set to patrol your house and [rob your dog of its last shreds of dignity](#).

Could it be that Bosch took its cue from this apocalyptic heatwave and opted to focus on providing the UK's electrical retailers with more fridge freezers than our Brexit blood rations can fill? According to the statement, it simply realised Kuri wasn't "a business fit".

As with all these home robots, it looks like it was designed by someone from the 1950s, while also boasting the key selling point of filming what your dog gets up to while you're out and about.

Do you want to know what your dog gets up to while you're out and about? It pines for your return.

We're glad man's best friend has been spared – for now, at least – the sharp rebukes it would've got through the speaker of this creeping machine as its owner checked in from some garden centre to stop it licking its nuts on the settee.

Kuri's *raison d'être* was to lodge itself between you and your loyal, sentient pooch in the household hierarchy by dobbing it in for daring to indulge in its very finite list of pleasures. What a shame it's now being shipped back to a dark warehouse with all the other narks to be melted into a dishwasher door. ■

➤ [Read more on the Downtime blog](#)