ComputerWeekly

Robots learning on the job

How artificial intelligence is making robotic process automation more resilient, more flexible and smarter

PHONLAMAIPHOTO/ADOBE

Facebook ducks calls to apologise over data leak

Facebook has attempted to deflect criticism of its data security practices after a leak of personally identifiable information on hundreds of millions of its users. It believes the data was taken using the contact importer feature prior to September 2019. This service was supposedly meant to help users find their friends to connect with by importing their contact lists from their mobile phones.

Post Office gives controversial Fujitsu contract another year

The Post Office will retain its controversial Horizon contract with Fujitsu until 2024, following a one-year extension to its retail and accounting system agreement. The additional year for the contract, which is at the centre of a scandal that ruined the lives of hundreds of subpostmasters, will cost £42m. The extension is being awarded to support the Post Office while it ends the current Horizon contract.

Irish 'right to disconnect' enshrined in code of practice

All employees in Ireland have been given the "right to disconnect" from work under an official code of practice drawn up by the country's Workplace Relations Commission. Under the right to disconnect, employees are entitled to "switch off from work" and not engage in digitally enabled communications outside of their normal hours, including not having to respond immediately to emails.

Private sector start date prompts mixed picture of predictions

The Association of Independent Professionals and the Self-Employed claims the government's decision to push on with the private sector roll-out of the IR35 tax avoidance reforms risks "undermining the UK's contractors at the worst possible time". The reforms are designed to clamp down on tax avoidance and disguised employment by limited company contractors who work as employees for private sector firms.

IFEELSTOCK/ADOBE

Deliveroo riders strike over pay and work conditions

Hundreds of Deliveroo riders across the UK refused to make deliveries in protest of poor pay and work conditions, as the company began its first day of trading on the London Stock Exchange. Deliveroo riders organised under the Independent Workers' Union of Great Britain and went on strike on 7 April 2021 to demand a guaranteed living wage and an end to over-hiring and unpaid waiting times.

Digital Markets Unit starts work on codes of conduct

A regulator set up to scrutinise the dominance of technology giants in the UK economy has begun its work on developing legally binding codes of conduct to prevent anti-competitive behaviour in digital markets.

Demands for digital evidence rule changes have government's ear

The Post Office Horizon scandal has forced the government to consider fast-tracking changes to the rules on the use of digital evidence in court, with a minister agreeing the government would look at the issue and provide updates on its progress.

Project Monterey returns to haunt IBM and Red Hat

A longstanding dispute over Unix copyright infringement has come back to haunt IBM and Red Hat. Xinuos has filed a lawsuit claiming that IBM and Red Hat have engaged in additional, illegal anti-competitive misconduct.

CDDO will assess delivery of government digital projects

Government Digital Service boss Tom Read and the government's Central Digital and Data Office (CDDO) executive director Joanna Davinson have revealed the next steps for digital, data and technology in government to aid Whitehall's digital transformation.

A billion extra contactless payments since limit increase

Visa customers across Europe have made one billion additional contactless payments since the spending limit was raised early in the pandemic. About 400 million of these were made in the UK, which is set to further increase the limit to £100.

Unpatched SAP applications are target-rich ground for hackers

Hackers are targeting unpatched vulnerabilities in SAP applications, according to a report issued by SAP. It highlighted that the time window for defenders to act was significantly smaller than previously thought. ■

EncroChat hearings delayed by lawyers

Court hearings into the EncroChat encrypted phone network compromised by French police have been delayed after lawyers submitted a request for prosecutors to disclose further evidence on law enforcement's capabilities to decrypt communications.

GÉRARD BOTTINO/ADOBE

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> GDS seeks director for identity assurance programme.
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Java APIs: What Google's victory means

Cliff Saran looks at the US Supreme Court ruling that specifying an application programming interface function call to enable third-party developers to access functionality should not be copyrighted

The US Supreme Court has handed Google a massive victory in its decade-long fight with Oracle over Java application programming interfaces (APIs).

In a blog post in 2019, Google's chief legal officer, Kent Ward, wrote: "Standardised software interfaces have driven innovation in software development. They let computer programs interact with each other and let developers easily build technologies for different platforms."

But over the past 10 years, Oracle has contested that the use of Java in Google's Android operating system for smartphones was a copyright infringement. The case involved the 11,500 lines of declaring code from the Java API used in Android.

But on 5 April, the Supreme Court ruled 6-2 that Google's use of code copied from Java APIs in Android was fair use.

In his written opinion, Justice Stephen Breyer wrote: "Just as fair use distinguishes among books and films, which are indisputably subjects of copyright, so too must it draw lines among computer programs. And just as fair use takes account of the market in which scripts and paintings are bought and sold, so too must it consider the realities of how technological works are created and disseminated. We do not believe that an approach close to 'all or nothing' would be faithful to the Copyright Act's overall design."

Breyer said Google used the Sun Java API to build new products and expand the use and usefulness of Android-based smartphones, offering programmers what he described as "a highly creative and innovative tool" for a smartphone environment. "To the extent that Google used parts of the Sun Java API to create a new platform that could be readily used by programmers, its use was consistent with that creative 'progress' that is the basic constitutional objective of copyright itself," he noted.

The filing illustrates the amount of detail needed to enable the court to understand the difference between defining an API through a declaration statement in a computer program and the actual implementation of the task, which is the code third-party developers access when they use the API in their own programs.

Breyer said: "Google, through Android, provided a new collection of tasks operating in a distinct and different computing environment. Those tasks were carried out through the use of new implementing code (that Google wrote) designed to operate within that new environment."

He described the lines of declarative code that define the Sun Java API as being "inseparably bound" to the tasks they are used to run, but added: "Google copied those lines not because of their creativity, their beauty, or even (in a sense) because of their purpose. It copied them because programmers had already learned to work with the Sun Java API's system, and it would have been difficult, perhaps prohibitively so, to attract programmers to build its Android smartphone system without them.

"Further, Google's basic purpose was to create a different task-related system for a different computing environment (smartphones) and to create a platform – the Android platform – that would help achieve and popularise that objective."

VAST AMOUNT OF MONEY

Although Google has made a vast amount of money from its Android platform, Breyer said: "The source of Android's profitability has much to do with third parties' (say, programmers') investment in Sun Java programs. It has correspondingly less to do with Sun's investment in creating the Sun Java API.

"We reach the conclusion that in this case, where Google reimplemented a user interface, taking only what was needed to allow users to put their accrued talents to work in a new and transformative program, Google's copying of the Sun Java API was a fair use of that material as a matter of law."

OpenUK was part of the group of organisations involved in an amicus curiae brief for the case. Commenting on the outcome, Amanda Brock, CEO of OpenUK, said: "What we see here is the evolution of the concept of fair use of copyright to allow developers, including Google, the right of fair use in the Java API building block and other such building blocks."

Brock said that while the law may struggle to keep up with the pace of technology change, it needs to be able to adapt to these technologies. "We see this not only in the US, but across Europe and the UK, where regulators and law makers have struggled to understand and apply laws to the new digital economies," she said. "The importance of this case may well be the attempt to protect openness and collaboration through fair use, which will allow developers to use those building blocks whether copyright applies or not."

> "THE IMPORTANCE OF THIS CASE MAY WELL BE THE ATTEMPT TO PROTECT OPENNESS AND COLLABORATION THROUGH FAIR USE"
> AMANDA BROCK, OPENUK

Brock added that the open source sector takes responsibility for managing copyright in source code, managed through open licensing. "Increasingly, we will see the importance of open use and the reliance of businesses, post-digital transformation, on this as we develop our digital economy and also look to the UK's similar legal concept of fair dealing in copyright," she said. ∎

> ❯ *Brexit will make it more difficult for UK companies to sell unused software licences.*

Employees express high expectations of IT in world of 'work from anywhere'

Research finds pandemic pushing organisations to transform workplace models. Joe O'Halloran reports

As employees continue to work remotely, the rise in vaccine availability has challenged business leaders to identify a logical next step for their staff, keeping safety and talent retention top of mind. But workers have moved on and expect at least some remote work and access to an IT infrastructure that can satisfy their needs wherever they are.

This is the basic top-line finding of the 2021 *State of work from anywhere outlook* report from network performance monitoring firm AppNeta, which identified user expectations for the future of work, highlighting the rise of "work from anywhere" and how this shift in the workforce model will impact IT teams after Covid.

The study was based on a sample of 1,000 people across the US, examining views of those Americans who rely on the internet to do their jobs. It identified critical areas to address for businesses to successfully implement a work from anywhere model.

The study observed that nearly 80% of respondents would prefer their work environment long term to include an element of remote work. Employees were looking for flexibility and a hybrid model, either hoping to work remotely permanently or have the option to come into a physical office only when needed.

Vast majority of workers say they would prefer a work environment that includes some remote working

SEVENTYFOUR/ADOBE

Furthermore, nearly three-quarters said they would be interested in their employer adopting a work from anywhere approach, allowing them the freedom to pick and choose where they set up work each day.

Surprisingly, since March 2020, 21% of respondents had relocated from their original address, with the American workforce now nearly evenly dispersed across urban, suburban and rural areas, identifying the need for companies to be able to provide the same level of user experience across vastly different regions.

This broader trend of urban decentralisation is said to have created new challenges for already strapped IT teams, as delivering optimal internet connectivity to residential and rural communities can be a challenging task, requiring employers and IT teams to set user expectations around the quality of their network performance.

Remote IT support

The survey also found that the events of the past year have challenged companies, regardless of industry, to move entire workforces to operate productively at home, essentially creating IT support needs for individual offices where each employee resided amid the pandemic.

The study noted that as business leaders plan how the new normal will look for their organisations, those adopting work from anywhere will want to set clear expectations for IT support with remote employees.

In a work from anywhere environment, employee expectations are high, with nearly half of those surveyed wanting support from the IT team with critical applications they use, 37% expecting support for internet connectivity issues, 35% expecting support with hardware and one-third expecting IT to support them in learning to use any new tools provided by the company.

Of the technology-related issues causing frustration for remote employees in the past year, the biggest gripe was found to be

> **The study noted that as business leaders plan how the new normal will look for their organisations, those adopting work from anywhere will want to set clear expectations for IT support with remote employees**

internet connectivity, with almost half (44%) of respondents expressing their frustration.

Another stress factor was issues with video calls, with 40% of respondents identifying freezing screens and challenges with popular tools such as Zoom. Unsurprisingly, more than a third of users said they were frustrated by technology challenges and experiences with their employer's IT team since the pandemic,

> ❯ *Study finds few workers see employers as prepared to support hybrid workforce.*

Tech-related issues causing frustration for remote
employees include internet connectivity and video calls

ALEX FROM THE ROCK/ADOBE

even though 21% of respondents acknowledged the IT team may be doing their best in the circumstances.

And when employees required IT's attention, they wanted it quickly. The study showed that nearly 30% of employees anticipated a response from IT within an hour of reaching out with a tech-related issue. An additional third thought a response within the business day was acceptable, while only 11% felt that a response within a week was acceptable. In a work from anywhere model, employee expectations need to be tempered to maintain clarity around IT's responsibilities and protect them from burnout.

In conclusion, AppNeta advised that where possible, business leaders should add clarity around responsibilities and response time, seek out technology solutions that are able to scale to the dispersed workforce, and assist in network performance

monitoring to ease the burden of internet connectivity and support with critical apps.

"The pandemic completely blew up most IT departments' support model for their remote users," said AppNeta CEO Matt Stevens. "Remote office visibility for the user experience of business-critical applications was already a challenge for many, but in the new normal, the 'user-to-problem ratio' is now often one-to-one versus the hundreds-to-one that used to be the norm with large groups of users consistently working on a regular schedule from a given office location," he said.

"The IT prioritisation process of understanding truly critical applications and their associated users, and achieving alignment with the lines of business, has never been more critical to the success of the overall business," Stevens added. ∎

It's still a battle for women to get to the top, says Bradford University IT director

Juliette Atkinson, Bradford University's IT director, took an unusual route to IT leadership, writes Karl Flinders

By her own admission, Bradford University's Juliette Atkinson is "not your normal IT director". She has had a diverse career, littered with challenges the vast majority of IT leaders have never faced.

"I came at it in a completely different way," she tells Computer Weekly. While most IT directors tend to have worked on the service desk and moved up or studied for degrees in computer science, her progression could hardly have been more different.

At 22, Atkinson was a single mother, at a time when the political environment had been shaped by years of Margaret Thatcher in Number 10, who famously later said she believed unmarried mothers and their children would be better off in religious orders than on welfare. Thatcher was the first woman to become prime minister, but not the best role model for aspiring young women.

"It's not great when a woman at the top doesn't think you can crack it," says Atkinson. "Being a single mum wasn't exactly ideal. I was solidly on my own with no safety net."

But she tackled the challenges she faced, which shaped her future. "The situation made me really resilient and also capable

Juliette Atkinson, Bradford University: "It's not great when a woman at the top doesn't think you can crack it"

of working around a problem or issue, even when I was told there was no solution," she says. "I don't accept defeat. While there are always failures and issues, these are learning experiences and make me better than before."

Her career path, over more than 25 years, is a testament to her determination, willingness to take on challenges and her different approach. Atkinson completed her A-levels and entered the

> ## "I don't accept defeat. While there are always failures and issues, these are learning experiences and make me better than before"
>
> ### Juliette Atkinson, Bradford University

world of work, but within a few years wanted to try something different. "I was a single mum and needed a job, so I started off selling telephone advertising and saved enough to buy a house," she says. At 23, she had made enough money and did just that.

It was during her time selling advertising that she was offered a job that took her into the sphere of IT. While selling advertising to a mobile phone reseller, Atkinson was offered a job, which she accepted. She began selling mobile phones as the technology moved from analogue to digital. Once again, she made an

impression and was soon offered another opportunity to progress, which would plant her firmly in the IT industry. "I got into IT through selling mobile phones and was poached by BT, where I was able to learn engineering skills," she says.

Atkinson moved from working with mobile phones into networks and connectivity. "Before my time at BT, I had had no IT training," she says. "At BT, I moved more into support. I enjoyed fixing technical problems more than I did selling, which is why I got out of selling fairly quickly."

ADDITIONAL SKILLS

Her next job was in operations at internet service provider Daisy Group, where she built up nine years of operational and managerial experience. While carrying out operational roles, Atkinson continued to gain additional skills in her own time, including IT Infrastructure Library (ITIL) and Cisco Certified Network Associate (CCNA) engineering qualifications.

Six years ago, she got her first IT director role through various internal promotions at a healthcare company, before moving to Aviva as global head of IT services.

It was after this that she moved into her current position, heading up IT at Bradford University. She is 18 months into the role, in which, alongside 60 IT staff, Atkinson caters to the IT demands of 10,000 students and 900 staff.

Despite her success, Atkinson says there is a long way to go in achieving equality between men and women in the IT industry. "Throughout my career, the conflict of providing for my family and spending time with them has been an ongoing battle," she says.

Challenges like this face many women in IT and other sectors, and they start early. Atkinson describes the challenges she even faced getting into IT at school. "I remember walking into computer studies on my first day with a friend, the only other girl in a class of 30 boys, and the [male] teacher turned to me and announced loudly that the typing class was two doors down and that we were clearly lost," she says.

She complained to the headteacher and his response was: "Well, he may have a point."

ON THE BACK FOOT

Atkinson doesn't think much has changed. "I may have been in the 6% minority back then, but I'm still only one of the 17% minority of women now in IT, and the number declines rapidly when you look at those in senior positions," she says. "You are on the back foot to start with, but I'm no stranger to that."

Education is required in society to teach people about what is acceptable in terms of behaviour or attitude, says Atkinson. "I've been in a meeting with a supplier more than once where I was the only woman, and the vendor assumed I was there to take notes."

But the biggest issue "by far", she says, is that it is still ingrained to think a man will provide better value for money than a woman doing the same job. As a consequence, she says the gender pay gap is real and applies to "not just wages, but other benefits".

Atkinson says if political and business leaders are serious about removing the gender imbalance in the IT and business sectors, there needs to be a systemic change to the way roles are advertised and women are recruited. ∎

GORODENKOFF/ADOBE
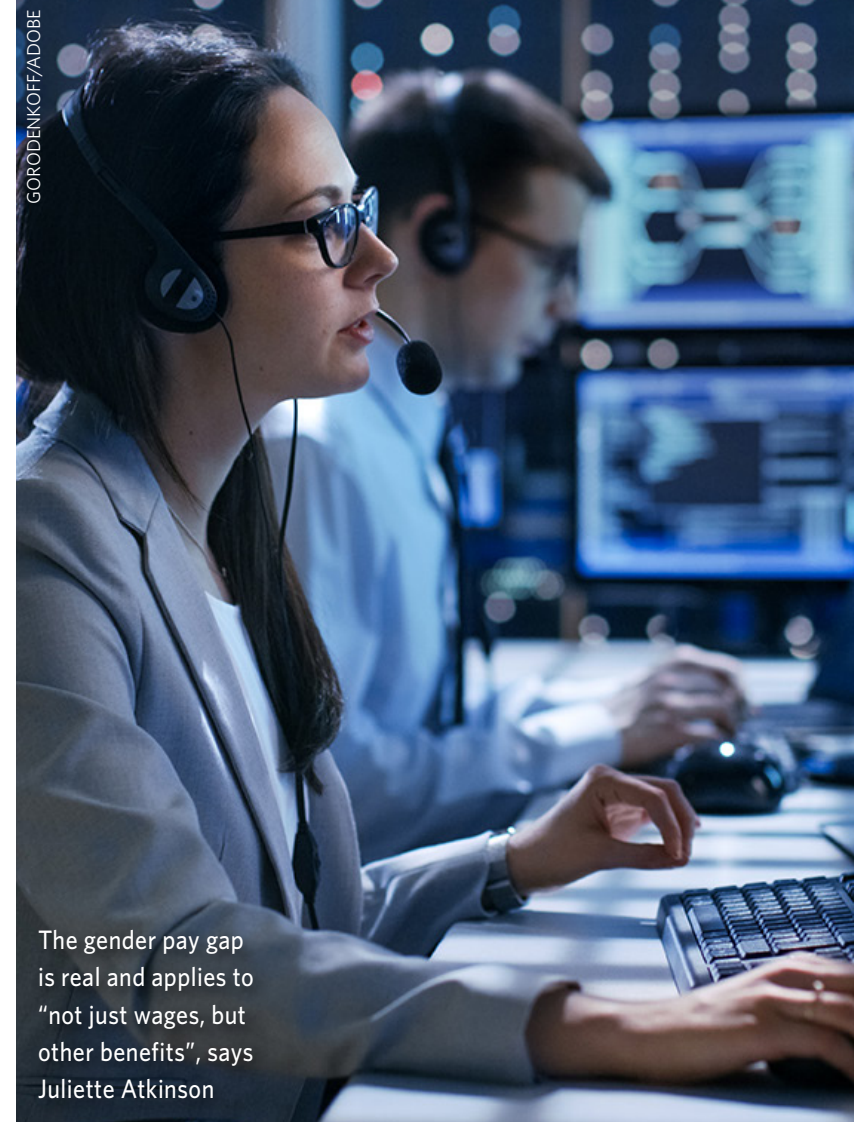
The gender pay gap is real and applies to "not just wages, but other benefits", says Juliette Atkinson

❯ *Many IT workers say their companies are working to address gender diversity.*

HOME

What will court ruling mean for APIs?

In a hugely significant legal case last week, the US Supreme Court ruled that Google did not infringe Oracle copyright on the Java SE API (application programming interface). The fact that the US Supreme Court has digested a load of expert statements and come up with an understanding of APIs has to be applauded. At one level, an API can be regarded as any other piece of intellectual property. It is a snippet of computer code that describes the way a programmer can access another piece of programming functionality. But, significantly, it is just an interface – a declaration of what the function actually requires in order to do its job. The code behind the API – the function or task that a third-party developer wants to achieve by using the API – is protected by copyright law.

Justice Stephen Breyer drew an analogy between an API declaration and the accelerator pedal of a car, and with the Qwerty keyboard – both of which provide a user interface to some functionality. Copying the accelerator pedal is in no way the same as copying the engineering schematic of the engine, nor do the millions of variants of Qwerty keyboards available infringe the operating system code that ensures each key press does the right thing. Breyer gave the example of a programmer building a new application for personal banking who may want to use various tasks to, say, calculate a user's balance or authenticate a password. "To do so, they need only learn the method calls associated with those tasks," he said. "In this way, the declaring code's shortcut function is similar to a gas pedal in a car that tells the car to move faster, or a Qwerty keyboard that calls up a certain letter when you press a particular key. As those analogies demonstrate, one can think of the declaring code as part of an interface between human beings and a machine."

USE OF AN API CAN HAVE UNINTENDED CONSEQUENCES

What is interesting is the example Breyer used – the authentication function in a personal banking application. Developing a secure authenticator for personal banking should really only be undertaken by a trusted party. The API provides access to the authentication code, thus allowing the developer to create a personal banking application with robust authentication.

Although it is just an interface, use of an API can have unintended consequences. The Supreme Court ruled that the API cannot be copyrighted, and what Google did was "fair use". The question for other organisations is: what constitutes "fair use" when a competitor starts using their APIs? ■

Cliff Saran, managing editor (technology)

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TechTarget

How RPA is getting smarter as it evolves

Robotic process automation is evolving, adding artificial intelligence layers that render it more resilient and agile. Stephen Pritchard looks at its prospects – and its limitations

MIN

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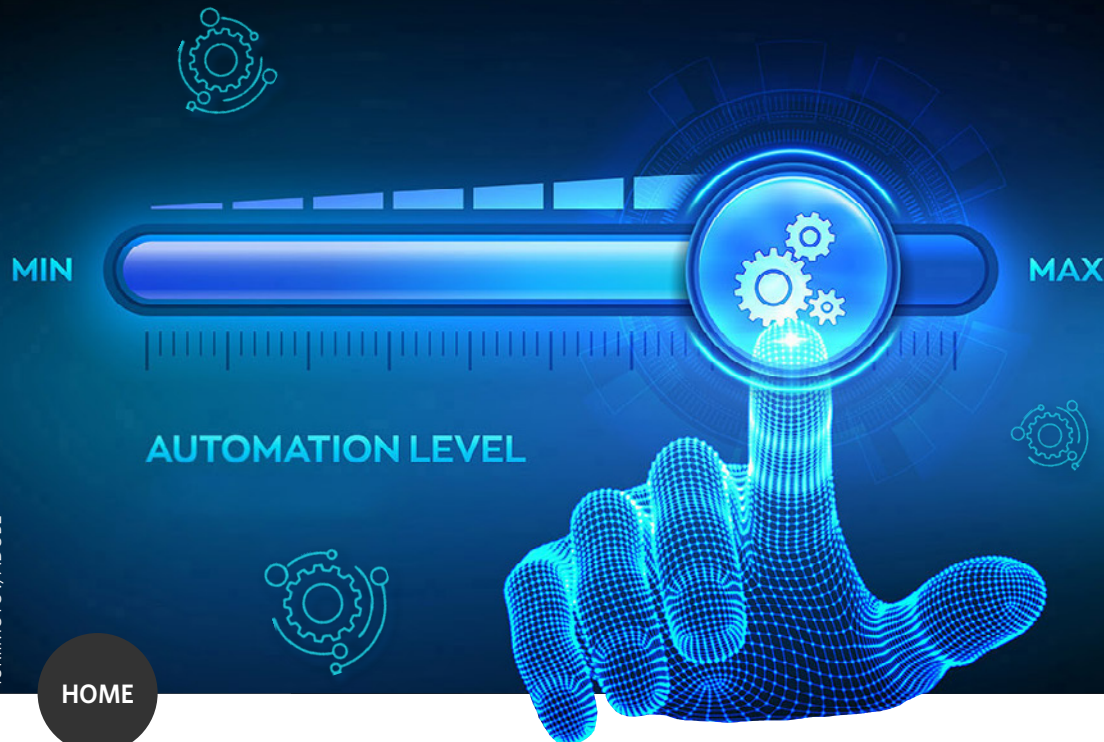
IURIIMOTOV/ADOBE

HOME

Robot technology is often associated with dangerous, dirty or dull work. Robotic process automation (RPA) takes that concept into the digital world.

As a software tool, RPA sets out to free human operators from repetitive tasks, and to boost efficiency and accuracy. It is especially useful where data needs to move between disconnected applications. But robotic process automation is evolving.

Bringing artificial intelligence (AI) into RPA systems promises to make them more flexible, more resilient and smarter. An RPA system can extract totals from an invoice, and even send them on to a human supervisor if they fall within a certain range. AI can go further by reacting to unexpected changes or detecting trends. This helps to minimise the workload passed on to humans and detects anomalies or fraud.

Software suppliers foresee systems that can learn how to streamline or improve business processes on the fly or can adapt to outages. Ultimately, this could lead to enterprise resource planning (ERP) or customer relationship management (CRM) systems that operate autonomously.

What is RPA?

RPA first gained ground in industries such as financial services, telecoms, government and healthcare – businesses with rules-based processes that involve rekeying data. More recently, the technology has gained ground in manufacturing and logistics.

RPA also lends itself to tasks that are common across businesses – processing invoices, setting up suppliers, human resources and

some areas of customer service. The ideal task for RPA is predictable and repetitive.

As a technology, RPA is not new – it shares its origins with rules engines and other basic business and workflow automation tools. However, RPA developed to solve a specific problem: systems that were not, and could not easily be, connected.

"RPA started over 10 years ago as a way to automate processes more easily via the user interface, rather than having to build a system-level integration or have a person rekey digitised data between systems," says Cathy Tornbohm, a distinguished vice-president analyst at research firm Gartner. "RPA tools are the 'Babel fish' of the technology world as they can interact with any type of system."

RPA IN ACTION

RPA began with a simple premise – to automate labour-intensive, clerical tasks. "RPA started out by mimicking computer users' desktop activities, such as mouse clicks and keystrokes," says Bernhard Schaffrik, a principal analyst at Forrester. "It has gone beyond simple mimicking, and is now focused on automating what computer users usually do manually."

CIOs typically turn to RPA as an alternative to, or part of, [business process automation](#) (BPA), which relies on connections between applications. Where these connections are not possible, or are too expensive to create, RPA is an alternative to human data entry.

"The primary problem businesses are trying to solve when they invest in automation and AI is that they're collecting data far faster than they can analyse it," says Chris Huff, chief strategy officer at Kofax.

"Certain business processes within the 'pool of data' are more fit for automation than others. Primarily, business processes that include structured and standardised data and are driven by rules-based processes operating in a stable environment are the strongest candidates for RPA."

RPA can also team up with optical character recognition or even speech-to-text systems to recognise data in scans or audio files, and use that data to move on to the next step. Used this way, RPA can speed up business processes or shorten time to market.

And, as a computer-based system, it is less prone to errors than human operators are. "RPA has a lower error rate than a comparable human," says Sebastian Schroetel, head of intelligent RPA at software supplier SAP. "We all have a bad day sometimes, when we get to work and make errors. That is reduced

> ## "RPA STARTED OUT BY MIMICKING COMPUTER USERS' DESKTOP ACTIVITIES, SUCH AS MOUSE CLICKS AND KEYSTROKES. IT IS NOW FOCUSED ON AUTOMATING WHAT COMPUTER USERS USUALLY DO MANUALLY"
> ### BERNHARD SCHAFFRIK, FORRESTER

with machine-based automation. They do their thing and don't have a bad day."

Translation services and consulting firm RWS uses RPA internally, and on client projects. "We use it for certain translation projects for customers which are quite complex, such as where documents are using content from previous projects," says George Bara, the company's vice-president for partnerships.

"We build an RPA system to service all those interactions or to transform data and move it within multiple systems. One of the most common use cases in corporations that are using RPA is to take processes and systems and bind them together, only relying on human interaction when there is a need."
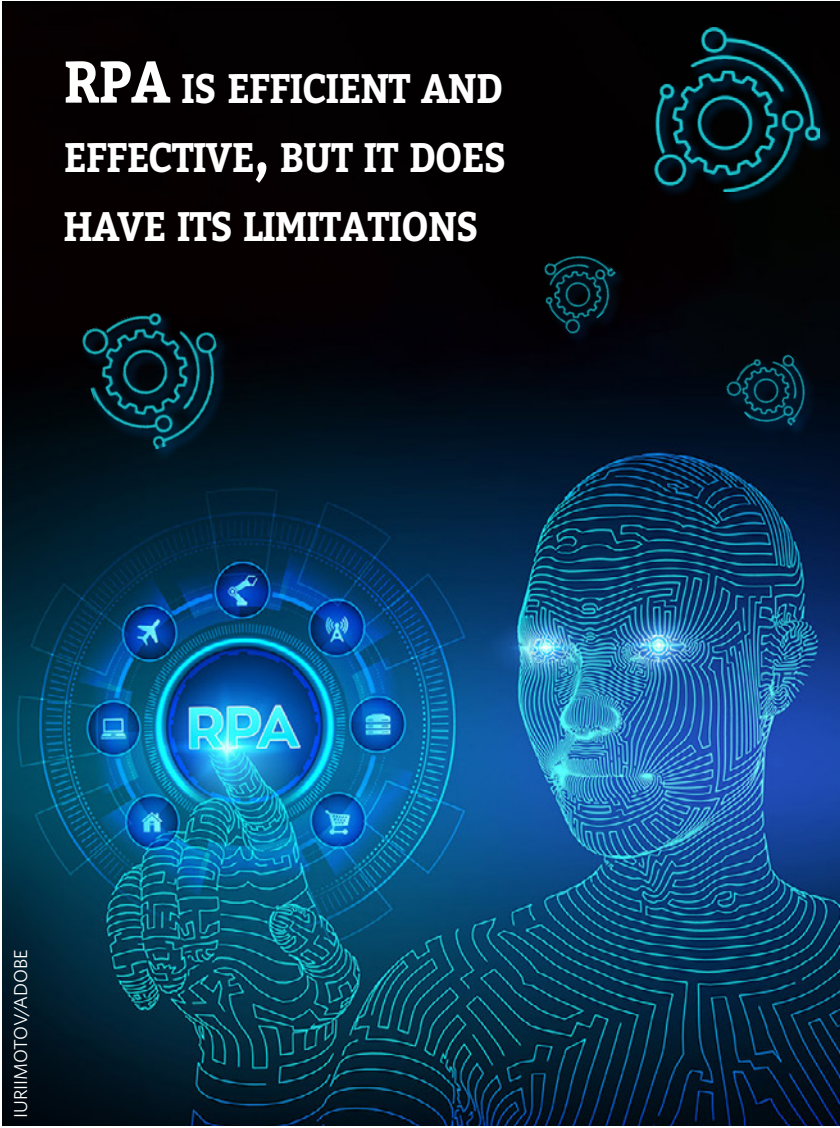
Internally, RWS uses RPA in invoice processing. The system can extract data from an invoice for, say, its German branch, extract the relevant information and translate it into English – without having to translate the whole document.

"It's about productivity," says Bara. "It's minimising time spent on non-productive repetitive tasks. Why would I spend time doing tasks that a robot can do on my behalf? Why have 100 people reading emails from customers or have a robot push them to humans?"

RPA – LIMITATIONS AND PROSPECTS
Robotic process automation is efficient and effective, but it does have its limitations.

"RPA is essential for BPA, but it doesn't consider how IT systems are connected through data flows and how these IT systems compute and deliver results behind those scenes, which

RPA IS EFFICIENT AND EFFECTIVE, BUT IT DOES HAVE ITS LIMITATIONS

IURIIMOTOV/ADOBE

are managed and triggered by users through data entries or mouse clicks," says Forrester's Schaffrik.

This is leading users of RPA, and suppliers, to try to make systems smarter. One advantage of RPA is that it is data- and application-independent. This allows it to work hand-in-hand with machine learning and artificial intelligence tools, as well as human operators.

"Because an RPA tool can take data from any feed, you can use other 'sister' tools to be a complex rules engine, or read a piece of paper and structure it or structure an email so the RPA tool can complete the prescribed next best actions," says Gartner's Tornbohm.

But as a rules-based, deterministic system, RPA can't make decisions on its own. For that, it needs to team up with machine learning or artificial intelligence. It also relies on structured data. AI offers the potential to replace human interpretation of unstructured data with an automated process.

"Once a machine is stood up, it is deterministic – it does the same automation time and time again," says SAP's Schroetel.

But in the future, RPA will go "broader and deeper" into business processes, he adds. This could lead to intelligent, or even autonomous enterprise systems, such as ERP. "We may see models that can take intelligent decisions and, step by step, move towards robots that don't just build cars, but more intelligent ones that run financial processes," says Schroetel.

> **PERHAPS THE GREATEST POTENTIAL FOR SMARTER RPA LIES IN SYSTEMS THAT CAN LEARN AND IMPROVE AS THEY WORK**

This will draw on developments in AI and supporting technologies. "Across industry, RPA is being leveraged to become more intelligent," says Jack Watts, head of AI at NetApp. "Computer vision, for example, is being leveraged in a greater way. In the past, this would have been used to recognise characters and numbers on a cheque being paid into a bank. Today, entire invoices, purchase orders and even forms of identity are being ingested into ERP systems."

The whole invoice-to-payment process can be automated, with limited human oversight. And improvements in computer vision are extending robotic process automation into other fields, ranging from medicine to law enforcement.

LEARNING SYSTEMS

But perhaps the greatest potential for smarter RPA lies in systems that can learn and improve as they work. More prosaically, systems that also use their intelligence to make it easier for humans to automate processes in the first place.

"RPA application suppliers have introduced discovery tools as well as process mining solutions for process streamlining and re-engineering," says Jukka Virkkunen, co-founder of Digital Workforce. "Better functioning and business-supporting processes will continue to operate autonomously and will not require management like the current ones."

In short, the next generation of RPA will find, and fix, problems.

"RPA is being integrated as part of larger intelligent automation systems," says Kalyan Kumar, chief technology officer at HCL Technologies. "You can have a chatbot or cognitive virtual assistant at the front end and RPA in the back end to execute activities or as part of an orchestration process. Then you really start to get value from RPA."

RPA, although effective, can be time-consuming to set up because a human has to capture the processes and write the rules. Over the last few years, RPA suppliers have moved towards low-code or no-code environments to make it easier for business units to create their own RPA systems or bots. With tools such as Microsoft's PowerAutomate, bots can even be created by individual users on their desktops.

"Over the past 10 years, RPA has upskilled an entire generation of non-technical citizen developers," says Kofax's Huff. "Now 'automation builders' can use AI for intelligent content processing, to allow better collaboration between people and machines."

But whether RPA, even with AI, will deliver its potential will depend on how it is implemented. "There is always a risk that you just automate an inefficient process," says Gartner's Tornbohm. "There is also a risk that you hold on to a bad applications suite when it should be rethought – and that you lose some opportunity to justify the legacy replacement as it is supported by RPA."

CIOs need to be sure that RPA is not simply patching up systems that are past their sell-by date.

And, as RWS's Bara says, the best way is to start projects small and then grow. "Projects are not successful when they try to tackle large problems early on," he says. "The way to do it is to break it down so you solve big problems by solving small problems. That is where RPA needs to go." ◼

SUPPLIERS HAVE MOVED TO LOW-CODE OR NO-CODE ENVIRONMENTS TO MAKE IT EASIER FOR BUSINESS UNITS TO CREATE THEIR OWN RPA SYSTEMS OR BOTS

MANUAL

RPA

IURIIMOTOV/ADOBE

COMPUTERWEEKLY

HCI: WHY SOFTWARE-DEFINED EVERYTHING MIGHT NOT WORK FOR ALL DATACENTRES

Choosing the right converged infrastructure in the first instance can pivot on a trade-off between security and agility requirements. Fleur Doidge reports

HURCA/ADOBE

While all datacentres have in essence become defined by their software, going for a fully fledged, software-defined hyper-converged infrastructure (HCI) will not always be the right course for every operator.

Not all operators need maximum abstraction and, for those that do, there can be critical barriers to achieving a true HCI-based environment.

Ross Warnock, director at datacentre infrastructure provider and consultancy EfficiencyIT, says the essential trade-off to consider is likely to be between security and agility. However, datacentre operators should kick off the decision-making process by ensuring that they have the difference between converged and hyper-converged infrastructures clear, he adds.

Suppliers use the terms to mean different things – typically leaning towards the specific context in which the supplier in question operates.

"There is a lot of misinformation out there," says Warnock. "Converged and hyper-converged infrastructures are similar and share the same goal. Converged infrastructure is primarily designed to simplify the deployment of compute networking and storage resources. Hyper-converged has the same goal but a slightly different approach, in the sense that hyper-converged infrastructure is with software-defined compute – and typically on commodity components."

Some operators may want to maintain a portion of their storage fabric, while others will not want to have "all their eggs in one basket", he says.

Operators should ask how much flexibility in design and equipment they need, and consider their overall security requirement on top of that.

For many companies, that primary HCI goal of easing management by having a single control pane is unattractive, says Warnock. It represents a potential vector for an attack which, if successful, could give the perpetrators access to anywhere and everything. "And that is not necessarily a flaw in the product," he says. "So that's probably the main difficulty."

There are several reasons not to go for maximum abstraction, including the question of in-house skillsets.

TRADITIONAL APPROACH

Warnock says the traditional approach of having a team that includes one person focused on storage, another in charge of networking, another for applications and yet another on the application layer will partly cancel out the benefits of an HCI migration.

"You need someone who understands all those elements well enough," says Warnock. "With the skills that are in it, that can be difficult. If you speak to a storage specialist, their networking knowledge is generally very limited. So to get someone at that level who is an expert in all those fields is difficult."

After all, a key HCI driver is about looking to manage the whole shebang via a single pane of glass when a migration is complete, he adds. Also, can you take the team with you? HCI migrations are complex, even stressful. Close examination of all assets and requirements is essential and even when done right, remediation will be required, simply because it is a move to a new environment.

"In some cases, there will be quite a lot of remediation; in others, things will be quite simple," says Warnock. "Sometimes it can't be done, so you physically cannot move."

He doubts that a "lift and shift" migration in one bite would be feasible in many cases, except perhaps in a very small environment with relatively "loose" requirements – maybe a startup with everything virtualised, rather than a lot of applications that will struggle in a hyper-converged environment.

"In reality, you see so many legacy applications that people are still running from years gone by that they are just trying to hold on to," he says. "There is always something there."

WEIGHING UP THE COSTS

Organisations need to confirm first why they want HCI, he says. If it is to reduce costs through easier management, those hoped-for savings can be years away. A company needs to be in a position where it can afford to put those years in and come out the other side.

> **HCI MIGRATIONS ARE COMPLEX, EVEN STRESSFUL. CLOSE EXAMINATION OF ALL ASSETS AND REQUIREMENTS IS ESSENTIAL AND REMEDIATION WILL BE REQUIRED**

Instead, companies doing HCI are often looking to speed up application deployment, says Warnock.

According to supplier Nutanix, in its HCI business case guide, operators must be sure they are comparing apples with apples when estimating the total cost of migration. Traditional storage-area network (SAN) and all-flash arrays have their own migration requirements and costs, and there is depreciation to account for, while typical cloud supplier total cost of ownership calculators often assume cheaper tech, it says.

Nutanix recommends estimating the number of virtual machines (VMs) across pre- and post-migration infrastructures, and including the cost and number of each specific server as well as of separate storage systems and SAN components, networking costs, virtualisation and licensing, not forgetting operating expenditure including admin, rack space, power and cooling. HCI, on the face of it, offers benefits by enabling infrastructure to be paid for as it grows, the supplier notes.

This is another reason why migrating workloads as needed will suit more operators than rip-and-replace – retiring older infrastructure as they go, evolving cluster by cluster instead of risking everything on a forklift upgrade. That way, they will be more likely to able to take advantage of new CPU, GPU, solid-state drive (SSD) and memory technologies as they emerge.

According to EfficiencyIT's Warnock, more customers are moving to HCI now, partly because not everything belongs in the cloud. "A hybrid approach works best for most businesses," he says. "In 2020, those that had solutions ready in some way to work from home, and who had the infrastructure

It is important to consider the cost of HCI migration to reap the benefits

HURCA/ADOBE

platform, certainly benefited. Other organisations were just playing catch-up from the get-go."

Dominic Maidment, technology architect at business energy supplier Total Gas & Power, has been involved in his employer's convergence migration for five years. He agrees that the best strategy for most will be workload by workload – not least because of the difficulty of dealing with legacy applications.

"We are not actually that keen to run those emulation programmes in terms of virtualising those loads," he says. "What we would rather do is extract and recode the apps, retest everything, and then move that onto a modern platform – otherwise, we are just shifting the problem."

Preparation is necessary, whatever the strategy, says Maidment, but companies should make their choices in their own time. That might mean a different solution or strategy, which may or may not suit a specific supplier.

Total Gas & Power, for instance, may have chosen differently if it had more of a focus on containerisation instead. At the same time, the firm urgently needed to replace its main disaster recovery (DR) facility.

Maidment adds: "Is HCI in general inevitable for everyone? Well, all the storage companies are putting massive amounts of R&D [research and development] into running in public cloud. And abstraction is basically the thing that makes HCI projects or products really cool. But abstraction is also the thing that makes the public cloud attractive, in that you don't have to deal with the noise and pain, and keep things going."

Todd Traver, vice-president of digital resiliency at the Uptime Institute, suggests that most companies could at least consider HCI. Of course, some may prefer to avoid the loss of control that comes with maximum virtualisation, being "one layer removed" rather than working directly with a storage device or CPU.

"The only people who shouldn't are those not prepared to do it, or who somehow think HCI is a cure-all for all the problems they have today, if they're currently a mess with high technical debt," says Traver. "And down the track, if people go there, then what's the next step after HCI? What are they looking forward to being able to do in future for which that is a necessary stepping stone?"

A trigger might be support ending for their underlying database products, or all the servers and storage reaching end of life, with support costs and outages soaring. "Those are the things that would trigger the effort to convert to HCI," says Traver. "But HCI is not something you would want to do in a big hurry." ■

> ## "THE ONLY PEOPLE WHO SHOULDN'T [DO HCI] ARE THOSE NOT PREPARED TO DO IT, OR WHO SOMEHOW THINK HCI IS A CURE-ALL FOR ALL THE PROBLEMS THEY HAVE TODAY"
> TODD TRAVER, UPTIME INSTITUTE

AI PROJECTS YIELD LITTLE BUSINESS VALUE SO FAR

Artificial intelligence has been red hot in recent years, but it is generating precious little business value so far, although some companies have achieved success, writes Cath Everett

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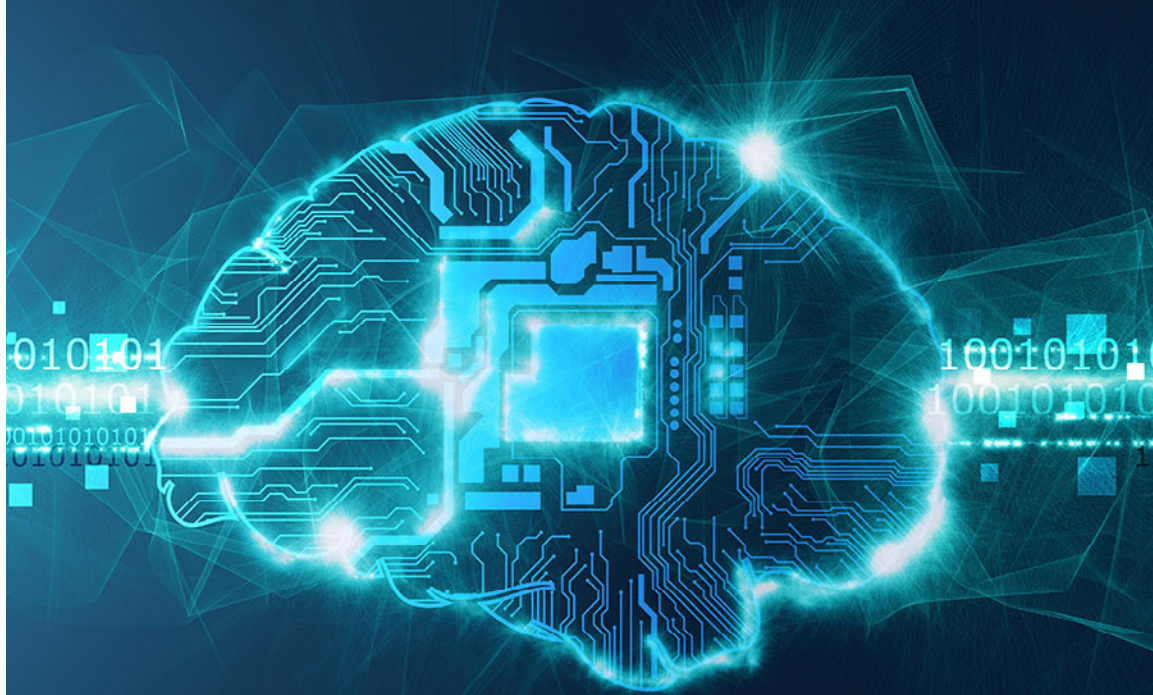
Although growing numbers of organisations are working with artificial intelligence (AI) software in some shape or form, very few are generating significant financial benefits when rolling it out in a serious way, according to new research.

A study conducted by the MIT Sloan Management Review and management consulting firm the Boston Consulting Group revealed that as many as 57% of the 3,000 managers, executives and academics questioned were currently either piloting or deploying the technology. A further 59% had devised an AI strategy and 70% believed they understood how the software could generate business value.

Despite this situation, the report, *Expanding AI's impact with organizational learning*, indicated that just one in 10 organisations were deriving significant financial value from the technology.

When exploring the reasons why, researchers found that simply getting the basics right – that is, having an appropriate strategy with the right supporting data, technology and skills in place – was not enough. Only one in five organisations gained major financial benefits that way.

Getting the basics right while building AI systems that the business actually wanted bumped success figures up to 39%, but to truly generate financial value, the secret appeared to be threefold:

1. Ensuring machines were in a position not only to learn autonomously, but also for humans to continuously teach them and for machines to continuously teach humans.
2. Developing multiple ways for humans and machines to interact based on context.

3. Introducing extensive process change in response to what has been learned across the organisation as a result of using AI. David Semach, a partner and head of AI and automation at Infosys Consulting for Europe, the Middle East and Africa (EMEA), agrees with the researchers that satisfaction with the technology in a financial sense is often quite low, partly because organisations "are mostly still experimenting" with it. This means it tends to be deployed in pockets rather than widely across the business. "The investment required in AI is significant, but if it's just done in silos, you don't gain economies of scale, you can't take advantage of synergies and you don't realise the cost benefits, which means it becomes a cost-prohibitive business model in many instances," says Semach.

Another key issue here is the fact that most companies "mistakenly" concentrate on using the software to boost the efficiency of internal processes and operating procedures, rather than for generating new revenue streams.

"Where companies struggle is if they focus on process efficiencies and the bottom line because of the level of investment required," says Semach. "But those that focus on leveraging AI to create new business and top-line growth are starting to see longer-term benefits."

> "**THE INVESTMENT REQUIRED IN AI IS SIGNIFICANT, BUT IF IT'S JUST DONE IN SILOS, YOU DON'T GAIN ECONOMIES OF SCALE, YOU CAN'T TAKE ADVANTAGE OF SYNERGIES AND YOU DON'T REALISE THE COST BENEFITS**"
>
> DAVID SEMACH, INFOSYS CONSULTING

A problem, however, is that people both in IT and the business are "restricting their thinking due to their resistance to change" as well as "concerns over their own jobs and being replaced", he adds. "So, it's not just about inadequate human-to-machine interaction – it's about companies not adopting the right strategic mindset and approach. The issue is that people are not actually truly understanding what AI can enable to support the business strategy, business change and potential disruption for good."

Another consideration, says Angela Eager, research director at TechMarketView, is that adopting AI involves a steep learning curve, but most UK organisations are "fairly early on in the maturity curve". One of the main challenges they face relates to data, and how clean, accurate and "aligned to your purposes" it is, she says.

A key issue here is that it takes time and effort to develop and train suitable data models, especially given that there are currently few tools to help – although machine learning operations (MLOps) is starting to prove its worth here.

"A big stumbling block today is how to operationalise AI, get it into production and keep it relevant once it's in production," says Eager. She explains that when creating a data model, it is

> ❯ *Assessing the business and societal value of artificial intelligence capabilities.*

Case study: Chatbot technology helps World Remit cash in on changing demand

World Remit obtained a return on investment when implementing chatbot technology during the UK's first Covid-related lockdown by focusing on solving a key customer-based challenge and working closely with the business to do it.

The digital international remittance provider found that the number of people wanting to use its services to send money abroad doubled overnight because they no longer had access to the corner stores that had traditionally undertaken transactions using players such as Western Union. This led to a boom in demand for online facilities among older customers who were not always as digitally savvy as the firm's more usual clients.

It also led to a boom in the number of calls to World Remit's call centre, with many queries simply about how the service worked and where it was possible to send money to and from.

As a result, the firm decided not only to put a "frequently asked questions" page on its website, but to introduce chatbot software on the "contact us" page to answer a number of prescribed questions. If customers' queries remained unanswered, they would be handed off to agents who could support several at once using live chat, leaving phone lines free to tackle more complex issues.

The ServisBot conversational AI bot was introduced in two weeks because, as Justin Sebok, the organisation's senior product manager, points out: "It was a burning business problem we had to solve in days rather than months."

The tech team initially had daily stand-up meetings with customer service leaders and the product team to review the approach being taken and ensure continual improvement.

Another consideration was learning from past mistakes. When the firm had introduced chatbot technology before, the right underlying data was not in place to answer open text queries, particularly from people for whom English was not their first language. This led to the software being taken out of operation.

To avoid a similar problem happening again, it was decided to adopt a menu-based approach that enabled users to navigate through a number of options. "We wanted to avoid open text because, while we want to get there in future, it does need to be approached in a really careful way," says Sebok.

However, the company has reached the limits of what it can do with a menu-based approach and will evaluate how to take things forward. A key aim is to integrate chatbot tech with its back-end systems,so as to answer questions in a more sophisticated way.

Another goal is to boost customer retention by embedding the software in specific contexts, such as the website's payment pages, so clients can receive appropriate advice. "At this point, it's been about creating efficiency by keeping a handle on costs while coping with a huge influx of transactions," says Sebok. "But as we get more contextual and move into places with more customer service friction, we hope to see more revenue growth."

Case study: Virgin Hyperloop employs AI to conduct 'orchestra of movement'

Without AI technology, Virgin Hyperloop could neither have designed its new hyperloop-based transportation system nor made a case for receiving fresh tranches of funding from its investors, says Jerome Wei, the firm's senior director of machine intelligence and analytics.

The proposed system, which is based on already incredibly fast magnetic levitation, or maglev, trains, is made even speedier by the fact that they travel along inside vacuum tubes. Virgin Hyperloop, which is based in Los Angeles, trialled its first-ever passenger journey using the technology in November 2020 when two employees travelled the length of a 500-metre test track in 15 seconds, hitting 107 miles per hour in the process.

The goal is to have the system certified by 2025 and for the company to roll out its first commercial version by 2030. But to hit those ambitious targets, Wei and his 18-strong team are focusing less on the hardware itself and more on how it can be used in the most effective, efficient and safety-conscious way.

"The aim is to make it a demand-responsive system, so, just like Uber's ride-sharing platform, you don't have to wait for the scheduled arrival of a vehicle," he says. "Instead, the system adapts to user requirements and allocates capacity as needed."

This would lead to fleets of thousands of small, driverless vehicles "coordinated in an orchestra of movement", says Wei. To enable this vision, the programme of work has been split into two key areas: the first is to design physical infrastructure, such as tube tracks and stations, and the second entails optimising how trains could move around this infrastructure most energy-efficiently and effectively, given geographical and other constraints.

As a result, the use of AI technology is vital, says Wei. "We're trying to advance design and product maturity quickly and iteratively on timescales that would be unachievable with usual methods," he adds. "Humans don't have the capability to integrate so much information in such a detailed manner, aggregate it and come up with a suitable design. It's not possible."

Using the Amazon Web Services platform, his team undertakes the simulation and analysis of big datasets using Databricks' platform to assess the pros and cons of different design ideas and understand whether or not they work, based on indicators and metrics that are important to investors.

Another crucial objective is to use the data to "represent and convince and substantiate claims of how much value we can bring", says Wei. "It's not a cheap endeavour as it's not like we're building a user-facing app. In total, it'll cost over $400m."

Wei says AI software is the best solution in this scenario, where processing huge amounts of data to understand complex scenarios and real-world problems is vital. "Humans can't contain the scale of all of this in their minds, so it's about using the technology that's most appropriate to the problem you want to solve."

important to ensure the data is "fresh and appropriate" and suitably cleansed. "But you also need to know how to train the data model, change it in-flight and manage the lifecycle once it is deployed – and not just as a one-off," says Eager.

"Data changes all the time, so you have to constantly ensure it is generating the right business outcomes, and change things quickly if it isn't."

Doing so requires not just having access to the right data, but also the right skillsets, both at the technical and more general data analysis level. This means upskilling may be needed in parallel with any technical initiatives, not least to educate business users and help them understand possible use cases.

But such activity also needs to take place as part of a wider change-management initiative to help employees address their fear of, and resistance to, transformation. Just as important is creating a centre of AI excellence, or AI function, with an enterprise-wide remit to oversee the creation of synergies between different business functions that lead to economies of scale.

"Ultimately, this isn't just a technical project," says Semach. "It's about generating cultural change, which means that putting people first is absolutely key." ■
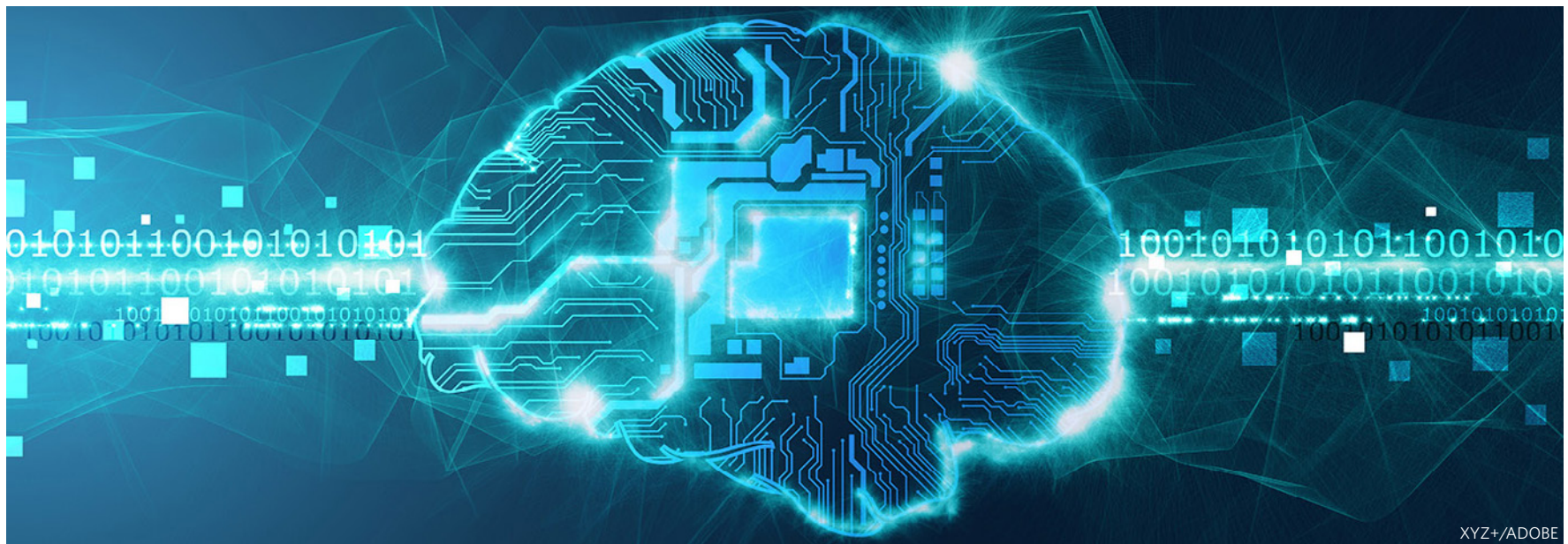
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A1018s & heartbreak

Comparison service site Uswitch has produced research that claims our homes are hoarding a combined total of 184 million unwanted items of technology, amounting to a worth of £7bn.

While a big chunk of that valuation comes from old laptops, TVs and digital cameras, some three million of us are also said to still be holding onto brick phones from a bygone era. Our father is one of those people, so we contacted him on his relatively avant-garde iPhone 5 to ask what he gets out of keeping a plastic-wrapped Ericsson A1018s somewhere in the back of his drawer. He declined to comment.

We can only assume he'd been waiting for something like Envirofone to exist, only to find it has no interest in a retro handset already offered up for £7bn by 2,999,999 other dads. ∎

❯ *Read more on the Downtime blog.*

"**Millions of us are hoarding old, unwanted tech that could be recycled to re-use the precious metals inside. Mobile phones, laptops, games consoles, cameras and TVs all hold a lot of value and can be exchanged for cash with minimal effort**"

Ru Bhikha,
Uswitch.com