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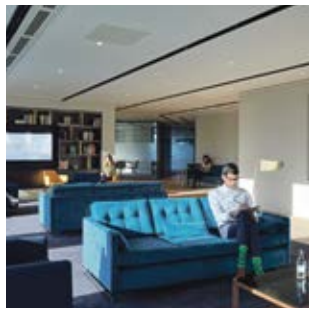

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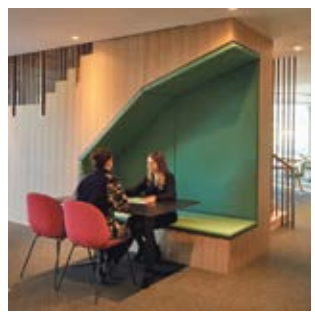

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COMPANY CULTURE

Breaking the business mould

Thinking differently and doing the seemingly impossible is the mindset of some of the world's most successful entrepreneurs

CHARLES ORTON-JONES

At a recent tech conference in Los Angeles, the esteemed chief technology officer of Teradata, a $2.3-billion revenue NYSE-listed data analytics company, held a press conference. Stephen Brobst is a guru in the data field and was independently ranked the number four CTO in America.

Looking spookily like the professor in *Back to the Future*, Brobst wore a hypnotically fluorescent orange and yellow Hawaiian shirt and scruffy trainers. A suave young journalist from the Italian newspaper *Corriere della Sera* was transfixed and asked: "Where did you get that shirt?" Brobst shrugged: "I don't own a suit. And I don't own shoes that aren't sneakers."

Try that look in Milan and you'll get long stares. But how's the Italian tech scene right now? The eccentricity of dress in California matches the level of innovation. Companies do what they want. There are no rules.

The rest of the world is catching up; you can define work how you want – there's no normal.

Last year legendary fund manager Neil Woodford axed bonuses at Woodford Investment Management. A radical move in a sector where bonuses are standard. His chief executive justified it thus: "There is little correlation between bonus and performance, and this is backed by widespread academic evidence." Staff received a pay rise instead. Was it the right move? Maybe. Maybe not. But Woodford is an original thinker. It's part of the reason investors trust him with their cash.

Elite companies routinely break the mould. Tesla Motors is perhaps the most exciting company in the world right now. It's the leader in driverless cars and is changing the way electric cars are viewed. This is a huge mission and the culture is set accordingly. Tesla identifies six rules: move fast; do the impossible; constantly innovate; reason from first principles; think like owners; and we are all in.

It's more than the usual corporate persiflage. Take rule two. When Tesla needed a new enterprise resource planning software system to run its entire operation, the IT team built their own from scratch in four months. It normally takes six months to install an imported one. Founder Elon Musk splits his time at Tesla with rocket company SpaceX and his hyperloop company which aims to shrink journey times from New York to Washington to 29 minutes. When he asks employees to do the impossible, he means it.

John Leyba/The Denver Post via Getty Images

Tesla is one innovative company breaking the mould

Rolls-Royce broke the mould when it switched from selling aircraft engines to an ongoing maintenance deal, with service included. Today all sorts of business have switched from sales to a service model, so called servitisation. Adobe did it with design software; it sells subscriptions, not a product. Spotify beat iTunes with the same model. Man Trucks did it with commercial vehicles.

Go behind the scenes at pretty any high-growth company and you'll find the same desire to re-engineer basic ideas.

Sandwich chain Pret A Manger grew faster than rivals thanks in part to a high-energy service culture. Pret wrote in granular detail the expected behaviours of staff. It listed 18 "Don't want to see" habits, including "agrees blandly with others", "becomes flustered when the heat is on" and "is just here for the money", plus a list of "Want to see" and "Pret perfect!" attributes such as "goes out of their way to be helpful" and "never gives up". Pret was criticised for the rigidity of these ideals. But the business built a 500-store empire and three quarters of a billion pounds in revenue, using the rule book.

Radical thinking doesn't have to be harsh. The winner of this year's *Sunday Times* Best Companies To Work For ranking was telecoms vendor 4Com that lovebombs employees, creating a cosy sense of family.

And there's no need to be whacky. Sometimes key workers simply want the ability to escape normal office life for a bit. BP and J.P. Morgan offer stressed execs access to The Clubhouse working space in Mayfair and the City. When they need to escape frantic office life it's a simple way to work differently for a while. Co-working space is perfect for startups. Why not for global enterprises too?

Experimentation is permitted. German fintech company FinanceFox adopted a flat management structure called a holacracy. Self-organising teams move fluidly from task to task. The boss Julian Teicke implemented it, raved about it, then ditched it after a year. Staff loathed it. But Teicke's instinct to play with new modes of business is why he's one of Germany's most successful entrepreneurs.

The king of original thinking was the Zen master of capitalism himself, Apple co-founder Steve Jobs. His biographer Walter Isaacson tells of Jobs' obsession with scrutinising every detail of the work environment. Jobs went to Japan in the 1980s and asked Sony chairman Akio Morita why staff wore uniforms. Morita explained after the war no one had smart clothes, so a uniform hid the fact.

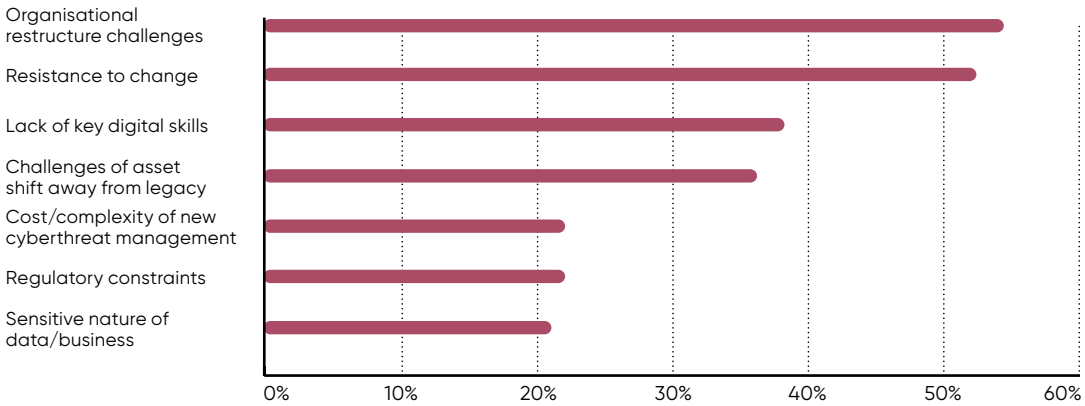
"I decided that I wanted that type of bonding for Apple," said Jobs. He got the designer Issey Miyake to create a uniform for Apple: "I came back with some samples and told everyone it would be great if we would all wear these vests. Oh man, did I get booed off the stage. Everybody hated the idea."

Jobs instead asked Miyake to produce a uniform for him alone. Miyake produced a black turtleneck, and Jobs purchased enough to last him for the rest of his life.

An amusing detail? Not at all. Jobs wanted to find new rules for every part of Apple, from stage presentations to font anti-aliasing. He invited us to "think different". We can. ●

BARRIERS TO FUTURE BUSINESS TRANSFORMATION

PERCENTAGE OF DIGITAL DECISION-MAKERS WHO SELECTED THE FOLLOWING AS OBSTACLES

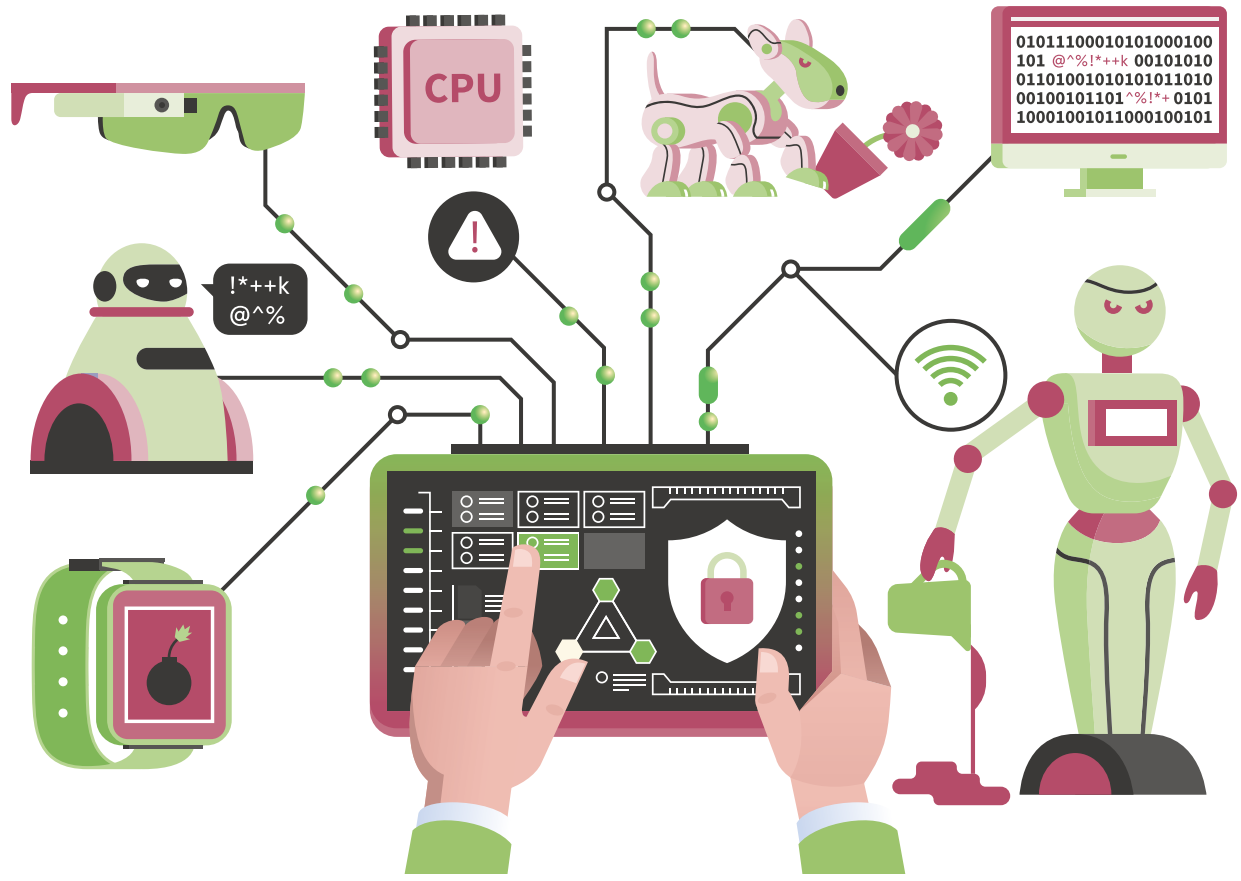


Harvey Business School 2017

POLICING THE ROBOTS

‘We have to keep the bots under control’

As artificially intelligent software robots, or bots, become faster learners and better at mimicking human behaviour, an augmented workplace is inevitable and poses ethical and policing challenges



HELEN BECKETT

At what point does a factory worker lose capacity because of a co-bot? What if a logistics artificial intelligence (AI) system is fooled by new data and makes a fatal error? What if board executives are duped by hostile chatbots and act on misinformation?

None of these instances of bot-gone-bad scenarios are science fiction fantasy. Don’t forget the Tesla driverless car that mistook a trailer for the sky, the racist Microsoft bot that learnt from bad examples and the chatbots that influenced the 2016 US presidential election. With 45 per cent of jobs forecast to be AI augmented by 2025, according to Oxford University research, alarmingly, policing the robots remains an afterthought.

> We need to build and engineer AI systems to be safe, reliable and ethical – up to now that has not happened

Alan Winfield, the only professor of robot ethics in the world, identifies the problem of technologies being introduced rapidly and incrementally, with ethics playing catch-up. “We need to build and engineer AI systems to be safe, reliable and ethical – up to now that has not happened,” he says. Professor Winfield is optimistic about workforce augmentation and proposes a black box with investigatory powers in the event of an AI catastrophe.

But not all AI is easy to police with some varieties more traceable than others, says Nils Lenke, board member of the German Research Institute for Artificial Intelligence, the world’s largest AI centre. Unlike traditional rules-based AI, which provides “intelligent” answers based on an ability to crunch mathematical formulae, learning algorithms based on neural networks can be opaque and impossible to reverse engineer, he explains.

Neural networks are self-organising in the quest to find patterns in unstructured data. The drawback, says Dr Lenke, is that it is impossible to say which neuron fired off another in a system composed of hundreds of thousands of connections learning from thousands of examples. “When an error occurs, it’s hard to trace it back to the designer, the owner or even the trainer of the system, who may have fed it erroneous examples,” he says.

Governments are beginning to tackle the complexities of policing AI and to address issues of traceability. The European Union General Data Protection Regulation, which comes into force in May 2018, will mandate that companies are able to explain how they reach algorithmic-based decisions. Earlier this year, the EU voted to legislate around non-traceable AI, including a proposal for an insurance system to cover shared liability by all parties.

More work is needed to create AI accountability, however, says Bertrand Liard, partner at global law firm White & Case, who predicts proving liability will get more difficult as technology advances faster than the law. “With [Google’s] DeepMind now creating an AI capable of imagination, businesses will soon face the challenge of whether AI can own or infringe intellectual property rights,” says Mr Liard.

In the meantime, an existing ethical gap that needs fixing now is the lack of regulation requiring companies to declare their use of bots or AI. If a chatbot gives a reasonable response online, there’s a natural assumption that we are communicating with a fellow human being. “Without an explicit warning, as recipients we have no opportunity to evaluate them and can become overwhelmed,” says Dr Lenke, who is also senior director of corporate research at Nuance Communications.

His concerns chime with the findings of a 2017 report, *Sex, Lies and AI*, by digital agency SYZYGY, which found high levels of anxiety about the undeclared conversational or video user interface. More than 85 per cent of respondents wanted AI to be regulated by a “*Blade Runner* rule”, making it illegal for chatbots and virtual assistants to conceal their identity. A cause for even greater concern, however, might be chatbots fronting an AI application capable of interpreting emotions.

Nathan Shedroff, an academic at the California College of Arts, warns the conversational user interface can be used to harvest such “affective data”, mining facial expressions or voice intonation for emotional insight. “There are research groups in the US that claim to be able to diagnose mental illness by analysing 45 seconds of video. Who owns that data and what becomes of it has entered the realm of science fiction,” he says.

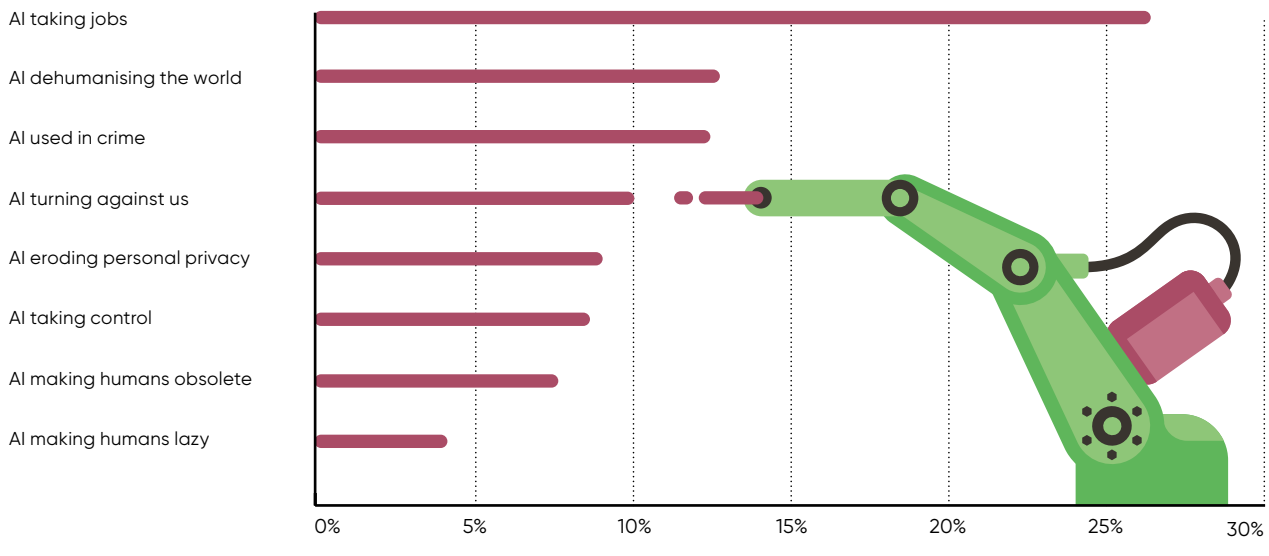
As executive director of Seed Vault, a not-for-profit fledgling platform launched to authenticate bots and build trust in AI, Professor Shedroff thinks transparency is a starting point. “Science fiction has for millennia anticipated the conversational bot, but what it didn’t foresee were surrounding issues of trust, advertising and privacy,” he says. “We are on the cusp of an era where everything is a bot conversation with a technical service behind it.”

Affective data harvested from employees could be used for nefarious and undercover purposes, says Professor Shedroff, who lists examples of employees inadvertently sharing affective data that collectively creates invaluable insider information and third-party suppliers collecting data they share or sell. GDPR (General Data Protection Regulation) does not cover affective data and companies are not aware or dealing with the threat. “We’re in new territory,” says Professor Shedroff.

> If social media giants deem it necessary to police their algorithms, it matters even more for high-stakes algorithms such as driverless cars or medicine

BIGGEST FEARS OF ARTIFICIAL INTELLIGENCE

UK CONSUMERS WERE ASKED ABOUT THEIR TOP FEAR OR CONCERN ABOUT POSSIBLE AI THREATS OR RISKS



Sex, Lies and AI, SYZYGY 2017

While legislators and regulators crank up, businesses such as Wealth Wizards are not putting competitive advantage on hold. The online pension advice provider uses AI and plans to use chatbots, but complies with the Financial Conduct Authority, says chief technology officer Peet Denny. "Basically, anything that is required of a human we apply to our AI tools. It's not designed for AI, but it's a start," he says.

In the absence of AI regulation and laws, a plausible approach advocated by UK Innovation charity Nesta is to hire employees to police the bots. In recent months tech giant Facebook has started to do exactly that, recruiting thousands of staff. "If social media giants deem it necessary to police their algorithms, it matters even more for high-stakes algorithms such as driverless cars or medicine," says Nesta's chief executive Geoff Mulgan.

An industry that has used robots for decades and is now embracing cobots is perhaps the best role model of how we should treat autonomous systems. Manufacturers are installing more intelligent robots on the factory floor and Ian Joesbury, director at Vendigital, anticipates a mixed workforce in the future. "Skilled technicians will work alongside a cobot that does the heavy lifting and quality assurance," he says.

Manufacturers are reviewing human resources practices in a new situation where a human works alongside a robot that never tires, Mr Joesbury adds. But the sector's policing of current generation robots provides a graphical warning of how we should respect future AI. "Robots can be unpredictable in the way they respond to instructions," he says. "You often see them caged on factory floors so they can't hurt the human workers.".

INSIGHT

BLACK BOX AND OTHER POLICING STANDARDS

Professor Alan Winfield, robot ethicist at the University of the West of England, has a background in safety-critical systems and believes artificial intelligence (AI) has much to learn from the sector.

In particular, he advocates the black box approach used by the aviation industry for investigating plane crashes. "It benefits everyone, including the AI industry, if services are tested and comply with a standard, and there is a mandated investigative procedure," he says.

At the moment, driverless car companies do log data that is collected, primarily to improve assistance, notes Professor Winfield. But the logging of data is not mandated by governments in the way that flight data recording is legally required. In an air accident, the operator or manufacturer of the aircraft is legally obliged to hand over contents of the black box. "None of those things apply right now in driverless cars or other robots," says Professor Winfield.

Ultimately, in the event of a disaster, humans are responsible agents and cannot hide behind algorithms, he says. "If someone is killed, you can't stand up in a court of law and say 'it is the algorithm'. If algorithms have consequences that cause harm, it is the humans who are responsible," says Professor Winfield. "All AI should have a robot equivalent of flight data recorder."

Nesta, the UK innovation charity, also believes an immature AI industry can learn from high-risk sectors which are effectively regulated. Two years ago, it proposed a human, regulatory institution, a Machine Intelligence Commission. "The field of human fertilisation has to work within an ethical framework to gain public support and has done a good job," says Nesta's chief executive Geoff Mulgan.

The British Standards Institute is also playing its part in ensuring safe AI and last year published BS 8611, the only ethical standard to date for AI design. Although voluntary, a standard makes a valuable contribution, says BSI head of market development Dan Palmer. "Unlike regulation, a standard is a living document that can be amended to respond to concerns or catastrophe," he says. "BS 8611 has attracted interest around the world."

COMMERCIAL FEATURE

Empowering employees for better customer experience

Nick Nonini, managing director, Europe, Middle East and Africa, at Verint Systems, tells how to empower a remote and flexible workforce to meet the needs of the always-on customer

The fourth industrial revolution, industry 4.0 – call it what you will, the workplace and all those within it are in the midst of the biggest revolution since the industrial age.

An emerging consequence of this is demand for remote and flexible working, and the hours and the type of work required, peaking dramatically over the last few years. In the UK alone the number of home-workers has gone up by nearly a quarter of a million in the last decade and 87 per cent of permanent full-time workers either currently work flexibly or want to. Few millennials or generation 2020 see their career comprising a job for life.

These are factors visionary organisations recognise as too important to ignore and particularly in a business world where competition on price is itself now competing more than ever with profit margin pressures alongside the need to capture and retain the best talent. Factors that are keeping 77 per cent of chief executives awake at night.

An additional factor senior managers are wrestling with is the need to balance these emerging resource demands against an increasing need to keep delivering the best possible customer experience and outcomes. More often than not, this must be delivered on a 24/7 basis and across an increasing number of channels, each of which demands increased consumer expectation in terms of time to decision and response.

The always-on consumer, with a wealth of communication channels at their fingertips, is less forgiving and more demanding than their analogue predecessors and certainly more prepared to jump to social media to communicate to the world where outcomes are not as desired. In parallel, the same cohort is ready to socialise a good experience, albeit perhaps not with the same vigour if they receive a positive service outcome.

> The combined solutions of eg and Verint empower employees and enhance workforce effectiveness by capitalising on the capability and availability of staff, while enabling a more engaged and empowered approach to customer service delivery

77% of chief executives are kept awake at night by factors such as capturing and retaining the best talent

87% of permanent full-time workers either currently work flexibly or want to

Statistics show that businesses that successfully meet these demands and provide a positive customer experience grow revenue faster than customer experience laggards, drive higher brand preference and, in doing so, improve retention levels and possibly also influence margin.

So how do organisations deliver required outcomes while meeting their employees' needs for remote and flexible working? These two objectives need not be mutually exclusive, provided businesses optimise operational processes, promote customer-centric behaviours and culture, and also invest in the right technology to utilise and focus employee effort to meet customer demands.

Remote workers and employees working flexible hours are now able to play an increased role in servicing the always-on customer and contributing to the overall customer experience.

An important first step is for businesses to evolve from traditional command-and-control tactics, and embrace a more collaborative way of working, centred on the end-to-end customer interaction, ensuring the relevant skills and capabilities reside within an empowered workforce.

A second key step is to invest in the ability to forecast accurately and utilise these skills and capabilities to allocate work to the workforce efficiently and effectively, regardless of physical location or time zone. This must coincide with the ability to monitor resource activity and utilisation fully, and importantly be able to evidence quality and compliance. Having this complete view of all capability within and across customer operations is no longer an operational luxury.

Managers need a comprehensive view of the workloads and subsequent performance of their teams. They need intraday and predictive analytics, alerts and performance notifications embedded within solutions that let them know where both latency and surplus resource exist before things go wrong. And they need this detail in real time.

Processes span what have traditionally been labelled front and back office. Providing real-time insight into these operations and forecasting of the workload should allow processes to be better optimised so resources can be allocated to deliver on the customer outcome, blending front and back office to service the customer best. Research from McKinsey suggests that companies doing this are achieving up to 50 per cent increases in efficiency in some back-office functions.

This is precisely why Verint has invested in enterprise workforce software by acquiring eg solutions, a pioneering back-office workforce optimisation software group. With solutions from Verint and eg, businesses can benefit from managing work, people and processes across the enterprise regardless of location, time zone or device.

The combined solutions of eg and Verint empower employees and enhance workforce effectiveness by capitalising on the capability and availability of staff, while enabling a more engaged and empowered approach to customer service delivery.

In a world where both customers and talent have high expectations, and their engagement and satisfaction defines a sustainable competitive advantage, successful organisations are those that will make the latter work to support the former. By investing in the right infrastructure, processes and culture to build a more collaborative and flexible workplace, businesses can strike the right balance to cement their place as a market leader.

For more information please visit www.verint.com

SIDE-HUSTLING

Something on the side keeps it interesting

Starting up a part-time business in their spare time is catching on among employees, but could have consequences for employers

CATH EVERETT

The side-hustle phenomenon, whether you have heard of it or not, appears to be on the rise in workplaces around the world.

According to research by GoDaddy, as many as one in five UK workers are likely to go down this route over the next two years, while a study by Bankrate reveals that a massive 44 million US employees are already at it.

But what does the term, which originated in the United States and is relatively new to the UK, actually mean? It refers to a growing trend among employees to start up personal enterprises or microbusinesses in their spare time, outside their employer's normal working hours.

> It is quite different in focus to the traditional temp trying to make it as an actor

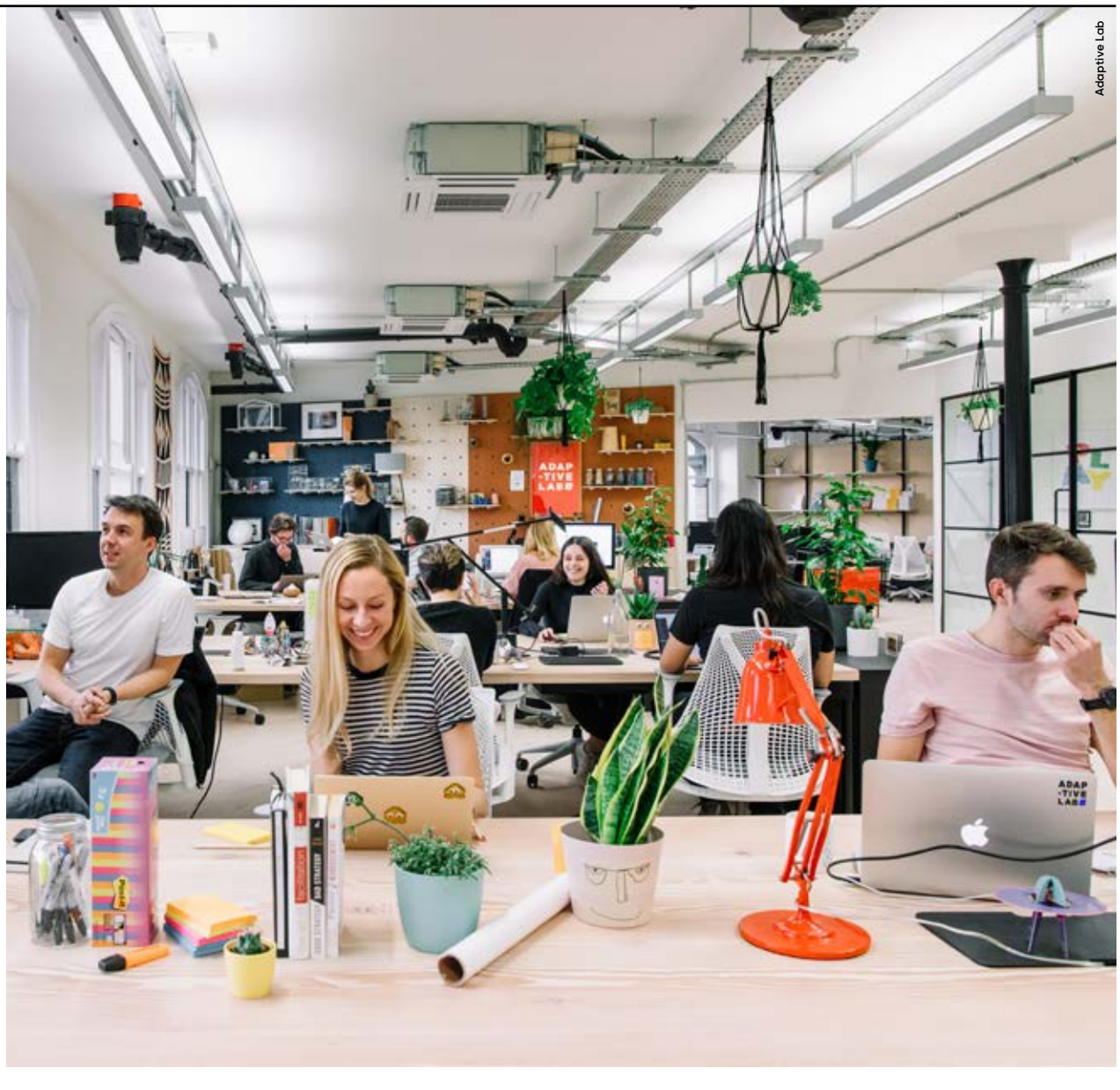
While some people undoubtedly do so to generate extra cash, a significant 45 per cent of those questioned by GoDaddy said they side-hustled to pursue their passion or hobby. While some were trying out new business ideas to test the water, others were seeking to achieve a balance between security and fulfilling a creative impulse that would not necessarily pay.

The phenomenon, which is linked to an increasing shift towards gig working, when people freelance or are on short-term contracts, and portfolio working, when they handle a number of projects for different organisations and/or switch careers at various times throughout their working life, is clearly part of a wider generational move towards more flexible ways of operating. But it is also quite different in focus to the traditional temp trying to make it as an actor, for example.

Emily Bain, founding director of recruitment consultancy Bain & Gray, explains: "While career temps just want to pay the rent, 'slashies' are keen to fulfil their creative passion and make beautiful things in the evenings that, due to today's technology, take just minutes to market and sell."

Slashies are generally defined as young creatives who refuse to be defined by their day job and list all their side-hustles in their professional title, such as graphic designer, vlogger, candle-maker and so on. This approach started taking off as little as a couple of years ago, says Ms Bain, but the demographic now makes up between 5 and 10 per cent of her temp desk.

The fact that many employers are unaware of such concepts is perhaps unsurprising though. GoDaddy's research indicates that 45 per cent of UK workers with a side-hustle have chosen not to inform their managers due to fear over their reaction, while 54 per cent of prospective side-hustlers agree they would be equally circumspect and there are certainly challenges from an employer's perspective.



Adaptive Lab

Adaptive Lab, a design consultancy based in London, has experienced benefits to productivity since introducing a formal policy on side-hustling

On the one hand, there is the obvious concern that an individual will be too tired or not committed enough to focus on their day job, or even that they might leave should their side-hustle take off. But there are also legal issues to consider, says Phil Allen, partner in employment law at Weightmans.

He points to the European Working Time Regulations, which mean that no one is allowed to work for more than 48 hours a week unless they sign an opt-out. The problem here centres on the fact that "if I know an employee is doing other work that takes them over the 48 hour total, I am in breach of the regulations and have to take reasonable steps to remedy the situation", Mr Allen says.

> Some organisations introduce clauses to prevent employees from undertaking second jobs

If staff members keep their activities secret or lie, however, employers are not liable. Although the issue may not be widely understood, it does explain why some organisations introduce clauses to prevent employees from undertaking second jobs.

As flexible working in all its forms becomes increasingly common over the next five years though, Sir Cary Cooper, professor of organisational psychology and health at the Alliance Manchester Business School, believes it makes sense for companies to embrace rather than block change, which is likely to happen anyway.

"The majority of employees won't want to side-hustle in the short term at least, but employers shouldn't just turn a blind eye to the situation," he says. "They need to think about it and take a positive approach. The psychological contract between employers and employees involves both sides getting something out of the situation, so it's better for everyone to be transparent, open and upfront."

1in5

British workers are likely to start a side-hustle alongside their full-time job in the next two years

GoDaddy 2017

CASE STUDY

ADAPTIVE LAB

Adaptive Lab introduced a formal policy on side-hustling some 18 months ago in a bid to attract and retain the best talent.

The design consultancy had been keen to take on a couple of freelancers for permanent positions, but the designers' initial preference was to remain as gig workers due to the flexibility afforded by the approach. As a result, Adaptive Lab offered them employment contracts that included express permission to side-hustle and over time the perk was extended to the rest of the company's 50-strong team.

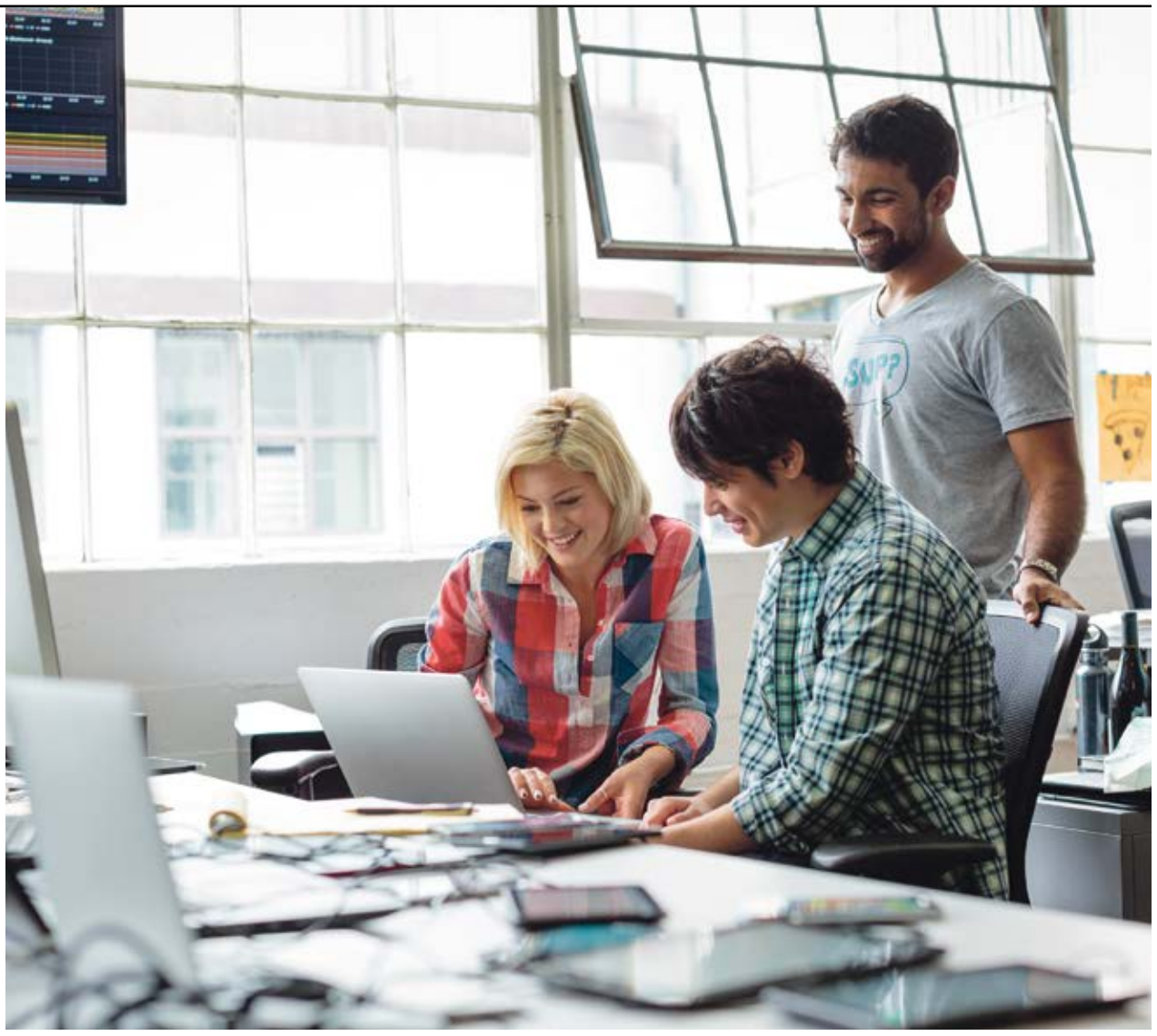
Now about half take advantage of this broad-based flexible working policy. Examples of employee side-hustles include a designer, who co-founded their own magic school and works for Adaptive four days a week, and a strategist who runs an antipodean food business and takes chunks of unpaid time-off during the year.

Kayleigh Smart, the company's talent lead, says the move has had a marked impact on how Adaptive Lab is perceived both internally and externally. "Employee happiness directly influences productivity, so it's important not only in terms of their day-to-day experience, but also in relation to our external employer brand," she says. "We've also realised that doing things outside expands people's skillsets and so the two worlds feed into each other."

COMMERCIAL FEATURE

The new workplace has frictionless productivity

Many businesses impose workplace collaboration technology on their staff and wonder why adoption levels are poor. Those seeing success are developing a better understanding of employees' needs to enable effective working



Hewlett Packard Enterprise

Digital disruption is affecting us all, driven by the pace of advances in consumer devices and it means every business must transform its workplace technology. When organisations get transformation right, the benefits are huge, including increased productivity, improved employee satisfaction and more profit.

Yet many businesses struggle. Every company knows that products and services will not sell if the customer's needs are misunderstood. This same concept must be applied when introducing technology into the workplace and all too often the customer, in this case the employee, is ignored; their needs and drivers are not understood, and change is forced upon them.

The predictable result is low adoption rates, reputational damage to IT and employee frustration. In this fast-paced world, IT needs to be driving value back into the business, innovating and enabling employees to work without barriers.

The first step to improving workplace tech is an examination of what users actually need. "Often we find the biggest challenges users face are simple daily tasks, like securely sharing files and working efficiently in teams," says Peter Mansell, director of intelligent workplace at HPE, which helps companies improve in this area.

"A lot of firms have multiple conflicting tool sets that their staff don't use or don't understand. This is a big problem because staff are choosing other systems that are not safe or secure."

During interviews and workshops to find out what staff need, people complain that it is hard to find information and share it securely, Mr Mansell notes. Often, even if the right tools are in place, they are not used properly due to poor employee engagement.

In any major change, working closely with people and hearing their needs is essential. One of HPE's most successful recent projects won HSBC the strategic transformation prize at The Banker Technology Projects of the Year Awards 2017. According to The Banker: "The scale, depth and breadth of HSBC's strategic transformation programme were the reason it took home the award. The UK bank's Mercury project aimed to deliver a set of innovative technology tools and capabilities to transform how 235,000 employees connect, communicate and collaborate in 4,000 offices around the world."

> The goal is frictionless productivity, so employees are able to work through daily tasks without technology blocking the way

Given that companies' most significant ongoing investment will be their staff, unlocking the ability to work is essential. The goal is frictionless productivity, so employees are able to work through daily tasks without technology blocking the way.

Frictionless productivity also offers organisations the ability to attract and retain talent. "Companies have to look at the whole digital and physical picture of the workplace. They can have the most beautiful, airy and open environment, but without the right tools for staff, which are simple and mirror their intuitive consumer experience, the job will become painful, and it quickly becomes hard to retain staff," says Mr Mansell.

A practical example of frictionless productivity includes a mobile sales executive, who is out most of the day meeting clients. That person may need to dial into a conference call from their car or look up prospect information when arriving at their destination. During the meeting, they will need to show information on-screen and later they may log in from a coffee shop to update colleagues. Technology needs to enable these functions so the sales executive can spend the maximum amount of time with customers.

Two forms of technology can aid companies in their change. Firstly, cloud-based environments such as Microsoft Office 365 give firms the ability to innovate regularly and have up-to-date, smart apps without the burden of managing complex infrastructure.

Then there is the increasingly common adoption of artificial intelligence (AI) bots, which can enable staff to complete repetitive tasks, across multiple systems, from a single chat application.

Mr Mansell explains: "Built on frameworks, AI can help with these daily tasks, ranging from booking meetings and looking up addresses, to querying purchase orders. Businesses can even draw out the right information from customer relationship management systems to see the status of a customer or project and update people about transport issues as they travel to meetings."

None of this can work without executive buy-in. "Unless leaders believe that these changes are a force for good, then it will be challenging to succeed," says Mr Mansell. "But in a culture where there is the ambition to learn from mistakes and constantly improve, there is strong benefit."

Employee engagement is essential because, while deploying technology is relatively methodical, making sure people use it is harder. As Cushing Anderson, a programme vice president at analyst house IDC, explains: "It's not just a fast chip that makes the tech work, it's a culture of adoption that makes the change work."

> It's not just a fast chip that makes the tech work, it's a culture of adoption that makes the change work

Highlighting the culture required, he adds: "Using a project management methodology has about a 60 per cent chance of meeting expectations, whereas not using it has about a 50 per cent chance of meeting expectations. Combining project management methodology with a strong management of change culture increases success to 70 per cent."

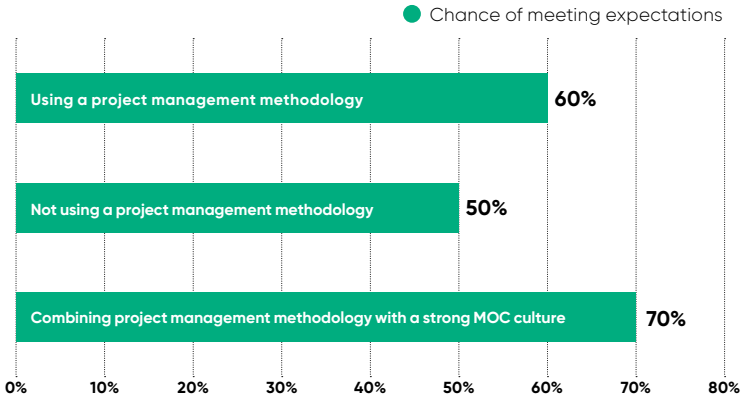
It is important to understand the different styles people have and how they develop. Some like to learn with videos, others via communities on the intranet, some like support groups and others prefer to talk on the phone. Businesses need to be prepared to provide support as needed.

As employees see the changes bringing about frictionless productivity, there is the potential for broader improvement. While companies will always face some resistance to change, Hannah Moyo, education and change management lead at HPE, notes: "Once a number of different people are visibly benefiting, the fear of missing out is a very powerful motivator in other peoples' eyes."

Ms Moyo adds: "We are firm believers that stories from real-life business users are the most powerful tool you have to increase adoption. Once you have some successes, perhaps a team has reduced its costs or another has automated a manual process, you can learn how they did it and create a productivity-win story. These success stories are surprisingly powerful in encouraging effective change."

To find out how your business can understand employees' needs and unlock true frictionless productivity please visit www.hpe.com/uk/en/services/consulting/mobility-workplace

PROJECT MANAGEMENT



Cushing Anderson, program vice president Project-based services, IDC

MILLENNIALLY MINDED

What a younger generation thinks about working life in the future

88%
of millennials prefer the simplicity of one full-time job to multiple part-time jobs

Qualtrics 2017

75%
of working millennials are currently in full-time jobs

50%
are open to non-traditional forms of employment in the future

ManpowerGroup 2016

75%
would like to start or increase opportunities to work from home or remotely

77%
believe they have total or a large degree of control over their future career paths

Deloitte 2017

WHAT MILLENNIALS THINK ABOUT AUTOMATION'S IMPACT ON THE FUTURE OF WORK

PERCENTAGE OF MILLENNIAL EMPLOYEES WHO BELIEVE THE FOLLOWING WILL IMPROVE OR GET WORSE

Deloitte 2017

CHANGING W

GLOBAL SURVEY OF 19

Full time
Part time
Freelance/ contract
Self-employed
Casual
Seasonal
Gig worker
Portfolio career (two or more jobs)

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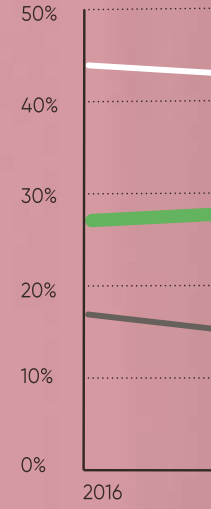
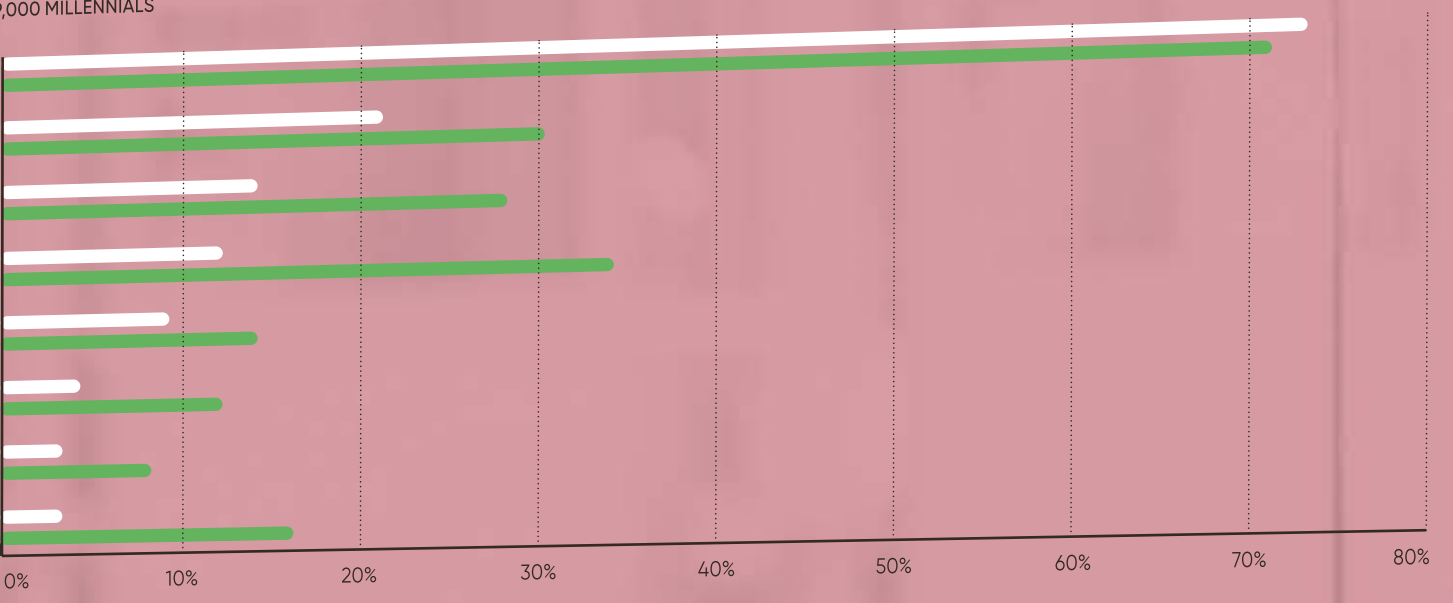
PERCENTAGE OF MILL



AYS OF WORKING

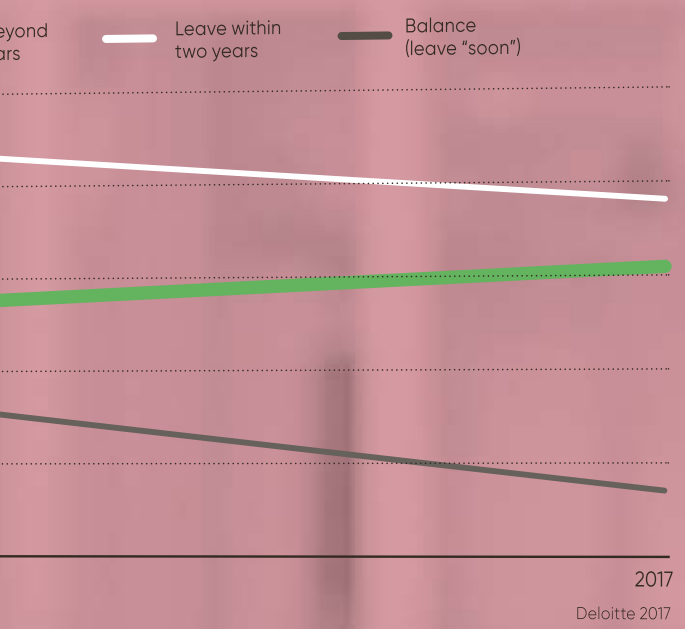
,000 MILLENNIALS



ManpowerGroup 2016

PROVING

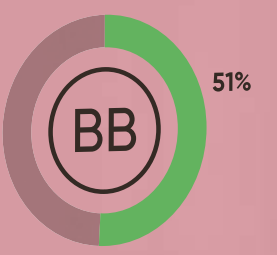
LENNIAL EMPLOYEES WHO EXPECT TO...



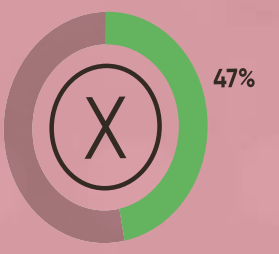
Deloitte 2017

PAY IS INCREASINGLY LESS IMPORTANT FOR YOUNGER GENERATIONS

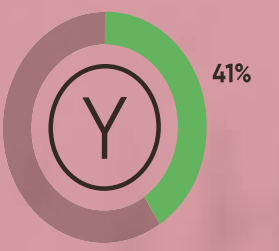
PERCENTAGE OF EMPLOYEES WHO SAID PAY WAS IMPORTANT WHEN CONSIDERING WHETHER TO ACCEPT A NEW JOB



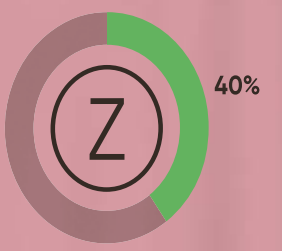
Baby boomers



Generation X



Generation Y



Generation Z

Hays 2017

INCREASED LEISURE

Will there be money to enjoy leisure time?

As robots and algorithms take more jobs, will enforced leisure be matched by sustained living standards?

OLIVER BALCH

It wasn't supposed to be this way. In 1930, the economist John Maynard Keynes predicted we'd all be enjoying lives of unparalleled leisure by now, occasionally popping into the office between rounds of golf and sunny mornings on the allotment.

The premise of Keynes' prediction was the speed of mechanisation. Fewer hands on the factory floor would mean more free time for workers. Yet, the modern era simply sees us cramming more work into the same nine-to-five day as always.

But could that be about to change? Such is the promise of the latest generation of automated technologies and self-learning machines. According to a report by independent UK research group, the Autonomy Institute, close to a third of UK jobs could be automated by 2030s, leading some to talk seriously of a post-work society.

The prospect of a better work-life balance certainly fits with the spirit of the times. Research by Timewise, a consultancy and recruitment firm, shows nearly nine in ten full-time employees say they either work flexibly already or that they would like to.

> For those on low incomes to be able to afford more leisure time, then either their wages need to go up or state welfare needs to increase

More time for leisure or study is at the heart of this desire for flexible working among almost a third of UK workers, says Daniela Marchesi, the firm's campaign director.

"The demand for flexible working is huge," she observes. "Our research busts the 'mum myth' too, showing that the desire [for a better work-life balance] is equally as strong in men, and that generation Y – those between 18 and 25 – are leading the charge."

Extra leisure time isn't just a potential boon for the overworked. It's also a chance to make today's workplace more equitable, with the underemployed and unemployed gaining a fairer slice of working hours on offer.

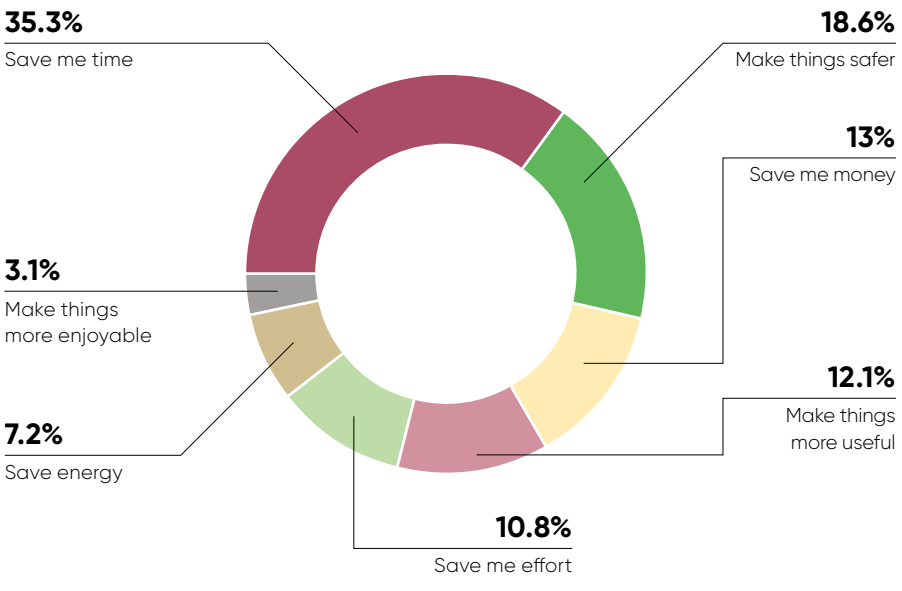
"By reducing the working week, we could see a fairer distribution of labour across society so that work is not thought of as being overbearing or, at the other end of the scale, a rare and precarious commodity," argues Kyle Lewis, the Autonomy Institute's spokesperson.

British workers shouldn't give up on the dreams of a shorter working week just yet though. The impact of self-learning machines, artificial intelligence and similarly incipient technologies on working patterns is only just beginning to be felt. Be patient, says Geraint Johnes, professor of economics at Lancaster University and research director at The Work Foundation.

Rawpixel/Unsplash

BIGGEST OPPORTUNITIES FROM ARTIFICIAL INTELLIGENCE

UK CONSUMERS WERE ASKED TO PREDICT THE MAIN BENEFITS OF AI TO THEM PERSONALLY



Sex, Lies and AI, SYZYGY 2017

To date, the rise of the robots has been felt mainly in manufacturing industries. The service economy, in contrast, which employs four in every five British workers, is expected to be far less impacted.

But come the robot-inspired leisure revolution, it eventually will, Professor Johnes insists. The key question for him is how evenly spread it will be. He cites jobs such as lorry driving, which could be decimated by autonomous transport, pushing truckers into what he euphemistically refers to as "enforced leisure".

"If we want to take advantage of the opportunities that machines give us to have more leisure then the ideal would be to have a fairly even distribution of the benefits," he argues.

Such a fair distribution will almost certainly require government intervention of some kind. If people are to work fewer hours per week, then their incomes will drop. For those on low incomes to be able to afford more leisure time, then either their wages need to go up or state welfare needs to increase.

But challenges can be found at the higher end of the income spectrum as well. There needs to be a cultural shift in how we think about work and the status we afford it, says Anna Coote, head of social policy at the New Economics Foundation. She singles out for particular attention the cult of hard work and long hours, buttressed by the pervasive notion that "we are what we do".

As she says: "It's not that hard work isn't good. Lots of people enjoy working hard. But work isn't the only thing in life. We need to reclaim all the things we do when we're not doing paid work, like friendships and caring for others."

Note, she doesn't say, "like jetting around the world". In modern times, leisure has increasingly morphed into an act of consumption. Once, all a rambler needed was an old pair of boots and a stretch of nearby countryside; rebranded hikers, now they are not equipped without a full Gortex wardrobe and regular trips to far-away trails.

> A life of more leisure depends on a host of cultural, political and employment factors

"Some hobbies can turn into a really very expensive and energy-intensive way of living," Ms Coote says. "This may be affordable for those with the extra time, but it's not sustainable if we're to have the kind of planet we want for our grandchildren."

Will Stronge echoes the need to rethink ideas of leisure as well as work. The term leisure is often misconstrued in modern society, interpreted as a synonym for being idle, says Mr Stronge, also of the Autonomy Institute.

The truth is far from it, however. Many people have very precise ideas about how they would productively invest any extra time their jobs might allow, often showing a willingness to invest the kind of effort and determination they demonstrate at work, if not more.

"In a society where people could sustainably reduce their working hours, we would start to see individuals developing in fascinating, unforeseen ways, making use of their new free time as they see fit," Mr Stronge says.

Automated technologies have huge time-saving potential, but a life of more leisure also depends on a host of cultural, political and employment factors. The ideal situation would be for people to elect for themselves how hard they wish to work. The ability to choose, after all, remains one of the defining lines between man and machine, however smart the latter may become.

COMMERCIAL FEATURE

Fora collaborates with MIT on the art and science of workspaces

Collaboration is a cornerstone of business success, and a workspace that supports a culture of close co-operation and the free flow of creative ideas plays a crucial part in this

FORA

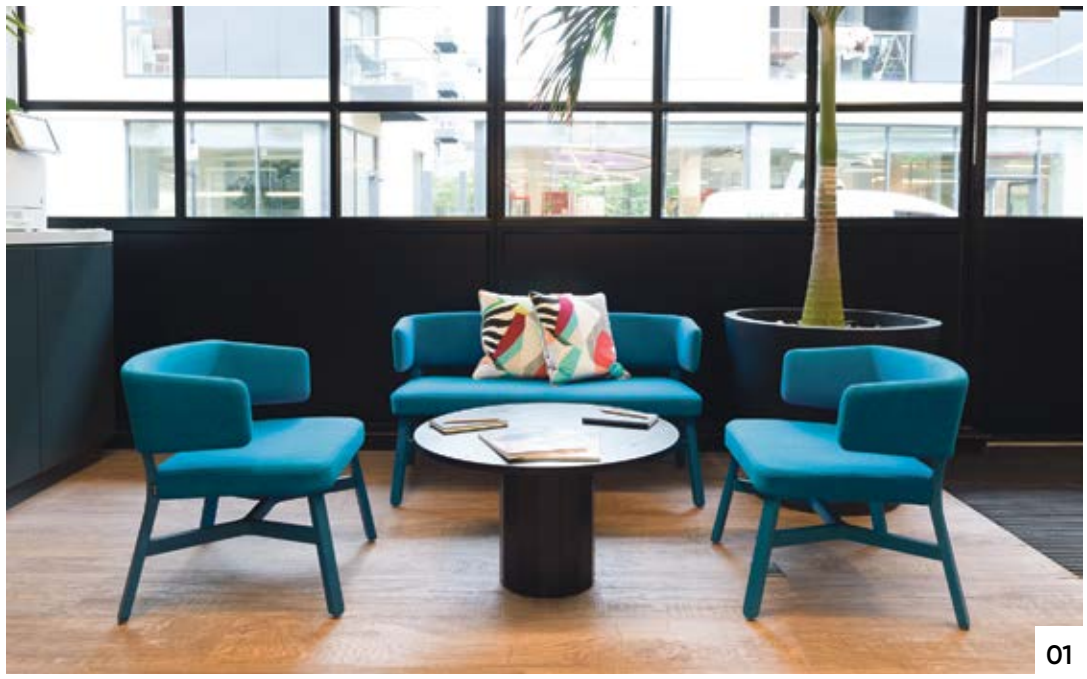
What constitutes an optimised collaborative working environment is a question that companies have been asking for years and one that London-based workspace company Fora is close to finding the answer.

Chief executive Enrico Sanna says: "We know that collaboration is part art, part science. My co-founder and I have the arts experience, from our backgrounds in hospitality and culture, and now we are calling on external experts to gain a better understanding of the science element."

In partnership with MIT, the pre-eminent Massachusetts Institute of Technology and Mr Sanna's alma mater, Fora has just embarked on a project to study the science behind the principle of a shared workspace as an environment that stimulates and encourages creativity and innovation.

Mr Sanna says: "As an institution, MIT has created some amazing companies, including Dropbox, BuzzFeed and Bose. We are investing in high-level scientific research to explore the science behind the way people collaborate. It is something that is so important for businesses and at Fora we want to fully comprehend the best way to facilitate this.

"People like to come together in different ways. Some people do it naturally, but some won't. Then there are people who need help in making that connection, which might involve the use of digital technology, because they are more comfortable using chat rooms or social media. Other people prefer to do it in person. It is a complex subject that requires a multi-pronged approach to enhance the way that people collaborate."



01

02

01
Breakout spaces designed to foster collaboration

02
A variety of social spaces serve a culture of communication

03
Fora residents Stuart Delivery within their "OwnedOffice" space

03

As a workspace provider, Fora has already differentiated itself from others in the sector through the provision of its hotel-style hospitality and offerings. These feature innovative technology, including white noise speakers to muffle sound, considered design with plenty of breakout lounges, and high-quality facilities, including showers and a wellness studio. In addition, there are curated programmes of events, with a focus on continuous learning to encourage self-improvement, alongside social meetings to stimulate collaboration.

"It's about understanding your audience," says Mr Sanna. "The Fora buildings are of a certain size to create an optimum environment for collaboration. We have seven differently sized and designed settings in this one building that you can work from. You might be sitting on a couch in a workspace and suddenly strike up a conversation with the person sitting next to you, and you might find you are dealing with the same issues. That's when the magic happens and the collaboration begins."

Mr Sanna, who previously managed the Las Vegas Cosmopolitan Hotel, and his co-founder Katrina Larkin, who co-founded lifestyle brand The Big Chill Festival and bars, have the experience to know how to bring people together, create the right environment and remove any barriers so people feel as though they belong. Not surprisingly, Fora's considered offering also has a big focus on food.

"When you walk into our lobby you don't walk into an office lobby. You walk into an area that has a unique restaurant, state-of-the-art events space and an informal cafe, all on the same floor," says Mr Sanna. "Whether it's a networking breakfast in the Resident Cafe, an important lunch with clients at the restaurant or over cocktails in the evening with friends and colleagues, these spaces provide the perfect backdrop to socialise with fellow residents and escape the norm. We find that a hospitality-led approach is a good way to break down the barriers."

The building comprises an eclectic mix of curated communal areas, including welcoming lounges, study rooms, meeting rooms, a library and kitchens. The residents that currently occupy Fora's shared workspaces range from established companies to startups representing a range of business sectors.

"It is important that you establish a mix of residents in a way that it doesn't feel there is any one company so large it appears to dominate the space," says Mr Sanna. "The one undeniable thing the shared office gives you that traditional offices will never do is the ability to collaborate and innovate within your own company, and across other companies, all under the same roof."

Fora resident Stuart Delivery will attest to that. The on-demand delivery specialist works with a range of customers, primarily in food but expanding to other sectors, and has operations in the UK, France and Spain.

UK general manager Joe McDermottroe says: "At Fora we have the space we need to collaborate in a number of different ways. Whether it is a regular meeting or an ad hoc brainstorming session, there is always a place in this building where we can sit down, think, talk and come up with new ideas.

> Fora is determined to achieve that Holy Grail of workspace optimisation by deploying some of the best researchers in the world to learn how best to structure a workspace for optimum collaborative outcomes

"As a growing business, there are lots of challenges that we need to address, and here we have the flexibility to break off into different sized groups, go elsewhere in the building to discuss it and come up with solutions. For us that level of flexibility is key."

Collaboration between the company's various teams and functions, including sales, marketing and operations, is crucial to working together closely to serve the needs of their customers. But opportunities to interact go beyond their business, as marketing manager Sara Carty explains.

"Some of our team members have collaborated with people in the other offices, so Fora presents us with a great opportunity for cross-business collaborative activity," she says. "It's also great when we bring our customers here for meetings; the space is more impressive than other co-working spaces we have experienced; it has the technology infrastructure that as a high-tech startup we absolutely rely on. It has been a good move for us."

Already a leader in shared working spaces, Fora is determined to achieve that Holy Grail of workspace optimisation by deploying some of the best researchers in the world to learn how best to structure a workspace for optimum collaborative outcomes.

Mr Sanna says: "With the help of MIT, we will have a better understanding of human interaction in the workplace, which will influence the spaces that Fora creates."

For more information please visit www.foraspace.com

COMMERCIAL FEATURE

Voice technology dictates the future of work

Automating services through voice technology offers a step-change in efficiency and will soon be a key element of the workplace

What has been the most disruptive technology in 2017? "No question, it is voice," according to Scott Galloway, professor of marketing at New York University Stern School of Business, who also predicts that a third of all computing will be screenless by 2020 and believes the rise and acceptance of home-based devices such as Alexa and Echo means Amazon has "effectively declared war on brands".

This trend is only going to accelerate, given the constant improvement in speech-recognition technology. Indeed, in September, digital marketing company iProspect UK's *The Future is Voice Activated* report claimed 15 per cent of the British population is currently using this tech. As chief executive Stefan Bardega points out: "That equates to 7.4 million people. There is an exponential effect that will happen with voice activation as more voice data means better accuracy rates – it's now at 95 per cent and was 30 per cent in 2012 – which in turn fuels more usage."

While consumers and well-known tech titans, including Google, Microsoft, Samsung, as well as Amazon, may be driving this trend, it will have a huge effect on the business-to-business market, too. And those developments are equally as significant, posits James Kippenberger, managing director for product strategy and innovation at market-leading software provider BigHand. To him, automating services, such as transcription, through voice technology offers a step-change in efficiency and will therefore be a key element of the workplace of the near future.

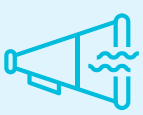
"Much of the voice technology that makes the headlines is about instructional or conversational speech recognition, but there is a subtle difference for technology which helps create documents and text accurately," says Mr Kippenberger, whose company supports 280,000 global users, in more than 2,650 organisations, from its six offices dotted across the world. "In the same way instant messaging started at home and moved into the workplace, businesses could struggle to keep pace with voice technology if they fail to listen to the warnings."

Having begun at London-headquartered BigHand in 2001, Mr Kippenberger is ideally placed to discuss the evolution of voice technology. "Dictation itself exists because someone could not type words at a reasonable speed. They delegated face-to-face transcription and shorthand was developed," he says. "Then there was the advent of analogue tapes and by dictating to a machine you could pass the audio on to a secretary.

1/3

of all computing will be screenless by 2020

Scott Galloway, New York University Stern School of Business



15%

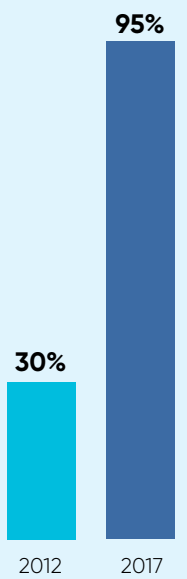
of the British population are currently using voice-activated technology. This equates to...

7.4M

people

iProspect UK

Voice-activation accuracy rates



"The next game-changer arrived in the mid-2000s when digitalisation became a reality and that triggered a mass migration from analogue. Once it was digital, people realised they could do significantly more with it; all of a sudden audio files could

> Businesses could struggle to keep pace with voice technology if they fail to listen to the warnings

be widely distributed, sent immediately from anywhere and instantly received. They could be tracked and analysed. Crucially, organisations could start to pull up data regarding turnaround times and therefore make business decisions about methods of working. Those insights from voice productivity stage two, if you will, allowed companies to look at their operations in a new, informed way.

"Right now we are well into stage three, having moved from digital dictation workflow to using speech recognition. As an industry, we've probably achieved just over 10 per cent of penetration on a user account of speech-recognition technology. Various industries, including healthcare, legal, accountancy and finance, are all desperate for this technology to work. They don't want to be paying someone to transcribe if they don't have to. Speech recognition is already a success story of artificial intelligence.

"Critically, technology is a means to an end, though. If businesses want to take advantage of the benefits of the tech, they must think about the impact on working practice change and potential organisational change, and properly engage their staff. In essence, they need to be sensible about why they are investing in the technology. Viewing the technology in isolation is a common mistake. We tend to think in terms of 20 per cent technology and 80 per cent people, and firms ignore that ratio at their peril."

Another macro trend with the future of work is the pull towards flexibility and agile working. And, as the demand for remote and on-the-go working rises, technology that enables more efficient processes

and is available around the clock is essential. "That message is coming through loud and clear, particularly from professional services markets," continues Mr Kippenberger. "Various studies show that making more money is sometimes less important than having more time nowadays. The war for talent is at its peak and one of the big things that employers can offer is a better work-life balance. BigHand's products help with that, and our automated workflow tools will also make organisations leaner and more efficient."

Mr Kippenberger predicts that developments in AI will improve voice technology and broader workflow requirements, though says it will probably be more gradual than most people think. "There is a lot of noise in the marketplace right now about things like conversational chatbots and, while there are some very good case studies where instructional voice technology will make a difference in terms of mass-scale adoption, I believe the move to what might be stage four of the evolution of voice technology will take quite some time yet," he says.

"I think we will definitely see the advent of office-based Google Home-type applications, where you will be able to request actions using your voice that previously could only have been done by completing an electronic form. One example is business intelligence and analytics tools, which offer voice-driven reporting technology. By using dictation, you can verbally request, say, an organisation's sales of a particular product in South America in the last month and the technology will understand the user sufficiently to then present that data without the need to write a complicated query."

JAMES KIPPENBERGER
MANAGING DIRECTOR FOR PRODUCT STRATEGY AND INNOVATION
BIGHAND

Mr Kippenberger summarises that while organisations would do well to both be aware of what is happening in this space, and think about how and where efficiencies can be found, there are very real returns and tangible benefits to be gained with the technology currently available.

"In a world where there is increasing demand for more information to be recorded, using your voice to create content makes perfect sense," he concludes. "And handing your staff the vital tools to be able to do their job from home or on the move is a great place to start."

For more information please visit www.bighand.com

SHIPPING

Unmanned ships set to sail the seas

Ships that sail themselves will cost less to operate and use clean energy, but will see the loss of crew jobs

HEIDI VELLA

Unmanned ships piloted by people onshore or that sail and navigate the seas completely autonomously is a concept first floated in the 1970s, but one which is now close to becoming a reality.

An uptake in development and interest in the technology this year shows there is a real business case and demand for autonomous shipping.

In May, Kongsberg and global fertiliser firm Yara announced the development of the world's first fully electric and fully autonomous container ship, the Yara Birkeland, which will transport products from Yara's Norwegian Porsgrunn production plant to Brevik and Larvik, also in Norway. The vessel's launch is planned for early-2019.

This June, Rolls-Royce and global towage operator Svitzer successfully demonstrated the world's first remotely operated commercial vessel in Copenhagen harbour.

Furthermore, BHP Billiton, the world's biggest mining company and shipper of one quarter of a billion tonnes of iron ore, coal and copper, this year said it intends to develop autonomous vessels to carry future cargo.

Unmanned shipping, like other automated technologies, offers several benefits to commercial operators, such as improved safety, cost reductions, more space for cargo and an overall more efficient marine supply chain, which could drive down costs for business heavily reliant on shipping.

"Remote-controlled and autonomous ships don't get tired, they will reduce the risk of injury and even death, as well as the potential loss or damage of valuable assets," says Oskar Levander, senior vice president, concepts and innovation, at Rolls-Royce.

According to a report by insurance company Allianz in 2012, between 75 and 96 per cent of marine accidents occur due to human error, mostly fatigue.

Furthermore, removing onboard crews can save freight shippers money by reducing personnel and construction costs because there is no need to build the facilities people require.

"When a ship sails autonomously you don't have to worry about crewing costs, so you can have a much more sustainable sailing profile; you can sail short distances over a longer timeframe and use much less energy because you are not travelling full steam," says Peter Due, director of autonomy at Kongsberg Maritime.

Another key driver for the technology is the potential to reduce emissions and save fuel costs in the long term. Autonomous ships will almost certainly need to be battery powered as there will be no one on board to provide the necessary maintenance fuel engines require.

The Yara Birkeland, for example, will be powered with electric battery propulsion that will reduce nitrogen oxide and carbon dioxide emissions, and improve road safety by ending the need for up to 40,000 truck journeys in populated urban areas.

The vessel will cost $25 million, about three times as much as a conventional ship of a similar size, but will save up to 90 per cent in annual operating costs by eliminating both fuel and crew, according to Yara.

However, the development of remotely controlled and autonomous shipping containers depends on the vessel's ability to sense and understand what's going on around it, and to communicate this, via satellite or other networks, to an onshore control room. It must also independently navigate, avoid collisions and perform complex manoeuvres.

Achieving these capabilities in ships is much harder than with autonomous cars. "Sensors must be much tougher and more advanced than the sort required for an autonomous car and it's important to consider to what degree there should be backup systems, because flying people out to fix a ship isn't going to be cost effective," says Øystein Engelhardtsen, senior researcher at DNV GL.

DNV GL has developed the ReVolt concept, a 60-metres-long, fully battery-powered autonomous ship for the short-sea transport segment that can alleviate issues of congestion in growing urban areas by taking trucks off the road.

In terms of physical security, unmanned ships would be safer than traditional vessels, as they can be built so it is difficult for pirates to board. The ship could even be remotely controlled to defend against intruders.

"The computers in command could immobilise the ship and without a captured crew to hold for ransom, piracy is significantly less valuable," says Mr Levander.

On the flipside, anything that is remotely or computer controlled is vulnerable to cyberattacks, malfunction or control being lost due to communication failures. An out-of-control vessel, taken over by rouge agents, could be a deadly weapon if aimed at coastal cities.

Other barriers to autonomous shipping include advancing battery technology for longer-haul journeys, so the amount of batteries needed don't take up most of the cargo space, and regulation, which is far behind the technology.

The European Union is currently assessing the feasibility of unmanned shipping. However, the rules for sailing in international waters are set by the International Maritime Organization, which has started to consider relevant regulation, but getting stakeholders to agree will be complex and no doubt long winded.

Steve Saxon, a Partner at McKinsey's shipping and ports practice, believes the timeframe for international autonomous shipping could be around 2067. He cites cheap labour from India and the Philippines, cybersecurity and the need for on-board maintenance as disincentives, but points out that ports are already beginning to automate.

National shipping, from one part of a country to another, will be much easier to achieve than international routes and offers the immediate benefit of taking trucks off the roads. Norway, which is proactively pursuing autonomous shipping, is expected to be the first country to have national regulation.

> Achieving these capabilities in ships is much harder than with autonomous cars

Kongsberg Maritime's Mr Due believes there will be a bi-lateral agreement between Norway and Sweden to sail autonomously between the two. However, crossing Norway to Denmark will be harder because there are international waters in between.

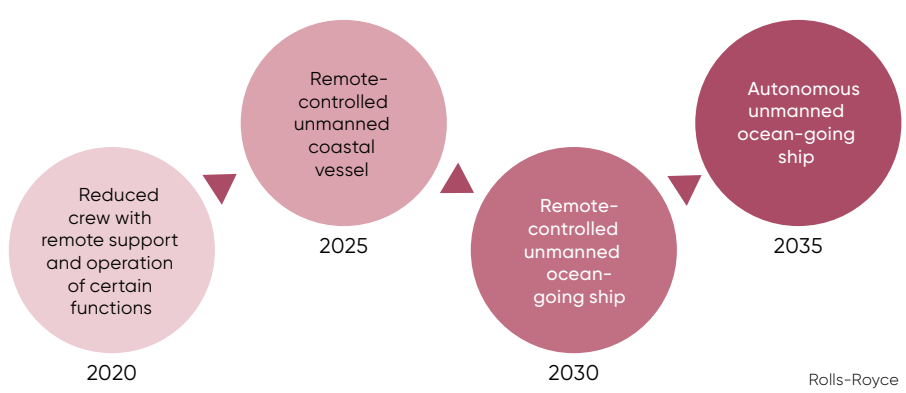
With the development of the Yara Birkeland underway, we could see autonomous ships operating in local waters as soon as 2020, with deals between neighbouring countries inked by 2025.

01 Rolls-Royce's Remote Operating Centre; the engineering group, along with towage operator Svitzer, successfully demonstrated the world's first remotely operated commercial vessel in Copenhagen harbour in June

02 Illustration of the Yara Birkeland, by Kongsberg and Yara, expected to be delivered from the ship yard in early-2019

PREDICTIONS FOR AUTONOMOUS VESSELS

ROLLS-ROYCE'S PREDICTIONS FOR UNMANNED SHIPS



Rolls-Royce

COMMUNICATIONS

John Lund/Getty Images

Communicate at the speed of thought

Advances in real-time networking are coming and this means much more than just faster internet speed and enhanced phone coverage – it will bring communication at the speed of thought

HEIDI VELLA

The capabilities of future networks might be beyond our current comprehension

There are now 20 billion devices connected to the internet of things, according to IHS Markit. By 2030, this number will grow to 500 billion, CISCO, whose hardware currently runs 80 per cent of the internet, predicts.

"The network is becoming the fourth utility," says Chintan Patel, a senior strategist at CISCO. "Now, every business is essentially becoming a technology business, with the network being the platform on which they run."

If the average company network manager is overseeing a hundred devices today, this could reach into the millions in the future, says Mr Patel.

"As we connect everything, the scale at which networks need to operate is going to fundamentally change," he adds.

This is especially true if emerging technologies such as self-driving cars, telemedicine, drones, artificial intelligence, augmented reality and virtual reality are to become ubiquitous.

Today the LTE/4G network works well, most of the time. But 5G, expected around 2020, will be transformative for business, say those developing it.

Sandra Rivera, senior vice president and general manager of the network platforms group at Intel Corporation, says the 5G network will have fifty times the peak data rate and ten times lower latency than 4G.

"This is the difference between a real-time image being transferred and transmitted in less than 10 milliseconds compared to up to one minute, or even an hour, in some networks," she told the Web Summit in November.

The fifth-generation network should enable new uses and capabilities as well as lead to increased productivity.

"By having better and more ubiquitous connectivity, you're going to get more done on the go; this can benefit UK productivity and in turn the economy," Mr Patel says.

CISCO piloted 5G with Verizon Communications in the United States earlier this year with the potential to disrupt some industries. For example, the physical supply chain could be in part displaced by 3D printing enabled by 5G. Designs could be exchanged over the network as simply and frequently as exchanging a text message and then 3D printed.

But 5G is only networking in real time. Fast forward ten years and the capabilities of the network might be beyond our current comprehension.

In May, The AT&T Foundry innovation centre in Palo Alto joined the California Institute of Technology to form the Alliance for Quantum Technologies, which aims to bring industry, government and academia together to speed up development of quantum technology for the network.

Quantum networking is the process of linking quantum computers and devices together to create fast and secure networks beyond anything possible today with traditional processors. But what does this mean exactly?

"It means that if I want to take a mobile call, I don't need a phone," says John Donovan, chief executive of AT&T Communications. "If we are quantumly entangled, I can just think it and we can have a conversation."

Mr Donovan says that when he realised the possibilities of the quantum network, he had an "oh my goodness, this is unbelievable" moment.

When people are quantumly entangled, they essentially will have an open channel that will always be available to send data back and forth at super high speeds "in a way that doesn't fit the profile of cell towers and cell phones".

The quantum, however, cannot yet be mixed with the biological, but the alliance is working on it.

"The proof of principle is there, the question is how do we up the game so that we have high fidelity, constant operation, stable operation, particular rates – this has not been done," says experimental physicist at the California Institute of Technology, Maria Spiropulu, who is leading the research alliance.

Professor Spiropulu says there could be a quantum Facebook or Twitter, where different people will see different parts of the superposition that senders want to show them.

> If we are quantumly entangled, I can just think it and we can have a conversation

Currently, the alliance is building a prototype network distribution of entanglement which is crucial in quantum physics because it encapsulates the correlations among information and particles that have inherent information. The team are using AT&T's fibre network in the lab for the prototype.

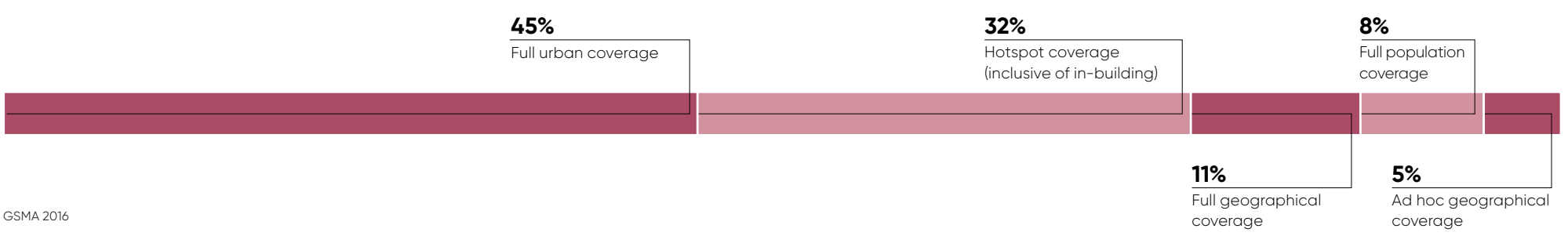
Creating a safe quantum network is paramount, however. Currently, it would take a billion years or more to guess your way to decoding present encryption, according to Professor Spiropulu. In a quantum world, it would take minutes, if not seconds, to run through all the possible permutations. "When it is that game-changing, it needs to be in the hands of good," she adds.

This technology will be created in "no less than five, but not more than ten years", says Professor Spiropulu and will completely disrupt the business models of current network providers.

AT&T's Mr Donovan concludes: "Everything we think about in our industry will no longer be valid. It is threatening and equally nerve wracking as the infinite possibilities. When we go to 5G, we will be operating at the speed of light, but quantum is the speed of thought and this creates dramatic opportunities."

LEVEL OF COVERAGE IN EARLY DEPLOYMENT

CHIEF EXECUTIVES OF MOBILE OPERATORS WORLDWIDE WERE ASKED ABOUT THE LEVEL OF COVERAGE A NEW 5G NETWORK AIMS TO PROVIDE IN ITS EARLY DEPLOYMENT



GSMA 2016

POTENTIAL OF 5G

‘Less than a millisecond for 5G response’

A pilot scheme providing 5G to businesses could propel the UK to become a global leader

NICOLA SMITH

In January 2018, a number of businesses in Brighton will be among the first in the UK to go live with fifth-generation mobile wireless connection, or 5G, which won’t be rolled out globally until 2020.

5G is designed to accommodate the growing number of internet-connected devices worldwide and is ten times faster than the highest speed enabled by 4G. It will make it easier for people to download and upload large files, and run complex mobile internet apps such as virtual reality (VR), as well as offering a more reliable connection.

O2 predicts that 5G will spawn new industries, platforms and services, and boost the UK’s productivity by £3 billion a year.

Non-profit innovation hub Digital Catapult Centre is spearheading Brighton’s 5G test bed and recently completed a series of workshops for local businesses. “It has enabled companies to explore new opportunities, new thinking, new products and new ideas,” says Richard Scott, innovation manager. “There is a real opportunity for small, disruptive companies to use 5G to be innovative and develop competitive advantage.”

One company excited by the possibilities for VR is Brighton-based VRCraftworks, which builds VR apps that empower businesses and people. It is one of the 33 businesses which has so far submitted an application to Digital Catapult to use the 5G test bed to develop new products and services. Peter Maddalena, director at VRCraftworks, says the immediate access to VR content, as a result of the lower latency offered by 5G and a delay of less than a millisecond between action and response, is one of the most promising factors.

The company is developing an app that enables companies to deliver virtual training courses via 360 VR video, supplemented with artificial intelligence (AI), with businesses able to push their own content into the framework. “In an AI-driven VR training space, each participant could be delivered a tailored course based on their questions and reactions to the virtual tutor,” says Mr Maddalena. “The personalised response that can be enabled by 5G [thanks to its ability to leverage large amounts of customer-specific data] will empower employees.”

Another opportunity presented by 5G is its use in stadiums, where lots of people are trying to connect to a network in the same place at the same time. “5G can handle a higher capacity, providing new opportunities for fan engagement and potential new revenue streams,” says Mr Scott.

It is an area the American Express Community Stadium, home of Brighton & Hove Albion Football Club, is currently exploring and one that also excites Andy Cummins, director of product development at Brighton-based digital media agency Cogapp. “We have a product called Neoscope, which enables crowd engagement in stadium-size settings and the idea of a reliable, high-speed connection for every member of a 60,000-strong crowd will really open up opportunities for us,” he says.

Mr Cummins cites capturing 360 footage from the performer’s perspective that can be experienced in real time, as well as mass upload of video, capturing key moments from a fan’s viewpoint, giving non-attendees an immersive sense of an event.

COMMERCIAL FEATURE

Telling of talking technology

Eddie Ginja, head of innovation at KYOCERA Document Solutions, shares his vision of a future with talking documents

KYOCERA Document Solutions

When the *New Scientist* magazine celebrated 60 years in print, it produced a wonderful list of forecasts for the year 2076. Artificial starlight has made energy free. Human-made life forms walk the Earth. And thousands of people live on Mars.

Another long-range thinker is Ray Kurzweil, the legendary futurologist, now head of Google’s language research division. He reckons we’ll live in a super-sentient hive mind, in which man merges with machine to become a near-divine celestial intelligence. The moment of convergence is “The Singularity” in the year 2045. Believers are called Singulatarians. There’s even a Singularity University to track progress to this new era.

Personally, I prefer to look shorter term. We are witnessing miracles right now. This is the dawn of artificial intelligence (AI). In my field, document management, we are sketching out how our industry will be re-invented by AI over the next five years.

Here’s an example. If you want to find a document on your computer, you need to know where it is or use a crude search engine using keywords. AI changes this. Imagine you’ve seen a chart with five coloured circles intersecting. How about just telling the AI engine, verbally, what you’ve seen? It knows what you mean, with a wide margin of error, and produces it. That’s such a time-saver.

It won’t be long before we see a printer which has facial recognition built in. Walk up to the printer and it will see you. Your personal profile will be loaded. Relevant documents and print jobs will be loaded for you to command. Revolutionary? At first, yes. But soon everyone will demand it as standard.

> “Something I expected to see, but have not yet discovered, is an AI which suggests documents as you chat online

Something I expected to see, but have not yet discovered, is an AI which suggests documents as you chat online. Executives are increasingly using instant messaging (IM) such as WhatsApp, Skype or Slack to talk to colleagues and clients. We often mention documents or articles. It makes sense to have an AI tracking this dialogue and suggesting a relevant link when appropriate. You could be on the beach in Barbados chatting via IM to a prospective client, mention a report, and the AI would produce the link, with the report hosted in the cloud. You’d click “approve” and the link would be sent. No searching, no bother. All automated. It needs to happen.

Talking documents are coming. Today we work in silence. But sometimes we are multi-tasking. It would be productive to be able to command an AI, “Read me the conclusion to report A” and listen as a fluent voice recites the relevant text. Amazon is touching on this and has equipped its audio book store Audible to skip to the steamy sex scenes in novels. The passages are identified by an algorithm. It’s a light-hearted proof of concept of something with much wider potential.

There’s a serious point to this. We are all looking for a step-change in productivity. Here in the UK productivity hasn’t risen in a decade, according to the Office for National Statistics. AI can be the catalyst. We spend our lives working with documents. AI can make searching, using and sharing documents so much easier. It will put the turbo boost under productivity.

At KYOCERA Document Solutions UK we are always working to launch these breakthroughs. It’s making the document management sector incredibly exciting to work in. I want to live in a world where AI is normal in our industry and can’t wait to make it a reality.

For more information please visit www.kyoceradocumentsolutions.co.uk

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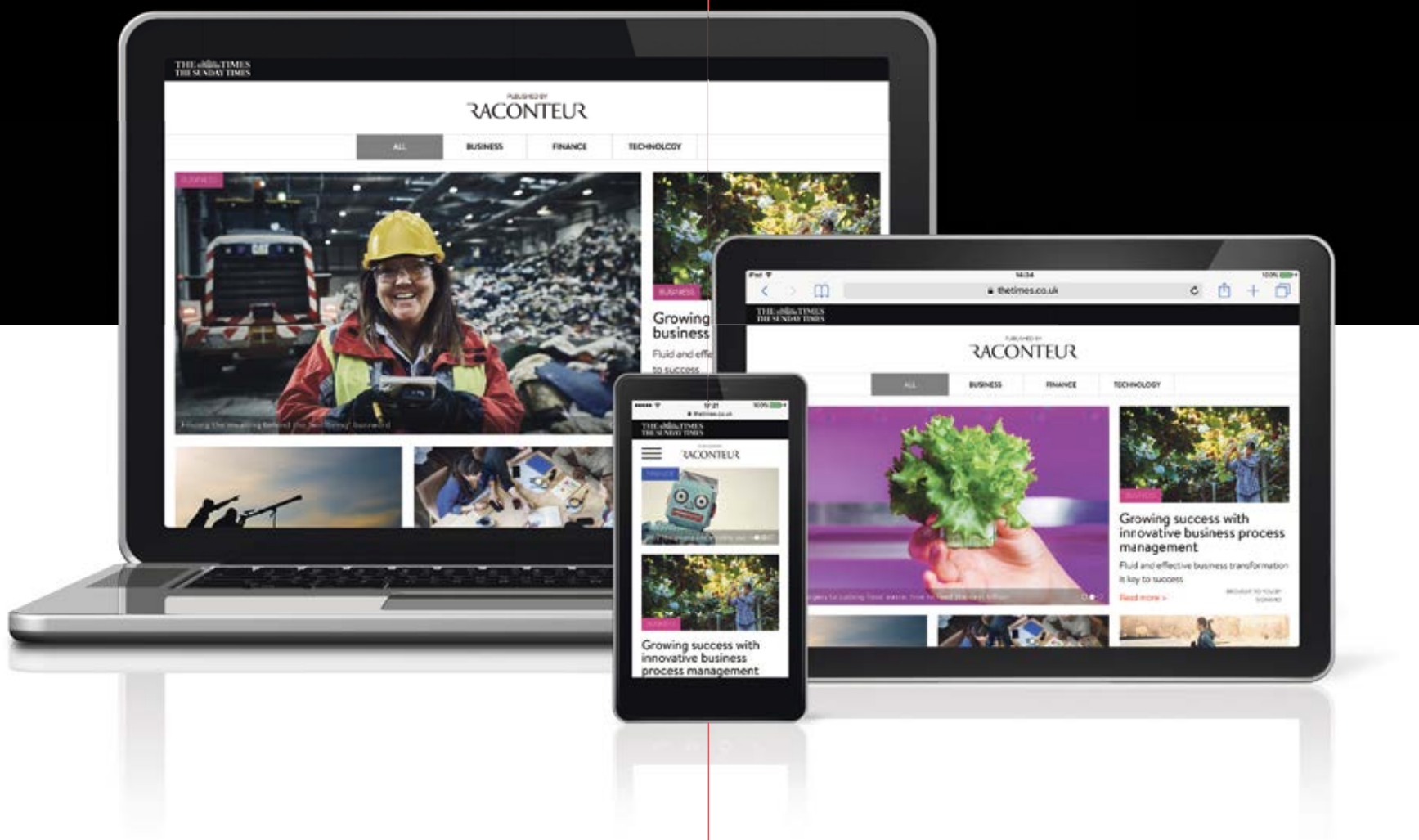

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