AI FOR BUSINESS

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STRATEGY

Pitfalls to avoid when using AI for the first time

Getting the integration process wrong can prove disastrous. Any business seeking to introduce the technology would be well advised to learn from the early adopters

Chris Stokel-Walker

Artificial intelligence has long been heralded as the technology of the future – although it is still the future if an international survey of 700 business leaders by Juniper Networks in April is anything to go by. Only 6% of respondents reported having adopted AI, but 95% said that their firms would benefit from doing so.

A similarly sized poll of IT decision-makers by *Insider* in the same month found that a third of respondents were planning investments in AI.

While many businesses are clearly keen to start using the technology, experts warn that they need to introduce it judiciously. Firms may well have more pitfalls to avoid than benefits to reap, so it's vital to learn from previous AI integrations elsewhere.

BT has been using various generations of the technology for some time, according to Paul O'Brien, director of AI, service, security and operations research. Today, the company utilises tech ranging from neural networks and deep learning to evolutionary computing and heuristics in the effort to streamline its operations.

"AI improves the way the company manages its networks and services," O'Brien says. "The technology automates routine tasks and augments people's capabilities with smart insights and support."

AI plays a role in many of BT's activities, from planning where next to install its fibre broadband network to handling the 27,000-strong team of field engineers and their vehicles. It helps managers to predict line fault volumes, organise rosters and schedule work. It's even being used by technicians to construct a digital twin (a virtual simulation) of the national phone network.

Despite his company's successful applications of the technology, O'Brien warns prospective AI adopters to integrate it into their existing systems with great care.

"There is too much hype around AI, which raises expectations and leads to misunderstandings of what it can do," he says, adding that its performance can depend heavily on the quality of the data fed into it.

Dr Catriona Wolfenden, partner and innovation manager at law firm Weightmans, agrees. "Many people fall into the trap of thinking that AI is some kind of magic wand that's simply going to fix all ills. It's not at all," she says. "You need to ensure that you're using AI on the right kind of thing and you must get the underlying principles and data collection right."

Bloom Productions via Gettyimages

The limitations of AI and the built-in biases that have dogged certain systems have attracted plenty of negative headlines. This risk factor has encouraged firms such as EY to employ AI ethics experts in senior positions as a mitigation measure. Ensuring that the technology is used ethically is vital. But, while 87% of respondents to the Juniper Networks survey agreed that their companies needed to put proper governance policies in place to minimise any harm resulting from the use of AI, this task ranked as one of their lowest priorities in the adoption process.

"Companies need to bring domain expertise on board, so that they can understand how to both exploit AI and understand its limitations," O'Brien advises.

Wolfenden has been careful to integrate AI into Weightmans' work gradually. "We've taken a very conscious approach that it's about the augmentation of a lawyer's expertise," she says. "It's there to enhance the professional's skills, not to replace them."

AI was first applied in a chatbot for internal use. "We started really small to survey the market and pick a use case," Wolfenden recalls.

Once that application had proved its worth, she applied the tech to another straightforward operation: pulling data from one set of files and inserting it into another set.

"It's really easy at the start to get carried away and think that you're going to do everything with AI," she warns. "Have the idea and scale it back – probably twentyfold – to begin in the right place."

The firm was also prudent in how it presented the technology to clients, knowing that they might worry that their highly paid solicitor was being replaced by a machine.

"A lot of this is a case of careful messaging, both internally and externally," Wolfenden says. "We provide fact sheets that explain why we'd use AI, stressing that humans are still involved."

Cary Cooper, professor of organisational psychology and health at Manchester Business School, advises firms introducing AI to "engage the workers with the process, rather than impose it on them. Getting them to come up with the solution so that it works for both them and the business is the most effective strategy."

Simply foisting AI on your staff is a sure-fire way to trigger resentment, Cooper warns. "That will create uncertainty and insecurity, motivating them to find ways to make it less effective," he says. "On the other hand, if employees have ownership in the introduction of AI, they won't try to undermine it. They'll make it work and it's likely to prove more productive."

95% of people who are directly involved with their company's AI plans believe that their organisations would benefit from embedding AI into their daily operations, products and services

88% would like to use AI as much as possible

6% of C-level executives have reported adoption of AI-powered solutions across their organisation

Juniper Networks, 2021

Commercial feature

Q&A

The positive power of uncertainty

Dr Francis Woodhouse, director of data science at the Smith Institute, discusses how business can reap rewards by embracing uncertainty in AI

Q How has the past year affected AI systems?

A "AI uses data from patterns of behaviour to make its predictions. But there has been an abrupt change in those patterns, which may even be permanent, although that too is not yet clear, of course. This makes the data harder to work with.

"Predictive modelling is only as good as the data on which it's built – and the events of the past year have skewed that data. We cannot rely on historical patterns in the same way as we did in 2019. If a transport-based forecast relied on the regular Monday-to-Friday commute, for example, that forecast will need radical re-engineering in the flexible future of 2021 and beyond.

"That means data scientists will have a significant challenge for some years to come, not least in ensuring that 2020-21 data doesn't corrupt their modelling and forecasting. But, fundamentally, it also demonstrates how easy it is to think of AI as a fait accompli when in reality it can sweep things under the rug. Now is the time to engage with AI to build back stronger."

Q So how can you still make use of AI?

A "By embracing uncertainty. The effective use of AI hangs on two things: understanding assumptions and being transparent about what's not known. Engaging with these intricacies will give you the best value from your AI investment while also expanding your decision-making power.

"It's easy to see AI as a crystal ball that's ready with clear, definitive answers. But an AI system will respond only according to the assumptions used to build it. Maybe it assumes behavioural patterns that are only rough approximations or maybe it smooths over unpredictable random effects. Either way, you need to be able to work with your AI and trust it in the face of such assumptions.

"A powerful way to gain transparency is to build AI that embraces uncertainty by calculating and reporting it clearly – using a forecast range, for example, instead of a single, more definitive number. A system built to be explicit about its uncertainty can help you to assess your risks honestly, empowering your planning and decision-making."

Q What's the point of AI if it doesn't give you a definitive answer?

A "We're familiar, and so perhaps more comfortable, with uncertainty when it comes to weather forecasts or opinion polls during elections. Will it rain tomorrow? No one can say for certain, because we don't have perfect data, but this doesn't mean that 'a 90% likelihood of showers' isn't useful information.

"AI that reports uncertainty can help you to understand and measure the possibility of different scenarios, even the so-called 'black swan' events – the outliers, such as extreme weather. By estimating the likelihood of different outcomes instead of making a single prediction, AI gives a nuanced view of what could happen, rather than a misleading guess at what will happen."

Q How should you approach AI to get the most out of it?

A "To obtain lasting analysis that can confidently support your critical decisions, you need to return to first principles and consider what you want to achieve. AI is no silver bullet. It's not a product; it's a process. By readily engaging with the process, you will learn more about your business, what's driving it and how to make better informed decisions.

"Engagement means getting a clearer picture of what information you need in order to understand the drivers affecting your business. When your uncertainty-capable AI offers you a wide range of possibilities, it's telling you that there's more to learn. You may need a higher degree of detail about what is driving customer behaviour, for instance.

"Off-the-shelf or automated AI is accessible and relatively affordable, but it may provide only superficial intelligence if it's not tailored to specific goals. It may report with confidence what should more accurately be reported with nuance. Instead of black-and-white certainty, a reliable system will report uncertainty that enables you to choose different options depending on how many shades of grey there are."

> **AI that embraces uncertainty gives you more information, not less**

Q Can you exploit the uncertainty that your AI is reporting?

A "Yes, AI can work to a very fine degree of nuance if you want it to, providing that it's based on the right questions.

"So it's up to you to define what success looks like for your business. You need to be clear about your key performance indicators, about the questions for which you want answers. By engaging with the process that is AI, you can set more specific and sophisticated goals, identify what 'unlikely' looks like and decide when that matters.

"AI that embraces uncertainty gives you more information, not less. You can plan for best- and worst-case scenarios and know right away when you're missing crucial information. All this can help to mitigate the extremes of performance that might otherwise be catastrophic. So, for example, AI can't give a supplier of wind-generated electricity an exact wind-speed forecast for a given day, but it can predict the likely variability in speed that will help the company decide whether to put back-up systems on standby to ensure continuity of supply."

Q So how do you recognise "good" when it comes to AI?

A "What 'good' looks like depends on your goals. Maybe you need a forecast that's as close as possible on average, or maybe you need a conservative model that shies away from over-forecasting – the consequences matter as much as the answer itself. Have honest conversations about what successful and transparent AI looks like for you. The more you engage, the more likely you are to end up with a system that pays dividends.

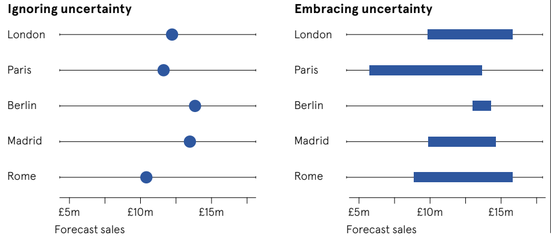
"Embracing uncertainty as you build your AI capability will help you to refine your business model and gain a sure long-term footing, ready to face the future with the risks and rewards firmly under your control."

For more information or to get in touch, please visit www.smithinst.co.uk

Smith institute

WHERE WILL SELL THE MOST? AND THE LEAST?

If your AI can report its uncertainty, you might reach very different conclusions - and change your decisions



Drima Sobko via Shutterstock

RECRUITMENT

For and against the 48-hour hire

Can a speedy hiring process be effective? Can an effective hiring process be speedy? The debate is on

MaryLou Costa

Against

Big companies such as Xero and Experian acknowledge the benefits of AI in the early stages of the recruitment process, but strongly believe that the more intricate tasks should be handled by people.

Humans are better able to identify candidates with the right cultural fit and eliminate any biases that algorithms can inherit from their programmers or existing data sets, according to Nicole Reid, Xero's chief people officer.

"We hire for cultural fit first. AI won't pick that up in the way it could pick up a particular skill," she says. "As much as we're interviewing a candidate, they're interviewing us, so they know what they'll be coming in for, what we value and what we expect of new recruits. Those are key factors for us, so we won't change our human approach."

Experian is similarly reluctant to use AI in shortlisting and selection, as it feels that this poses an unacceptable risk of algorithm bias.

> **As much as we're interviewing a candidate, they're interviewing us, so they know what they'll be coming in for, what we value and what we expect of new recruits**

Its chief HR officer, Justin Hastings, explains: "We continue to train our hiring managers and talent acquisition teams to recognise and reduce bias in our selection processes – and we'd set the same bar for any AI tools we might adopt. AI is about improving the quality of the hiring process and helping us to source and identify diverse and highly skilled people. But we still need to bring talent into our organisation based on human-to-human interaction."

While G4S has attracted a more diverse range of successful job candidates when using AI, behavioural scientist Diarmuid Harvey observes that employers require a substantial data set to achieve this. The tighter the schedule, the smaller the opportunity to attract a diverse enough pool of talent, he notes.

"If your process has come down to days, do you have a sufficiently large pool to enable you to test whether or not your model is biased?" says Harvey, who is head of science for the Chemistry Group, a talent strategy consultancy. "It would take massive amounts of data to support an approach like this."

He adds: "Even if you did test this on very large data sets, it doesn't take away from the fact that there's a lot of upfront work required in identifying the role's competencies. And, if you're going to assess someone's intellect – their personality, motivations and behavioural competencies – all of that requires some interaction with the individual."

Speed, Harvey concludes, is clearly an important factor, but it should be secondary to ensuring a fair selection process. "The question to ask", he says, "should be: 'how effective is this speedy process?' As opposed to: 'how speedy is this process?'"

For

Filling a senior-level vacancy in 48 hours sounds too good to be true, but that's what AI-enabled recruitment platform Vervoe claims to have done when it appointed a new VP of sales in February. Using its own 10-question assessment of essential skills, the Melbourne-based firm believes that it secured the best candidate in the most efficient way.

But is speed really that important when it comes to hiring? Efficiency does not necessarily translate to effectiveness, after all. Is a great candidate always someone with all the requisite skills, or is the AI-dependent recruiter missing out on vital elements of a good employee by disregarding some of the key factors – cultural fit, for instance – that the algorithms can't rate?

What do the experts have to say?

Naturally, the co-founder and CEO of Vervoe, Omer Molad, believes that speed is essential in recruitment, given that the most talented and capable people are rarely on the job market for long before getting snapped up.

"The best candidates have options and aren't willing to wait around," he says, observing that most of his clients are taking just a few days to recruit at most levels.

Probe Group, a provider of call-centre services, has cut its time to hire for front-line jobs from four weeks to a mere 24 hours, for instance, while marketing agency KlientBoost has filled management roles within 72 hours.

G4S has been able to reduce its recruitment process for security guards and correctional officers from 20 to 15 weeks. This has created significant resource savings for the company's head of talent, Richard Rushton, whose team had to manually review up to 600 applications at a time. AI assessments have also increased the quality and diversity of applicants, he reports.

"It takes unconscious bias out of the equation, because a recruiter can still look at a CV and make a judgment based on someone's name and location before they've even tested that applicant's skills," Rushton says.

Although G4S is benefiting most from AI in its high-volume hiring at present, he feels that it would be possible to cut stages from the process at the professional level to achieve 48-hour recruitment – providing that all the right groundwork is done beforehand.

"If you can build the assessment quickly enough and you've got the desire to run things through that fast, you could do that," Rushton says. "A 48-hour hire would be nice, although I would probably want a bit more due diligence and work to be done on candidate sourcing. If you took out the sourcing aspect, you could push things through quickly enough to get to that point."

Indeed, the VP of sales who was successfully recruited by Vervoe in 48 hours had initially been referred by a well-connected contact in the CEO's network.

> **A long-winded hiring process will prevent you from getting the right people... Invest time in understanding whom you really need**

Katrina Collier, an expert in candidate engagement and the author of *The Robot-Proof Recruiter*, echoes Rushton's views about the preparatory work required to enable a short hiring process.

"A long-winded hiring process will prevent you from getting the right people. But, before you post your advert or seek referrals, invest time in understanding whom you really need to hire," she advises. "What problem will they be solving? Where will they develop and grow?"

Collier continues: "Assess what is missing from your current team too. This will ensure that you don't hire someone because they're like you when you need the opposite. Once this is done, you can go out to market and keep the process short – even 48 hours if you want. But be wary of being overly reliant on AI to make the decision."

Modern enterprises need real-time information

Regardless of the industry they operate in, all businesses must incorporate real-time data into their critical workflows to address the risk landscape successfully

Over the past decade, the ways in which we produce and consume information have evolved enormously. The global health and economic impacts of the Covid-19 pandemic have accelerated change further, pushing the boundaries of potential risks to the enterprise.

The breadth of enterprise risks has been expanding for some time now, growing at the rapid speed of digital adoption and technology-fuelled globalisation. For business leaders, this means that a threat to physical locations can come just as easily from a data breach as it can from a local power cut. Or threats to their brand's reputation can surface on social platforms they aren't even invested in or aware of, rather than a single in-person customer complaint.

Before Covid-19, the real-world consequences of a poor or slow response to a crisis spanned sharp declines in shareholder value, executive resignations and impacts to brand reputation, customer loyalty, employee retention and more. Then, during the height of the pandemic last year, the ramifications of failing to prepare for the unexpected, and underestimating or overestimating the potential impact across business-critical functions, became painfully clear.

Though endless, enterprise risks can be broadly categorised into four segments: operational, business intelligence, cyber, and reputation and brand management, each with its own subcategories. Operational risk, for instance, includes subcategories of asset protection, executive protection, physical security, travel safety, human health, logistics and deliveries.

"Real-time information about emerging risks and disruptive events across the key segments of the enterprise is vital for decision-makers." So says Jason Edelboim, chief operating officer and president at Dataminr, whose AI platform for real-time event and risk detection enables tens of thousands of users at hundreds of organisations to learn first of breaking events worldwide, form effective mitigation strategies and respond confidently as crises unfold.

While most organisations recognise the importance of real-time information in crisis response, not everyone interprets the term in the same way. Dataminr commissioned a Forrester survey of more than 400 professionals in the UK, US, Australia and New Zealand responsible for managing risk and compliance at companies with annual revenues exceeding $500m. When asked to define "real-time", their answers ranged from seconds to months.

The respondents were divided in their views, with 47% saying that real-time information is data created some time in the past day. Some of these said minutes or seconds. The other 53% said it is data that's between a week and a quarter old. Breaking that down further, 8% of risk professionals saw real-time information as data from the past few seconds, while 12% thought it referred to data created within the past three months.

It was also clear from the survey that inflexible technologies and siloed processes are a hindrance, making real-time information less accessible when it is most needed. It found that only 43% of enterprise crisis-response teams include the HR department, for example, while only 33% include the corporate communications team.

"At Dataminr, we deliver actionable, real-time information about emerging risks and impactful events as close to when they occur as possible – often within seconds," Edelboim says. "Every department needs real-time information that's tailored to its specific needs, sharing the responsibility of risk detection across the enterprise. Unfortunately, functional silos are common."

He continues: "As modern crisis management is a shared exercise and disruptions can impact every function, it's vital that all departments have clearly defined areas of responsibility as per the four main segments of risk, and that leaders allow for a rapid, coordinated response during a crisis. A siloed approach in today's enterprise risk landscape is one of the greatest risks of all."

In terms of how organisations are approaching risk management and crisis response, the survey found that more than 80% of risk professionals thought that access to real-time information has never been more necessary. Well over 40% said that they were planning to implement, or expand their implementation of, a real-time alerting platform in 2021.

The study also demonstrated that the inconsistent use and understanding of real-time information hinders strategy and action. Eight out of 10 survey respondents agreed that it is important to have access to real-time information that affects their business, even though only 16% accurately defined real-time information as data that's no more than a few minutes old.

While managing risk is challenging, it doesn't have to be entirely daunting. With crises diversifying and happening at the speed at which information spreads, the value of real-time information is immeasurable against the weight of not having an early sight of impactful disruptions. Whether it's a cyber breach or a PR maelstrom, achieving an accurate, holistic picture of the size and scope of a crisis is essential to making better-informed business decisions.

Especially in the case of global enterprises, real-time information about an incident thousands of miles from headquarters could influence a decision affecting operations in several regions. And, for the employees and external stakeholders in the immediate vicinity of a breaking event, a hyper-local view of that event as it unfolds is crucial for frontline decision-makers to be effective.

"During a corporate crisis, every second counts," Edelboim says. "Relevant, up-to-date information is a crucial input to crisis management. Incorporating real-time information into your business or function's critical information system closes the gaps between an emerging risk becoming a crisis, and your response to protect your people, assets and, ultimately, your brand."

He concludes: "Businesses of all sizes and industries benefit greatly from mapping out risk management plans that describe clear roles and responsibilities, and use real-time information as the North Star in the early detection of emerging risks and crises for coordinating a truly unified response."

For more information, visit dataminr.com

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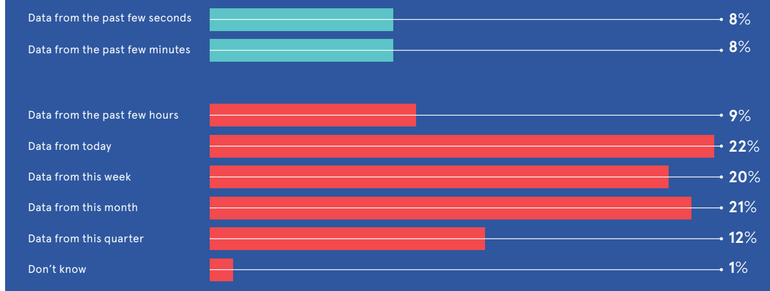
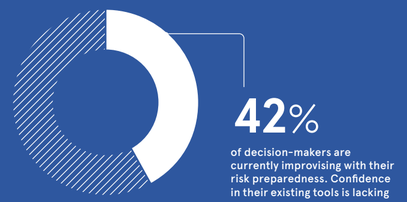
> **Enterprise risks today can be broadly categorised into four segments: operational, business intelligence, cyber, and reputation and brand management, each with its own subcategories**

ENTERPRISES WITH AN ACCURATE UNDERSTANDING OF REAL-TIME OUTPACE THOSE WITH AN INACCURATE UNDERSTANDING

ACCURATE VS. INACCURATE UNDERSTANDING OF REAL-TIME: DEFINED



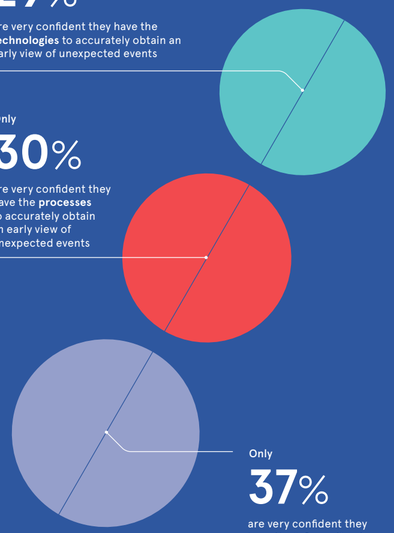
THE RISE OF THE REAL-TIME ENTERPRISE



42% of decision-makers are currently improvising with their risk preparedness. Confidence in their existing tools is lacking

Only **29%** are very confident they have the **technologies** to accurately obtain an early view of unexpected events

Only **30%** are very confident they have the **processes** to accurately obtain an early view of unexpected events



Only **37%** are very confident they have the **information** to accurately obtain an early view of unexpected events

A commissioned study conducted by Forrester Consulting on behalf of Dataminr

Q&A

Early detection gives companies the edge

Helen Sutton, senior vice-president of EMEA and APAC sales at Dataminr, reveals the crucial role that real-time data is playing in managing the sheer magnitude and breadth of enterprise risk

Q What have been the main barriers to business resilience over the past year?

A "An enterprise's ability to adapt to the pandemic era has become an indicator of resilience. That said, most businesses' resiliency strategies have been put to the test in the past year. And most of those challenges were down to not having enough information or not having it at the right time to make critical decisions quickly. Leaders must connect the dots among the growing diversity of risks, vulnerabilities and gaps they have discovered during this turbulent period and equip decision-makers across the enterprise with real-time information to help them solve real business problems in real time."

Q How vital is advanced, intelligent technology to managing enterprise risk effectively?

A "Having the right architecture is essential. It's important to assess the gaps in support, skills and the total risk identification and response framework first and then invest in advanced technology that can effectively and efficiently play the roles you need. A baseline responsibility of any function leader is to drive process innovation. Decision-makers who under-utilise technology are slow to innovate and unable to adapt to the rapid growth of the information landscape. They will fail to grow both their function and their business."

Q How can organisations ensure they identify an evolving risk before it's too late?

A "An unexpected event can occur anywhere at any moment, radically affecting people and operations. Organisations need an early and clear line of sight into a developing situation, with additional context, to enhance their decisions as the incident unfolds. Real-time information is crucial for enhancing organisational agility, sustaining business continuity and responding with speed and confidence. This is especially true as public data sources continue to expand and diversify, spanning social media, information sensors, blogs and the deep web."

> **Leaders now must connect the dots among the growing diversity of risks, vulnerabilities and gaps they have discovered during this turbulent period**

Q How does Dataminr support enterprises in this area?

A Think of Dataminr as your first layer of crisis response. Our AI platform processes billions of units of public information daily, searching for early indicators of risk, so you don't have to do that manual labour and risk missing critical information. The technology provides the first warnings of high-impact events to users across an enterprise to enable more effective risk mitigation strategies and faster coordinated responses.

Dataminr has detected millions of global, national and hyper-local events since its first patent in 2010. Our initial detection of the Covid-19 virus from local Chinese social media platforms such as Weibo, at 9.11am Eastern Standard Time on 30 December 2019. This provided our customers, which include global corporations, public sector agencies, NGOs, and newsrooms, with the earliest warning in advance of the CDC announcement seven days later, and the WHO's report ten days later.

Q Can you reveal some companies you've worked with and how they use your technology?

A We work with hundreds of corporations in dozens of industries, including more than half of the Fortune 50. We have a significant footprint in retail, financial services, technology, telecoms, pharma, insurance, automotive, real estate, transport and logistics. Our value is industry-agnostic and our customer base, which includes Goldman Sachs, Vodafone, L'Oréal, Netflix, Dyson and Shell, reflects that. Our customers rely on Dataminr for real-time alerts to protect their people, brand and physical and virtual assets every day. They're continually uncovering new use cases in areas such as physical safety and security, reputation risk and crisis management, business intelligence, logistics and cyber threat detection.

Q What is your vision of the future of enterprise risk?

A The future of enterprise risk is expansive. About 95% of the 150,000-plus data sources that integrate into our platform didn't even exist in 2009. One can imagine that the risks coming at the onset of new social platforms and public data sets in 10 years will differ from today's ones. The only way to prepare for that is to understand how the information landscape is changing and be able to access the right information at the right time. We're at the forefront of real-time event detection, but we have only scratched the surface of the potential use cases.

INTERVIEW

Bias in AI: an urgent problem to solve

Human prejudices are still finding their way into algorithms, which can make choices that reinforce socioeconomic inequality. Unesco's senior expert in inclusion, **Gabriela Ramos**, is determined to stop the rot

James Lawrence

For better or for worse, AI is becoming deeply embedded in business and wider society. A global survey of 2,400 companies by McKinsey & Co in June 2020 found that half had adopted the technology in at least one function. Although uptake in the public sector has been slower, according to research by the World Economic Forum, it is accelerating.

The result is that an increasing number of important decisions are being made – or at least informed – by machines. This presents a problem that's troubling many industry observers, ethicists, policy-makers and business leaders. The fact is that, intentionally or not, human prejudices are finding their way into the algorithms that power AI systems, as well as the data sets they use. These biases are increasing societal inequality on a hitherto unimaginable scale.

Among those most concerned by this pernicious trend – and most determined to find a globally applicable solution to it – is Gabriela Ramos, assistant director-general for social and human sciences at Unesco. Ramos, whose remit covers the ethical aspects of AI, explains the problem as she sees it.

"AI is nothing other than the enhanced capacity to analyse data and come up with predictions, perceptions, information and outcomes. An algorithm is nothing other than a mathematical representation of the problem you want to solve," she says. "But we humans define the problems and the boundaries, training our AI systems to recognise certain aspects that we want to address. Within this process, there may be assumptions, cultural traits, knowledge, ignorance or a lack of diversity that could lead to biased outcomes."

One of the main causes of bias in AI, Ramos argues, is a form of collective blindness created by homogeneous groups of people when they are working together to develop the technology. They are normally male and "Anglo-Saxon, usually with a certain culture and certain ways of looking at life".

That lack of diversity is a recipe for groupthink, she says. "You might not see this while you're working, because you're in your context, your culture, your environment, your network. But what we're saying is that, when there is an outcome, you'll need to be able to determine whether it is fair or unfair."

She points to Amazon's use in 2014 of a recruitment and selection tool based on machine learning, which, it was claimed, had discriminated against female applicants for software development roles. "How did that happen? Well, it might be that the system's database had overrepresented successful workers, who'd usually been white, male, of a certain age and from certain regions."

Ramos can cite numerous examples of baked-in bias, including how the use of AI in parts of the financial sector is reinforcing socioeconomic exclusion. "If you use unrepresentative data sets including only people who currently have access to financial services and then introduce biases from your own mindset, it turns out that the machine recommends giving good credit ratings to white men," she says.

Similarly, when GSCE and A-level results in the UK were moderated by algorithms in the summer of 2020, "they didn't control for socioeconomic outcomes. That's a bias," Ramos says. "This is no different from what happens in the world, because the world is biased. But what we cannot allow is for the technologies to run by themselves, or to be run by a very small share of the population, because the reality is that we must be inclusive."

> **This is no different from what happens in the world, because the world is biased. But what we cannot allow is for the technologies to run by themselves**

Ramos believes that an important first step in tackling the problem is simply to put it under the spotlight. "Just by talking about it, we're starting to solve it," she says.

This will be aided, she hopes, by the forthcoming publication of Unesco's *Recommendation on the Ethics of Artificial Intelligence*, which aims to promote "a common understanding of the issues".

A further step is to begin fixing some of the real-world imbalances affecting the technology. A lack of racial and gender diversity in digital industries is an obvious challenge, according to Ramos, who says: "The gender issue is huge, with the lack of female ICT students and women in software development roles. And we need to enhance the ability of the Global South to participate."

She also recommends that organisations using AI should improve their procedures: "There are some simple practices that we are trying to advance, such as contesting a hypothesis, framework or model. For instance, some companies have divided their teams into those that plan developments and those that implement them. This separation can create a checkpoint."

To aid such a process, Ramos is planning for Unesco to produce an ethical impact assessment tool for AI. "This is a checklist of questions that covers the diversity of teams and the representativeness of data. It looks at outcomes and sees if they are having a discriminatory effect," she says.

Ultimately, it's down to governments to introduce effective legislation to counter AI's bias problem, according to Ramos.

"We need the capacity to protect citizens whenever they are affected by these technologies," she says. "But governments can't do it alone. The task has to involve a wide range of stakeholders. As usual, the regulators are lagging behind developments. It happened with the financial markets and now it's happening with digital technologies."

It is therefore "super important" for law-makers to collaborate with big tech and the wider business world to make the algorithms they use less opaque, she says, calling for the adoption of principles rooted in accountability, traceability, explainability and privacy.

While Ramos acknowledges that over-regulation can stifle innovation – and cause compliance problems for multinationals if regulatory standards aren't applied across borders – she argues that this factor must be weighed against the need to protect the interests of disadvantaged individuals and groups.

"We have to balance the public good with many other competing objectives," she says. "But these are mature technologies – solid developments that will cope well under a good regulatory framework."

Despite the problems that algorithmic bias has created, Ramos remains in awe of the benefits that AI can deliver. As one example among many, she highlights the huge advances it has enabled in healthcare.

"We have a Covid vaccine that was developed in just one year with the aid of these technologies," Ramos says. "And their use by doctors has moved the accuracy of medical diagnosis to a higher plane."

She adds: "We believe in the impressive power of AI. But we also know that, if we don't put some effective frameworks in place, it's going to create backlashes. Then no one will talk about the good it's doing. Building trust is essential – and that's exactly what we're trying to contribute to."

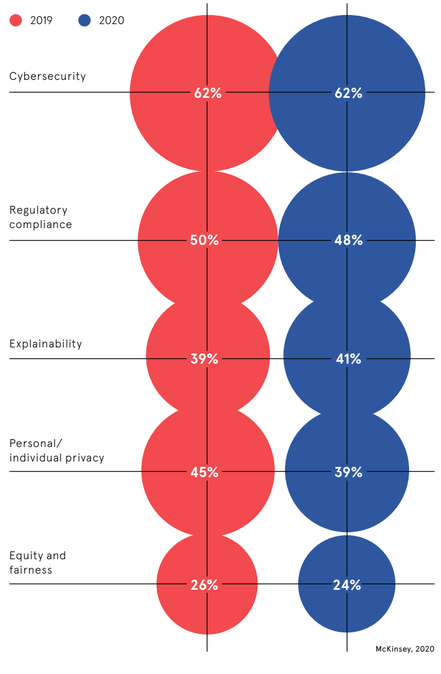
HOW TO KEEP AI ETHICAL

Actions taken by large global organisations to ensure that there is a focus on ethics when using AI

Capgemini, 2020

BUSINESS NOT TAKING AI ETHICS SERIOUSLY ENOUGH

Percentage of global organisations across sectors that consider the following AI risks to be relevant



McKinsey, 2020

Commercial feature

Decision intelligence unlocks the power of data

Putting AI in the hands of commercial decision-makers is helping companies to overcome decision paralysis and grow their revenues and profits

The explosive growth of data over the past 20 years, and assertions that data is a business leader's best friend, has fuelled perceptions that decision-making must be easier than ever. In reality, the opposite is true in many cases. The sheer volume of data available to decision-makers can lead to decision paralysis, whereby they become so overwhelmed by information that it slows them down.

A recent study of business leaders by decision intelligence company Peak found that roughly two-thirds believe that decision-making is more complex than ever before, while a similar proportion have suffered decision paralysis.

"The theory goes: 'We should just be able to make better decisions because we've got more data,' but that's not what we're seeing," says Richard Potter, CEO of Peak. "We want people to unlearn the idea that 80% of time spent on making decisions has to be on the grind, sifting through vast amounts of information. We want companies to be able to focus more on the outcomes of their decisions, not to be crunching through data to find the relevant insights."

> **We want companies to focus more on the outcomes of their decisions, not crunching through data**

As organisations rebound from the Covid-19 pandemic to meet the redefined needs of customers, it's essential that they banish decision paralysis. They need to work faster, not slower, to respond to the rapid changes happening in the world and make sense of vast amounts of changing, complex data. This requires technology that will ensure that they don't let decision paralysis lead to inaction.

AI is the key to unlocking the power of data and informing decisions with the use of vast and complex data sets, yet 70% of digital transformations fail. To be successful, businesses must embrace new ways of thinking and working, and put AI in the hands of commercial decision-makers for the first time.

Decision Intelligence, a concept pioneered by Peak, is the commercial application of AI to enhance business decision-making and grow revenues and profits. Peak outlines the way to achieve this and eliminate decision paralysis. It starts by combining as much data together from across the business as possible, before enriching that data with predictions and categorisations from AI models. The final step is to put those predictions to use in as many places as possible, going beyond dashboards and into guiding decision-making, creating companies that make choices in sync, with a shared goal of growth and sustainability.

"Every business needs its own, dedicated AI system to build and run its own AI," Potter says. "Just as each business function needs its own system of record – sales has CRM, operations has ERP and so on – businesses need a new kind of system in order to think smarter and make great decisions. Point solutions will only ever offer a piece of this puzzle. The use of decision intelligence represents a wholesale shift towards becoming an AI-driven business."

Peak has developed a Connected Decision Intelligence system (CODI), which helps to democratise AI, allowing the rapid deployment of solutions that use the technology to put power in the hands of business decision-makers.

"CODI is powerful because it lets you do all the aspects of decision intelligence in a single place. And it's always explainable, never black-boxed," Potter says. "There's also a real human aspect to it. We're here to put CODI in your hands, while getting rid of some of the data grind and levelling up the AI experience so it's done in more places than ever before."

For more information, visit peak.ai

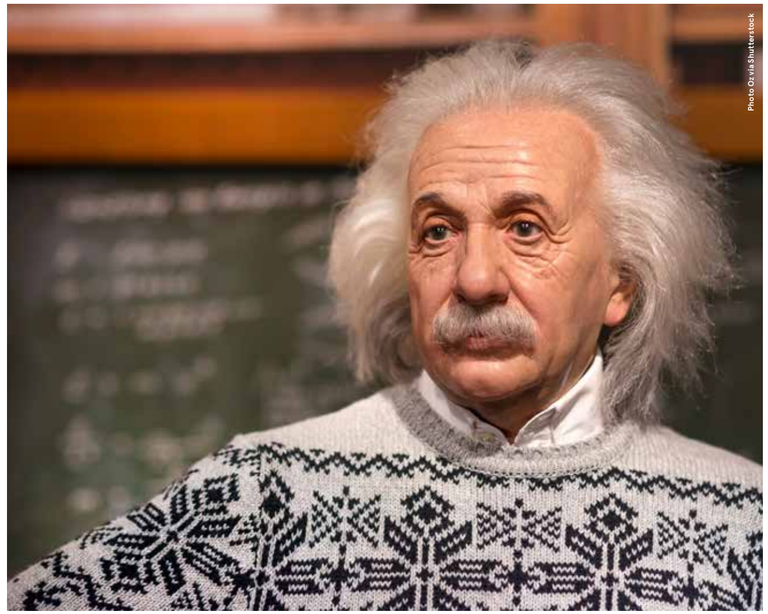


Photo 02 via Shutterstock

EDUCATION

What Einstein can tell us about AI in tuition

A new generation of humanoid chatbots has arrived, led by a digital reincarnation of the scientific genius. Do these virtual guides represent the future of teaching?

Gareth Platt

He's the ultimate science teacher. The 20th century's most brilliant physicist brought back to life, promising to unlock the mysteries of his subject. He's approachable too, with twinkly eyes and a mischievous Teutonic lilt.

This is Digital Einstein, a chatbot that recreates the great man's voice and facial features. The AI-powered reanimated Albert can set quizzes, answer questions and even offer opinions – just ask him if he thinks the Earth is flat.

This is the product of an international collaboration involving teams in Europe, New Zealand and the US. The voice element of Digital Einstein has been provided by Aflorithmic, a Barcelona-based company whose COO, Matthias Lehmann, sees education as a key use case.

"By using these chatbots in schools, you could bring subjects to life for kids," he says. "Wouldn't it be great to learn from these amazing figures?"

But beneath the glitzy visual rendering and the pattern-recognition software that produces Digital Einstein's tailored responses, there are questions. Are chatbots like this appropriate for education, with its emphasis on fairness and mutual development? Just because we can now bring these titans back from the past, is it right to entrust them with our children's futures?

> **Education is a social activity that's about personal development. It's not just knowledge transfer**

Until now, such questions would have been academic. Chatbots were always too unsophisticated to have any useful role in education. Unless the conversation stuck to a planned flowchart, they would get confused.

But other forms of AI have been infiltrating our schools. Intelligent learning programmes, which give each user a personal education plan tailored to their existing knowledge, are already helping thousands of students in the UK. Using games and quizzes, these programmes offer tips on how to develop at a suitable pace and recommend which modules to study next.

Mark Raymont, a maths teacher at All Saints Church of England Academy in Plymouth, is an early adopter and fan of such assistance. Having implemented Sparx, an AI-based system that provides bespoke homework plans, he reports that his classes' overall homework completion rates have improved to more than 95%.

"Instead of increasing homework, it has actually streamlined it," says Raymont, who adds that the technology has provided further benefits in the classroom. "We use Sparx to identify trends. Our system gives us more in-depth insights into how a class, or an individual student, is doing. It enables us to provide more support to disadvantaged learners. Parents have been very positive."

The recent sharp increase in chatbot capability has resulted from advances in natural language processing (NLP) technology and contextual AI. These have given the bots more emotional intelligence and enables them to go off script and have back-and-forths with users. Instead of simply mapping out a student's learning pathway, they can be used as virtual teaching assistants.

Take-up has largely been limited to a few universities, which have built their own Einstein-style systems. But there are signs that the technology is trickling down.

The tech team at Bolton College, a provider of further education and vocational training, has created Ada, named after the 19th-century computing pioneer Ada Lovelace. The chatbot is equipped with IBM Watson's NLP platform and dozens of Q&A pairs, crowdsourced from teachers. It can field subject queries via Android, iOS and Alexa, and provide near-instant responses.

The project is still in its infancy, but Aftab Hussain, learning technology manager at the college, reports that his team has already been speaking to other organisations with a view to sharing the technology. He believes that virtual teaching assistants are set to become a common feature throughout the education system.

"Every student and teacher will have one in years to come," Hussain enthuses. "When students from other schools have come here, they have said: 'Why haven't we got one?' My ambition is that every child, from the age of three upwards, has a personal digital companion to support their studies."

For all the chatbot champions' optimism, constraints remain. Processing power is a big one – Digital Einstein can still only speak to a handful of people at a time, for instance, and answer about 300 questions.

The ultimate goal, for both Digital Einstein and Ada, is to have meaningful responses to a vast number of potential questions. But, even then, it remains to be seen whether chatbots can branch out beyond factual answers into subjects that require nuanced discussion.

Wayne Holmes, a consultant on AI and education at Unesco, is sceptical about that prospect. "So far, they can work only in specific domains, such as mathematics, where there's a right answer," he says. "In subjects such as English, they are less effective. I don't believe that any student will ever be able to have an in-depth conversation with a chatbot."

Holmes issues a further caveat – a particularly salient one, given that recent research has found that up to 80% of children in the UK lack sufficient communication skills when they start school.

"These systems separate children from their peers and the teacher," he says. "They claim they can do the job better than the teacher, but they have a limited understanding of what education is about. Education is a social activity that's about personal development. It's not just knowledge transfer."

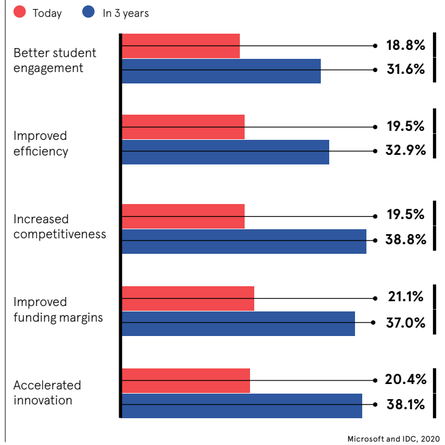
Perhaps the biggest issue with the technology is a socioeconomic one. Even before the Covid-19 lockdowns, the gap between rich and poor students in the UK was among the widest of any developed nation. This disparity has only widened during the school closures. According to the National Foundation for Educational Research, students from disadvantaged backgrounds fell further behind in 2020, losing far more learning time than their more affluent counterparts. With this problem in mind, many educators will feel that it would be unwise to introduce more teaching technology for use on expensive devices such as laptops, tablets and smartphones.

As with many dilemmas about digital adoption, there is probably a middle ground to be found for virtual teaching assistants. By using these in the appropriate situations, promoting social equality and preserving teacher-pupil relationships, education providers can bring the best out of a hugely promising technology.

But how exactly will they achieve that? For now, at least, that's a question that even Einstein might struggle to answer. ●

WHAT AI CAN DO FOR LEARNING INSTITUTIONS

Percentage of staff at US educational institutions who said that AI has had, or will have, an impact in the following areas



Microsoft and IDC, 2020

OPINION

'The UK needs to stay competitive in AI and keep pace with the rest of the world'

The government will be publishing its new national AI strategy this year. Its goal is to make the UK a global centre for the development, adoption and commercialisation of responsible AI.

This country is already considered a global leader in many aspects of this field. But this is no time for complacency. We need to stay competitive in AI and keep pace with the rest of the world.

The strategy is the government's chance to set out a clear vision for the nation's AI future and demonstrate what we have to offer companies that are thinking about moving here and scaling up. This document needs to include action plans that address the following five key areas.

1 Putting skills and diversity at the heart of the strategy

Covid-19 has significantly disrupted the workforce, leaving a huge number of people unemployed. Research also suggests that 4.8% of British jobs could be automated this year. It's therefore crucial to identify the hardest-hit industries and the skills gaps within them. By supporting the mobility of talent through retraining programmes, both the government and the private sector can help to promote workforce resilience and redeploy employees' skills in response to change.

2 Democratising access to data

A readily available supply of high-quality data is vital for effective AI research and development. Measures to encourage the sharing and reuse of data across organisations and between sectors – building on the work of the Open Data Institute on data trusts, for example – will be key to the nation's AI future.

Good accessibility to data also relies on a robust infrastructure. The government needs to invest in the UK's high-performance computing capabilities if it's to unlock the technology's full potential.

3 Growing the economy through the widespread adoption of AI

The UK is renowned as a pioneer in the use of AI in healthcare and financial services, but all parts of our economy need to benefit from the technology. We must identify the sectors that could gain the most from using AI and give them adoption guidance. Given that the Office for Artificial Intelligence has produced guidelines for AI procurement in government, the publication of similar guidelines aimed at businesses would be useful.

4 Building on the UK's strong academic credentials to drive commercialisation

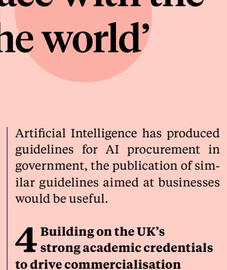
World-leading academic institutions are working on AI in this country. But it is important to continue converting research into development and commercialisation to come up with new AI-driven products, services and enterprises.

5 Ensuring that the UK is the leader in the ethical development of responsible AI

We need to design practical frameworks for ethical AI development that businesses of all sizes can use. It is important that this country makes the most of its thriving digital ethics community to anticipate and address ethical challenges on the horizon, as well as supporting the field of applied ethics.

The strategy cannot be developed in isolation. It will require input from industry, academia and wider society. It must also be joined up to other key government initiatives, such as the national data strategy.

TechUK stands ready to support the development of the AI strategy to help ensure that it will work for all stakeholders. ●



Sue Daley
Director of technology and innovation at techUK

For more information about techUK's programme of work on data analytics and AI, visit techuk.org/accelerating-innovation/artificial-intelligence.html

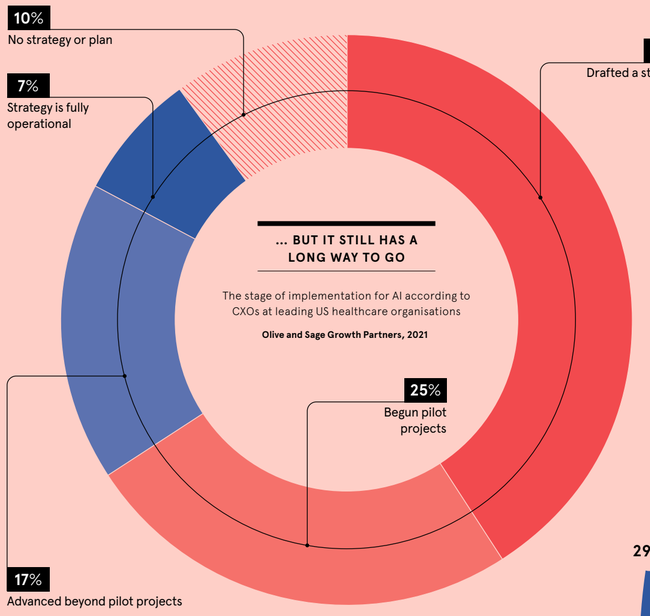
IMPLEMENTING AI IN HEALTHCARE HAS INCREASED DRAMATICALLY OVER THE PAST 12 MONTHS...

Olive and Sage Growth Partners, 2021

53% of CXOs at leading US healthcare organisations had an AI strategy in place in 2019

90% had an AI strategy by 2020

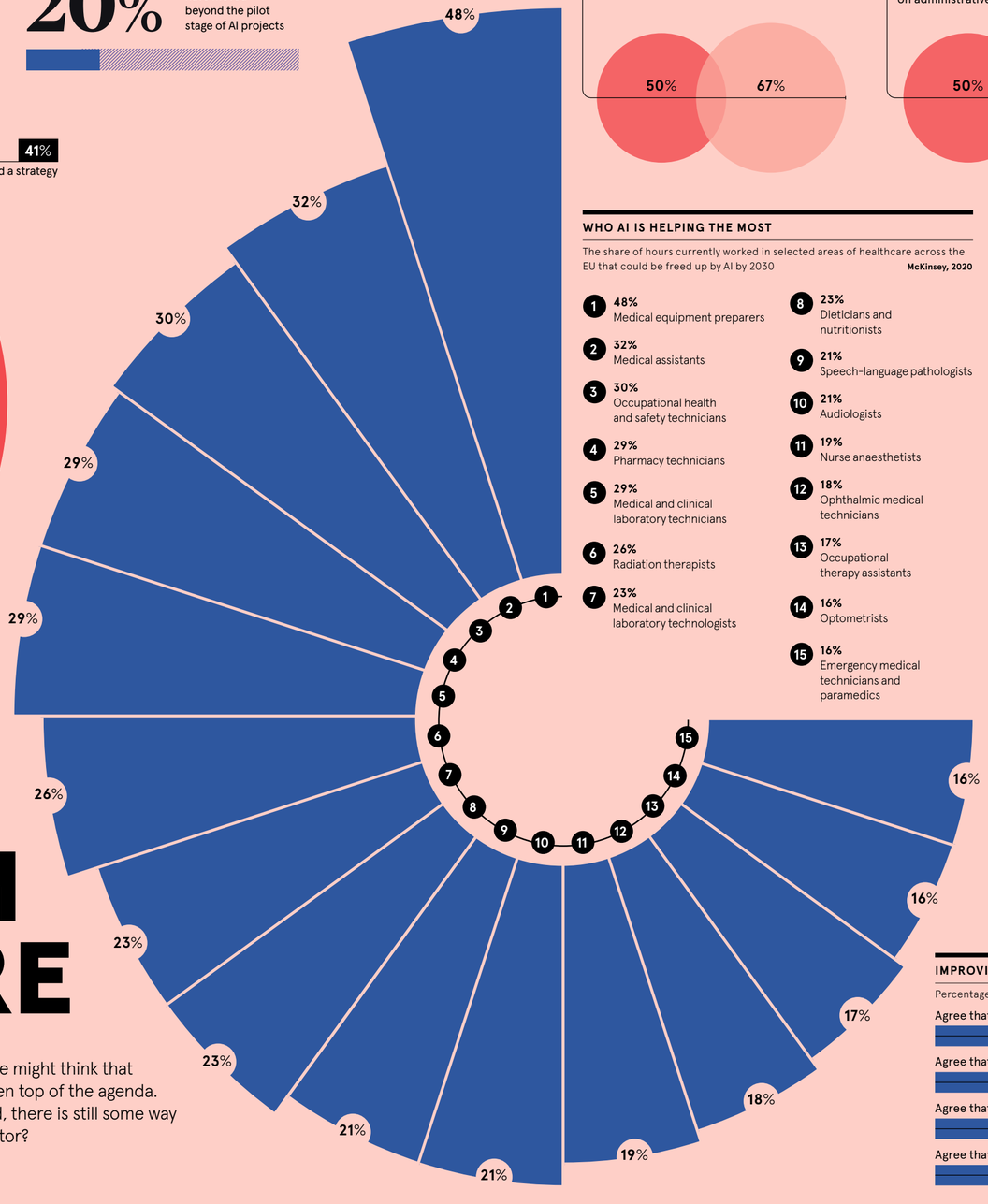
20% have moved beyond the pilot stage of AI projects



... BUT IT STILL HAS A LONG WAY TO GO

The stage of implementation for AI according to CXOs at leading US healthcare organisations

Olive and Sage Growth Partners, 2021



WHO AI IS HELPING THE MOST

The share of hours currently worked in selected areas of healthcare across the EU that could be freed up by AI by 2030

McKinsey, 2020

1. **48%** Medical equipment preparers
2. **32%** Medical assistants
3. **30%** Occupational health and safety technicians
4. **29%** Pharmacy technicians
5. **29%** Medical and clinical laboratory technicians
6. **26%** Radiation therapists
7. **23%** Medical and clinical laboratory technologists
8. **23%** Dieticians and nutritionists
9. **21%** Speech-language pathologists
10. **21%** Audiologists
11. **19%** Nurse anaesthetists
12. **18%** Ophthalmic medical technicians
13. **17%** Occupational therapy assistants
14. **16%** Optometrists
15. **16%** Emergency medical technicians and paramedics

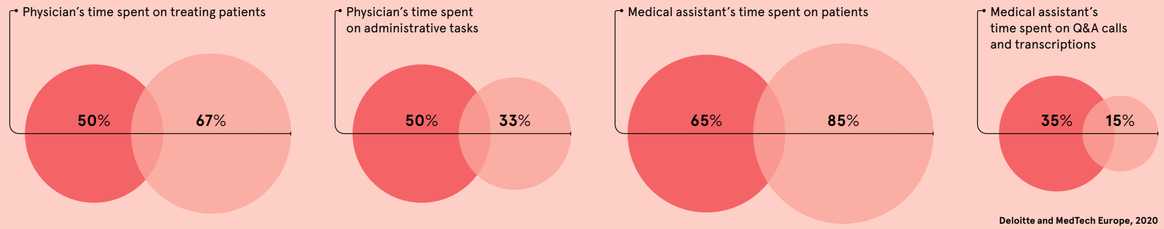
HOW AI COULD TRANSFORM HEALTHCARE

After a year when healthcare organisations were stretched to their limits, one might think that implementing technology that can greatly improve efficiency would have been top of the agenda. But, although AI is being rolled out by healthcare providers around the world, there is still some way to go before its true potential is realised. So how can AI actually help the sector?

FREEING UP TIME FOR CRUCIAL TASKS

The percentage of time that European healthcare professionals could save if AI were implemented

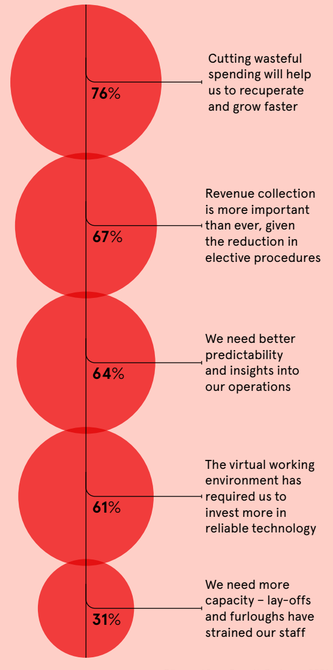
Current · With AI



Deloitte and MedTech Europe, 2020

WHY HEALTHCARE ORGANISATIONS NEED AI

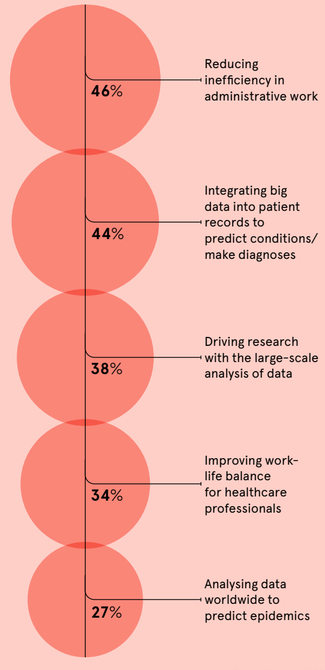
Percentage of CXOs at leading US healthcare organisations on the factors driving their investment in AI and automation



Olive and Sage Growth Partners, 2021

HELPING HEALTHCARE WORKERS

Share of young (under 40) healthcare professionals globally who believe that AI will help in the following ways

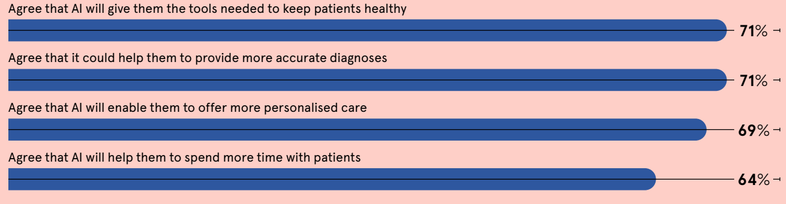


Philips, Sermo, 2020

IMPROVING PATIENT CARE

Percentage of young healthcare professionals who agree that the use of AI will lead to better outcomes for patients

Philips, Sermo, 2020



MARKETING

Beat regeneration

Marketers are now able to delegate the task of copywriting to machines. But should they be entrusting AI with this – and what would it mean for the future of the profession?

Jack Apollo George

Jenner Images via GettyImages

And, O, Tyger!
What shouts (with thee?)
What glory (was with us?)
Was 'mid those forests (thee?)
When our first ancestor (and thee?)
Being (a tiger?) slew.
I can imagine you
Proudly roar and say,
'I am the tiger'

The above text is part of an AI-generated rewriting of William Blake's classic poem *The Tyger*, as programmed by American writer Gwern Branwen using OpenAI's latest GPT-3 technology. Apart from its Pythonesque repetition of "thee", these lines unerringly evoke the spirit of mystic romanticism – and, crucially, they *feel* poetic.

Frightening, right? Maybe not. It should come as no surprise that machines are getting quite good at generating interesting strings of words. Fed on an ever-expanding diet of online content, their algorithms can continually learn how to improve their output.

A number of software services, such as Nichesss, Writesonic and CopyAI, are granting marketers access to these systems for copywriting purposes. They can create social media posts, blog outlines, product strategies and corporate slogans. But is any of it actually worth reading?

Kim Darragon, a marketing expert and founder of the Kim Does Marketing consultancy, has tested out some of the software. She thinks that "AI-generated content can be pretty impressive. With a handful of keywords and in just a few seconds, you can have some solid copy for product descriptions, Instagram captions, Google meta-descriptions and LinkedIn ads."

But the impressiveness goes only so far. Because AI relies on existing data, "it's not coming up with fresh ideas", Darragon says. "Although the content often looks good at first glance, it's often shallow and still cannot replicate the depth of human-generated copy."

> **If every brand is suddenly fantastic at creating content, brand copy may begin to sound the same – and then everything will start to be a bit boring**

Bernard Huang agrees that such writing is often limited to factual paraphrasing. He's the co-founder of Clearscope, which uses an "AI-powered platform" to help marketers produce content that better meets the ranking criteria of various online search engines. Despite being immersed in this sector, Huang doesn't "explicitly use any AI tools" to enhance his own writing. He also doesn't expect robot scribes to replace many human copywriters.

"My hunch is that the things that get automated will have a fairly low impact," Huang says. "There's already too much content on the internet. Making it easier to produce does not help to keep that inventory down."

At some point, quantity can cancel out quality. As Darragon puts it: "If every brand is suddenly fantastic at creating content, brand copy may begin to sound the same – and then everything will start to be a bit boring."

AI's mimicry of existing patterns of writing – and, by definition, thought – poses other risks. AI-generated content "can also include human biases, faux pas and other nasty things. After all, it's just an algorithm," Darragon says. "At a time when brands need to be super-careful with language, this is something to be wary of."

Marketing professionals are indeed becoming increasingly conscious of the dangers of algorithmic bias. Christopher Kenna is co-founder and CEO of Brand Advance, a media network that helps companies to find a more diverse audience for their marketing campaigns. He says: "Despite the significant benefits of AI, there are challenges, because the data sets that it learns from are steeped in the social inequities of the real world."

This factor is especially important in the case of sensitive projects such as the NHS's recent drive to encourage BAME people to seek vaccinations. Brand Advance has been helping to fine-tune some of its campaigns using IBM Watson's language system, which ostensibly reads what is being written about them online.

"We can classify an article's sentiment to gauge whether the reaction is positive or negative," Kenna says. "We combine this with real-time data about article engagement to help inform our audience strategy."

AI will probably have the most impact on such data-heavy and analytics-driven marketing tasks in the coming years, according to Darragon, who adds: "You can't beat a machine for that."

> **The romantic in me (and the wishful thinker) hopes that marketing will continue to include a critical human function**

But marketing covers so many more disciplines, of course. The profession existed long before these AI-powered tools and techniques came along – and it will probably outlive them. Indeed, marketing has often been presented as one of the most automation-proof of all careers, because it straddles creativity and human empathy. With this in mind, a widely held view in the profession seems to be that, regardless of how much the daily work of a marketer changes, AI should present more of an opportunity than a threat over the coming years.

No matter how sophisticated the AI toolkit becomes, a thoughtful and imaginative strategist should still be needed to make sense of the whole, according to Darragon.

"The romantic in me (and the wishful thinker) hopes that marketing will continue to include a critical human function," she says. "It lies in steering a brand's marketing ship in the right direction, making the big strategic calls and keeping the beating heart of a brand alive – the *je ne sais quoi* that, I hope, no machine can replace."

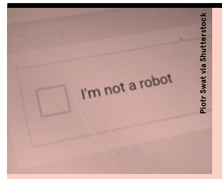
Huang is similarly sanguine. "The value of creativity will shine in a world of automation," he says.

So, no, your new favourite author is unlikely to be a machine, but the next product description you fall for might just have been helped along by one. ●

WHAT AI IS ALREADY DOING FOR MARKETING

Business outcomes realised through the use of AI, according to marketers worldwide, as of December 2020

Marketing Artificial Intelligence Institute and Drift, 2021



Piotr Swat via Shutterstock

The MarkeTuring test

While compiling this article, I had a little play with some of the latest copywriting AI software by typing in short prompts relating to the topic of AI in copywriting (which is about as meta as it gets). Here's what came up.

Sometimes, what it came up with was plainly ridiculous: "What happens when you do spend the time and money marketing your business? Nobody does!" (CopyAI.)

On other occasions, it was incredibly profound: "Humans are emotional creatures. We make decisions on gut instinct and our everyday actions are driven by emotion. AI can help marketers to understand their customers' needs and wants based on their past purchases, but marketers must first understand where the human brain is headed." (Nichesss.)

And, in a few cases, it produced disarmingly verbose, yet chilling, robo-threats: "As a marketer, do you know what it means to have your brand align itself with the values of AI? You'd better be able to answer this question in the affirmative if you want to stay ahead of the curve and make sense of how it will affect your business." (Copysmiths.)

Commercial feature

How AI is cleaning the ocean

Offshore wind farms and oil producers are using machine learning and 3D vision technology to maintain their marine assets more efficiently, cutting carbon pollution significantly in the process

Offshore wind power has rapidly ascended the ranks of energy sources in the past decade. Its growth is expected to continue, with generation capacity predicted to soar from 35GW to 234GW over the next 10 years, according to the Global Wind Energy Council (GWEC), which ranks the UK, Germany and China as the largest national markets.

Offshore wind is proving particularly popular in governments' energy strategies, given the plummeting cost of provision and the fact that turbines can be placed ever further out to sea. As a result, the GWEC predicts the compound annual growth rate of offshore wind generation over the next five years to be nearly 32%, compared with 0.3% for land-based turbines.

Advances in wind generation are crucial to nations' efforts to decarbonise their economies and reduce their environmental impact. But a problem has emerged: the extensive work required to maintain offshore structures, given the stress on them exacted by the seas, is creating surprisingly high levels of pollution.

This has arisen from the need to send out large ships, which carry the subsea robots that are used throughout the year to monitor structural aspects of the turbines, including the integrity of cables and the extent of seabed scour around foundations. These vessels are often crewed by up to 60 people, from engineers and robot drivers to cooks and cleaners.

Their impacts are enormous, reports Brian Allen, founder and CEO of marine technology business Vaarst. "The vessels, which cost £1m to £10m a month to operate, depending on the job, will emit 275,000 tonnes of carbon over their lifetimes. This is something the industry is pushing to change quickly," he says.

Oil and gas suppliers also use these highly polluting ships to monitor their key marine assets and conduct subsea surveys. They too are urgently seeking ways to reduce the vessels' environmental impact. Until recently, there was little that they could do in this respect. But, in the past few years, the maturation of cutting-edge systems has set in motion a vast transformation, removing their need for the ships.

"Artificial intelligence, 3D vision and autonomous robotics have been at the heart of the change, empowering the rapid removal of these large vessels," Allen says. "This is essential to cutting environmental impacts while increasing efficiency."

The use of these technologies is catalysing the growth of offshore wind generation by reducing its costs dramatically and helping the sector to deliver on the promise of a minimal environmental impact. This has created a virtuous cycle: as the cost of producing each kilowatt using offshore wind falls, investment and policy support grows. This enables larger wind farms to be created, thereby achieving economies of scale, which in turn makes clean energy cheaper for consumers. The installations are also creating biodiverse shallow reefs around them.

"Offshore wind farms are turning to AI, removing the need for massive inspection costs and hundreds of hours of examination," Allen says. "In the coming years, fully automated vessels will become available. In the oil and gas sector, this technology will also be essential in the process of decommissioning older assets more rapidly."

Some of the most successful offshore energy firms work with Vaarst, which provides cutting-edge technology for underwater AI. The Vaarst 3D vision system enables the rapid collection of data from subsea robots, as well as drones and climbing robots that work above the waterline, with real-time streaming to connected devices anywhere in the world.

The company's machine learning delivers rapid and actionable analysis to operators, with trials already in place with oil super-majors, and fully commercial autonomous subsea robots are expected to prototype soon, says Allen, who adds: "Powerful AI technology is helping wind farms and oil businesses to become much more efficient and far less polluting. This will be vital to achieving environmental targets, helping countries through their clean energy transition."

Vaarst, which is shortly starting a series B funding round, is profitable and has backing from sustainable equity investors, venture capital firms and energy companies.

Allen expects that, given the growth of the technology and the multi-trillion-dollar addressable marine energy and subsea internet market, Vaarst will double its revenue again to £25m next year and continue growing at that sort of pace. "We're aiming to become one of the UK's unicorns, with a billion-dollar valuation within the next three to four years," he says.

Offshore energy businesses continue to be particularly active in using Vaarst's technology because of its adaptation to popular remote-operated underwater robots and the application of true autonomous AI to deliver ever larger efficiencies.

There is also strong potential to apply the technology to other sectors, as Allen explains: "These systems have been battle-tested in the sea, one of the world's harshest environments. While marine is our focus, we could also imagine using the technology on land in the near future. The visualisation and data flow, the machine-learning analysis and the automation are all applicable to construction and other land-based industrial settings."

It's clear that AI has a key role to play in cleaning the ocean by delivering more efficient greener energy and reducing the use of highly polluting ships. As offshore energy suppliers increasingly take up 3D vision and machine-learning analysis while preparing to introduce fully automated vessels, they will create much healthier seas and achieve sustainable energy production that will meet the world's growing demands.

Powerful AI technology will be of vital importance to achieving environmental targets, and helping countries through their clean energy transition

To find out more about how AI is cleaning the ocean, visit vaarst.com

vaarst

Estimated 2030 combined value of marine energy & communications infrastructure:

$34tn

Annual growth rate of offshore wind generation

32%

compound annual growth rate over next 5 years

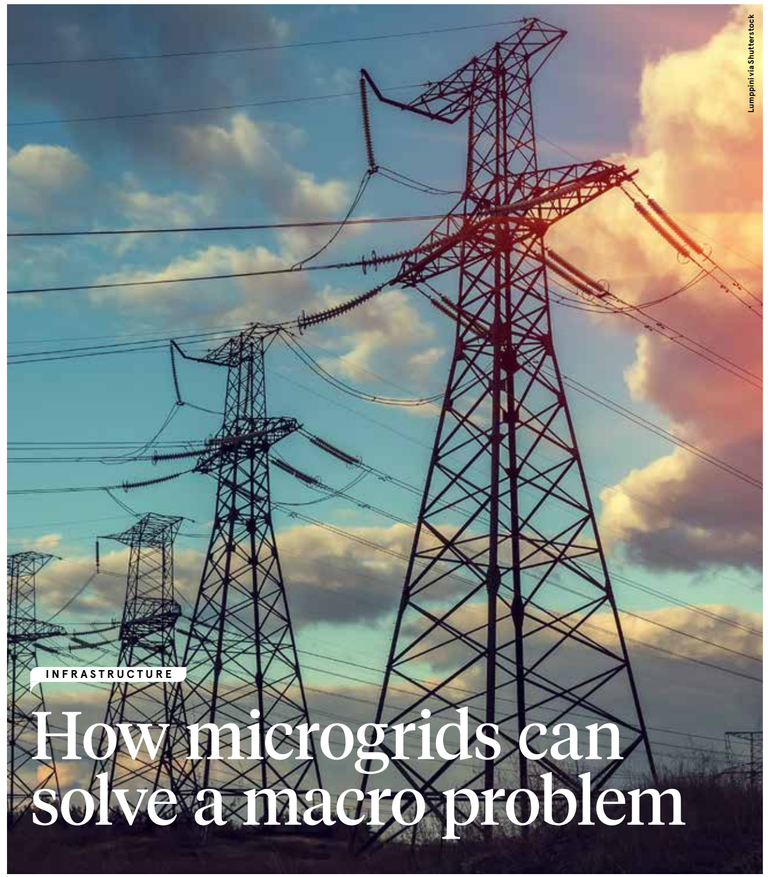
Global Wind Energy Council

Offshore wind farm growth

35GW to 234GW

growth over next decade

Global Wind Energy Council



Lumppini via Shutterstock

INFRASTRUCTURE

How microgrids can solve a macro problem

AI is helping to make the 'utopia' of clean, cheap and locally generated energy a reality. As more schemes come online, their benefits are becoming apparent

Olivia Gagan

Microgrids – small, decentralised power hubs that use local sources of energy – have long been touted as a solution to the problem of ageing national grids, which are becoming increasingly prone to cyber attacks, blackouts and inefficiencies where power is consumed far from where it is produced.

Despite their potential, uptake has been patchy, so microgrids have yet to capture the public imagination. But AI technology is helping to turn them into viable hyper-local projects that can serve global carbon-reduction ambitions.

Rotterdam is the location of Europe's largest seaport. Since August 2020, it has also been home to what's understood to be the world's first high-frequency, decentralised energy market, where port users share and sell clean energy.

"When we first met to discuss the project, the Dutch government had just been taken to court by citizens for failing to meet its carbon emissions targets. It lost the case. The port is a state asset and it accounts for a third of the entire country's emissions, so people were very interested in this initiative," says James Rilett, global innovation director at S&P Global Platts, one of firms that developed the supporting AI system.

Many port users have their own sources of clean power, such as solar panels. They have been equipped with an AI application that serves as an energy trader, creating prices that fluctuate according to supply and demand. Energy-intensive tasks in the port can be scheduled for when power is cheaper. Blockchain technology is used to anonymise users, validate transactions and uphold the market's rules.

Since the market opened, energy costs for users have dropped by 11%, while producers have enjoyed a 14% increase in revenue, as they are no longer wasting surplus energy. Once it's working at full scale, the grid is expected to deliver an annual carbon saving of up to 30 million tonnes – crucial for the port, which has committed to carbon neutrality by 2050.

The city of Helsinki has committed to becoming carbon neutral by 2035 – earlier than many others are aiming for – but it has a big obstacle to surmount. Sub-zero winters are the norm in the Finnish capital, which burns coal for more than half of its heating needs.

In the spring of 2020, the city ran an international competition to find ways to reduce its dependence on fossil fuel. One of the winners, the Hot Heart initiative, involves the use of AI and 10 giant thermal batteries – in essence, highly insulated cylinders of heated seawater located just off the Baltic coast – to receive, store and release clean heat to the city on demand. Excess renewable energy generated by Helsinki's solar and wind assets will be converted by heat pumps, warming up the brine stored in the batteries, which are each more than 250m in diameter. AI systems will monitor national grid fluctuations and local demand, issuing warmth from the batteries back into the city's heat-distribution system as needed.

Four of these structures will be capped with inflatable domes to house tropical forests, increasing the city's public space and creating an offshore tourist attraction that's in keeping with the Finnish concept of *jokamiehenoikeus* – the right to roam and enjoy nature. The project, still in the planning stage, is set for completion by 2028.

French tech company Schneider Electric has been developing the AI control system for Hot Heart. Andrew McKenzie, who leads its microgrid work in the UK and Ireland, says that, although this sounds like a unique concept, the AI element is highly replicable.

"There's a lot to be learnt from the Helsinki microgrid, especially its scalability," he says. "That scale has been a utopia for a lot of people in the energy world."

The issue of scalability – and the potential to install smart microgrids quickly and cost-efficiently – is an important one in Africa, where several countries have immature power distribution networks, which are expensive and time-consuming to develop.

Demand for energy in Africa is rising at about 4.5% per year in line with population growth and the continent's expanding middle class. Many African countries therefore stand to benefit hugely from AI-controlled microgrids and could become pioneers in realising the technology's potential.

Richard Power is a partner specialising in energy at law firm Clyde & Co. He believes that "the motivation to create microgrids is stronger in Africa" than it is in Europe. "There is little existing infrastructure here and resources such as sunshine, wind and land are abundant, while many citizens are familiar with mobile and digital payment systems. All of these factors put African countries in a fantastic position to simply skip centralised power and go straight to microgrids."

Power observes that AI-controlled microgrids are already gaining traction in Nigeria, where 43.5% of the population is still without electricity. Renewable Africa 365, a humanitarian NGO, is using the technology to map out the best sites to install solar panels. It then matches this data with information pinpointing areas where the demand for electricity is highest, enabling grids to be created at the most appropriate locations.

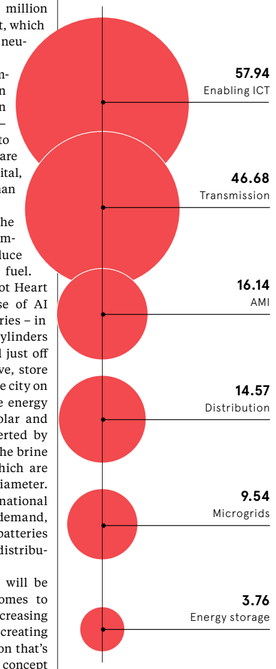
The data-backed nature of its proposed projects offers reassurance to investors and policy-makers. This is important, because the development of AI-controlled microgrids ultimately hinges on whether investors can be convinced of their value. If that happens, our homes, villages, towns and cities could become independent traders of clean power sooner than we might imagine.

Rilett is confident of such an outcome. "It's decarbonisation while saving money," he says. "That's a pretty good sell."

There's a lot to be learnt from the Helsinki microgrid, especially its scalability. That scale has been a utopia for a lot of people in the energy world

THE BUSINESS CASE FOR MICROGRIDS

Global electricity and delivery management industry revenue by segment in 2020 (in billion US dollars)



Advanced Energy Economy 2020

REGULATION

Trust is a must: why business leaders should embrace explainable AI

The EU's proposed regulation on artificial intelligence has earned widespread praise. The prospect of harmonised rules presents an ideal opportunity for firms to improve transparency and reduce bias in their processes by investing in AI that's easier for humans to understand

Oliver Pickup

The European Commission vice-president responsible for media and information matters, Margrethe Vestager, neatly summarised the founding philosophy of the EU draft legal framework on AI at the time of its publication in April.

"Trust is a must," she said. "The EU is spearheading the development of new global norms to make sure AI can be trusted. By setting the standards, we can pave the way to ethical technology worldwide."

Any fast-moving technology has the ability to create mistrust, but Vestager and her colleagues decreed that those in power should do more to tame AI, partly by using such systems more responsibly and being clearer about how these work.

The landmark legislation – designed to "guarantee the safety and fundamental rights of people and businesses, while strengthening AI uptake, investment and innovation" – encourages companies to embrace so-called explainable AI.

Most business leaders have welcomed the initiative, understanding that the goal is to increase public trust in AI by promoting the use of more transparent systems.

Peter van der Putten is director of AI solutions at cloud software firm Pegasystems and an assistant professor of AI at Leiden University in the Netherlands. He believes that the EU has produced a "sensible, risk-based framework" that distinguishes "prohibited, high-risk and low-risk" AI applications from each other.

"This is a significant step forward for both EU consumers and companies that want to reap the benefits of AI but in a truly responsible manner," he says.

Given that many organisations are using opaque algorithms to make significant decisions – sometimes with disastrous results – the creation of a legal framework that would encourage them to adopt explainable AI is welcome. So says Matt Armstrong-Barnes, chief technologist at Hewlett Packard Enterprise.

"If we want AI – constructed using complex mathematics – to play a role in decision-making, then we, as citizens, have a right to understand how the AI came to a decision, regardless of its complexity," he argues. "Explainable AI can answer the fundamental question: why? Once we know this, the decision can be evaluated to ensure that it's made without bias. 'Computer says no' is no longer acceptable or desirable."

> **By setting the standards, we can pave the way to ethical technology worldwide**

Draft EU regulation is aiming to make AI more trustworthy

Pip White, managing director of Google Cloud in the UK and Ireland, agrees. "Your ability to understand your AI and machine-learning models entirely is key to your ability to roll out the technology confidently, particularly in regulated industries where trust is critical," she says. "It's also paramount in helping to unpick bias and other gaps in data or models. Ultimately, the more informed you are about the 'why' of AI-driven decisions, the more useful and responsible your AI deployments will be."

But not all experts believe that that the draft law, which proposes fines of up to 6% of a firm's global revenue for the most severe breaches, will have a sufficiently positive effect if enacted in its current form.

"You have to admire the EU for arriving late to the party and telling everyone to turn the music down," says Mark K Smith, founder and CEO of ContactEngine, a conversational AI company. "I agree that AI needs regulation, but a regulation that stifles innovation would be unhelpful and lead only to developments being encouraged elsewhere."

Van der Putten, who stresses that AI was never intended to replace human intelligence, believes that the proposed law will serve as a "reset moment" for the technology and its proponents, because it will help to improve trust.

The EU's intervention is timely, concurs Joe Baguley, EMEA vice-president and chief technology officer at enterprise software firm VMware. A survey by his company at the start of this year found that only 43% of Britons trust AI.

"This absence of trust can be attributed to AI's perceived lack of transparency, which must be a key consideration for business leaders," Baguley says. "There is no doubt that AI has the potential to revolutionise the workplace and society, but the need for explainable AI will become more pressing while fears about the technology remain high."

He continues: "If developers themselves don't know why and how AI is thinking, this creates a slippery slope, as algorithms keep becoming more complex. Offering the public more insight into how AI makes decisions will give them more confidence and, in turn, help them feel more secure about the organisations that use the technology."

Kasia Borowska, managing director of AI consultancy Brainpool, believes that the rest of the world needs to catch up with the EU in regulating the technology.

"The next step needs to involve making these regulations international, because uneven laws between different blocs could have catastrophic consequences in the longterm," she warns. "International leaders should look at this urgently. We know that AI will give unparalleled advantages to those in less controlled countries."

How should businesses in the UK respond to the lead that Brussels has been taking? "Be more guide dog than guard dog," advises Caroline Gorski, group director of R² Data Labs at Rolls-Royce. "Create your own simple framework that meets the EU requirements. Focus on defining what can be done rather than what can't, then break it down into steps, with auditable standards for each step. Join them all up and create a procedure."

Simon Bullmore, co-founder and CEO of data-literacy consultancy Mission Drive, suggests that firms seeking guidance on explainable AI should engage the Open Data Institute, the Alan Turing Institute and the Office for Artificial Intelligence.

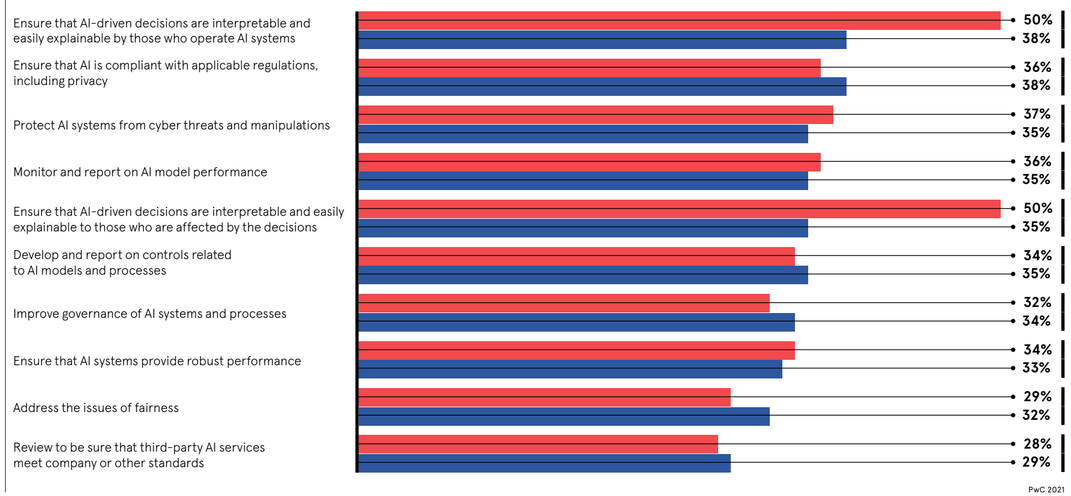
He urges business leaders to treat the EU's initiative as a chance to invest in explainable AI – and to educate both themselves and their employees in the technology.

"Regulators step in whenever they lose trust in a market's competence and desire to self-regulate," Bullmore says. "Part of the challenge of using AI is the disconnect between what leaders know about AI and what their organisations are doing with it."

Now that the rules of the game are changing, it will be the proactive leaders who find the competitive edge for their companies by going back to basics with AI.

HOW TO ADOPT AI RESPONSIBLY

Implementation steps for adopting responsible AI in US organisations



PwC 2021

Commercial feature

Q&A

Smart Buildings and smarter construction

Silicon Valley start-up ONX.Ai is using cutting-edge digital tech to bring a laggard industry into the 21st century. Its CTO, **Senthil M Kumar**, explains his and his company's masterplan

Q What made you get into this field?

A Over the years I've had the good fortune of building technologies and solutions for a diverse set of Industries. All the way from Smart Cars, Smart Buildings, Energy Solutions, Healthcare, Risk Management to even the subjective field of medicine. While construction techniques and materials have evolved, the ecosystem around construction, from design to supply chain to financial modeling to task composition lags far behind. This leads to increased costs and inexcusable waste of labor and material. When a challenge was posed to me to help build a platform that can propel this industry forward and at the same time be good to the earth and environment, I was all in.

Q What are the main challenges facing this industry?

A This industry has fallen victim to a confluence of sub optimal processes. The processes breed incoherent activities. Delays in schedules are accepted as a cost of doing business due to lack of holistic insights. Cost overruns, ill-timed procurement and sub optimal supply chain are frequent. Failure to factor anticipatory intelligence (supply disruption, pricing, quality, climate, environment) and the ability to adapt to dynamic conditions does not exist.

A lot of data is generated in a construction process and a lot more that gets underutilized and lost in time. While the cost of manufacturing over the years has significantly gone down in most industries compared to a few decades ago, in construction it seems to be going in the opposite direction."

> **We all have an obligation to leave this place a bit better for the next generation. I am accomplishing it through technology**

Q How can AI and other tech address these challenges?

A We are using AI to improve the speed, efficiency and success of construction by performing better than human-level cognition. With AI, we can chart the optimal path for project completion, financial modeling, calculate the most efficient task orchestration , taking account of the dynamic variability caused by unforeseen events. Even if there is an unexpected disruption or an issue with the quality or pricing, AI can offer guiance, factoring in data from multiple real-time and historical data streams.

Advanced AI logic looks at multiple datasets involved in construction more efficiently than a human operator can. The benefits for construction are numerous – the use of smart scheduling to support a just-in-time inventory system, the use of AI to analyse IOT data, digital twin, supplier chain, real time prediction and formulate optimal pathways to productivity.

AI also enables more sustainable construction process by creating pathways that promote smart sourcing, carbon-foot-print reduction and better resource allocation. For example, if an adverse event is predicted, the AI platform could calculate the best alternate course based not only on economics but also sustainability and the overall impact on the the project's carbon footprint.

Q What keeps you going, what's exciting about your work?

A My work on construction technology has a direct, tangible impact that improves people's livelihoods and the economy, locally and globally. Our success in this space improves efficiency, results in significant cost savings and optimises time to build. In turn, this leads to the more effective use of land and resources. Supporting environmental conservation and sustainability is a great motivator for me. We all have an obligation to leave this place a bit better for the next generation. I am accomplishing it through technology.

Senthil M Kumar is a technocrat and architect of a number of innovative technologies. He also serves on advisory boards of start-ups and contributes to industry think-tanks on AI and advancements in computational science.

For more information about ONX.Ai, visit www.onx.ai

onx .AI

HEALTH

Eight ways in which AI is transforming healthcare

The medical sector is achieving remarkable results across the board. Here's a round-up of some of the most interesting applications

Christine Horton

Artificial intelligence has been at the forefront of the medical profession's efforts to fight Covid-19 and treat patients during the coronavirus pandemic. Enabling healthcare providers to make fast and accurate decisions, the technology has been producing some extraordinary outcomes.

Outside the Covid crisis, machine intelligence is lending itself to hundreds of medical applications, from scanning vast numbers of people to assess their risk of dementia to accelerating the drug discovery process. Here is just a small selection of cases where the technology is revolutionising healthcare provision.

Easing the admin burden

Healthcare professionals are taking advantage of developments in AI-powered speech-recognition systems to update electronic patient records more quickly and accurately.

"This has had a big impact on the efficiency of getting our letters done for any clinic," reports Dr Paul Altmann, chief clinical information officer at Oxford University Hospitals NHS Foundation Trust. "Clinicians can now send letters within 24 hours, or even instantly if they aren't waiting on blood test results. Before the speech-recognition era, letters took two weeks or even longer to be completed."

Dr Simon Wallace is chief clinical information officer at Nuance, a provider of speech-recognition systems. He says that clinicians spend an average of 11 hours each week creating documents. If you factor in the time wasted on lost and repeated documentation, they could be spending up to half of their working week on admin – a lot of time to be away from their patients.

"We speak three times faster than we type. By using AI-powered speech recognition, clinicians save time on documentation processes, which enables them to spend more of it on delivering care," Wallace says. "Even when clinicians talk extremely quickly for long periods, the speech-recognition technology can recognise and record all their words, transforming these into detailed medical notes. Thanks to the capabilities of the software, all medical terms are automatically recognised in the correct context. The only thing that users need to do is use their voice."

Wallace believes that this facility could significantly reduce the admin burden associated with remote consultations and could even help to reduce the risk of burn-out among NHS staff, many of whom have been stretched to the limit by the Covid crisis.

Improving communications with patients

Conveying information to the public in a timely and effective way has been crucial during the Covid-19 vaccination programme. It's therefore vital that they do not ignore important messages. This was the challenge faced by pharmacy chain Walgreens as a vaccine provider in the US.

Brian Tyrrell, its senior director responsible for customer marketing platforms, stresses the importance of the wording of the company's messaging. "You would expect people to be more responsive to emails giving them critical health information, of course, but we had a duty to ensure that our messages were heard," he says.

Walgreens, which can reach about 50 million people via email, has been using Phrasee's AI technology. This system learns from each communication the type of language that will connect best with the target audience.

"This means that we can double down on our efforts to reach the maximum number of people with relevant updates as time moves on," Tyrrell says.

Walgreens estimates that 30% more of its email recipients than normal have opened a message from the company since it started applying the Phrasee system to the vaccination campaign. Potentially, that could mean up to 30% more people than normal reading information about appointments – and up to 30% more getting vaccinated.

Monitoring for adverse events

Agencies such as the US Food and Drug Administration and the UK Medicines and Healthcare Products Regulatory Agency have systems in place to monitor reactions to any drug, device or therapy. Biopharma companies also have their own systems for monitoring adverse events for their products. These are under more pressure than normal owing to the Covid crisis.

Dr Vladimir Makarov is a consultant and programme manager at the AI Centre of Excellence at Pistoia Alliance, a not-for-profit group advocating greater collaboration in healthcare and life sciences. He says that AI supports the monitoring process, "which will be straining under the extra workload imposed by the worldwide vaccine roll-out. AI also helps to interrogate data and evidence from various healthcare environments, from understanding the effectiveness of a drug in a real-world setting to analysing genome sequencing."

AI is also being used to identify existing drugs that can be repurposed for patients. It gives researchers an efficient method of reviewing large volumes of data and uncovering new insights. For example, the Pistoia Alliance recently collaborated with a group of partners on an AI 'datathon' for drug repurposing. In one month, this helped scientists to discover four repurposing candidates with potential to treat chronic pancreatitis – a disease affecting about 1 million people worldwide – which currently doesn't have an approved treatment.

Automating Covid-19 reports

The pandemic has presented many new challenges, one of which has been the introduction of additional daily reporting responsibilities.

As part of the NHSX AI Lab project, tech consultancy Foundry4 took on the task of automating the daily Covid-19 situation reports being sent to NHS England by Kettering General Hospital NHS Foundation Trust.

"A lot of our time was taken up with conveying an accurate picture of how the hospital was coping," says Ian Roddis, the trust's acting digital director. "Although it was a vital part of the national response, we were adamant that the process wouldn't prevent us from dedicating as much of our time as possible to patient care."

He and his colleagues were aided in their efforts by the introduction of the Mary Bot, named after the trust's head of IT. This is software that autonomously draws data from patient and HR admin systems to help manage the reporting process.

"Removing the heavy administrative burden from our clinical staff has not only enabled them to spend more time attending to patients; it has also eradicated errors in our reporting," Roddis says. "It has ensured that we are providing an accurate picture that supports that national pandemic response."

On top of this, the automation has saved an estimated 4,400 working hours a year, representing an annual cost saving exceeding £150,000.

Reducing stroke recovery times

Stroke survivors are often left with long-term health problems such as impaired mobility, which can require periods of rehabilitation lasting months or even years. Fewer than a third of patients fully regain their mobility and strength.

ReLive, a start-up based at Nazarbayev University in Nur-Sultan, Kazakhstan, is working to improve stroke patients' recovery times with the aid of rehabilitation robots. These devices are wearable exoskeletons that can be strapped around the affected limb. They are controlled using software that reads and interprets the patient's brain signals via an electroencephalogram (EEG). Information about their progress can be recorded during the rehabilitation exercises on an online platform for clinicians to analyse.

The system can interpret the signals obtained by biosensors, such as an EEG, and pass these on to the robot controller. It can also learn an individual's gait to fine-tune the robot's movements and optimise these so that the stress on the soft tissues surrounding the affected limb is minimised.

Detecting the early warning signs of dementia

AI-enabled systems have come to the forefront in the diagnosis of Alzheimer's disease and other forms of dementia. For instance, they can note slight changes in speech, such as the elongation of pauses between words, a growing preference for pronouns rather than proper nouns and the use of overly simplistic descriptions.

ViewMind is one company that's using AI to detect Alzheimer's and similar conditions at the pre-clinical stage. Using a VR-type headset in a test that takes about 10 minutes, it's aiming to assess 1 billion people a year in settings such as GP surgeries and opticians as part of a standard health check. The system captures more than 10,000 data points through eye movements. The company says that this can detect cognitive problems two decades before the symptoms present themselves.

ViewMind recently conducted a study that's found that a significant portion of Covid-19 patients have contracted a form of so-called long Covid that could trigger potentially serious cerebral side effects. The researchers used the headset device on patients to stimulate parts of their brains and measure their eye responses. The results were fed through an AI system to analyse the cognitive impact of the virus.

Improving fertility treatment

Virtual fertility clinic Apricity uses a proprietary algorithm to predict its patients' chances of successful conception, with and without treatment.

"Our patients have found great value in using our AI fertility predictor tool, which analyses lifestyle factors to evaluate the likelihood of pregnancy," says Dr Cristina Hickman, Apricity's chief scientific officer. "It can suggest various types of treatment to support them in their quest for fertility."

She continues: "Our team is developing machine-learning models with applications in a number of areas, including embryo selection, follicle-scan interpretation and hormone treatment. When we're culturing embryos, for instance, we can capture many images and millions of data points. We can use these to create an algorithm-based standard classification, where we assign a score to each embryo and predict its chances of becoming a healthy baby. Compared with traditional methods, this would save the time, money and stress usually spent on unviable embryos, resulting in more babies and better standards of practice."

AI can also assist the clinicians in standardising processes such as selecting the best sperm and determining the optimal number of embryos for transfer to maximise success rates while minimising multiple births.

"Ultimately, AI can help to involve patients in all the key decisions," Hickman says. "This brings simplicity, autonomy and less stress to a journey that, without AI, is anything but straightforward, controllable and stress-free."

Accelerating pharmaceutical R&D

Machine learning is proving invaluable to the pharmaceutical industry in the drug discovery process and the testing of new products. Given that bringing a new treatment to market can take up to 15 years and be an extremely costly and risky exercise, many pharmaceutical companies are devoting more resources to finding new uses for existing drugs.

"Even though machine learning is used at all stages of drug discovery, it is of most use at the start, when there is a large amount of data to process and connect," says Amanda Schierz, principal data scientist at AI platform DataRobot. "This is the best stage to predict any problems that could occur further down the line. Towards the end of the process, machine learning is used predominantly as a support tool for human decision-makers, enabling researchers to investigate alternative combinations and candidates more quickly."

She observes that the speed and productivity of automated machine learning align well with the drug discovery philosophy of 'fail fast'. This helps to reduce the number of failures later in the process.

"With the public focusing on – and becoming more knowledgeable about – the drug discovery process in relation to Covid-19, it's time for companies to rely more on machine learning," Schierz says. "This enables them to innovate and fail fast, instead of putting all their resources into one metaphorical basket."

AUTOMATION

Hyperautomation will revolutionise work – but what exactly is it?

Experts agree that the growing maturity of a cluster of technologies has transformative potential, but businesses must act quickly if they're to gain a competitive edge from this

Oliver Pickup

Hyperautomation has been thrust into the spotlight for the second time in six months by Gartner. In October 2020, the research giant named it as one of its top strategic technology trends for 2021. Its latest report on the subject, published at the end of April, forecasts that the global market that enables hyperautomation will be worth almost £430bn in 2022 – a 24% increase on the previous year's figure.

"Hyperautomation has shifted from an option to a condition of survival," says Fabrizio Biscotti, research vice-president at Gartner.

But what is hyperautomation, why is it generating such interest now, and – most crucially – how can businesses best harness its potential?

In essence, hyperautomation is a strategy that enterprises adopt to quickly identify, vet and automate as many processes as possible, applying a disciplined, holistic approach and mix of technologies. It spans the whole spectrum of operations, using digital tools to simplify a range of time-consuming tasks. These tools include AI systems, robotic process automation (RPA), low-code application platforms and virtual assistants.

The concept is becoming increasingly relevant, Biscotti says, because organisations will "require more IT and business process automation as they are forced to accelerate their digital transformation plans in a post-Covid, digital-first world".

Gartner's October 2020 report had noted: "Many organisations are supported by a patchwork of technologies that are not lean, optimised, connected, clean or explicit. At the same time, the acceleration of digital business requires efficiency, speed and democratisation. Organisations that don't focus on efficiency, efficacy and business agility will be left behind."

Peter van der Putten is director of AI solutions at cloud software company Pegasystems and an assistant professor of AI at Leiden University in the Netherlands. He suggests that the drive towards hyperautomation has been "gathering pace for some while as the technologies have matured".

> Hyperautomation has shifted from an option to a condition of survival

Their simultaneous emergence has created far-reaching possibilities. There is low-hanging fruit to be gobbled by business leaders, he says, although those who invest heavily in hyperautomation stand to gain the most from it.

"There is more to this than streamlining workflows to save time and reduce cost," van der Putten says. "There are strategies that enterprises can adopt to link automation with business outcomes more directly. Realising the potential of hyperautomation hinges on robust governance and the quality of executive-level support – how it is implemented across an organisation and not in narrow niches."

For instance, the ability to manage exceptions through AI enables finance, IT and governance experts to deliver value for industries that already use new networks or decentralised cloud services. A recent global survey of 1,300 business leaders by Pegasystems identified key areas where hyperautomation has already been benefiting financial services providers. Many respondents reported achieving quick wins in a number of functions, including finance, data management and production. They expect to see significant advances in areas such as supply chains and "partner ecosystems" over the next five years.

As an example of what's possible with hyperautomation, take credit broker Loan.co.uk. The business, which has been building intelligent systems since 2014, has transformed mortgage lending from a process that's traditionally been opaque, complex and painfully slow. The total automation improvements to date have "saved our 40 advisers and processors on average three hours and 45 minutes a day", reports CEO Paul McGerrigan.

The company's AI helper, Albot, can search thousands of lenders' offers in less than a second while matching more than 10,000 criteria, delivering the lowest rate appropriate for each applicant's circumstances.

"Our smart AI underwriter can fully underwrite approximately 100 cases in 30 seconds, including credit searches," McGerrigan says. "Previously, it would have taken an adviser 20 minutes to underwrite one complex case."

The company's new approach has significantly increased transparency and, in turn, engendered greater trust among its customers. McGerrigan urges other organisations to embrace hyperautomation, which, he says, "will do to the knowledge worker what the industrial revolution did to the manual worker. We are seeing the largest shift in how we work in 100 years. Most firms have been taken by surprise at the speed of change, while some are still asleep."

Guy Kirkwood, chief evangelist at UiPath, an RPA software provider, agrees that the potential for hyperautomation is huge. "In the US alone, 2.6 trillion hours of work a year are automatable," he says, noting that the pandemic-induced lockdowns have added impetus to the trend.

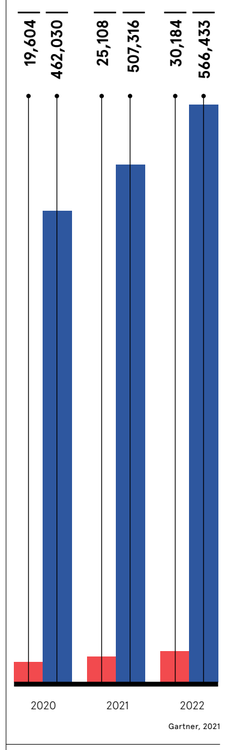
"Work will be revolutionised," Kirkwood predicts. "Almost over night, employees were expected to work from home, deal with unfavourable economic conditions and handle a huge rise in their workloads in areas such as customer service and data entry. Many turned to automation to adapt."

He points to a firm providing smart infrastructure that used to print, sign, scan and upload 400,000 invoices a year manually. The business "now has a robot that performs these tasks digitally. This means that no employee needs to physically be in the office to process an invoice."

Now that businesses have been catapulted into the digital age, regardless of their industry, we are on the verge of a new era of work in which hyperautomation will play a much greater role. Companies that make the leap today and go big on automation will be winners tomorrow.

HYPERAUTOMATION DRAWS BIG MONEY

Worldwide forecast for hyperautomation-enabling technologies ($m)



Gartner, 2021

Automating document communication: a lightbulb moment

Companies waste a vast amount of time, effort and money on converting information sent to them by their business partners into the right format. It's time to let AI take the strain

Consider any item on your desk right now, whether that's your computer or even just a mug. Hundreds of companies – from suppliers, manufacturers and utilities to logistics providers, retailers and payroll services – will have worked together to bring that product to where it is now. The world of business is a giant dance, where all these participants move in unison to keep supply chains running. And they all connect and communicate with each other using a single tool: documents.

A purchase order, a statement, a packing list, an invoice – a constant stream of documents aids this giant dance. But a challenge arises when the participants perform different moves from each other. Every business speaks its own language when issuing a document, imposing its own quirks of nomenclature and layout on what it creates and sends to other parties.

Herein lies one of the most underestimated opportunities in the world of commerce: making this world of interconnected communication more efficient, despite how diverse it is, and choreographing a universal dance.

"I like to think of these documents as arteries of organisations. All of the key information that flows across must become a document, so that you can pass it on to your business partners, and then become raw data again once it's received," says Petr Baudis, co-founder and chief AI architect of Rossum – a company very much tapping into this vein of thought.

He continues: "Because every company sends its documents in a different format, humans on the receiving end would typically serve as the translators. Unlike traditional optical character recognition (OCR) software, people can understand all the variations, but the cost is vast. In large companies, huge teams are typing over data from a sheet of paper to a computer form, field by field, eight hours a day, five days a week. It becomes a huge drag, where transactions can take weeks to execute before someone simply types in the data. This is all happening in a world where such communications should take minutes at most."

AI as a universal translator between companies

A new wave of AI technology is bringing significant disruption to this sleepy area of enterprise. Firms seeking to streamline their communications have traditionally had two choices: either configure capture rules for each document format or move their transactions to the electronic data interchange (EDI) format. Both choices are extremely costly, because they mean implementing an IT mini-project for each business partner. This has made both options feasible only in situations where a handful of business partners are generating vast numbers of transactions.

But new AI based on neural networks can now largely replicate what only humans were able to do. This includes scaling up data capture to cover a vast range of document formats and learning quickly on its own. By automating document communications, AI can act as the universal translator between companies.

"The starting value of what we call the Rossum document gateway is making back-office teams 800% more efficient at processing document transactions," Baudis says. "AI technology automates the understanding of each incoming document, but it also streamlines how documents are received and – equally importantly – how exceptions are handled. This is vital when you consider the crazy back and forth that occurs when some documents are wrong, which happens all the time in many operations."

Freeing up talent

To achieve this level of automation, companies use a system such as Rossum's – a vertically integrated solution for end-to-end document communication. It's a cloud-based platform that automates the receiving and understanding of incoming documents, exception handling and IT integration. The enterprise-wide impact on efficiency of inter-company communication is comparable to the impact that robotic process automation (RPA) tools such as UiPath are having on intra-company processes, even though the technology differs greatly.

It's already been received well by a host of high-profile enterprises, including PepsiCo. Jana Vlkova, the company's head of accounts payable in central and eastern Europe, describes PepsiCo's situation – a typical one for many firms with a heavy data-entry workload: "We had a never-ending backlog – at least hundreds of documents at all times. Before we implemented Rossum's document gateway, team morale was hitting rock bottom and we feared that many colleagues were about to quit. Now, we are always able to complete our work on time."

THE ISSUE WITH MANUAL DATA CAPTURE

Data capture ties up huge human effort and slows down business

1 billion text invoices a day are exchanged worldwide

100 billion keystrokes daily are required to enter the data

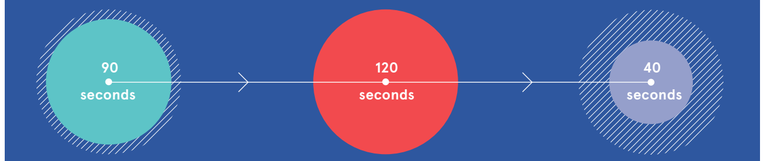
7,000 man-years a day are spent on manual data entry

80% of invoices are entered manually

10 days days average document waiting time

AUTOMATING DOCUMENT COMMUNICATION

Every business document consumes human time at three key stages:



Communicate

Retrieving and sorting incoming documents, handling amendments and inquiries, returning wrong documents and handling other exceptions

Understand

Turning documents into actionable data regardless of the document format, going item by item and page by page

Integrate

Working in the target system to add metadata and pair extracted fields with master data records such as companies and orders

Billentis report

Baudis adds: "Adopting a modern solution is not just about the raw processing cost per document. Even obtaining the manpower to get that tedious work done at all may be a challenge. A fresh solution that uses AI to eliminate the repetitive component of work, and makes the user experience of processing documents actually pleasant, can make a big difference to employee retention. We do see some companies focusing on AI as a simple cost-cutting measure. But, more often, the people who are freed up from that toil are reassigned to more value-adding tasks."

> By automating document communications, AI can act as the universal translator between companies

Traditional tasks undergo a digital revolution

Rossum's vision is a world where business transactions take minutes rather than weeks to complete, thanks to touchless communication. In 2020 alone, its efforts saved data-entry teams worldwide 1 billion keystrokes. Rossum's document gateway firmly leads the automated document communication category, yet it's clear that the solution is still just scratching the surface in terms of the potential global impact on manual document processing.

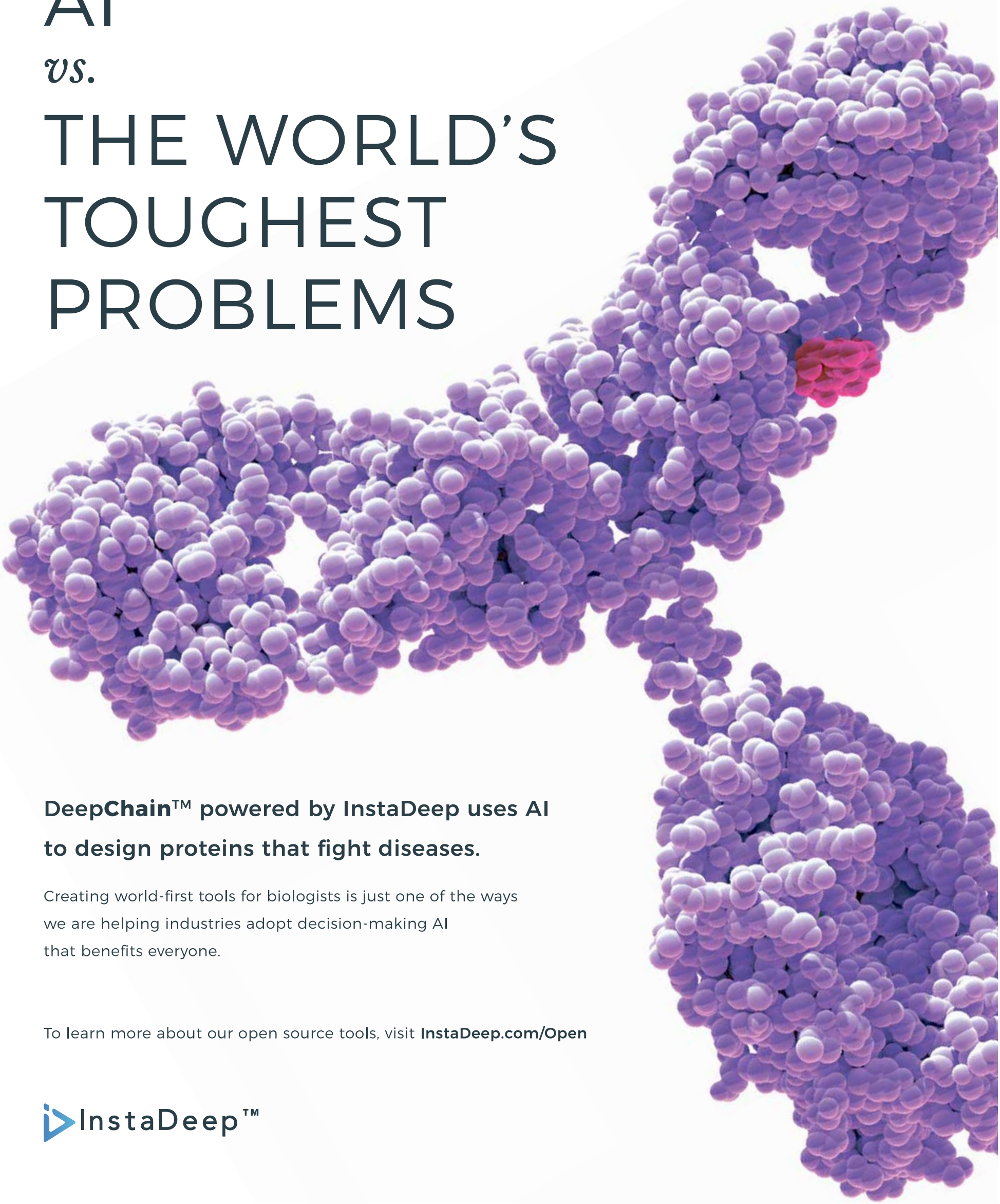
As hundreds of enterprises, including PepsiCo, Bosch, Veolia and Siemens, have adopted its universal document gateway, the true impacts of document-based communications are being rethought. It's become possible to complete transactions in minutes rather than weeks; to identify and rectify anomalies and exceptions across all formats; and to have an easily implementable system enabling all this, hosted and managed in the cloud.

It could be a lightbulb moment for industry in the wider context of AI. In organisations where there is still reluctance to adopt the technology, watching your most staple and traditional tasks undergo a digital revolution is likely to trigger a broader acceptance of its value.

For more information please visit rossum.ai/document-communication

ROSSUM

AI
vs.
THE WORLD'S TOUGHEST PROBLEMS



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