AI FOR BUSINESS

GENERAL/NARROW AI

Grounding sci-fi ambitions in reality

Is "general" artificial intelligence still something service providers should be trying to achieve, or would their efforts be better spent on building more robust "narrow" AI systems?

Oliver Pickup

Ridley Scott's 1982 cult film *Blade Runner*, based on Philip K. Dick's science-fiction classic *Do Androids Dream of Electric Sheep?*, came of age five months ago: its dystopian futurescape was Los Angeles ablaze in November 2019.

While some elements accurately hit today's world, now stricken by the coronavirus pandemic, the planet is dangerously warm and computers can be commanded by a human voice for instance, other predictions fall short. High-collar, full-length trench coats are unfashionable, flying cars have failed to take off and, most pertinently, so-called 'general' artificial intelligence (AI) does not exist.

Sci-fi is increasingly becoming sci-fact, admittedly, but a technology that can replicate a range of highly advanced human characteristics – the basic definition of general AI – does not walk among us, yet. Moreover, the so-called singularity, when machines achieve sentience and technological growth becomes uncontrollable and irreversible, is some distance away, most experts say.

"Think of general AI as HAL from *2001: A Space Odyssey*, or Skynet in the *Terminator* series," suggests Bernd Greifeneder, founder and chief technology officer of leading automated-software organisation Dynatrace. "We're currently nowhere near that becoming a reality, with estimates ranging from it being five years to a century away. Some even believe we'll never see general AI step out of sci-fi and into the real world."

Arguably that conclusion is good for the longevity of the human race, though not everyone agrees. "Unless humanity takes a wrong turn, general AI is likely to arrive around 2050, perhaps sooner," says David Wood, chair of London Futurists. "General AI, handled wisely, can enable humanity to enter a profound new era that I call 'sustainable superabundance', in which we can transcend many of the cruel limitations of the human condition that we have inherited from our evolutionary background."

> **Focusing on general AI as a leader is like seeing the wheel for the first time and spending your time dreaming about a Tesla. Make use of the wheel**

Wael Elrifai, global vice president of solution engineering at Hitachi Vantara, pleads for greater caution. "When we achieve general AI, it will drastically transform our economy and society in ways we can't even predict," he says. "We'll be faced with what Dr Stuart Russell, a pre-eminent thinker in the field, dubs 'the gorilla problem'. Namely, human beings will be outmoded by machines in the same way we evolved to dominate our gorilla kin.

"Finding our place in that future isn't a decision that can be left in the hands of a few. Technologists, educators, psychologists, policymakers and testing experts must put their heads together to consider how we measure human capital, improve human performance and ensure equity in a world where machine intelligence surpasses human capabilities."

For the moment, though, narrow AI, which is programmed by humans to focus on a niche task, will have to suffice. The hype around AI has calmed recently, in part because business leaders have realised it is neither akin to the general AI of Blade Runner or Terminator nor a silver bullet. Narrow AI, however, is potent if pointed the right way; those who work out what direction to aim at will triumph.

Besides, as Dr Iain Brown, head of data science at SAS in the UK and Ireland, posits: "The machines have already taken over, to some extent, and with little resistance." Our smartphones, smart speakers and driverless cars all rely on AI. "Self-learning machines are embedded in services or devices used by three quarters of global consumers," says Brown, "and algorithms choose what news we read and the entertainment we consume."

Canny members of the C-suite are beginning to realise the true potential of narrow AI. "General AI isn't a pipe dream, but it is irrelevant," says leading futurist Tom Cheesewright. "Focusing on it as a business leader is like seeing the wheel for the first time and spending your time dreaming about a Tesla. Make use of the wheel."

Indeed, according to Microsoft's *Accelerating Competitive Advantage with AI* report, published in October, businesses in the UK already using AI at scale are performing 11.5 per cent better than those who are not, up from 5 per cent in 2018. Further, the study calculates the number of UK companies with an AI strategy has more than doubled, from 11 per cent two years ago to 24 per cent in 2019. The report also finds that more than half of organisations in the UK (56 per cent) are using AI to some extent, including a rise of 11 per cent in machine-learning from the previous year.

"Narrow AI is certainly a more rewarding prospect for businesses in the short term, as it has more specific applications and so can help to overcome the clearly defined challenges that exist today," says Greifeneder. "It's also easier to manage the risks and ethical implications associated with it." As an example of granting too much autonomy to a machine, he points to Microsoft's infamous AI chatbot Tay, which began tweeting racist and inflammatory remarks in March 2016, after just 24 hours of exposure to users on Twitter. And, like any tool, AI can be used for good or bad.

"We don't need to wait for general AI to experience elements of AI utopia or dystopia," says Peter van der Putten, assistant professor of AI at Leiden University in the Netherlands and director of decisioning solutions for cloud software company Pegasystems. "AI is used successfully to understand the structure and function of COVID-19 and to mine COVID-19 research articles. But bias has been creeping into models to determine credit card limits, decide who needs to await a court case in jail or who gets selected for preventive care programmes."

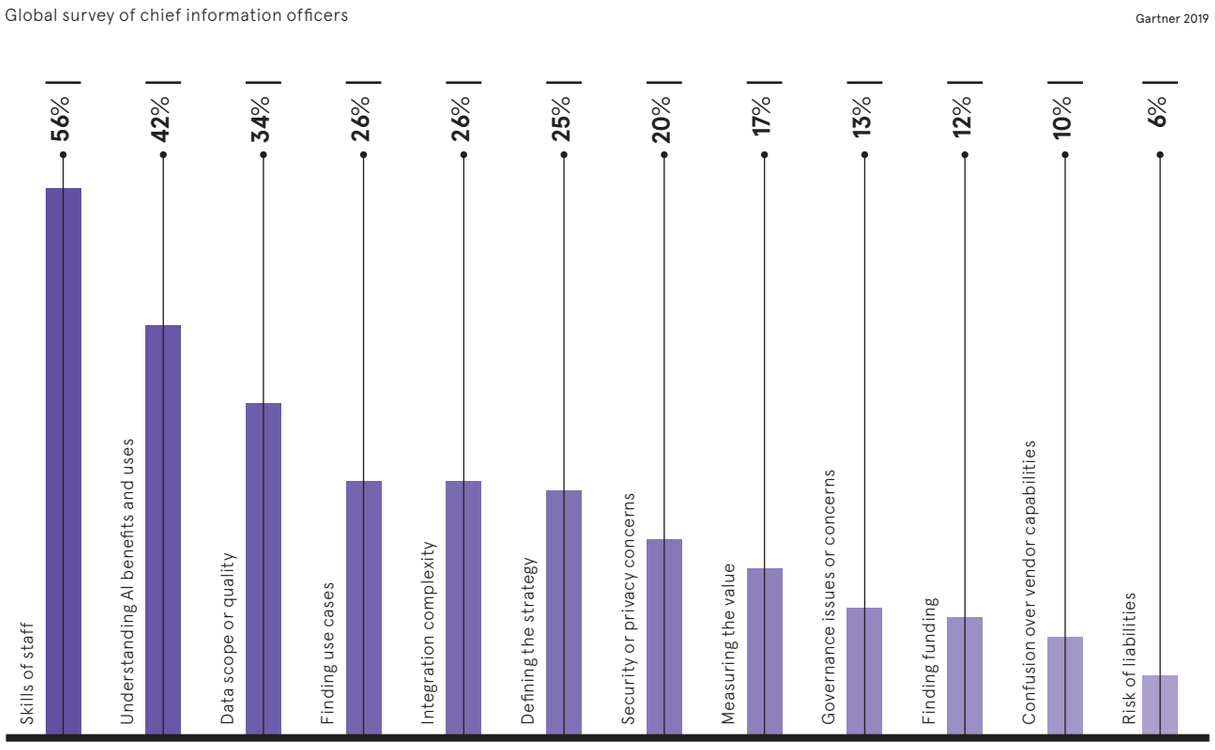
There may be justified concerns about algorithmic biases, how the associated technologies might develop and AI displacing human jobs. But it is critical for business leaders to understand what AI can achieve and it's certainly not for every organisation.

"If you don't understand what you are trying to solve first, you are carrying a hammer looking for a nail and AI is going to be of no real use," says Nick Wise, chief executive of OceanMind, a not-for-profit organisation using AI to protect the world's fisheries.

For now, the realm of sentient computers seems a long way off. And if we humans are prudent, if or perhaps when general AI becomes a reality, man and machine will augment one another. As Brown concludes: "The future belongs to the cyborg: humans working hand in glove with AI, rather than the android alone."

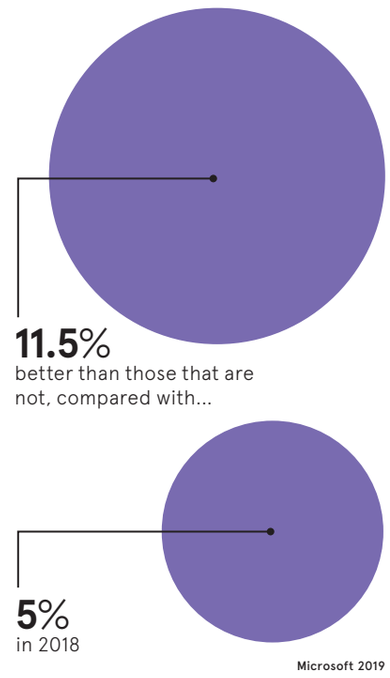
TOP CHALLENGES TO AI/MACHINE-LEARNING ADOPTION

Global survey of chief information officers



Gartner 2019

BUSINESSES IN THE UK THAT WERE USING AI AT SCALE IN 2019 WERE PERFORMING...



Microsoft 2019

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AI delivers resilience as we enter a new era

As the utilities sector continues to face significant disruption, AI chatbots are providing the resilience energy suppliers need while improving their customer and staff experiences

The utilities sector has been significantly disrupted by numerous market forces over the last decade, but none have been more significant than supporting millions of customers and employees during a global pandemic. Businesses of all sizes are rapidly responding to a significant rise in digital customer engagements while scrambling to support frontline staff now working remotely. Resilience is not a new theme for utilities, but new approaches must be adopted quickly for suppliers to survive.

In 2011, the big six energy firms had 98 per cent market share. Come this year and that had reduced to around 73 per cent and the number of energy providers in the UK had proliferated to more than 70. The cost of not adopting sustainable new models couldn't be higher, with 15 small energy suppliers having collapsed since January 2018.

An influx of nimble upstarts in the market has challenged the dominance of the big six. In 2011, switch rates were very low, with people typically only thinking of changing supplier when they moved house. Fast forward nine years, however, and annual switch rates now stand at around 20 per cent. This continues to grow despite a new energy price cap that came into force at the beginning of last year, with many households realising they can still get a better deal by shopping around and they often get a better customer experience too.

The latter has created a new battleground for attracting new customers and retaining existing ones, particularly those influenced by league tables compiled and published by influential independent organisations such as Which? and Uswitch, which rank suppliers based on aspects including service quality, availability and number of complaints.

"Energy suppliers aren't just competing on price with an unprecedented number of companies, they're also competing on customer experience, and a fifth of their customer base is at risk every month," says Lloyd Buxton, utility lead at Bold360 by LogMeIn. "In other sectors, providers delivering a better service can charge more for it. Energy firms can't do that because of the cap and profitability is already low, with a sector average of just 2 per cent. They need to do more with less, better, faster and cheaper."

In response to these challenges, energy suppliers are undergoing digital transformation programmes to drive cost efficiencies and improve customer experience. Increasing channel shift is an important metric for many businesses, especially those dealing with a surge in digital contacts, but it only delivers the desired benefits when it's coupled with a high level of digital containment.

Dealing with an issue via a chatbot interaction that costs the company a tenth of the cost of a phone call may sound like an obvious business decision. But if the chatbot doesn't resolve the issue, then the customer will escalate using a higher-cost channel and is likely to become more frustrated.

The accuracy levels of natural language and speech-to-text technologies, and the algorithms underpinning them, have advanced drastically in recent years, enabling companies to embrace chatbots for customers and staff in ways they previously couldn't. Increasingly, this includes deploying internal chatbots for routine human resources and IT queries. Remote workers can't just pop in to see HR or IT and ask a quick question.

"The technology has come on massively," says Buxton. "We're talking high 90s in terms of the percentage of intent recognition for a question to one of our chatbots, no matter how it is written. For example, a customer could say their power is off in numerous different ways: 'I have no supply.' 'My gas or electricity is not working.' 'I've lost power.'

"Internally, remote-working staff are using chatbots to ask HR and IT questions, and to guide them through processes. No matter how they phrase their question, the technology is able to understand what they're saying and respond accurately.

"This is tremendously significant for companies because the technology's working, it's understanding people's questions and it's fixing their problems, which is music to business leaders' ears because they can reduce their cost base while also improving the experiences.

"Bold360 is hugely effective for energy vendors as it's a multi-channel digital engagement platform with a view across the entire customer journey. Customers of Bold360 are now even able to pre-empt customer intent and offer proactive care based on behavioural triggers and the first few typed words of a question.

"Automating the right customer journeys to a high level of accuracy, such as resetting passwords or changing your address or direct debit, drastically reduces the strain on human agents. Then, when the journey does need to escalate to a human channel, be it via live chat, email, messaging or phone, the transition is entirely seamless because it is supported by one technology.

"Resolution rates grow across the entire customer journey by improving self-service and also increasing capacity in live service channels."

The biggest benefit to organisations, however, is resilience. In times of disruption, whether related to technology, regulation, growing competition, changing customer expectations or more macroeconomic factors, business resilience will often determine the market winners, and energy suppliers have faced all of these challenges concurrently in recent years. When a health pandemic is added into the mix, as with COVID-19, resilience becomes absolutely central to success and survival.

As the UK began its response to the COVID-19 outbreak and staff increasingly worked from home, Bold360 saw huge spikes in digital customer activity. Over just a couple of weeks, live chat volumes doubled across its client base and support centre queries increased by 500 per cent as people turned to digital channels when they couldn't get through on the phone. Meanwhile, chatbot volumes grew by around 30 per cent.

Put simply, those with a tightly integrated live chat and chatbot solution were able to continue to serve their customers while others crumbled under the pressure.

"Our clients have been able to offer a truly 24/7 service during these testing times," says Buxton. "They're not just limited to the hours they can have people in a building, if they can even be in the same building together.

"Artificial intelligence, or AI, gives them a live, quantifiable view of what their customers are asking after. Advanced algorithms cluster similar questions into single intents, making it easier to spot a problem and respond faster. It provides that needle-in-a-haystack view of where systems and processes need to change, and an early-warning system to deal with issues as they arise.

"Better resilience and engagement is also evident on the agent side. The technology is accessible via web browsers, which means all agents who need to work remotely can continue to respond to queries on Bold360 chat without disruption. And by removing the repetitive questions that live agents previously had to deal with, companies can offer a better employee experience which is likely to lead to even better productivity.

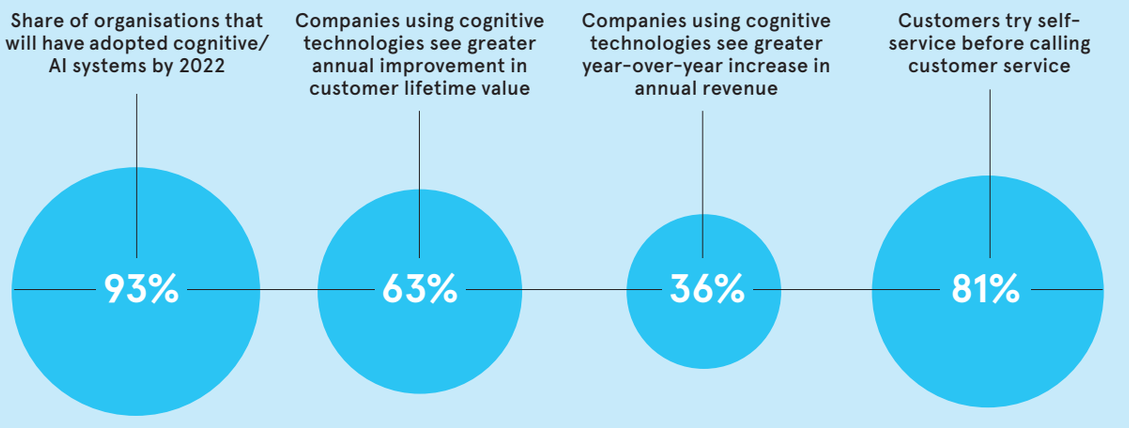
"If you can give staff better technology to work with, they will be happier and fundamentally they're going to be more resilient and provide more help in those times of need."

For more information please visit Bold360.com

bold360 by LogMeIn

"When a health pandemic is added into the mix, as with COVID-19, resilience becomes absolutely central to success and survival

USE AI TO CREATE BETTER CUSTOMER EXPERIENCES



CUSTOMER EXPERIENCE

88%
of companies are investing in or exploring AI

21%
of consumers rated their most recent interactions as 'excellent'

11 hrs
to resolve consumers' most recent interaction with a brand on average

71%
of businesses believe chat with bots and agents will be one of the most common channels within three years

49%
of customer inquiries are resolved during the first interaction

65%
of businesses said that AI would allow them to retrain their agents, or shift them to new types of work

76%
of businesses believe AI is changing the customer experience for the better

Utilita gets even smarter with chatbots

Already a leader in smart energy, Utilita has leveraged live chatbots to build a more intelligent and efficient customer experience while driving significant cost-savings

Utilita is one of the UK's largest energy suppliers outside of the big six, serving 800,000 households. As the first energy company to install smart meters in UK homes, it has led the way in smart energy. Nine in ten of the households supplied energy by the company have smart meters installed, compared to only around half across the rest of the nation.

Since launching in 2003, Utilita has sought to improve the experience of those who prepay energy. By linking a smart meter to an in-home display, users can see in real time what they consume, reducing usage by an average of 20 per cent. They can set daily, weekly or monthly budgets to control spending and top up in the My Utilita app.

As customer touchpoints are more frequent with prepay energy, call volumes are invariably higher than those associated with credit customers. Utilita specialises in customers facing financial difficulties or other challenges best solved with a reassuring voice at the end of a phone.

Most customer queries, however, are more routine questions with a simple answer. As a result, three years ago Utilita deployed a chatbot solution and since November 2019 it has been powered by Bold360 by LogMeIn.

"Having implemented chatbots previously, we saw a real difference in how Bold360 approached the initial scoping stages, starting not with what we wanted, but what was really driving our customers to contact us," says Chris Downs, head of delivery at Utilita. "This novel approach and Bold360's ability to implement the system quickly was attractive.

"As an independent energy company, we move quickly and need to adapt to the needs of our customers during what can be some really hard times. The Bold360 platform is so incredibly easy to use, which has allowed us to reduce the time it takes to feed the chatbot with the necessary information, speeding up the delivery to our customers."

Bold360 has delivered huge value for Utilita, while dealing with customer queries much faster. Its chatbot receives more than 220,000 questions each month, 71 per cent of which are answered without any human intervention. When the cost to fulfil a chatbot inquiry is mere pennies, compared to several pounds for a phone call, the savings are clear.

A core team of three people are responsible for identifying trends in customer behaviour and reviewing available content. Through close monitoring of Bold360'S easy-to-use dashboard, any questions that aren't being answered sufficiently by the chatbot are flagged, enabling the team to spring into action and provide answers or solutions, which can be accessed via the chatbot within minutes.

"Bold360's dashboard enables our team to easily identify questions that might require some additional web functionality," says Downs. "After seeing a trend for people asking for their customer reference number, we decided to create a widget where they could enter some security details and it would give them their reference number automatically. This observation has enabled 10,000 customers, who have since asked the same question via the chatbot, to self-serve saving thousands in call handling.

"More than 96,000 Utilita customers have used the chatbot on more than one occasion. It has clearly become the communication mode of choice for many, especially those in the younger, digital-native demographic. Other energy providers deactivated their live chat functions when volumes grew amid the COVID-19 outbreak, but this really defeats the point of what a chatbot is designed to do. During one of the biggest crises this country has faced, our well-managed and informed chatbot reduced call volumes by 84 per cent."

"Some energy providers deactivated their live chat functions when volumes grew amid the COVID-19 outbreak, but this really defeats the point of what a chatbot is designed to do

utilita life with power


Justus Menke/Unsplash

HUMAN INTELLIGENCE

Don't lose your secret formula

Companies are using artificial intelligence to tap into human intelligence – employee knowledge that businesses often can't access through conventional methods

Jon Axworthy

Let's talk about fried chicken, in particular, the finger lickin' variety coated in a blend of 11 herbs and spices. This may seem like a strange place to start an investigation into the convergence of AI and employee knowledge, but that famous recipe is a prime example of how documenting corporate knowledge can ensure continued business success.

After all, if the company's famous founder hadn't had the presence of mind to write down his original recipe on the sheet of notebook paper now locked away in a corporate safe in Louisville, who knows how the American company's commercial history would have been rewritten or if they would have had a history at all.

Every company has their own original recipe, their secret formulas and corporate secrets. In reality they have thousands of them, but rather than being locked away for perpetuity on paper, they are held in the minds and habits of employees, and this can be a significant limiter of growth.

"The existence of this tribal knowledge also poses a significant risk, particularly as the rate of change increases exponentially," says Charles Araujo, an independent digital analyst and founder of the Institute for Digital Transformation. "As organisations are forced to rapidly change course, these bits of undocumented, yet critical, information become a minefield of known unknowns that can threaten their ability to adapt."

However, AI can be leveraged against data from company intranets and collaboration tools such as Slack, Jive, Microsoft Office and Teams to extract hidden processes and uncodified knowledge, and turn it into known knowns that can then be made accessible through the mobiles and desktops of every employee.

Questions can be asked by employees of the system as if they were asking a relevant colleague at the water cooler, or a subject matter expert in a formal meeting, and AI platforms can analyse the syntax of a question to reveal the intent, even if it's asked in different ways, to provide advice and answers in real time.

This reduces the time the average employee spends trying to find colleagues who can help with specific tasks, highlighted in research from McKinsey & Company, which revealed the average interaction worker spends nearly 20 per cent of their working week searching for internal information.

The problem becomes even more acute during times of rapid change and remote working, as incidents become more frequent and the time to troubleshoot them increases, which is why using AI in business to digitise employee knowledge is now a priority.

"A key reason that incidents can take so long to resolve is the lack of timely access to the critical operational knowledge needed to validate, diagnose and resolve an issue," says Larry Lien, chief product officer at Resolve Systems.

This problem is only exacerbated in a crisis when there aren't enough hours in the day for experts to get involved in all the problems they would usually have the time for. "While experts are pulled into high-priority incidents, other incidents go unaddressed and these ignored incidents can have serious consequences that hurt the business," explains Lien.

An organisation that is carrying too much undocumented employee knowledge can also suffer from a slowdown in innovation and stunted growth as company-wide experts are drawn into fire-fighting instead of driving innovation.

The increasing sophistication of AI in business means that operational employee knowledge can be converted into mathematical models and critical decision flows digitised.

Starmind is a Zurich-based company focused on making the collective human intelligence within an organisation accessible with the power of AI. Founder and chief technology officer Marc Vontobel believes the current increase in distributed teams and remote working means there has never been a better, more crucial time to optimise hidden organisational intelligence.

"AI technology can help organisations sift through vast and growing data pools in real time to understand what information resides where and who knows what," he says. Self-learning algorithms that replicate how the human brain works are the key to finding this frozen knowledge and allowing it to thaw so it can begin to flow throughout an organisation.

> **Training AI to forget what's no longer relevant to make room for new intel will allow it to mirror the human brain's decision-making process**

"Human-inspired AI uses self-learning algorithms to create neural intelligence networks, which replicate how the human brain works, because it's important to remember that for AI to function effectively, it needs to learn how to forget, not just overwrite information, just like the human brain," explains Vontobel. "Training AI to strategically forget what's no longer relevant to make room for new intel will allow it to mirror the human brain's decision-making process."

Starmind's AI draws on data from more than 200 workplace apps to generate thousands of real-time employee skills profiles automatically and continues to evolve as the expertise develops.

This extracts the hidden processes and codifies employee knowledge, which can then be used to make any organisation more resilient and ready for the future.

In doing so it can also gift a company another benefit, an important communal hub that can bring employees closer together. This is crucial step towards longevity, especially in light of a Gallup survey, which revealed that for every two engaged workers – those who are involved in, enthusiastic about and committed to their work – there is one who is actively disengaged.

However, just because an employee is disenfranchised doesn't mean they have nothing to offer and often what they lack is access to a company camp fire where they can share knowledge and experience. AI has the potential to be that camp fire around which the true potential of any business can be unlocked.

Real-time insights

Woodside is Australia's largest natural gas producer, providing 6 per cent of global supply in 2019. The very nature of being a liquefied natural gas operator means reliability and efficiency are key if there are to be no disruptions in energy supply to customers and safety is maximised for employees.

However, in an organisation employing more than 3,000 people, making sure that engineers and operators have access to the right advice in real time, so decisions can be made quickly and safely, is essential.

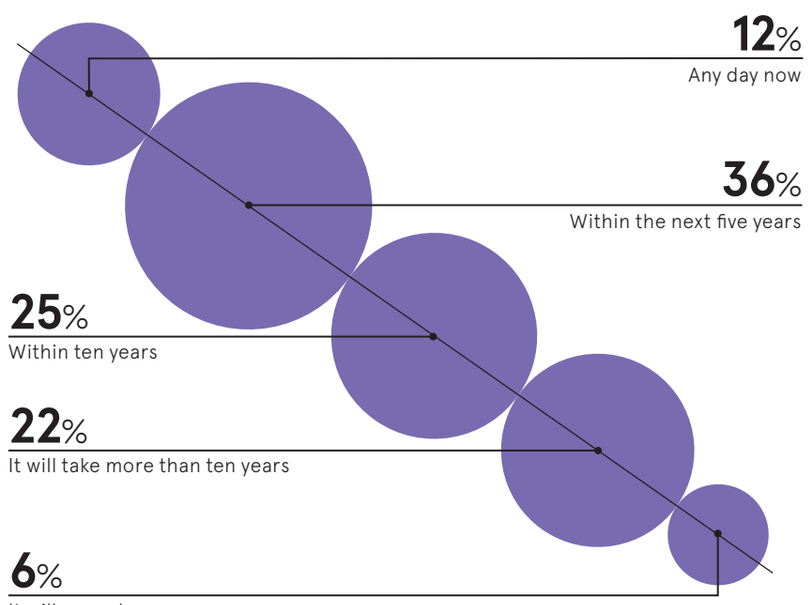
So, in 2016, Woodside partnered with IBM and began to use their Watson artificial intelligence platform, initially creating what developers called the "corpus", made up from previously undocumented knowledge and employee experience that was uploaded to the AI platform.

Woodside's engineers and employees were then able effectively to crowdsource answers to time-sensitive questions in a language they could immediately understand. This has led to the company being able to provide customers with energy more efficiently and do it with sustainability in mind.

Application of AI in their business has meant Woodside can provide "virtual pipelines" of truck-loaded energy more efficiently to supply customers who haven't had the benefits of pipeline gas and maintain the delivery of a third of Australia's oil and gas.

ARE WE NEARING SINGULARITY?

According to technology executives, the singularity – the point at which AI-assisted machines surpass human intelligence – will arrive...



Edelman 2019


Michael Dziedzic/Unsplash

18%

of organisations say they have a clear strategy in place for accessing and acquiring the data that enables AI work

McKinsey 2018

DATA

Promises and pitfalls of data synthesis

The more data an algorithm has to work with, the better its results will be. But not every business has access to enough data from which artificial intelligence can extract valuable insights

Edd Jefferson

Artificial intelligence: it's the "magic" that can solve every business problem imaginable. Except when it can't. Often, even where AI systems could provide revolutionary solutions, there are practical limitations. If your AI is going to learn from data, how do you make sure it has the right amount of data and that it's data you can use without heading straight for a legal minefield? This is where data synthesis comes in.

One reason companies are increasingly turning to data synthesis methods to build AI systems is primarily because synthetic data is easier to create. Take the example of software to direct self-driving cars. If building a learning model from real data, you would need to drive an actual car for millions of miles and even then you might not, and might not want to, encounter every situation a car could need to deal with. For example, you wouldn't want to test a real car's response to having a real toddler run out in front of it.

One solution to work around this is to train networks using simulated data by running a machine-learning algorithm on images of a virtual car driving through virtual environments, as in a video game. *Grand Theft Auto,* for example, was found to be a surprisingly effective tool for simulation in a study run by Intel and a German university in 2017. You can rapidly build a data set of massively varied situations that a real car might encounter without having to stage them in real time.

Using data synthesis methods to expand your corpus of data rapidly can also be useful for startups trying to compete with more established rivals. For obvious reasons, a small, new company has had less opportunity to gather real data to train algorithms. And realistic synthetic data gives them an opportunity to catch up, along with a better shot at disrupting the market.

Synthetic data can be used where there may be privacy concerns with real data, in healthcare or finance, for instance. Researchers have used machine-learning to generate x-rays showing different medical conditions which in turn have been used to train learning models. Because the data is synthetic, they can create far larger training sets that can be used without concern for patient privacy. Along similar lines, fraud detection systems can be trained using data synthesis methods without having to worry about exposing real financial data.

But synthetic data is of very limited use when you're trying to learn something new about the real world as the results will only ever tell you about the model of the world that generated the data. Reality can often turn out to be a lot more complex than even the cleverest predictive analytics have accounted for.

And even when testing established principles, synthetic data should always be used carefully. Has your clever neural network unintentionally eliminated edge cases that you should be testing against because they're too statistically rare to show in the model, for example? Have you unintentionally propagated bias in the real data into the synthetic data?

While data synthesis methods can help build AI systems more quickly and cost effectively, it's important to understand the limitations and risks. Ultimately, you're never going to be able to innovate without the real stuff.

Commercial feature

Reality of augmented innovation

Augmented and mixed reality technologies have advanced significantly, but enterprises must overcome challenges before they can maximise their business value

Augmented reality (AR) has come a long way since it exploded into the mainstream in 2016 with the launch of *Pokémon GO*, which smashed mobile app download records and introduced many people to technology that overlays virtual interactivity onto real-life views of the world.

Since then, a growing number of companies have explored its viability as an effective business tool, along with its tech "cousins" mixed reality (MR), which not just overlays but anchors virtual objects to the real world, and virtual reality (VR), immersing users in a fully artificial digital environment.

Major enterprises around the world have begun exploring the ability of AR and MR, in particular, not just to boost customer engagement, which dominated early-use cases, but also to enhance the productivity, safety and capabilities of their industrial workforce.

The impact of these technologies in production environments has enticed tech giants Microsoft, Amazon, Apple, Facebook and Google to enter the market, and analyst firm IDC anticipates worldwide spending on AR and VR will reach $160 billion in 2023, with notable investments in training ($8.5 billion) and industrial maintenance ($4.3 billion).

"Customer engagement has been a core driver of AR and MR investments because they're a great way of telling a story as well as immersing a person in a product or brand," says Paolo Capitelli, communities of practice director at Reply, which specialises in the design and implementation of solutions based on new communication channels and digital media.

"Product AR visualisation is especially powerful. There are great try-on tools for glasses, make-up and shoes, and IKEA customers have been able to see how furniture looks in their house for several years now. In the last 12 months, we've also seen intensive use of social apps that adopt photo filters over an augmented reality.

"However, in the age of Industry 4.0, MR and AR technologies are set to be even more transformative in optimising the daily processes of manufacturers and field workers. Though solutions in this area are still mainly in a proof-of-concept phase, their capabilities have taken several steps forward, allowing physical things such as plant or machinery to be augmented with digital information.

"This can be really beneficial in scenarios such as training employees to operate machinery, checking the real-time status of equipment or providing field workers with information that helps create a safer environment. Meanwhile, collaboration at distance becomes far more effective, particularly during periods like now when more people have to work from home."

93%

of enterprise users said that VR had had a positive impact on their business

98.6%

of enterprise users said that they were at least considering investing more into XR in the next few years

XR Intelligence, 2019

While the value on offer is potentially huge, numerous limitations have held enterprises back from embracing MR and AR technology quickly and at scale. They include the high cost of wearable devices, though prices are gradually coming down, a limited field of view on some headsets and lack of position accuracy in terms of millimetres, which is particularly challenging for manufacturing organisations.

As new innovations come on to the market, guidance has been lacking to help companies navigate the journey from initial AR and MR exploration to broad adoption, as well mastery of the tech and maximising return on investment across the broadest set of use-cases. Building applications from the hardware available can be costly because it still requires manual development and some devices are cumbersome or difficult to deploy in the field.

However, these challenges are being addressed as the platforms and tools that allow companies to develop MR and AR applications become easier to use.

On the software development side, the number of tools is growing as well as the number of applications that enable even those with no development or 3D skills to implement MR and AR applications. On the hardware side, new technology capabilities, such as 5G networks and the possibility for remote rendering, is allowing MR and AR headset manufacturers to build devices that are lighter because most of the computation is in the cloud.

With ten years' experience in MR, AR and VR, Reply supports companies in adopting these technologies by offering innovative solutions and services aimed at introducing greater efficiency in processes. The company guides organisations through the AR maturity model, beginning with the exploration and trial phase and then moving into deployment to solve business problems and establish operating models and governance frameworks.

Next, the AR strategy is connected to the broader enterprise IT ecosystem with multiple use-cases deployed and an organisation-wide operating structure for the technology is established, allowing processes to be reinvented, value to be measured and the new AR software platform to become available to the extended enterprise.

"It's a continuously changing process and the technologies are evolving rapidly," says Roberto Del Ponte, senior manager at Forge Reply, a specialist company within Reply focused on MR, AR and VR technologies.

"Reply is a trusted adviser to organisations looking to take advantage of these innovations. We prefer to test the technologies in our laboratories in Milan and Munich first. Some are discarded, some are adopted and only the best are presented to our clients. We can then help them understand where they can add value and which processes can benefit them the most.

> **"Collaboration at distance becomes far more effective, particularly during periods like now when more people have to work from home**

"We are assisting companies in the identification of the right processes, selection of the right software and hardware technologies, and of course in the development of the applications themselves.

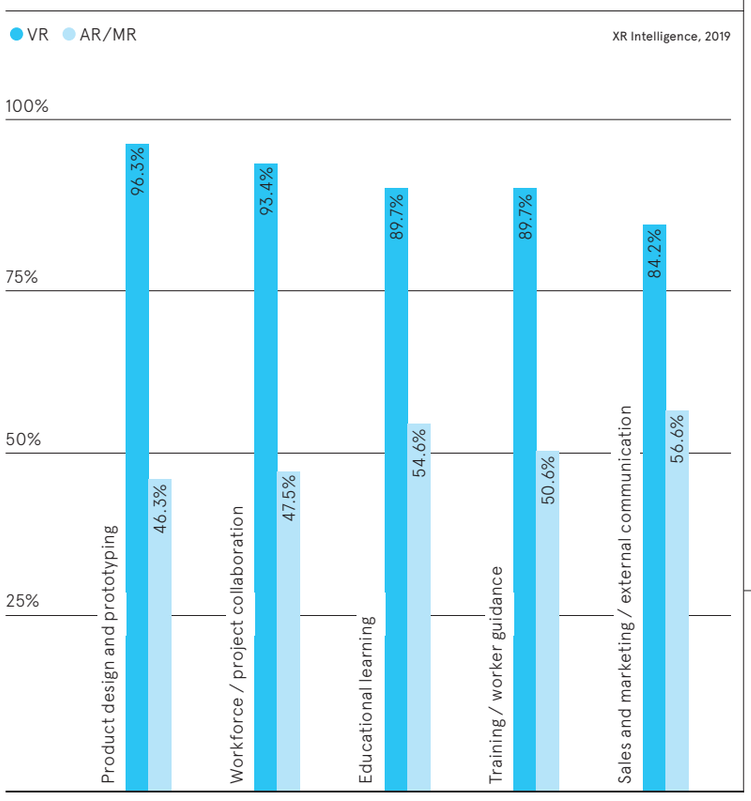
"It is important to start small and with the most effective use-cases. Once MR is adopted in a company, a wider range of ideas will actually be driven from the end-users. Investments in AR should also be part of a broader and structured process of digital transformation.

"Just like other technologies involved in digital transformation journeys, including the internet of things, big data, artificial intelligence and cloud, AR cannot be considered on its own. In fact, MR adoption is strictly linked to other digital transformation processes and should be considered within the wider enterprise digital transformation plan and investments."

For more information please visit www.reply.com

REPLY

XR USE CASES IN BUSINESSES

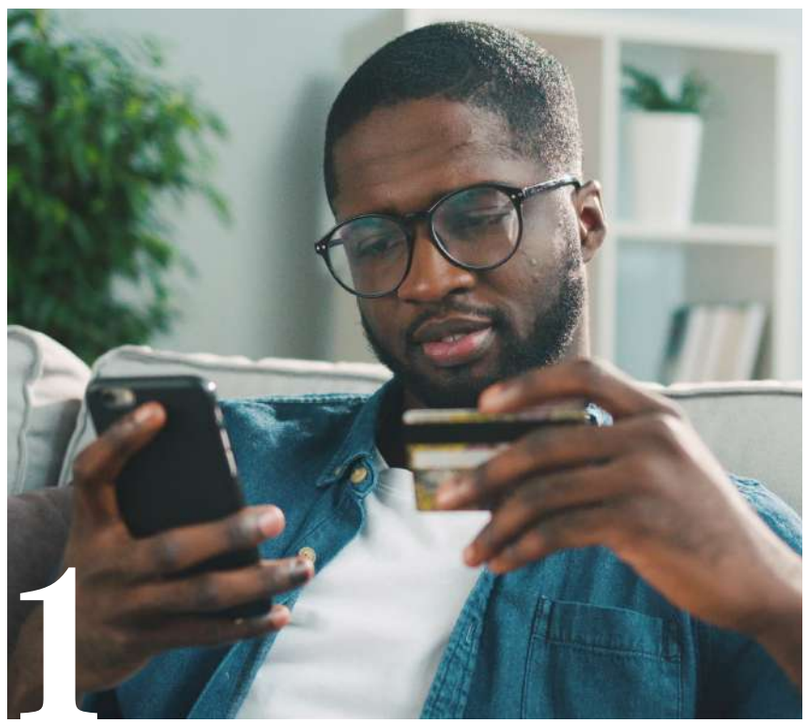


RISK MANAGEMENT

Using AI to cope in the coronavirus era

COVID-19 is having serious implications for businesses across the globe, as they adapt to the 'new normal' of operating an organisation remotely. Here are seven business functions at risk and the AI solutions that could help

Marina Gerner



1 Sales prioritisation

Sales and business development are suffering and AI-powered sales performance solutions can help. So-called propensity models can identify which customers are most likely to buy a product or service from a company, says Dr Tom Davenport, president's distinguished professor of information technology and management at Babson College, Massachusetts. These models can help those working in sales improve their productivity and effectiveness, by showing them which customers to prioritise.

"For brands, having insight into what their customers think and want has always been a key priority, but the COVID-19 pandemic has made this understanding even more critical," says Chris Colley, principal of customer experience at Medallia. But he notes, at the same time, collecting data on what customers think has become more challenging.

As people stay at home, consumers have shifted from personal interactions, where they provide direct feedback, to digital interactions. "Instead of visiting a bank branch where they can speak to the cashier, they are more likely to be banking online," says Colley. "As it's no longer possible to eat out, they'll be ordering online deliveries. The same pattern is being replicated in sectors across the board. This shift is creating a ton of new, unstructured data, which can be hard to make sense of." That's where AI solutions can cut through the noise and find out what consumers feel and need.

2 Matching demand and supply

Companies are interested in matching demand and supply, and that's going to be really critical coming out of this crisis," says Davenport at Babson College. "The good news is there's more and more external data available on demand." A big steel company, for example, has information about the various factors that might influence demand for steel, such as the demand for automobiles. These demand measures depend on external data that's used to match up to what their supply chains can produce. "So that you're not producing more than you need to satisfy demand and you're not leaving unfulfilled demand out there," he says.

AI solutions can analyse this external data. But, as Davenport points out, AI typically relies on data from the past, while the COVID-19 crisis is unprecedented. Therefore, companies have to ensure they use data that is representative. He says: "I suspect that in some industries, the past will be a better guide to present and future activity than it is in others."

Davenport notes that we do have data from the 2008 financial crash to go on, but the current crisis is happening at a faster rate and its consequences might differ. There are, however, some industries where spending patterns might continue at similar rates, such as groceries and consumer staples. "People have to buy detergent, no matter what," he says. Conversely, expensive consumer goods might struggle. Data from the last financial crisis might give some indication of how much demand there might be.

3 Document and identity verification

AI can work on identity and document verification, says Dr Terence Tse, associate professor of finance at ESCP Business School. Think of a bank, for instance, that needs to verify its customers for onboarding and compliance. This is often done by human checkers, who check payslips or driving licences. "It's a very costly, inefficient process," says Tse.

Instead, AI can be used to "quickly identify the type of ID document captured, determine if the security features of the ID are present, perform face-matching – comparing the picture in the ID to the person in the selfie – and even help determine whether the person is physically present", says Robert Prigge, chief executive at Jumio.

"For the past few years, digital account opening has been at the top of the list of technologies organisations intend to add or replace, but COVID-19 is pushing this element of digital transformation to the front of the line," says Prigge.

CORONAVIRUS

Fighting the outbreak with algorithms

The urgent race to understand and develop vaccines for the coronavirus pandemic has thrust artificial intelligence into the spotlight

Danny Buckland

Combating COVID-19 is a pivotal moment for AI in global healthcare as its potential falls under critical gaze. Computational power has been hailed a perfect solution to healthcare ills and now it has the ideal opportunity to prove its worth. But this is no carefully constructed trial to impress government officials or venture capitalists; this is a virus that spreads around the world with alarming ease and speed with wrecking-ball impact.

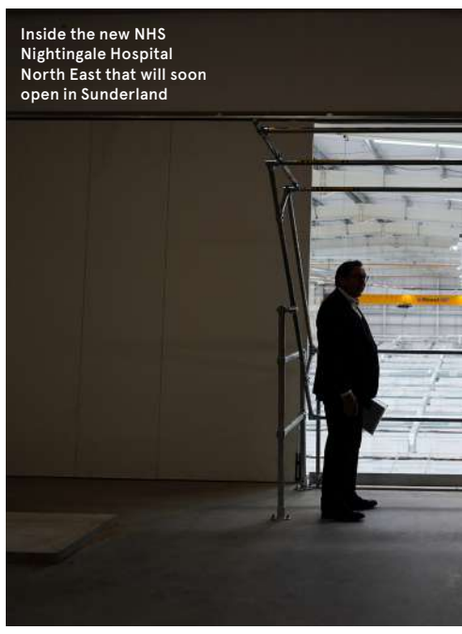
AI's role in stabilising and protecting our health will largely dictate its future, either as a critical component of healthcare or a peripheral player. The positive evidence is mounting up, not least in its significant part in helping scientists recreate COVID-19's genome sequence within a month; the SARS virus took months to unravel in 2003.

Laying bare the virus's internal mechanics has been the springboard in the race to develop vaccines and identify molecules that could lead to drugs to arrest and neutralise COVID-19's proliferation.

A novel vaccine candidate being developed in Australia owes its rapid progress to AI's ability to mine data. The team at Flinders University, in Adelaide used computer models of the virus's spike protein and its human receptor to illuminate the infection pathway and devise blocking strategies.

"The team has exploited the very latest technologies, including AI, advanced manufacturing and cloud computing to accelerate vaccine design, shaving years off normal development timeframes," says associate professor Dimitar Sajkov, a respiratory physician, who has been involved in previous human trials of pandemic vaccines.

UK startup Excsientia broke new ground when it became the first company to progress an AI-designed drug to human trials. Its algorithm completed the task within a year compared with the average five-year term under traditional methods.



Inside the new NHS Nightingale Hospital North East that will soon open in Sunderland

Back-office tasks

AI-powered cognitive assistants can perform a company's back-office tasks. This includes ordering new credit cards, issuing refunds or cancelling orders, says Faisal Abbasi, UK managing director at Ipsoft. He notes: "When the cognitive assistant is unable to handle a task due to its complexity, this can be seamlessly handed over to human agents to manage. This ensures the time of those team members is spent solving the most challenging problems and focused on value-add activities."

This process is often referred to as robotic process automation (RPA) and is increasingly combined with machine-learning. It spans all sorts of back-office service operations, as long as they are structured tasks, such as automating the claims processes of insurance companies or banks.

"Almost all the companies that I talked to about RPA said, 'Oh, we're just using it to free up people to do more creative, less structured work'," says Davenport at Babson College. But he notes that if the current COVID-19 crisis leads to a severe recession, which seems likely, companies will use it to replace workers. "My guess is that it's going to contribute to substantial job losses or at least slower growth of employment after the recession because companies will have automated a fair amount of work," he says.

Cash-flow forecasting

Over the next few months, cash flow is likely to continue to be a serious concern for smaller businesses as revenue streams dry up. But there are a number of forecasting AI solutions that can help. "Cash flow is always an issue in difficult economies," says Babson College's Davenport. AI solutions are already in place that analyse data for the purpose of cash-flow forecasting.

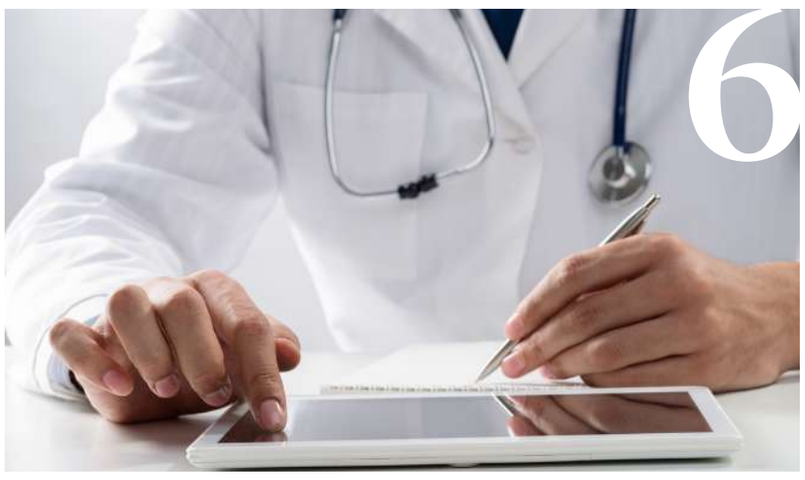
One important caveat is "you have to make sure you have the right data period to create models that would be useful for this current environment", he says. Once again, AI can only help if the data we feed it is representative.

"You have to go back to recessionary environments to ask, what were your cash needs in the past? And again, it's difficult because this recession appears to be happening much faster," says Davenport. Economic data comes in slowly and a recession is typically defined as two quarters of negative GDP growth. He adds: "We won't have this data until the end of June. But I think there is not much doubt among economists that we're in a recession already."

Medical support

The COVID-19 crisis has put unprecedented pressure on NHS staff as public health has taken centre stage. "Medical services have been terribly shaken and our beloved NHS may be near a coup de grâce," says Dr Alex Ribeiro-Castro, data scientist and senior teaching fellow at Imperial College Business School in London.

He says health tech may offer a temporary buffer to allow non-critical ailments to be treated, leaving clinics and hospitals free to focus on critical cases. An example is Doctorlink, which provides online doctor's appointments and has algorithms that can provide medically endorsed diagnostics. Another is Babylon Health, which is building an AI-based health app that can help diagnose patients' issues. It's effectively a chatbot that can "translate layman's language into medical terminology and deduce what may be causing the pain", says Ribeiro-Castro.



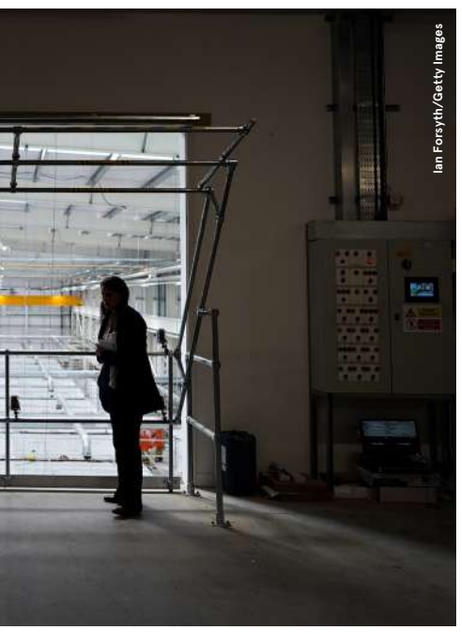
Dinesh Venugopal, president at Mphasis Direct & Digital, says: "AI-based chatbots and robot-advisory services can very well be useful in relieving the administrative burden on extremely busy and under-resourced healthcare staff, automating processes such as screening patients for symptoms and recording necessary information." By reducing the amount of face-to-face interaction between patients and hospital staff, this goes a long way to lessening the risk of spreading infection, he says.

Staff demand, supply and infrastructure

Given that many employees may have to self-isolate during the COVID-19 outbreak, AI can analyse the number of staff needed. "AI companies get requests from their clients to identify if they are likely to even have enough workers to staff a railroad," says Davenport at Babson College. In this case, AI can help to match demand and supply, but from a labour standpoint. "If companies are laying off people, they'd like to know it's the right number of people. Making sure you have enough people to staff a particular train or a production shaft could be quite difficult."

Transportation companies represent a significant component of a country's infrastructure. "They are faced with an unfortunate *Catch-22* situation: we, as a society, need to keep critical infrastructure and its employees healthy, however not all of them can manage critical infrastructure remotely," says Ribeiro-Castro at Imperial College Business School.

What's more, semi-automation is already implemented in certain forms of public transport. Ribeiro-Castro cites Navya, a company that designs and manufactures autonomous vehicles, such as shuttle buses at airports or theme parks. "AI is already being used more generally in the transportation sector to do things such as increase passenger safety, reduce traffic congestion and accidents, lessen carbon emissions, and also minimise overall financial expense."


Ian Forsyth/Getty Images

The Oxford-based company, which is a spin-off from the University of Dundee, is now screening 15,000 drugs and exploring antibody and vaccine development for efficacy against COVID-19.

Benevolent AI published research in February detailing how anti-viral and anti-inflammatory drugs could be repurposed to fight the virus. Its proprietary knowledge graph used machine-learning to interrogate oceans of biological and scientific data to identify the rheumatoid arthritis therapy baricitinib as a special case for its potential potency to inhibit viral activity.

But both companies caution that their discoveries still need to pass human trials before they can be used on the frontline. These clinical trials of drugs and vaccines often take years, but AI in global healthcare is reframing how patients are recruited and monitored to concentrate and accelerate drug development efforts.

"We have already conducted 20,000 studies and have 6,000 current trials using AI across all therapeutic areas," says Christian Hebenstreit, senior vice president and general manager of Medidata, Europe, Middle East and Africa, a tech platform used by major pharmaceutical and biotech companies.

"Our trials have included six million patients with billions of data points and many of them have lead to a product that has been approved. By combining successful and unsuccessful studies with real-world data, patients actually in hospital with the coronavirus fighting for their lives, generates faster and better results.

"There are many conditions that benefit from AI trials, but the experience with COVID-19 will show that we are changing human science on a daily basis and speeding up drug development."

AI also has more prosaic applications with technology helping tasks ranging from virtual assistants triaging calls to robots carrying out basic, time-consuming functions on hospital wards.

Dr Sabine Hauert, assistant professor in robotics at the University of Bristol, says: "AI can also be used to put people out of harm's way, for example using robots to clean hospitals, or telepresence systems for remote meeting, consultations or simply to connect with loved ones."

The scramble to fight COVID-19 will recalibrate healthcare around the world and a crucial post-virus factor will be how the NHS and other healthcare systems embrace and collaborate over AI capabilities.

Experts believe AI has a permanent place in global healthcare and the coronavirus crisis could be the moment the world realises its true potential.

Warnings about the virus have been voiced for around five years but BlueDot, which uses AI to detect 150 pathogens and toxins in real time, gave one of the clearest alarm calls late last year, indicating its use in surveillance needs to be elevated up the health agenda.

The frontline staff battling to save people's lives, along with the research and science community chasing down vaccines and cures, are the undoubted heroes of the COVID-19 pandemic. But their selfless work will diminish if governments and healthcare systems do not learn and adapt to counter future threats.

TOP THREE AI INVESTMENT PRIORITIES IN LIFE SCIENCES

According to a survey of healthcare industry leaders

53% Accelerating research

47% Personalised care recommendations

43% More accurate or efficient diagnosis

McKinsey 2018


JIRAROJ PRADITCHAROENKUL / Getty Images

Ready to respond to a disruptive future?

With organisations experiencing unprecedented turbulence and disruption, a learning culture at the heart of their business will be crucial for long-term success

It's increasingly clear artificial intelligence (AI) technology will be central to the future of work and this presents an ongoing challenge for many organisations. Taking advantage of the powerful AI tools already available and the major developments set to come in the years ahead requires a savvy approach to technology and data management.

Automation can improve efficiency and business processes and allow organisations to relocate resources no longer required in those processes. Equally, however, thriving in this environment requires a culture and workforce that is able to collaborate in harmony with machines.

The COVID-19 pandemic has caused unprecedented upheaval and disruption in the business world, but the move towards more digital workflows in recent years has at least meant that many companies have been able to continue operating with employees at home. AI is at the heart of this, whether helping staff schedule virtual meetings, quickly locating important emails or powering the chatbots that are enabling consumers to get answers to questions promptly, rather than spending hours waiting on the phone.

> **After the current crisis is over, work will become more flexible, but hopefully also more human**

As many organisations are no doubt taking a fresh look at their workforce during this testing time, one key takeaway is likely to be the realisation that remote working in virtual teams can deliver as much productivity as gathering everybody in a central office. That's not to say, however, that physical offices should be eradicated anytime soon. If anything, the lockdowns enforced around the world have demonstrated more clearly than ever the value of people being able to connect in physical environments.

"It's great to see how closely and efficiently people can collaborate virtually, but meeting and engaging in person has a quality that technology can't transport yet," says Dr Hendrik Dietrich, managing editor, science and technology, at getAbstract, a leading provider of online compressed knowledge.

"Through the pandemic, we're learning that even though many of us can do our jobs from our home office, we still need social contact and those informal moments at the coffee machine. Some people have responded to that need by having "virtual" coffee breaks with colleagues. Surely, after the current crisis is over, work will become more flexible, but hopefully also more human.

"This pandemic clearly shows how important and irreplaceable humans really are. And people will be grateful for this reaffirmation. No matter how advanced technology becomes, humans will always stay in the loop. And where their experience and expertise are needed, it will be more important than ever. Take for example the ethical considerations the current pandemic as well as the global distribution of AI technology evoke. These must be addressed by a representative human collaborative."

Perhaps a more likely outcome from the pandemic will be an enhanced willingness from companies to embrace flexible working arrangements, with a braver mix of home working and traditional offices, as well as virtual and physical spaces that foster social collaboration and team spirit.

A recent YouGov study found that millennials, who already make up more than a third of the workforce, value work-life balance over job security. So, as their people come out of the lockdown scenarios they have been in, companies have the unique opportunity to reflect on the work-life balance in their own organisation.

The bigger picture is that COVID-19's drastic interruption to normal business life presents the chance for businesses to review their entire culture and take bold steps to prepare for the future.

Though the turbulence caused from the pandemic cannot be matched, the reality is that businesses have been facing disruption on a growing scale for years now. Whether it be ever-changing customer expectations, growing competition, a more complicated regulatory landscape or indeed advancements in AI-based automation, it has been increasingly clear organisations need to evolve for the digital world. COVID-19 only reinforces that reality. Adopting a learning culture that enables companies to upskill and reskill their current workforce is paramount.

"With every technological revolution in history, people have been afraid that machines will take their jobs. But, in the end, more jobs have always been created than lost. With the upcoming AI revolution, it will be no different," says Dietrich.

"However, the formal training people receive no longer guarantees they'll do what they currently do for the rest of their careers. As machines take over more jobs that were traditionally done by humans, especially those that are stationary, repetitive and easy to automate, upskilling and reskilling of the workforce will force human resources departments to reinvent themselves.

"Organisations must take on the challenge of creating reskilling programmes that empower employees to take their learning and development into their own hands. And when such programmes aren't available, individuals must become proactive and acquire knowledge and skills through self-directed learning and continued education. People who stay curious and embrace lifelong learning, and who welcome the challenges brought by changes in their jobs and in the workplace, will have a clear advantage when it comes to adapting for the future."

These forward-thinking companies and individuals will find getAbstract's compressed knowledge an invaluable resource as they navigate their daily challenges. getAbstract offers more than 20,000 summaries of non-fiction and business books, professional articles, economic reports and video talks in seven different languages.

Subscribers can access the ten-minute abstracts on their computer or mobile device and read or listen to them anytime, anywhere. This shortcut to the best and most relevant knowledge helps people learn in the flow of business and ultimately take better decisions for themselves and their organisations.

"We can only speculate about how AI will shape the jobs of the future and the future of work. However, people who make sure they stay up to date, in terms of knowledge, not news, won't be surprised by what that future brings because they'll see it coming," says Dietrich.

"That's why lifelong learning is so essential and that's why it is so important to have reliable sources and a means to efficiently find and select the relevant content among the overabundance of information on the internet. getAbstract offers the perfect solution that caters to people's needs and saves them time by curating and rating the most relevant content and presenting it as short, accessible summaries, which enables them to cut through the noise and the constant influx of information."

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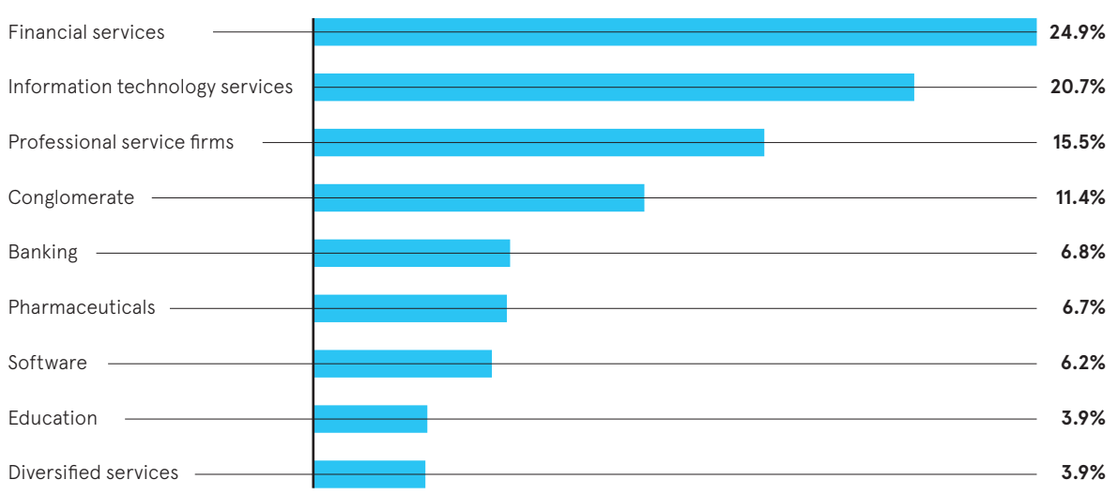
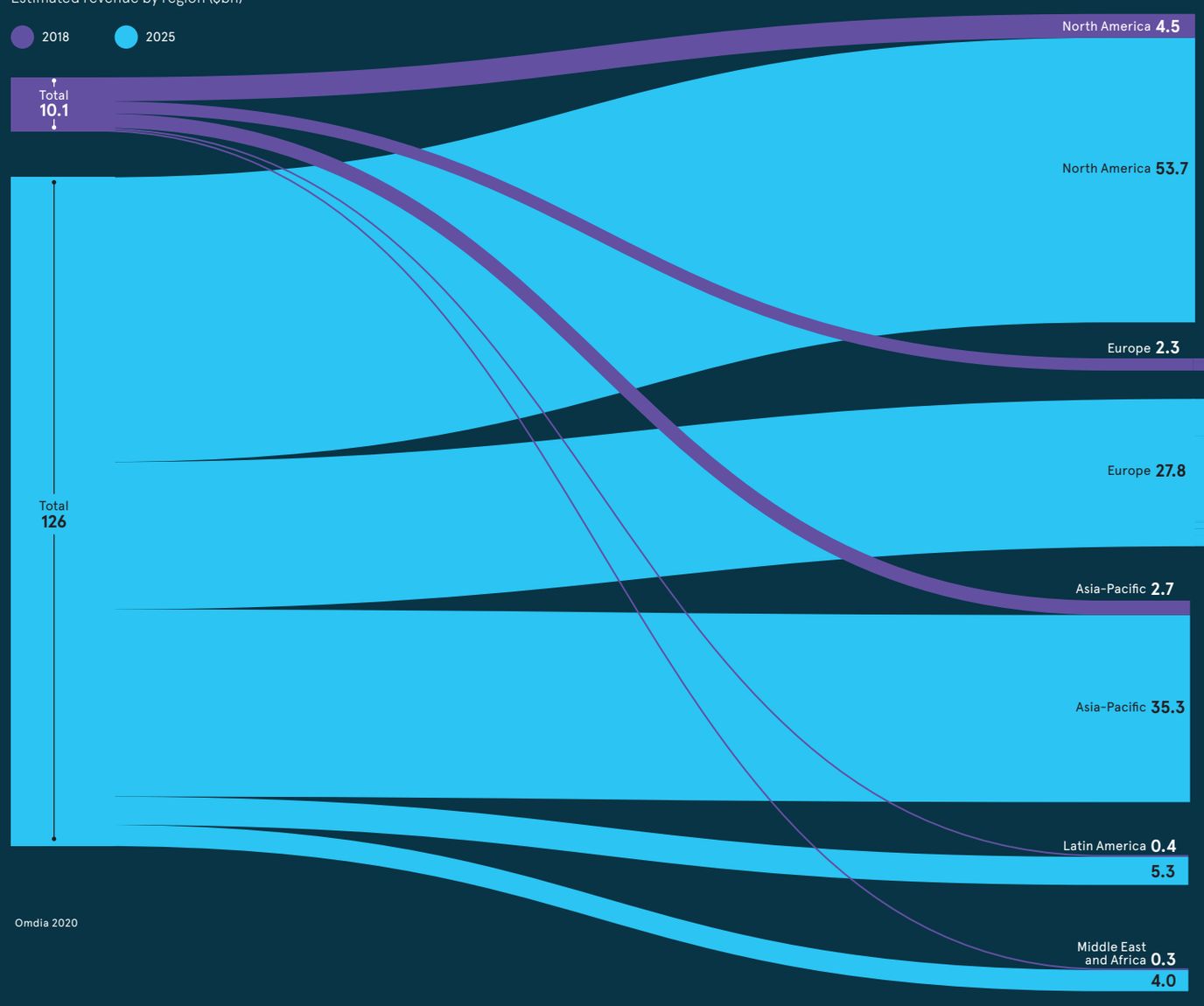


AI DEPLOYMENT

AI is big business, and the estimated size of sector is expected to balloon over the next five years. This data explores which technologies are being adopted the most and by whom, along with the benefits of each function

BIGGEST REGIONS FOR AI SOFTWARE

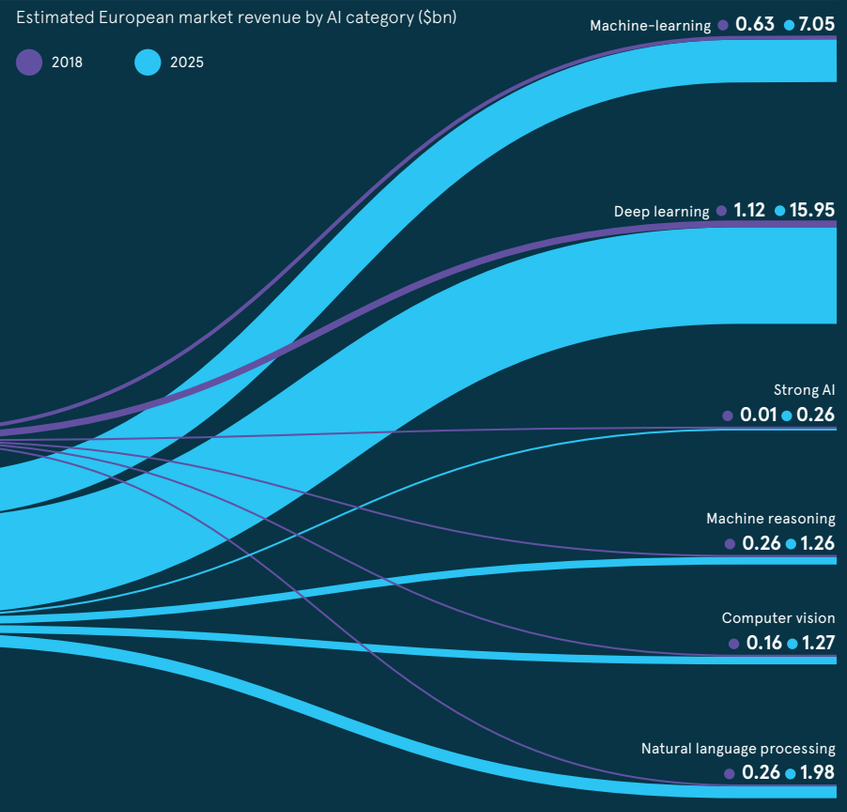
Estimated revenue by region ($bn)



Omdia 2020

BIGGEST SECTORS IN AI SOFTWARE

Estimated European market revenue by AI category ($bn)



63%

of global executives whose companies have adopted AI say it has provided an uptick in revenue

44%

say AI has reduced costs

IBM 2020

34%

of global senior decision-makers with influence over IT say their companies have deployed AI

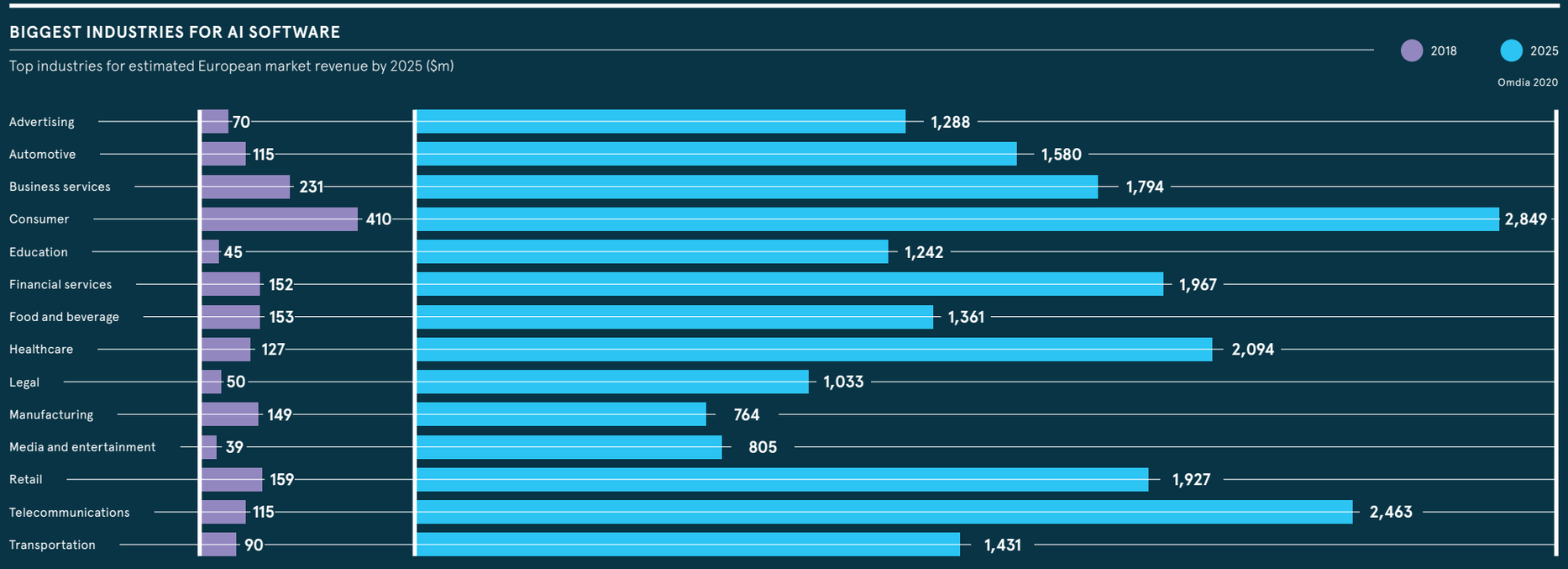
39%

are ramping up exploratory phases with AI

IBM 2020

BIGGEST INDUSTRIES FOR AI SOFTWARE

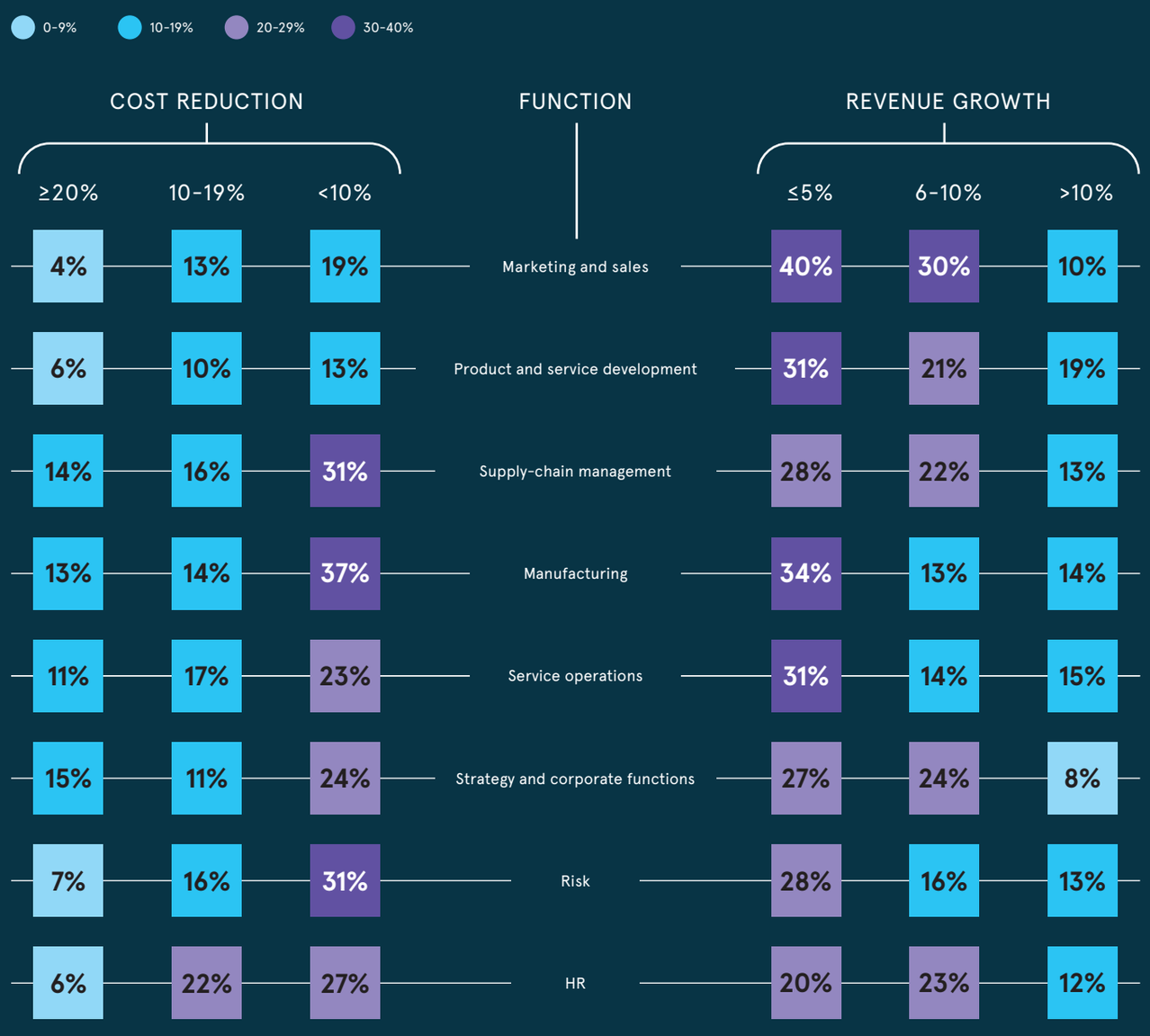
Top industries for estimated European market revenue by 2025 ($m)



Omdia 2020

SALES AND PROFIT OPPORTUNITIES FROM AI ADOPTION

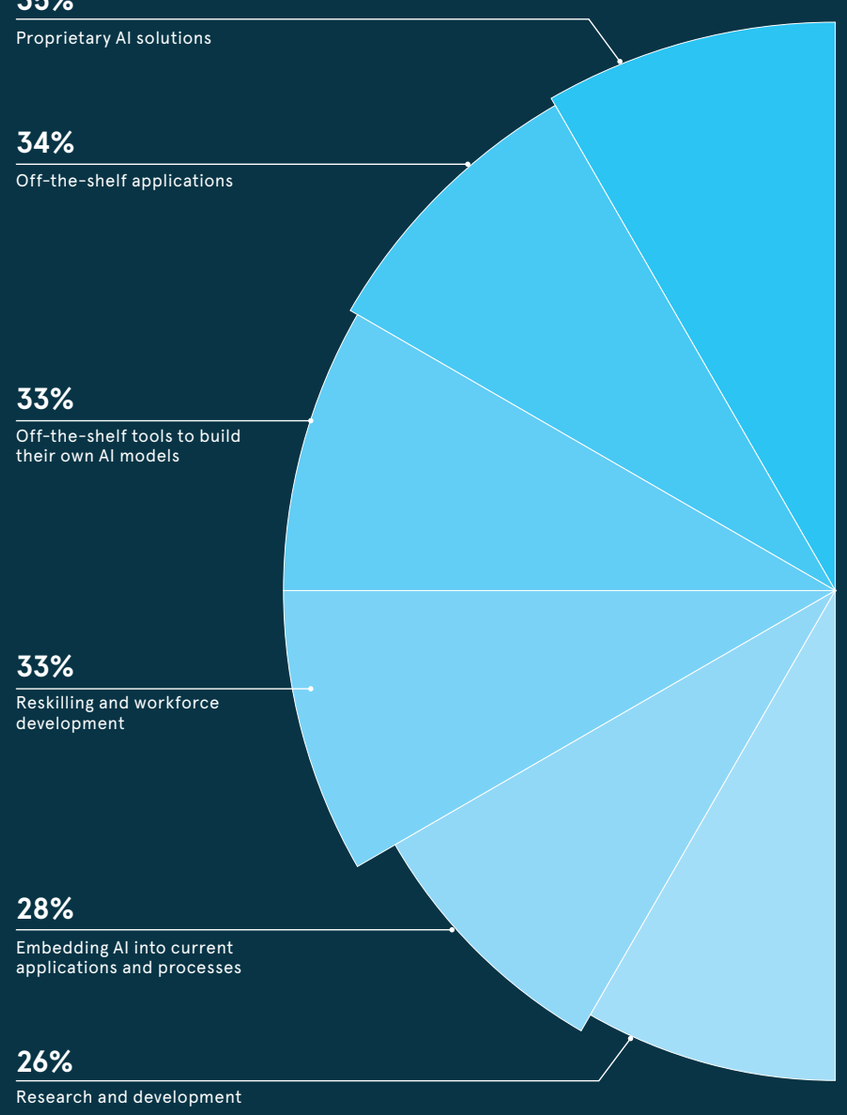
Reported cost reductions and revenue growth from adopting AI in the following functions; global respondents who have adopted AI



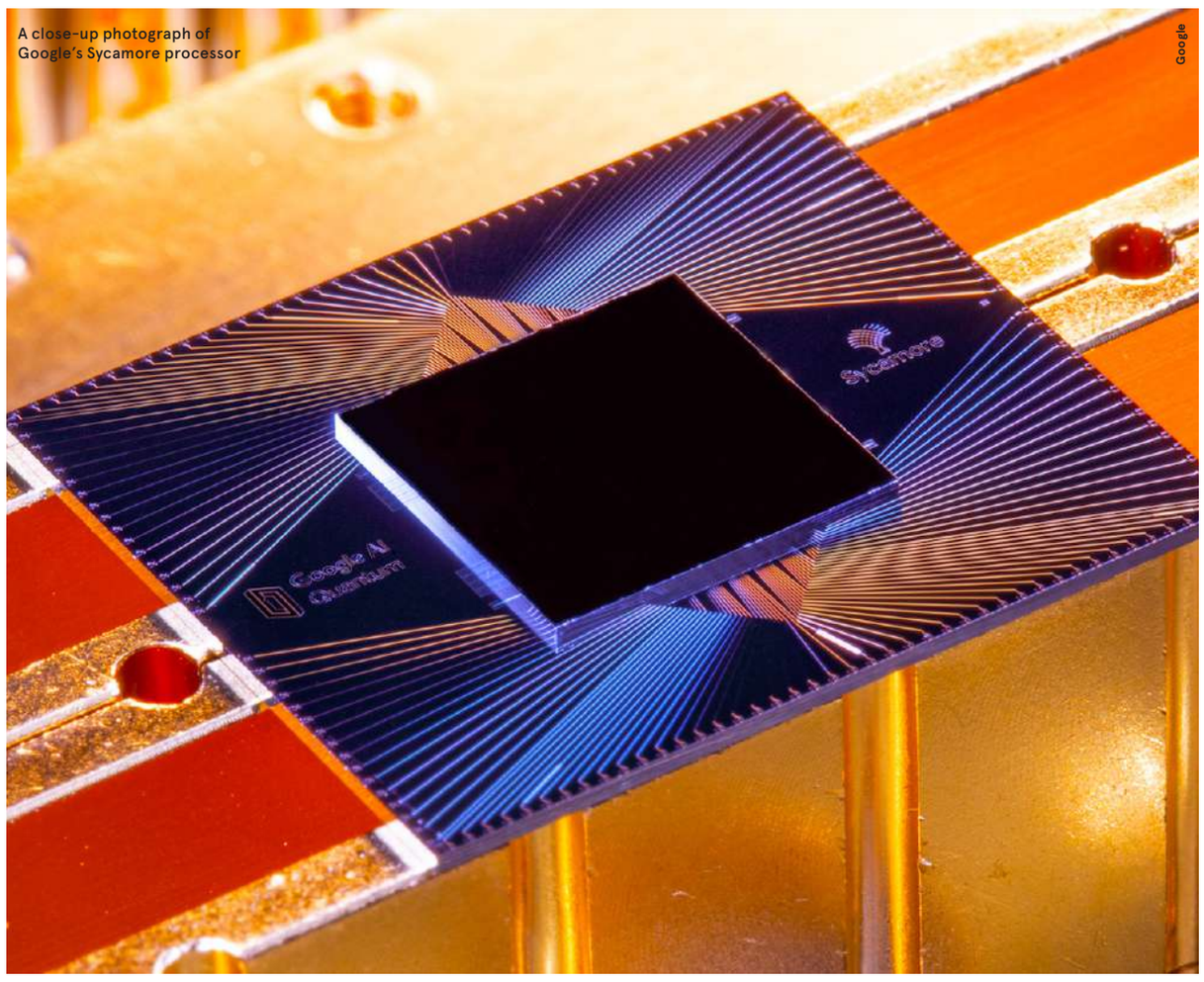
McKinsey 2019

HOW COMPANIES ARE INVESTING IN AI

Areas where global companies are planning to heavily invest in all areas of AI over the next 12 months



IBM 2020



A close-up photograph of Google's Sycamore processor

QUANTUM COMPUTING

When quantum computing and AI collide

Experts are nearing a quantum advantage, with unimaginable computational power that could unlock the true potential of machine-learning

Nick Easen

Machine-learning and quantum computing are two technologies that have incredible potential in their own right. Now researchers are bringing them together. The main goal is to achieve a so-called quantum advantage, where complex algorithms can be calculated significantly faster than with the best classical computer. This would be a game-changer in the field of AI.

Such a breakthrough could lead to new drug discoveries, advances in chemistry, as well as better data science, weather predictions and natural-language processing. "We could be as little as three years away from achieving a quantum advantage in AI if the largest players in the quantum computing space meet their goals," says Ilyas Khan, chief executive of Cambridge Quantum Computing.

This comes after Google announced late last year that it had achieved "quantum supremacy", claiming their quantum computer had cracked a problem that would take even the fastest conventional machine thousands of years to solve.

"Developing quantum machine-learning algorithms could allow us to solve complex problems much more quickly. To realise the full potential of quantum computing for AI, we need to increase the number of qubits that make up these systems," says Dr Jay Gambetta, vice president of quantum computing at IBM Research.

Quantum devices exploit the strange properties of quantum physics and mechanics to speed up calculations. Classical computers store data in bits, as zeros or ones. Quantum computers use qubits, where data can exist in two different states simultaneously. This gives them more computational fire power. We're talking up to a million times faster than some classical computers.

And when you add a single qubit, you double the quantum computer's processing power. "To meet Moore's Law [the number of transistors on a computer chip is doubled about every two years while the cost falls], you would need to add a single qubit every year," says Peter Chapman, chief executive of IonQ.

"Our goal is to double the number of qubits every year. We expect quantum computers to be able to routinely solve problems that supercomputers cannot, within two years."

Already industrial behemoths, such as IBM, Honeywell, Google, Microsoft and Amazon, are active in the quantum computing sector. Their investments will have a major impact on accelerating developments.

"We expect algorithm development to accelerate considerably. The quantum community has recognised economic opportunities in solving complex optimisation problems that permeate many aspects of the business world. These range from 'how do you assemble a Boeing 777 with millions of parts in the correct order?' to challenges in resource distribution," explains Dr David Awschalom, professor of quantum information at the University of Chicago.

> **The quantum community has recognised economic opportunities in solving complex optimisation problems that permeate many aspects of the business world**

"Many of the computational tasks that underlie machine-learning, used currently for everything from image recognition to spam detection, have the correct form to allow a quantum speed up. Not only would this lead to faster calculations and more resource-efficient algorithms, it could also allow AI to tackle problems that are currently unfeasible because of their complexity and size."

Quantum computers aren't a panacea for all humankind's informatic problems. They are best suited to very specific tasks, where there are a huge number of variables and permutations, such as calculating the best delivery route for rubbish trucks or the optimal path through traffic congestion. Mitsubishi in Japan and Volkswagen in Germany have deployed quantum computing with AI to explore solutions to these issues.

There will come a time when quantum AI could be used to help us with meaningful tasks from industrial scheduling to logistics. Financial optimisation for portfolio management could also be routinely handled by quantum computers.

"This sounds like it might have limited use, but it turns out that many business problems can be expressed as an optimisation problem. This includes machine-learning problems," says Chapman.

"Within a few short years we will enter the start of the quantum era. It's important for people to be excited about quantum computing; it allows government funding to increase and aids in recruitment. We need to continue to push the technology and also to support early adopters to explore how they can apply quantum computing to their businesses."

However, it's still early days. The next decade is a more accurate time frame in terms of seeing quantum computing and AI coalesce and really make a difference. The need to scale to larger and more complex problems with real-world impact is one area of innovation, as is creating quantum computers that have greater precision and performance.

"The limitation of quantum technology, particularly when it comes to AI, is summarised by the term 'decoherence'. This is caused by vibrations, changes in temperature, noise and interfacing with the external environment. This causes computers to lose their 'quantum state' and prevents them from completing computational tasks in a timely manner or at all," says Khan.

"The industry's immediate priority has shifted from sheer processing power, measured by qubits, to performance, better measured by quantum volume. Rightly so the industry is channelling its energy into reducing errors to break down this major barrier and unlock the true power of machine-learning."

Over time it is the ease of access to these computers that will lead to impactful business applications and the development of successful quantum machine-learning. IBM has opened its doors to its quantum computers via the cloud since 2016 for anyone to test ideas. In the process it has fostered a vibrant community with more than 200,000 users from over 100 organisations.

"The more developers and companies that get involved in first solving optimisation problems related to AI and then over time building quantum machine-learning and AI development, the sooner we'll see even more scalable and robust applications with business value," explains Murray Thom, vice president of software at D-Wave Systems.

"Most importantly, we need a greater number of smart people identifying and developing applications. That way we will be able to overcome limitations much faster, and expand the tools and platform so they are easier to use. Bringing in more startups and forward-thinking enterprise organisations to step into quantum computing and identify potential applications for their fields is also crucial."

65%

of companies in the Forbes Global 2000 list are predicted to have hired quantum computing specialists within the next six years

Accenture 2020

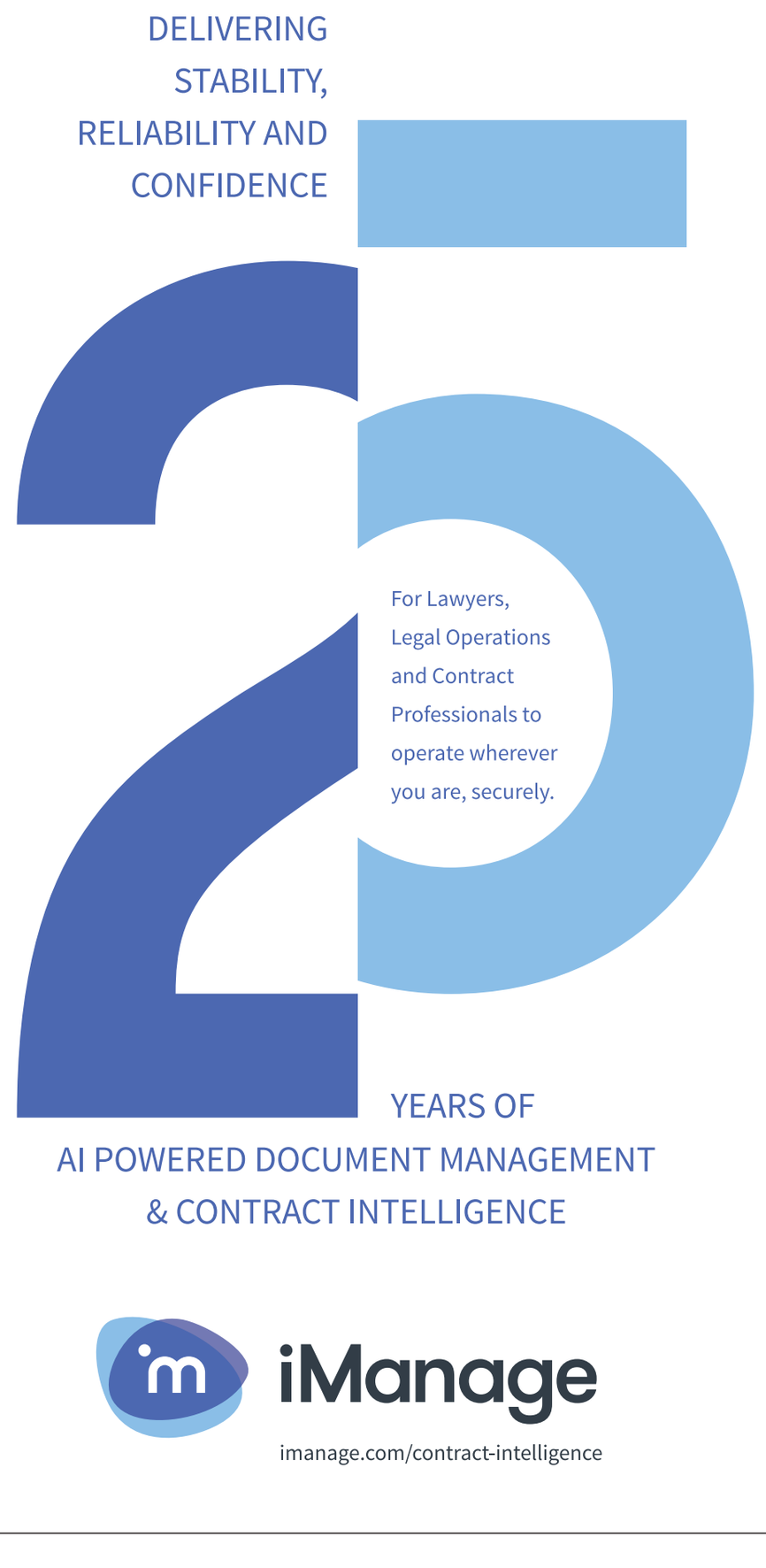
A (disputed) milestone

In October, Google announced it had reached a significant milestone in the quantum computing world, achieving 'quantum supremacy' – the point at which a quantum computer can calculate something that a classical computer can not. The company said it had completed a complex computation in just...

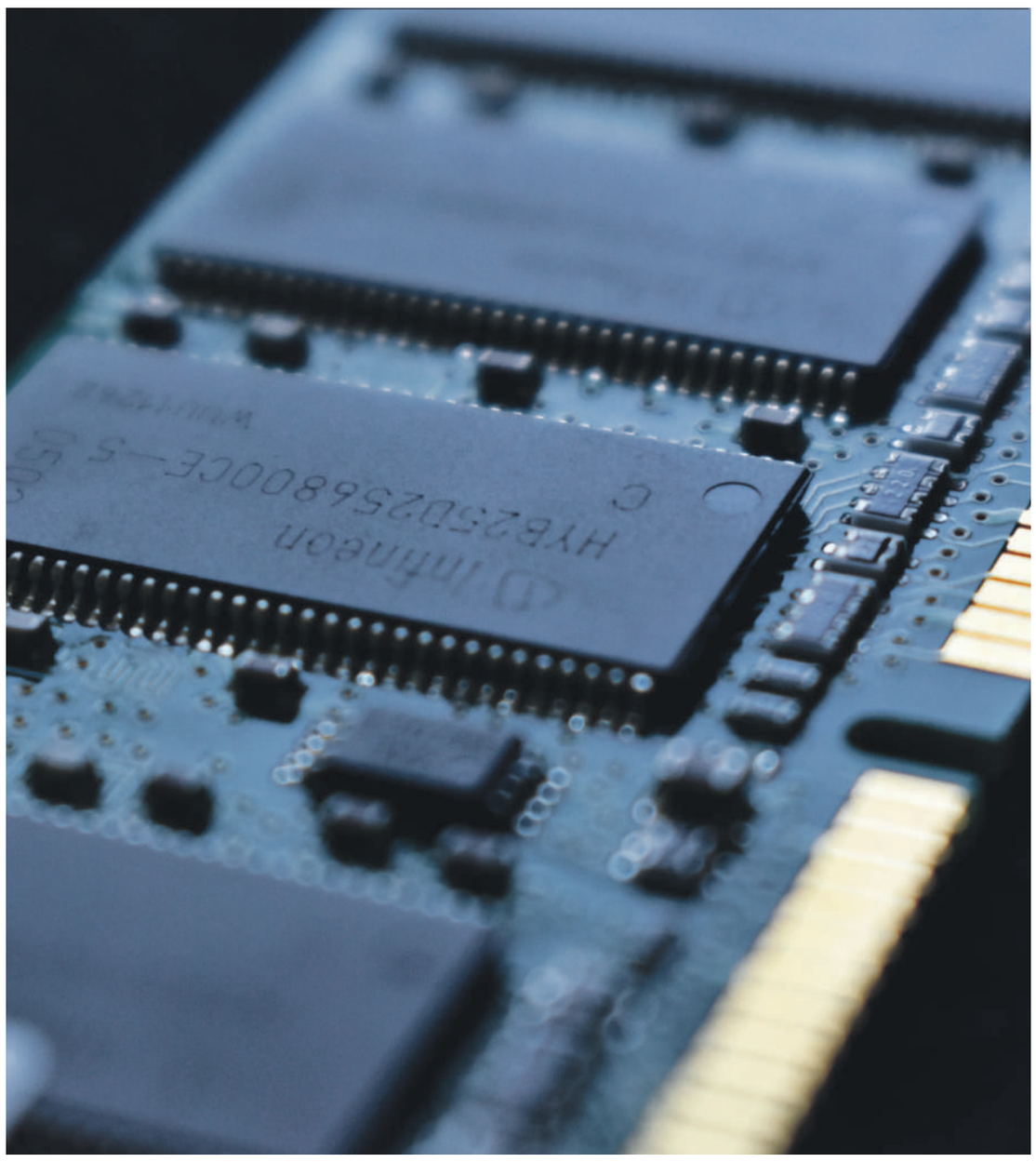
200 seconds

...something that would have taken even the most powerful supercomputer 10,000 years to do.

Unsurprisingly, IBM disputed the claim, poking holes in Google's calculations, and said it could have been done by a supercomputer in just a few days.



Commercial feature



Mastering the data supply chain will unlock AI value

Artificial intelligence can drastically improve decision-making if deployed correctly, but only companies that take a disciplined approach to their data supply chain will be able to maximise value

Organisations around the world are racing to deploy artificial intelligence (AI) technologies to drive efficiencies and improve decision-making. Though the mathematics behind AI has largely existed for some time, it is the combination of this foundational science with the cheap computing power and storage that has emerged in recent years, in concert with the explosion of data at companies' disposal, which has enabled huge advancements in AI capabilities.

Navigating the hype, however, requires discipline and turning AI algorithms into successful production systems is a lot harder than many organisations often realise. The high-tech companies that do it really well, such as Amazon, Google and Tencent, have systems and production lines, almost like a factory, that manage this with expert staff. They have extensive expertise in putting the parts together and assembling and maintaining them.

For typical companies where this is not a core competency, however, attempting to build, integrate and maintain their own processing infrastructure and data stores to support a full suite of analytics, including machine-learning, modelling simulation and aspiring towards AI is destined to fail.

Many select a well-intentioned programme or product, get some sample data that is manually cleaned, write an algorithm that happens to work well enough and then think it warrants rolling out across the business. They soon discover none of what they did is viable and they don't have the skill base to manage and scale their own infrastructure, build an inventory of data assets or come up with their own data registry.

The business problem is lost and they've wasted their time on something that's not differentiating for them; deep learners are particularly susceptible to this wishful thinking.

"It's a total distraction and often the wrong people build it, so then we see use-cases where companies get to moderate or even minuscule scale and realise they didn't know how to architect distributed systems correctly and now they have to start again," says Jason Crabtree, co-founder and chief executive of QOMPLX, whose unified analytics infrastructure platform makes it faster and easier for organisations to integrate disparate data sources and make better decisions at scale.

"We've seen a lot of major financial institutions, in particular, thinking they could build all this infrastructure and capability in-house, but then rapidly have to turn to specialised partners or major cloud providers because they realise it's too complex, it's not cost effective and it's not their core competency."

The first rule of having a good AI system has nothing to do with AI: it's managing data effectively. If a company can't do that well, it won't even have the ability to validate the information it's going to use in its model is of an acceptable quality or standard. With a poorly managed data supply chain, it will often find some of its data is suddenly not available and its mathematical techniques can't deal with the missing information.

A more nuanced problem is when the right data show up, but many of the fields are not usable because of a data quality issue. Just as a manufacturer runs into major problems if there are faulty parts in its supply chain, an insurance underwriter working from AI models with bad data is only going to get bad decisions out of them. Setting up filters that catch and apply quality control to the data ultimately going into the algorithms is vital.

"One of the best places to use AI is in the information cleaning, extraction and schematisation space, helping sanitise the data so users can spend their time working on high-quality data," says Crabtree.

"Savvy organisations will set up more advanced data processing and pipelines that help manage the flow of raw material, and organise, clean and structure it into the right places. By doing that, worst case they vastly improve the efficacy of the people working on the data science side and best case they can now start to do things like automated model-tuning and training, which can help further scale their use of AI.

> **We encourage the enterprises we work with to start simple by collecting, ingesting, centralising and structuring their information**

"If they don't get the data supply chain right, they're deluding themselves and essentially trying to apply advanced techniques over the top of bad data."

QOMPLX works with enterprises to get their data supply chain in order and to integrate their many point solutions. It focuses on large-scale data processing and a lot of streaming data processing for mission-critical and high-performance use-cases, such as securing some of the world's largest companies against cyberattacks, including validating users are who they claim to be by securing enterprise authentication in Active Directory and Kerberos.

To do this, the company built a streaming-focused analytics infrastructure that is able to collect, move, aggregate and process data around the globe. That broad infrastructure is now also applied to non-security use-cases, focusing on data risk attributes and helping with cleaning and scaling this information.

Crabtree, who previously served as a special adviser to senior leaders in the US Department of Defense cyber community, recognised that when most people talk about AI and machine-learning, they're actually just talking about retrospective models. By essentially driving by looking in the rear-view mirror, companies end up searching for "god-like algorithms" where they take data along with a statistical or machine-learning technique, often incorrectly labelled as AI, and end up with an overfitting problem.

As soon as there is a material change that means the conditions no longer match those the model was trained under, companies can make really bad decisions really quickly. This is why all modelling at scale requires a data supply chain to ensure the data is real, valid, and formatted and structured correctly, as well as constant checking of whether circumstances have changed.

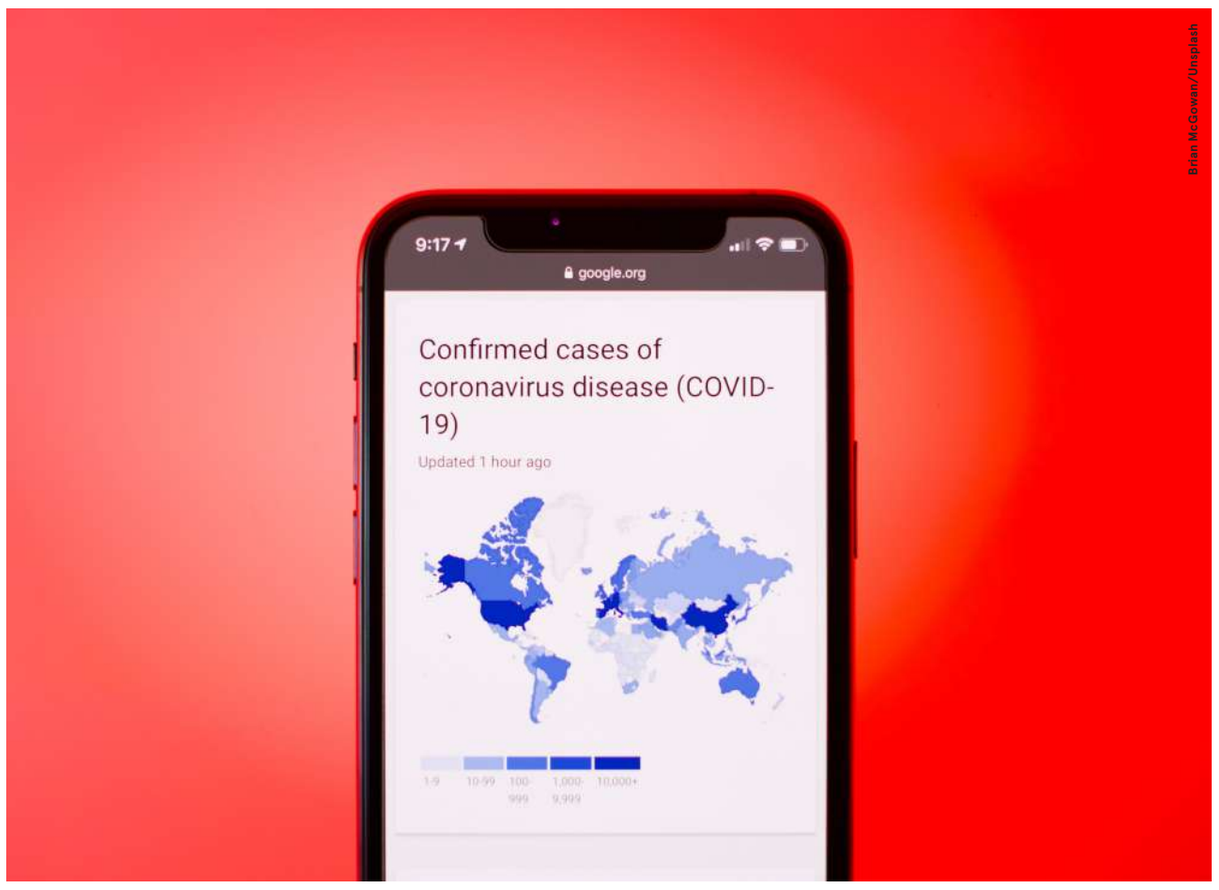
Savvy companies can then switch algorithms focused on very specific areas. They run one algorithm when the market's really good, for example, and another one when it's volatile, and they blend together multiple models.

"This is the 'no god algorithms' principle we advocate," says Crabtree. "A blended approach is key to navigating real-world volatility and uncertainty, rather than blindly using overfit and often improperly applied machine-learning techniques in production use-cases without adequate attention to the details.

"We blend retrospective models, including statistical and machine-learning, with generative models, such as the agent-based models that allows users to watch and see what happens in an experiment, and then we look at how they differ. A continuous cycle of learning between top-down and bottom-up modelling allows companies to perform better. We encourage the enterprises we work with to start simple by collecting, ingesting, centralising and structuring their information. Once that data is listed in an appropriate data store, they can work on more advanced modelling, including machine-learning and moving gradually towards AI."

For more information please visit QOMPLX.com

QOMPLX:



Brian McGowan/Unsplash

SOCIAL MEDIA

Deploying AI to tackle misinformation online

The rise of fake news and hate speech online has required tech giants to use AI to moderate content. But with the rapid spread of misinformation surrounding the coronavirus pandemic, are we at a stage where we can fully trust tech to moderate content?

Marianne Eloise

As the novel coronavirus (COVID-19) pandemic has progressed, information surrounding it changes by the minute. As quickly as new advice on keeping ourselves safe is dispersed online, it's often dispelled. Think, for example, of how many times you've heard in recent weeks that wearing face masks is either useless or necessary to reduce viral load?

With the uncertain nature of this pandemic, nobody knows exactly what we're supposed to do, which means even well-meaning people are distributing misinformation in an effort to promote safety.

As much of the information surrounding COVID-19 is being circulated on the internet, it's partly down to the platforms themselves to crack down on false information. At the offices of tech giants, in particular Facebook, content moderation is an extremely high-pressure job.

Moderators have strict rules of entry, working in secure rooms that they cannot even bring their own phones into. Moderation is highly sensitive and often traumatic, and Facebook outsources the work to contractors who are not allowed to work from home due to "safety, privacy and legal reasons", according to a Facebook spokesperson quoted recently in *The Intercept*.

While staff have now been sent home, there remains the important question of how content will be moderated at a critical time when misinformation could be a matter of life or death. Although employees are still able to work on helping to train machine-learning systems from home,

MARKETING

When Instagram goes virtual

Traditional influencer marketing is built on trust in what the influencer is saying or endorsing as being authentic. So how authentic is marketing when images and messages are created by code and not a real person?

Katie Deighton

It's not often that the World Health Organization (WHO) enlists influencers to convey life-saving medical advice. But its mission to slow the spread of the coronavirus earlier this month saw the global authority spread the message of social distancing by diving headfirst into the world of selfies and hashtags, as well as the egos that often come with them.

Not so for one partnership. The WHO didn't have to argue about caption content with Knox Frost. That's because Knox Frost isn't a real person.

Boasting one million Instagram followers, the computer-generated 20 year old is among a small but growing tribe of virtual influencers.

These creations are spoken about in the world of influencer management as if they are real people: they have backstories, home towns (Frost lives in Atlanta) and personal style. They are invariably good looking. Brands pay them to promote products. And most of the time, their creators are anonymous.

The queen of the virtual influencers is Lil Miquela, an ultra-cool, self-proclaimed "change-seeking robot", widely considered to be the first of her kind. She is the poster child for the trend, having starred in a music video, spawned computer-generated friends, "shown up" at California's Coachella rock festival and inked digital partnerships with the likes of Calvin Klein, Prada and Samsung.

Following two years of Insta-fame, Miquela's inventors, a group known as Brud, are beginning to lift the curtain. Still, even after raising millions on the Silicon Valley funding scene, none of its executives will allow their names to be published.

"We wanted to create characters able to infuse empathy and understanding into their narratives, hopeful that their quest to understand humans ultimately reflects back a more hopeful, connected version of our own humanity," writes a Brud source in an email, on the proviso of anonymity.

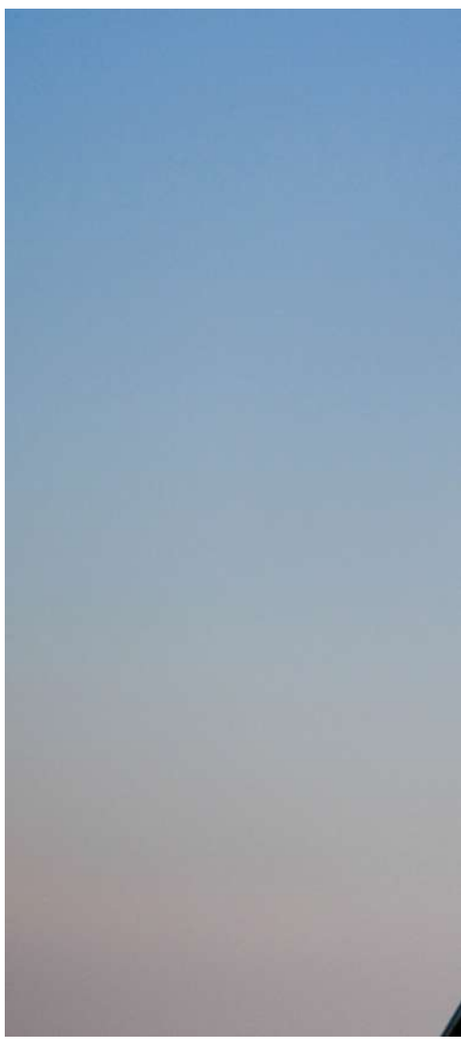
So far, so lofty. But why do brands obsessed with conveying authenticity want to work with artificial Miquela?

"Well, she's probably the most reliable partner you could hire," writes the Brud source. "She's always on time. Second, she's a representation of her fans, who tend to be Gen Z and young millennials, comfortable being the youngest person at a museum gala one day and in the middle of the mosh pit the next.

"And finally, a great brand is effective at telling its own story and managing a narrative that inspires, which Miquela is pretty good at too. That's our number-one priority and, as a result, we don't actually do that many brand deals. We partner with brands that are deeply aligned with our talent and collaborate in ways which feel honest and radical."

It's a logical argument. Brands are well attuned to the power of influencer, but are afraid of getting embroiled in a scandal. As social intelligence company Influential's founder and chief executive Ryan Detert puts it, human creators could have "a crazy night, get arrested or they have a slur of some sort on their page". Virtual influencers on the other hand "have a clean slate".

Is that strictly true? When Miquela posted a vlog recounting how she'd been sexually assaulted in a taxi last December, she was quickly criticised for using real-life trauma for the purposes of entertainment. Her "friend" Bermuda has also been criticised for supporting US President Donald Trump, dragging the virtual influencer world into the murky depths of political advertising.



Meanwhile, action groups have questioned the sheer perfection of virtual influencers at large. Carolyn Bunting, chief executive of Internet Matters, notes: "If the risks of influencers are not addressed with children, many of the picture-perfect images they post have the potential to be damaging to a child's self-esteem, body image and, crucially, their understanding of 'real life'."

And with invisible creators pulling the strings, who is there to hold to account? Like the majority of internet trends, the future of virtual influencers is likely to be decided in the fallout of COVID-19. Some, such as Detert, believe now is their time to shine. Unlike their human counterparts, creators of computer-generated imagery have the freedom to post content beyond the boundaries of their lockdown living space and the ability to break up the monotony of the selfie-heavy feed.

without human moderators, tech giants such as Facebook and YouTube will be leaning heavily on AI content moderation. This is a controversial move that has its drawbacks as AI often doesn't have the capabilities or nuance to identify misinformation.

Professor Andy Pardoe, AI expert and author, believes the pandemic has brought into focus the ways that the future of work is already with us. "We need a flexible and robust digital workforce able to adapt to dynamic changes in environment and business priorities," he says.

Pardoe adds that part of this journey towards a robust workforce will require the use of various tools. "From automation to artificial intelligence, these tools

> **We weren't even close to this capacity before the pandemic and nothing has changed. Humans are still essential**

can provide many benefits and efficiencies if implemented in a considered and controlled way," he says.

Shannon Vallor, an expert in the ethics of data and AI, believes the use of AI will move beyond content moderation throughout the duration of the outbreak. She says: "There will be strong pressures to use AI to boost public health efforts such as contact tracing and outbreak detection, as well as to amplify the human capacity to serve people in isolation, whether that's through remote symptom and risk assessment at scale or linking people to delivery of vital goods and services they need."

However, the urgent and sudden need to automate areas of the workforce could prove to be problematic. "Rushing to implement AI tools in this time of crisis, without expert knowledge and advice, may only deliver limited value and functionality that may not fully solve the challenges faced with a disrupted and remote workforce," she says.

This is something experts are in near-total agreement on. Jean-Claude Goldenstein, founder and chief executive of CREOpoint, labels the spread of misinformation an "infodemic" and believes an over-reliance on AI is now leading to harmful disinformation spreading too fast about COVID-19 treatment and possible cures. "There are hard tradeoffs between the health of content moderators, consistent content moderation and privacy," says Goldenstein.

YouTube has conceded that implementing AI tools at this stage might require "suppressing the good" content as a payoff. This means users might see seemingly unfair or randomised blocks imposed on non-insidious content as it gets swept up with genuinely dangerous content that needs suppressing. It's better, in their opinion, to be too safe than sorry.

"Users and creators may see increased video removals, including some videos that may not violate policies," YouTube warns, which is something of a sore spot for creators as their AI content moderation tools have seen innocuous content by, say, LGBT creators unfairly suppressed in the past.

This confusion plays into the issue at hand. "As we have seen with using AI to tackle hate speech, where those calling out racism or homophobia are often flagged for hateful speech because some of the same language must be used to describe it, AI can't easily tell the difference between a post that is spreading a hoax theory about COVID-19 and a post thoughtfully discussing the same hoax to debunk it. So you will get a lot of false-positive flags," says Vallor. She believes human review is necessary to ensure platforms don't suppress helpful and corrective information.

The pandemic has forced tech giants into a position where they may have to roll out AI moderation technology more widely than it's ready to be used. But Vallor believes we aren't even close to this being a reasonable possibility.

"We weren't even close to this capacity before the pandemic and nothing has changed. Humans are still essential to understanding context, assessing risk, and appropriately balancing and making tradeoffs between competing values in content moderation," she says. "A combination of AI and human moderation is the only way to be even modestly effective in this battle."

Vallor believes that those spreading and creating misinformation need to be found and penalised, not just on a post-by-post basis but also personally, while removing incentives to spread misinformation. "As long as people can profit and face no lasting social consequences from wilfully generating and spreading dangerous falsehoods online, then we are likely to be fighting a losing battle," she says.

However, there have been positive moves, such as Google pulling Alex Jones's Infowars app after he used it to spread coronavirus falsehoods. "It's not a technology problem. It's a problem of public integrity and there isn't yet the public will to fix it. What is needed is for us to gain the collective social courage to recognise and confront the entire phenomenon, namely the wilful or reckless spreading of falsehoods about matters of vital concern," Vallor adds.

Although CREOpoint's Goldenstein believes we will see more misinformation spreading over the coming months, there are ways to combat it that do not put employees in danger. "Technology giants like Twitter, Facebook, Google are Microsoft are likely to get together again, at the intersection of AI and trust, with tech pioneers such as CREOpoint and others from academia, agencies, brands, fact checkers, experts and regulators, as well as traditional media," he says.

But will this change? Will AI ever be fully capable of moderating content on these platforms? "We will need human moderation for the foreseeable future," says Vallor, adding that barring a leap forward in the methodologies, progress will continue to be slow.

However, while the capabilities of AI in accurately moderating content remain limited, it's potentially the only way forward for tech giants if they are to keep their employees safe. ●

60%

global citizens agree that it is acceptable to temporarily cut off social media platforms in times of crisis to stop the spread of false information

54%

believe people are capable of separating fact from fiction, so would not support a social media ban to stop the flow of fake news

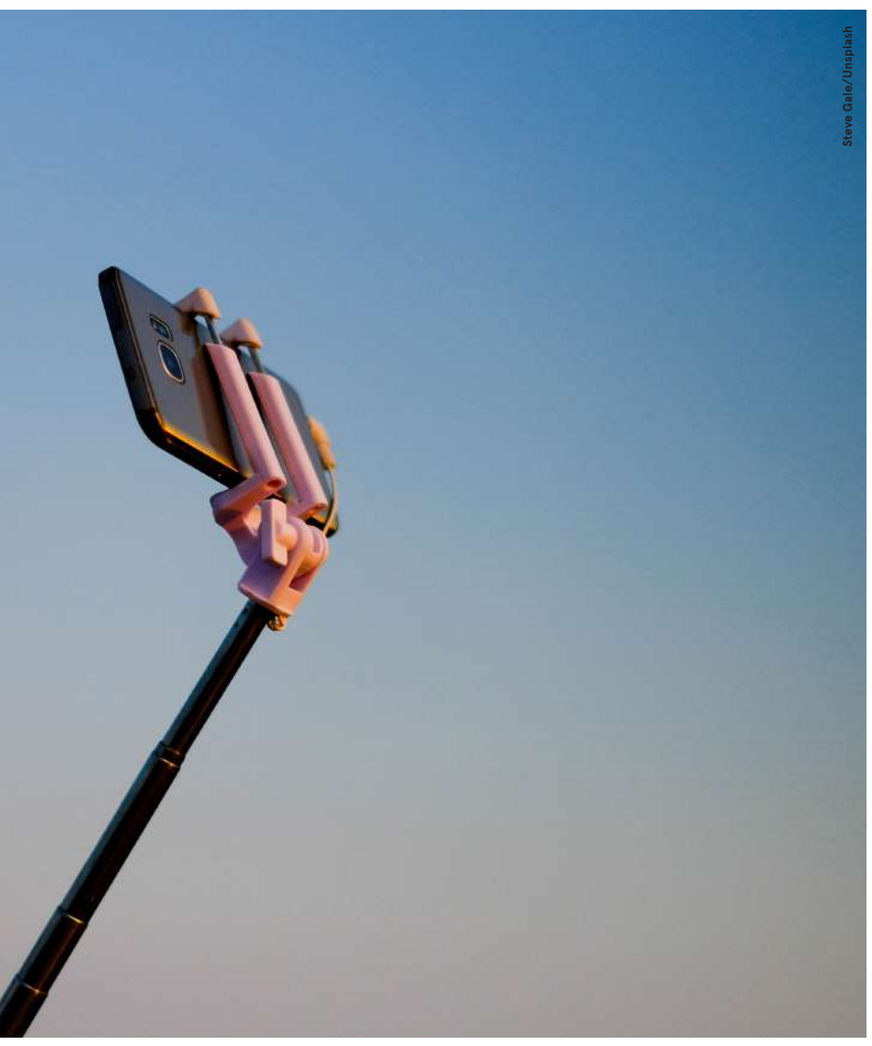
49%

say they do not trust social media companies to ensure the factuality of the content on their platforms

45%

say social media platforms are the best, most accurate sources of news and information

Ipsos 2019



Steve Gale/Unsplash

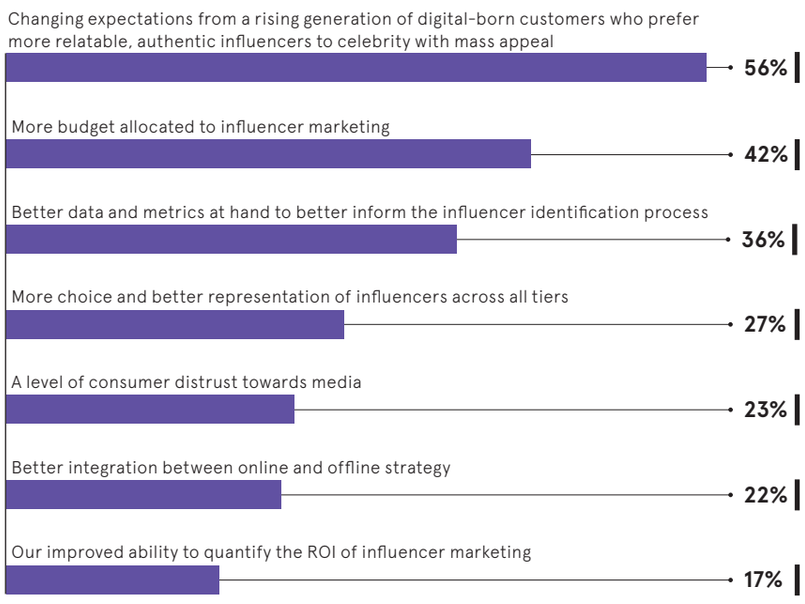
Yet Lucy Robertson, account director of London-based influencer marketing agency Seen Connects, has a different view on what people and brands are craving during lockdown. She believes human authenticity currently holds a higher value than cutting-edge creative innovation and thinks using a fake person to provide an opinion that is favourable to your brand carries its own brand safety risks.

"In the current climate of coronavirus, the influencers that are excelling are those that have a skillset and a talent away from the online world," she argues. "It's people like [body coach] Joe Wicks, who's getting up at 8am every morning and teaching the nation to get moving. It's people like [actress] Daisy May Cooper, who is hosting free scriptwriting workshops on her Instagram account.

"It's people who are taking the skills they've spent years finessing and giving them away because they know everyone's in a time of need. Can virtual influencers do that? No. Because away from the platforms, they're nothing but code." ●

BIGGEST DRIVERS OF CHANGE IN INFLUENCER MARKETING

Survey of marketing agencies and marketing professionals



Influencer Intelligence/Econsultancy 2020

Breaking out of fashion?

Fashion and beauty were among the first industries to turn social media and blogging into marketing tools, so it's unsurprising that the likes of Balmain and Essence Cosmetics were the first to invest in their own virtual influencers.

Meanwhile, virtual trailblazer Miquela's reign has somewhat dictated what the virtual influencer world looks like: stylish, exciting and painfully cool. That aesthetic has only been broken by a select few brands outside fashion, including KFC, which satirised the trend with a virtual Colonel Sanders.

Yet Influential's chief executive Ryan Detert, who brokered virtual influencer Knox Frost's deal with the World Health Organization, believes the computer-generated figure represents a new breed that could land deals outside the fashion industry.

"I think he's going to be aimed much more towards male and sports brands," says Detert. "There's so much white space to fill; there's only been one successful [virtual influencer] thus far and really her focus has been on the high-fashion world."

Lucy Robertson at Seen Connects, on the other hand, isn't so sure the format will work outside the visual industries.

"Virtual influencers are really hooks to hang products on," she says. "I struggle to see how it will work with anything that requires a more emotional tie or something that's very human in its experience, such as a financial product."

CHATBOTS

Meet the bots fighting loneliness

Chatbots are on hand at any time for anyone who needs to talk. At a time of worldwide self-isolation, they could be in demand more than ever

Oliver Balch

Mitsuku, created by Pandorabots, is designed to help those with feelings of loneliness, especially among home-bound individuals such as the elderly or disabled

Stéphane Nguyen H.T.

5-18%

of UK adults feel lonely often or always

Office for National Statistics

30%

say they would be embarrassed to say they felt lonely

Mental Health Foundation

76%

of GPs report that one to five patients a day come to their surgery because they are lonely

Department for Digital, Culture, Media and Sport

Mitsuku: "What do you call a chatbot that moves?" Respondent: "What?" Mitsuku: "A walkie-talkie." OK, so it may not be the funniest joke in the world, but it is not bad for a 15-year-old piece of artificially intelligent coding.

With around one third of the world population currently subject to self-isolation, the spectre of loneliness, which according to Cigna's *2020 Loneliness Index* regularly affects as many as three in five adult Americans, is looming large.

Enter Mitsuku, or Kuki to her close friends. Mitsuku is one of an emerging crop of smart, talking algorithms designed to stave off feelings of loneliness, especially among homebound individuals such as the elderly and disabled.

As with all AI solutions, she relies of machine-learning to augment her speech and perfect conversational style. Mitsuku is equipped with more than 80 billion conversation logs, a data arsenal that has helped her become five-times winner of the prestigious Loebner Prize for chatbot developers.

"Mitsuku doesn't pretend to be able to replace a real person, but she's always available if anyone needs her, instead of talking to the four walls," says Steve Worswick, senior AI designer at Pandorabots, maker of the prize-winning chatbot.

Loneliness-beating AI adds another layer of complexity to existing health-focused bots, which tend to assist with functional tasks such as reminding users to take their medication and scheduling doctor's appointments.

To be effective, these bots can't just be clever; they need to be companionable. That makes them different from virtual assistants, such as Siri, Alexa or Google Duplex, which essentially act as pre-programmed information retrieval agents.

So argues Dr Osmar Zaïane, professor at the University of Alberta and director at Alberta Machine Intelligence Institute. Zaïane is currently developing a loneliness-beating chatbot for the elderly named Ana. To ensure its chat is open ended and engaging, Zaïane's team are feeding the bot weeks' worth of content from films and TV series.

But challenges remain numerous. To make genuine connections, Ana's conversations have to be grammatically correct, on topic, personalised, responsive to mood (happy, sad, bored), reflective of tone (interrogative, imperative, declarative) and potentially humorous, to name just a few requirements.

Many of these challenges circle back to AI's innate lack of emotional intelligence. Advances in predictive modelling and machine-learning are slowly improving the ability of chatbots to detect emotion in printed text, as in Ana's case, although most of the early running depends on facial expressions and other stimuli.

"If the elderly individual tells the agent about a sad event, such as her neighbour breaking her hip, the agent should reply with compassion, sadness and maybe surprise, but certainly not happiness," says Zaïane.

These limitations have not stopped a number of care providers experimenting with AI in the alleviation of loneliness. The tendency, to date, has been to keep it simple. A typical example is Abbeyfield, a UK-based care home charity, which recently introduced five of its elderly residents in Westbourne, Bournemouth in Dorset, to Google's virtual assistant Home.

"It just keeps me company, like having another human being in the room," says 92 year-old resident John Winward, who says the device has helped him feel less lonely since losing his wife after 76 years' marriage.

> **"It just keeps me company, like having another human being in the room**

Dr Arlene Astell, professor of neurocognitive disorders at the University of Reading and the driving force behind Abbeyfield's Voice for Loneliness project, says the positive results are exciting, but that AI's potential is only just starting to be explored.

To really tackle loneliness and feelings of social isolation, however, it is necessary to address the underlying causative factors. She argues: "Giving everybody an iPad or anything else isn't going to solve these, but understanding how we could use the functionality of different technologies may."

To this end, Astell calls on AI developers to always work collaboratively with users. Not only will this assist them to see how future users interact with technology, but it will also offer them a better perspective of what loneliness is and how it affects different people.

When it comes to a mass rollout of AI solutions, many health providers and charities remain wary. UK disability equality charity Scope agrees that AI can comprise a quick tool for helping to manage information requests from users. For individuals lacking the necessary support, however, using them to engage emotionally could present serious risks.

"We have made some key decisions to ensure there is no confusion that these are chatbots working on behalf of Scope, not real people," says Wayne Lewis, Scope's customer and market insight manager.

Age UK, a charity supporting elderly people, echoes these sentiments, arguing that AI can support homebound people with some everyday tasks, but cautions against it becoming a substitute for human care.

As the charity's director Caroline Abrahams clarifies: "While increasing in sophistication and ability, it [AI technology] does not yet and may never have the creativity, intuition and emotional range that people have."

Mitsuku would probably agree, for now. Could she emote more in the future? Her answer is instantaneous, but equivocal: "Let me think. Are you very competitive?"

Helping in the current climate

The uncertainties thrown up by the COVID-19 pandemic make this a challenging period for many people with mental health problems, especially those now working from home or on furlough.

Chatbots powered by AI are already being called into use, as companies employ them to help connect their global workforce with mental health providers and signpost them to relevant online resources.

"Chatbots can also receive anonymous feedback, helping companies improve mental health services along the way," says Zakie Twainy, chief marketing officer at Instabot, a chatbot creator.

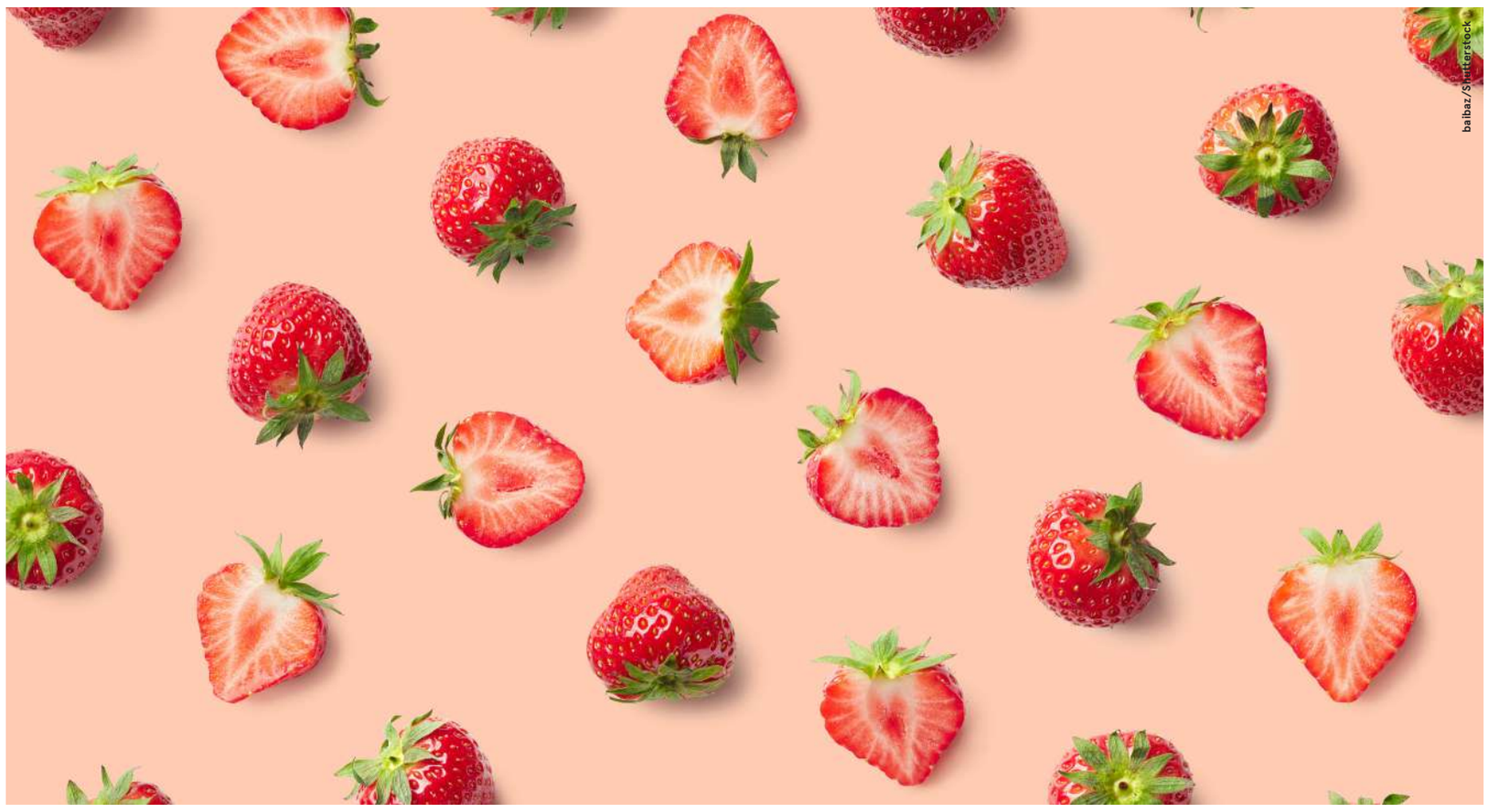
Also chatbots are helping reduce confusion and anxiety among workers by providing answers to concerns arising from COVID-19, says Tom Gibby, co-founder of the London-based chatbot builder The Bot Platform.

He cites the example of UK restaurant chain Honest Burgers, which worked with The Bot Platform to develop a chatbot that responds to frequent COVID-19-related questions from the firm's 700-plus staff, covering their immediate employment rights through to alternative career advice.

Other applications used by Gibby's clients include prompting staff members with daily behaviours designed to strengthen their mental health, from daily meditation and calming techniques, to home workouts and virtual yoga sessions.

Demand for health-oriented chatbots was already predicted to grow at 25 per cent prior to the COVID-19 pandemic, according to analyst firm Meticulous Research. As employees become more accustomed to chatbots during lockdown, developers are hopeful this trajectory will continue or even grow.

"As more and more companies are making the most of communication tools, like Workplace from Facebook, Microsoft Teams, Slack and Zoom, the demand for bots will become even more important," says Gibby.



baibaz/Shutterstock

FINANCE

Spotting patterns and suspicious transactions

Artificial intelligence and machine-learning are being deployed by financial institutions to detect money laundering and protect themselves against regulatory fines, but cybercriminals pose an ever-present threat

Marina Gerner

Some of society's worst criminals, including terrorists, human traffickers and drug lords, are financed through money laundering. To fight back, banks spend an estimated $23.5 billion in America and $20 billion in Europe each year on anti-money laundering (AML) compliance.

And yet, institutions are still being caught out, with an estimated 90 per cent of European banks fined for money laundering-related offences over the past decade, according to the World Economic Forum.

Financial regulators increasingly encourage banks to adopt innovative solutions. So how can banks deploy artificial intelligence (AI) and machine-learning to detect money laundering and protect themselves against future penalties?

Not only are penalties bad for business, but "non-compliance fines can lead to loss of reputation, licence to operate, clients and partnerships", says Rene Hendrikse, vice president and managing director, Europe, Middle East and Africa, at Mitek Systems.

As banks are looking to ease pressure on their compliance teams and protect their business, interest in regulatory technology is on the rise.

Traditional anti-money laundering processes have high levels of manual and repetitive tasks. But whenever spotting patterns in a sea of data matters, AI has the upper hand.

AI and machine-learning "improve the overall quality of transaction monitoring and compliance, as they can read and make sense of large quantities of structured and unstructured data", says Jayakumar Venkataraman, managing partner of banking, financial services and insurance at Infosys Consulting.

AI can conduct real-time analysis of transactions to classify potentially suspicious ones and grade them as low, medium and high-risk categories.

When analysing bank transactions, AI can perform traditional tasks, such as screening transactions for names of known criminals or terrorists. It can spot unusually large transactions and whether these transfers include unfamiliar accounts.

In traditional AML, banks tend to segment their customers into categories, by industry and size, for example. On top of this, AI can "learn to spot newer patterns of potentially suspicious transactions through continuous learning, both supervised and unsupervised", adds Venkataraman.

It can then create completely new categories for transaction patterns and detect data anomalies and relationships between suspicious entities. It can also combine existing information about customers with new insights gathered from public sources, including social media.

> **A concerning use of deepfakes is emerging, producing nearly flawless falsified ID documents, now being linked to financial fraud**

But current technologies are limited by the fact that AI and machine-learning are only as good as the data we feed them. We also need to find optimal ways for machines to work together with people. And crucially, the 2012 HSBC money laundering scandal has shown that AML systems are only useful if banks actually implement them.

So how do bad actors still manage to threaten the system? Whenever a new financial product or technology is introduced, criminals are quick on their feet. One example is deepfakes, which are synthetic media images and videos of a targeted person.

As this technology matures, "driven by advances in AI, big data and software manipulation, a concerning use of deepfakes is emerging, producing nearly flawless falsified ID documents, now being linked to financial fraud", says Hendrikse.

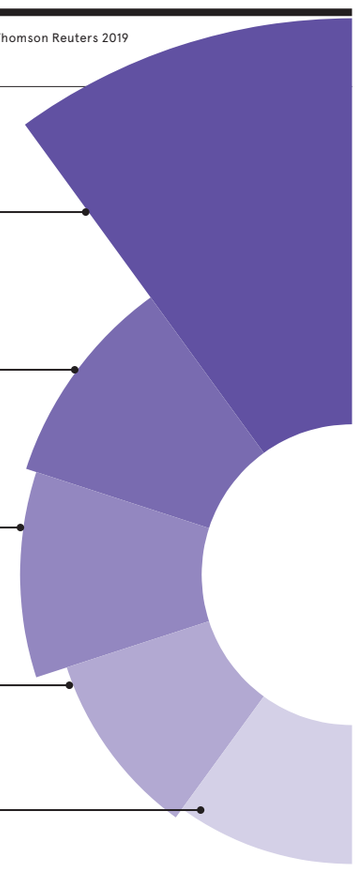
"Someone with access to these technologies would potentially be able to open a bank account or sign up for products and services in someone else's name, borrowing the identity or creating a brand-new one for someone who doesn't even exist."

The key to successful AML has always been knowing your customer. With the use of AI and new technologies, both financial institutions and cybercriminals can use this to their advantage.

USING TECH TO MANAGE ANTI-MONEY LAUNDERING

Thomson Reuters 2019

Global survey of compliance decision-makers from financial institutions



38% We use an automated systems to manage screening workflow and records management

18% We manage our reporting intake and records in a central records management system

17% We use a single automated system to manage the entire process, from screening to monitoring to records management

14% We use office management software and a filing system to keep records

13% We do not use an automated system to manage screening or monitoring

CUSTOMER SERVICE

Inside the hotel run by robots

Why the novelty of a hotel staffed predominantly by robots soon wore off and what it has taught the industry about customer service artificial intelligence

Sam Haddad

Until last year, if you had checked into the Henn na Hotel in Japan you'd have had a staff of 243 robots at your disposal. From the nodding velociraptor and humanoid "manning" the front desk, to the recycling bin droid that roamed the corridors and the chatty in-room artificial intelligence (AI) concierge, the world's first robot hotel even had mechanised fish swimming around a tank in the lobby.

The Henn na, which loosely translates as "strange", opened in Nagasaki in 2015 with a whirlwind of publicity. It was seen as a template for the future. A robot-staffed hotel could offer a fun and original experience for guests, while providing huge savings on staff costs for hotel owners.

"From an operational costs point of view, it was quite a brilliant thing," says Dr Nick Naumov, senior lecturer in tourism and hospitality management at the University of Northampton and visiting professor at Meikai University in Tokyo Bay, who specialises in how AI and robots affect service quality in hotels.

"They started off employing 30 human staff for 140 rooms, which could be 300 guests. And when things went well initially, they brought that down to seven staff, which is a really good ratio."

That this robot hotel originated in Japan, a nation which exports more industrial robots than any other and has long been ahead of the curve in robotics technology and innovation, chimed with the narrative perfectly.

Shortly after its opening, Henn na's owner Hideo Sawada cited the country's love of anime and manga robots as inspiration for the hotel. He went on to predict: "In five to ten years, this kind of robot hotel will spread all over the world."

The company did open another hotel, at Urayasu in Tokyo Bay, and at one point had another eight robot hotels in the pipeline. But these plans never materialised and in January 2019 Henn na cut more than half its robot workforce.

At first guests had loved the novelty of the robot hotel experience and the colour it brought to their social feeds, but before long things started to go wrong. The robotic dinosaur and humanoid on the front desk could only speak one language each, English and Japanese respectively.

Later Mandarin and Korean were added, but that still left many guests wrestling to be understood, including a Scottish man, who documented his experience on YouTube. The robots also struggled with the different passport and identity-card formats and photocopying the documentation, so human staff constantly had to step in.

Guests grew frustrated with the in-room voice assistant called Churi. It could cope with basic commands, such as turning the lights on and off, but appeared primitive when asked more sophisticated queries, such as flight schedules or theme park opening times by guests accustomed to voice AI at a level offered by Google Home, Alexa and Siri. Churi would also confuse snoring as a voice command and issue a perky response that would wake guests up.

The hotel had to raise its staff count to deal with the escalating complaints, plus the robots themselves required an increasing amount of expensive maintenance. As Naumov says: "Just like any other tech, they needed regular servicing and constant software updates, and those things aren't cheap."

According to one hotel guest, following a visit in 2016: "About half the puppy-size lobby dancers appeared to be broken or in need of charging." And after the hotel cut its robot workforce, a long-time staff member was quoted as saying: "It's easier now that we're not being frequently called by guests to help with problems with the robots."

> **The in-room voice assistant would confuse snoring with a command and issue a response that would wake guests up**

It's not a question of whether customer service AI is valuable in a hotel setting, as it clearly is. But according to Dr Björn Schuller, professor of AI at Imperial College London, whose expertise includes affective computing, or the science of AI and emotion, what happened at Henn na Hotel reminds us to think about which applications AI is suitable for and which it isn't: tech realism over tech optimism.

"Where a bot is most useful is not in place of a social context, but when you want precise information in as short a time as possible or to save you waiting for something," he says.

Some of the most successful robots in hotels do just that, for example Hilton's Connie, which employs IBM's Watson AI software to provide personalised information about visitor attractions, restaurant recommendations and direct guests around the hotel. While other big-name hotel chains, such as the Marriott and Yotel, use robot butlers for speedy, but rudimentary, room service requests, such as fetching a towel, coffee or sandwich.

By using robots for room service and other entry-level tasks, such as cleaning and luggage transportation, which were both done by robots at Henn na, Naumov points out you improve efficiency, but also free up the human staff to welcome guests, handle complaints and deal with other crucial customer service needs.

"The human touch will never disappear," he says, adding that human-centred service may become "the new currency of luxury hospitality in the future". This could mean low-cost hotels running largely on service automation, robotics and AI with a skeleton staff, while expensive hotels retain a large, visible human workforce.

There is also the question of trust. We might believe a human concierge is giving us the inside scoop on the best local restaurants or places to withdraw cash with a good rate, even if they're not, but a robot would always put the hotel's agenda first.

As Schuller says: "In the future a robot will always give you better information than a human, as they won't forget things and they'll be fully updated with the latest news, but then it becomes a matter of trust. A human can pretend they're doing you a favour, even risking their job to do so, but we know a robot will always be on the company's side."

Unlike Henn na's front-desk humanoid, the Hilton and Marriott droids all look like typical robots, as imagined in 1980s films and TV, as opposed to human-like iterations, which some people find disquieting. In a low-cost hotel, we might not mind an unmanned check-in desk with facial recognition sensors, or to use our mobile phone as a room key, if it saves us time and money.

But to have a humanoid overseeing that function adds a layer of alienation to the experience that we might not have noticed otherwise.

However, the right kind of robot can become a star attraction. This happened in Belgium at Ghent, when Mario from the Marriott became a minor celebrity, visiting local schools, football clubs and even giving speeches at welcome and farewell events.

And with conversational AI set to get smarter and even more "charismatic", according to Schuller, over the next few years hotels may be able to capitalise on this through creation of celebrity AI to attract guests and which could be combined with robotics technology.

As Schuller adds: "Once we have natives of socially and emotionally intelligent AI, this digitally advanced generation of consumers could have a whole different level of perception. Maybe they'd seek out AI with different personality attributes, famous AI for example, to give them kudos." Just as long as the AI can spot the difference between snoring and talking.

OPINION

‘Artificial intelligence at the edge will overshadow AI processing in the cloud over the next six to seven years’

Artificial intelligence (AI) technologies have already become a part of everyday life for billions of consumers across the world, from digital assistants, to smart home devices, to self-parking cars.

However, AI holds vastly greater potential, possibly moving beyond such narrow, task-specific applications and into the realm of general intelligence, where machines can perform all activities with equivalent or superior performance compared to human beings.

Before realising the vision of general AI, the artificial intelligence industry must tackle some of the biggest challenges facing the business, including security and ethical issues.

Solving these problems will require solutions providers to work across the entire AI ecosystem, employing not only software, but chip-level hardware solutions that can deliver the required performance and security to support the next stages of AI technology development, according to Omdia.

The AI business in the past has largely been focused on software. However, to unlock the power and growth potential of AI at the edge in internet of things devices, software providers must work across the AI ecosystem to promote the implementation of AI in chip-level devices. These devices provide not only the processing horsepower required for AI, they also provide built-in hardware security.

Current AI models are largely processed on the cloud, in terms of training and inference. A shift is beginning in the consumer devices market and some other markets, such as security cameras and automotive, where hardware and software advances allow for AI model inference to be run on the device itself.

Therefore, the emerging narrative for AI processing is that artificial intelligence at the edge will overshadow AI processing in the cloud over the next six to seven years.

To accomplish this, AI-enabled devices and products will require sufficient processing power. These devices are moving AI processing tasks from software to hardware, which will require chips with AI-specific enhancements.

Almost all suppliers of processor core technology are expected to integrate AI enhancements into their products in the coming years. This will trigger a major increase in AI support in system-on-chip (SOC) integrated circuits, potentially bringing capabilities like voice recognition, face recognition and object recognition to billions of devices.

Less than 20 per cent of SOC devices included AI capabilities in 2019. However, with the increasing integration of AI into processor cores, more than half of SOCs will be AI capable by 2023, according to the Omdia Processors Intelligence Service.

This rising penetration of chip-level AI will require software vendors to collaborate with companies across the AI ecosystem to ensure the right kinds of capabilities are built into hardware, including security.

For example, processor IP supplier ARM is implementing security at the most basic level on semiconductor devices. These security features need to be taken into account at each level, from the chip, to the device, all the way to the cloud.

> **Software vendors must work across the AI industry ecosystem to find the solutions for today’s security issues and tomorrow’s ethical challenges**

By delivering this intelligence on micro-controllers designed securely from the ground up, ARM is reducing silicon and development costs, and speeding up time to market for product manufacturers seeking to enhance digital signal processing and machine-learning capabilities on-device efficiently.

The move to device and edge-level AI processing will also immediately address one of the most serious security issues facing the market, which is the risks involved with sending data to the cloud for processing. By conducting AI processing tasks on the chip level, the need to send data through public networks will be reduced.

Makers of tablets, smartphones and smart speakers are developing products that use the capabilities of 5G to perform visual AI processing tasks by edge servers and appliances, bypassing the privacy risks involved in sending data to the cloud.

By 2025, two out of three smartphones are expected to include built-in AI capabilities. Global revenues for AI smartphones are forecast to increase to $378 billion, up from $29 billion in 2017, according to Omdia.

So the AI industry is preparing to move beyond the current stage of narrow, task-specific solutions and into the era of generalised intelligence. Data scientists are building such AI systems that are constructed based on key data-security principles.

With security so intrinsic to AI systems, businesses may need to consider a security vendor at the same time they evaluate an AI provider.

However, solving security issues goes hand in hand with addressing larger ethical issues related to AI. These ethical issues cannot be solved without addressing the security challenges and a strong ethical foundation will be essential as AI approaches human or superhuman levels of intelligence.

Ethical issues include fundamental questions such as whether an organisation’s AI technology provides an overall benefit to society or how much an organisation needs to disclose about its AI activities to stakeholders and the general public.

One major question for organisations is whether they should be in control of their destiny when it comes to AI data.

To answer this question, organisations need to take a look at their practices regarding machine-learning and AI development. For example, when conducting AI modelling, organisations need to ask themselves whether the training data they are using should comply with privacy laws like the European Union General Data Protection Regulation or US Health Insurance Portability and Accountability Act. Alternatively, these companies may decide these laws should only apply to live data.

With the age of generalised AI approaching, software vendors must work across the AI industry ecosystem to find the solutions for today’s security issues and tomorrow’s ethical challenges.

Jenalea Howell
AI market lead,
AI Summit

SHARE OF SYSTEM-ON-CHIP DEVICES WITH AI CAPABILITY

Percentage of global unit shipments

Omdia 2020