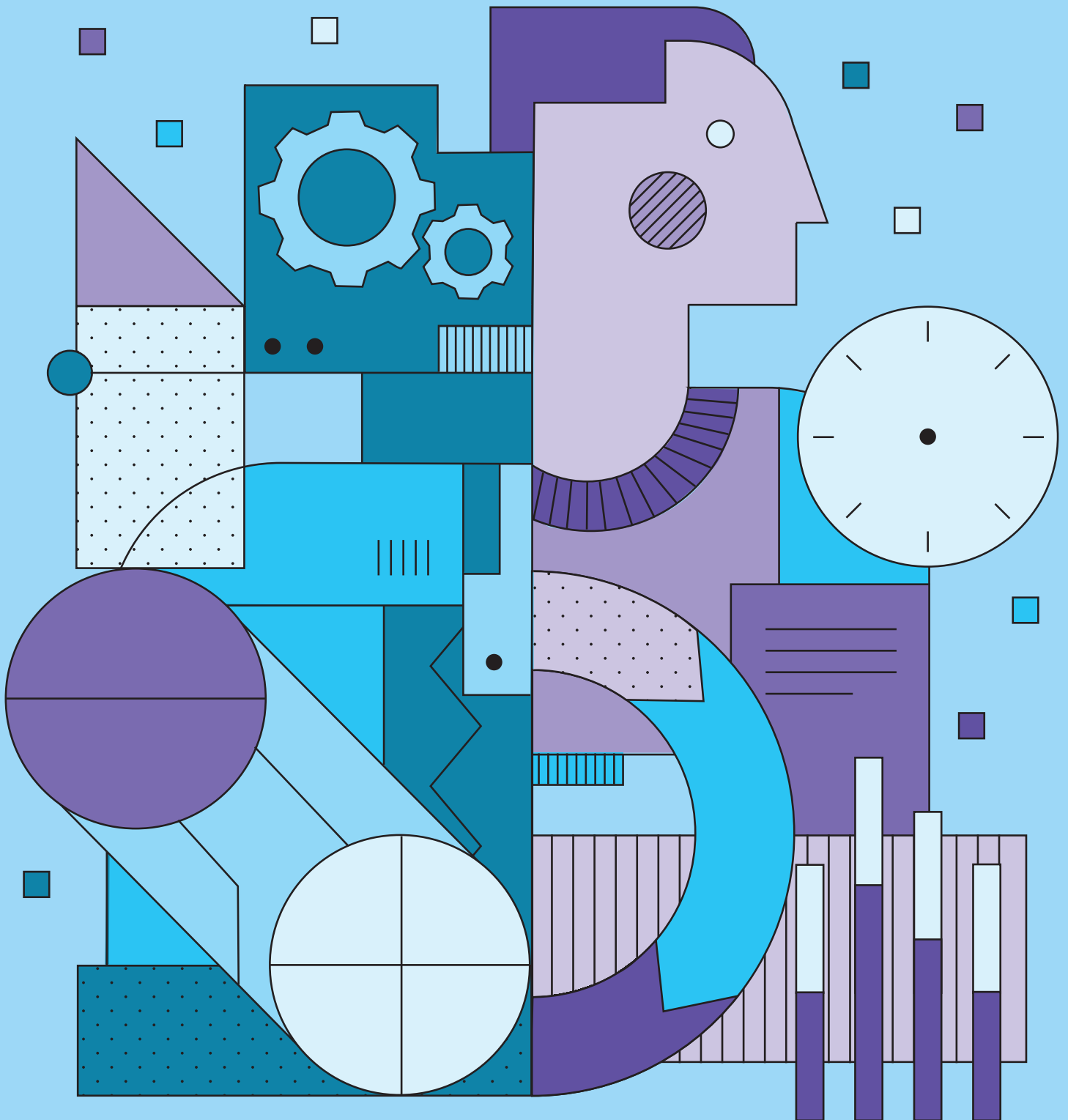


RACONTEUR

The Augmented Enterprise



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This report explores the ongoing relationship between humans and automation, and ways in which machine learning can augment human intelligence, empowering workers to unlock new human possibilities

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CULTURE

Data science as a means, not an end

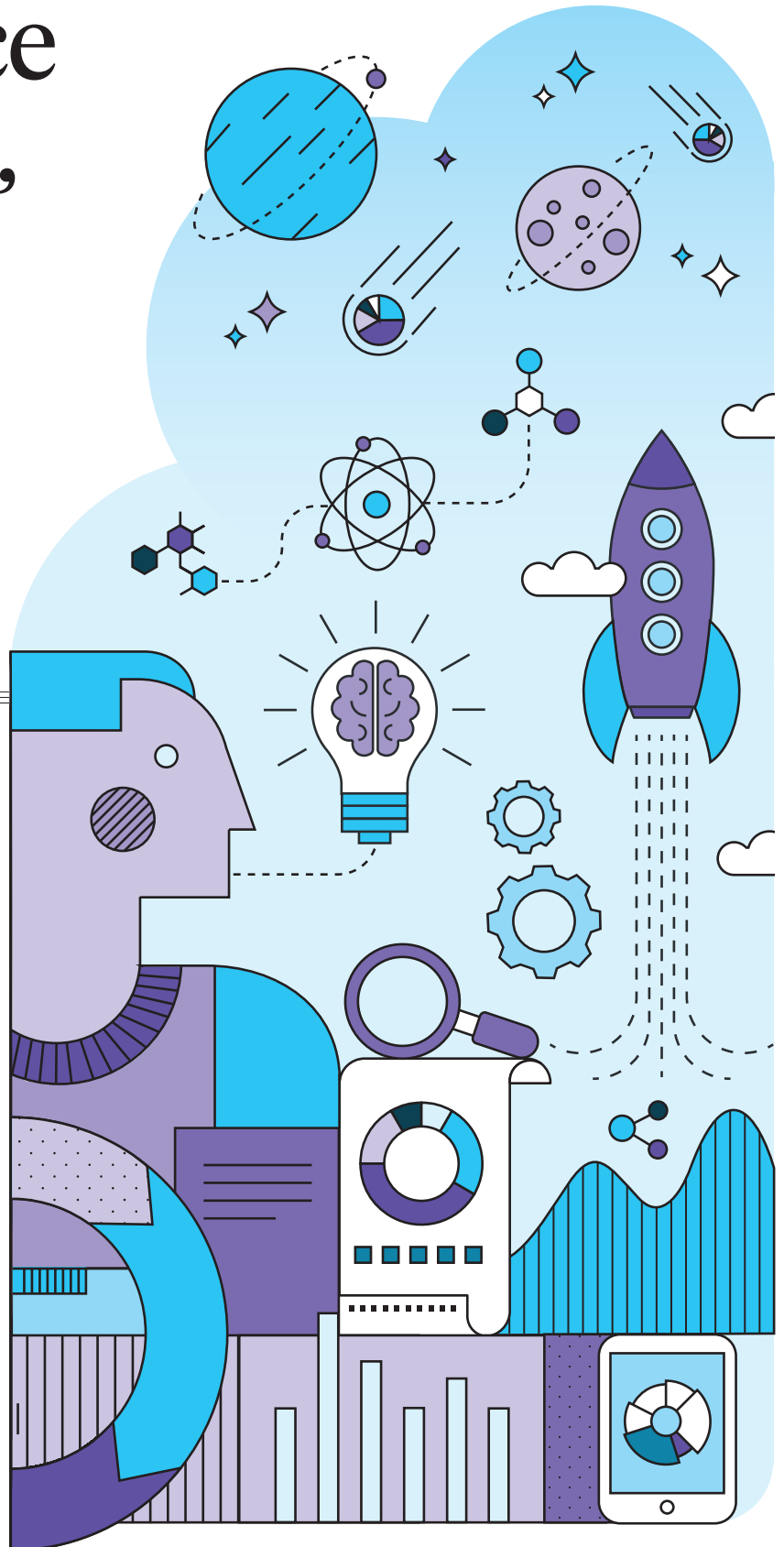
Digital technology presents huge opportunities for business leaders, but must be viewed as a useful tool, rather than an outcome in itself

Oliver Pickup

The digital universe is doubling in size every two years, according to International Data Corporation, and will reach 44 trillion gigabytes by 2020. Against this backdrop, the pressure is on business leaders to embrace data science and take advantage of the technologies offered by artificial intelligence (AI) and the internet of things (IoT).

Big data and analytics provide a method for converting huge data volumes into next-level insights. However, rather than being a “silver bullet” – and despite the confusing and misleading hype around AI in particular – data science must be viewed as an essential tool to solve business challenges, and not a final outcome in itself.

Data science is hugely valuable if used correctly, but business leaders should take time to determine whether – and why – it should be embraced by their organisation. Clare Barclay, chief operating officer of Microsoft UK, advises firms to focus on small improvements, or “low-hanging fruit”. She says: “If you start thinking of the really big things, you do nothing. Ask yourself: ‘What is the problem I am trying to fix?’”



Manjit Johal agrees. The co-founder and chief technology officer of AVORA, a London-based company that offers business intelligence and machine learning as a service, acknowledges that it can be easy for firms to get lost in a sea of data when it comes to data science, focusing too much on the algorithm or model and losing sight of the actual business goal.

“As with any new initiative, it’s always best to start with the end in mind, so that you don’t get distracted along the way,” he says.

The C-suite should neither be overawed by data science nor “think of it as something new”, suggests Wael Elrifai, vice principal for solution engineering, big data analytics and Internet of Things at Hitachi Vantara. Business leaders have always used past information to optimise decision-making and determine the future of their businesses, he says. The point is that these prediction methods are advancing.

“It means that existing business processes can be optimised, and they can predict things they weren’t previously able to,” he says. “Other times, these insights can define entirely new business processes, such as shifting to predictive maintenance rather than fixed scheduling.”

Maureen Norton, global data scientist profession lead at IBM, says business leaders should use data science to generate insights that help them keep up with competitors. However, they must take care not to ignore their most valuable asset: their employees.



Keeping human factors front and centre is an essential part of organisational culture

Maureen Norton

Global data scientist profession lead, IBM

“We are in an era of business reinvention and organisations are facing unprecedented convergence of technological, social and regulatory forces,” she says. Those unfamiliar with the power of data should read Michael Lewis’s “Moneyball: The Art of Winning an Unfair Game”, she says, or watch the 2011 Brad Pitt film based on the book.

While we hear more about augmented and cognitive enterprises – and the AI technologies that power them – people remain the most important aspect, Ms Norton says.

“Keeping human factors front and centre is an essential part of organisational culture.”

Robots are not going to take all of our jobs. Data science allows man and machine to work together, with AI and IoT helping to remove dull, automatable tasks. Still, many workers will have to evolve and upskill to make the most of the mushrooming number of opportunities presented by tech advancements.

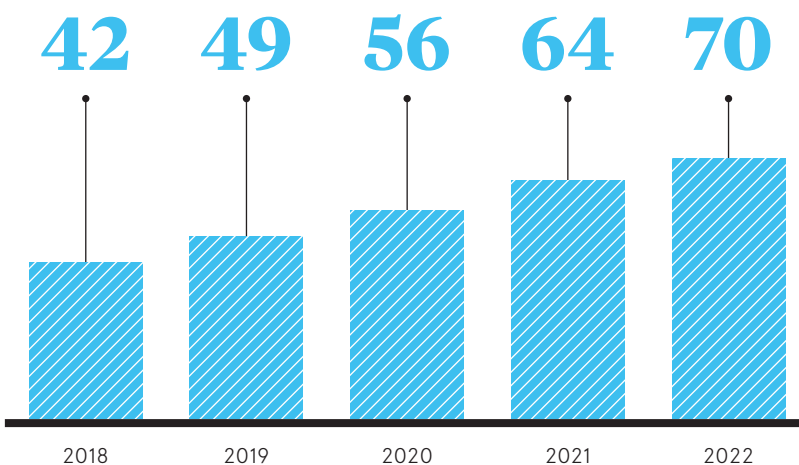
To maximise benefit, Ms Barclay recommends educating staff across the organisation on science and associated technologies; this can help catalyse a successful digital transformation. “By involving employees, you’re culturally engaging with them around the things that are going to change and you’re equipping them with new skills.”

Ms Norton emphasises the value of data science as a vehicle for optimising the workforce, not as the ultimate goal.

“New technologies and corporate architecture enhance both client and employee experiences and provide the insights to spark creativity and engagement,” she says. “That in turn raises the expectations for personalised services that include human interaction and empathy, which are attributes that, in 2019, differentiate a company from its competitors.” ●

WORLDWIDE BIG DATA MARKET IS GROWING AT AN 11.4% CAGR

Big data market size revenue forecast worldwide (in billion USD)



Wikibon 2018

EDUCATION

A democratic approach to data excellence

Organisations must educate employees on the opportunities presented by data, rather than simply hiring specialists with new-fangled titles

Oliver Pickup

If data is the new oil, business leaders know they must siphon off value. Yet a woeful lack of knowledge at C-suite level and a lack of skilled workers have fostered an alarming number of unsuccessful – and costly – data science and artificial intelligence (AI) projects, according to experts.

Gartner estimated that in 2017 some 60 per cent of big data programmes would fail to get beyond the pilot stage. The analyst firm's Nick Heudecker updated the calculation in November that year, writing in a post on Twitter – since deleted – that it was “too conservative” and the figure was, in fact, closer to 85 per cent.

Little surprise, then, that McKinsey has identified the relatively new role of analytics translator as one of the most sought-after positions

for data analytics. The firm says that translators play a critical role in bridging the technical expertise of data engineers and data scientists with the operational expertise of frontline managers in marketing, supply chain, manufacturing, risk and other areas.

“Data science should be seen in the business not just as a reactive service but as a source of new ideas that can help drive innovation,” says Jonathan Clarke, statistical modelling manager at LexisNexis Risk Solutions. “To do this, it's vital that the analytics team can clearly describe their function and solutions to the wider business. But this is not an easy task and is a skill that often sits outside the junior scientist's toolkit,” he says. While translators can fulfill this function, hiring them is often proof that the data science team is not properly integrated into the business.

Mr Clarke raises an important point: is regularly hiring talent with new-fangled titles to grapple with data the correct approach, or is it in fact myopic?

“It is bureaucratic overkill – if a translator is needed, then team dynamics have already broken down,” argues Dr Al Hartmann, chief scientist at cloud security software company Ziften. “Role proliferation is not the answer. Keep teams small, agile, and well connected.”

David Gonzalez Martinez, head of big data for Vodafone Business, agrees that employees at every level should be encouraged to analyse data. Given the integral role that data plays in business in today’s economy, everyone needs to understand it, even at a basic level, he says.

“The entire C-suite has to provide support, ensuring that their area is primed to harvest robust data and that stakeholders understand the value of using it in conjunction with analytics and AI.”

Business units need to use this data throughout the organisation to realise the benefits it can deliver, he says.

“Only with this more democratised approach will individual teams begin to adapt their behaviour.”

A long-term strategy focused on distributing data excellence across the organisation is critical to future success, says Miguel Milano, president of Salesforce in Europe, the Middle East and Africa.

While companies could pay a premium to acquire talent, this would be a short-term solution. Even if they are happy to bear the costs and could find people with the right skills, “it will not help in a few years when those new skills are no longer needed”, he says.

“As new roles emerge and skills requirements change, the size of the existing pool of



The entire C-suite has to provide support, ensuring that their area is primed to harvest robust data and that stakeholders understand the value of using it in conjunction with analytics and AI

David Gonzalez Martinez
Head of big data, Vodafone Business

CULTURAL IMPEDIMENTS TO BIG DATA BUSINESS ADOPTION

A number of barriers are holding businesses back from the benefits of Big Data



NewVantage Partners 2017

skilled workers just isn’t going to be big enough to meet demand,” Mr Milano explains. “Companies won’t simply be able to fall back on hiring new employees as they attempt to future-proof their workforce. To address the problem, companies must invest more in enabling their workforce to reskill – starting now.”

Mr Milano heralds the move to democratise data science, with the introduction of pre-built algorithms and open-source machine learning libraries helping “non-experts” handle data and deliver insights. He points to a raft of (often free) online courses on offer from Coursera, Udemy, and Stanford and Harvard universities, among many others.

There is an urgent need for a massive increase in tech skills among the working population, Mr Milano warns business leaders. Companies cannot solely rely on conventional educational approaches, whether through schooling or arduous qualifications.

“We need to create ways of learning that are accessible to employees and that can adapt to a fast-changing digital landscape, instead of rigid curricula and time-consuming programmes,” he says. “It’s time to change the way people think about their careers, building an understanding that reskilling is a viable and indeed a necessary option.” ●

An augmented workforce: the AI advantage

Machine learning and AI are making big inroads into the workplace, offering numerous advantages for employees

Dr Davide Zilli

Director of client services at Mind Foundry

If past headlines were to be believed, hordes of us should be out of a job by now. Back in 2013, indeed, one expert claimed in a national newspaper that clerical jobs would have disappeared completely by 2018.

That clearly hasn't happened. Machine learning and artificial intelligence (AI) are indeed making big inroads into the workplace, but with a very different end result. Staff members aren't so much being replaced as augmented, given extra capabilities that enable them to work more efficiently and intelligently than before.

In the field of data science, workers generally spend upwards of 80 per cent of their time cleaning and preparing data, which can be very manual and repetitive, and only the remaining

20 per cent on the more interesting aspects of model building and analysing results. With the right tools, however, repetitive tasks can be automated, freeing up time for work where human expertise is very valuable. People then get the chance to spend more time on what they really want to do: digging deeper into meaningful data.

Choosing a model

Choosing the right machine learning model is another time-consuming task. It usually means trying out a number of different possibilities, often based on what the individual data scientist knows and prefers. With automated machine learning tools, however, it is possible to leave that selection process to the machine, which not only can do the job better, but in a fraction of the time.

The right tools can also make it possible to analyse far more dimensions of data than ever before. Human beings are generally very good at spotting patterns, but where there are multiple variables this ability can only go so far.

Deluged by data

Machine learning can work with hundreds of dimensions. This is where it really becomes possible to see relationships in data that our brains have no chance of understanding, and to extract meaningful insights. Imagine looking at a graph to explore your data. In two dimensions everything makes sense. In three it gets complex, but it's possible. How do we look at data that has 200 dimensions?

It reminds me of when we were using machine learning to detect the spread of malaria. In a project between Royal Botanic Gardens Kew and Oxford University, called HumBug, we developed a real-time detection system based on a phone app that aims to detect malaria-carrying species of mosquito by the sound they make. This data is combined with information on associated environmental factors drawn from high-resolution remote imaging: the composition of local vegetation, the distance to water and so on. It's a huge amount of data, but thanks to machine learning, it can all be analysed to produce detailed, real-time maps of the spread of malaria that can help with the targeting of control programmes.

Endless possibilities

Expanded capabilities like these make the role of the data scientist far more sophisticated than before. Once people get to grips with the possibilities, they come up with novel applications.



Far from stealing people's jobs, AI and machine learning simply make those jobs more satisfying

Dr Davide Zilli

Director of client services, Mind Foundry

Sometimes these aren't even work related. One Mind Foundry client has collected over ten years of data on the performance of his children's football teams, and has so far only analysed it manually. Now he would like to use our platform to gain predictive insights that can help improve their performance.

While analysing kids' football scores won't do much for one's employment prospects, the skills gained from these new tools certainly do. This is probably one reason why we find that so many workers are keen to learn more about how the machine interprets the data and draws patterns from it. We make the processes as transparent as possible, exposing all the parameters, so that the user can see how the decisions are made. As a spin-off from Oxford University, we have access to a great deal of cutting-edge research, which we always include in our training programmes.

There's a great deal of evidence that, far from stealing people's jobs, AI and machine learning simply make those jobs more satisfying. In a recent survey by the Chartered Institute of Personnel and Development (CIPD) and PA Consulting, 43 per cent of workers at two companies using AI felt they were learning new things, while a third said they were doing more interesting tasks.

Similarly, a study this spring by the Japan Science and Technology Agency found a clear pattern: the more that new information technologies like AI are adopted, the bigger the increase in worker job satisfaction. This really shouldn't be a surprise. When AI is acting as a super-capable assistant that frees you up for more insightful work, why wouldn't you feel satisfied?

Even small organisations can benefit from machine learning. Ask yourself: are your staff wasting time on routine tasks, rather than focusing on what they do best? How much more could they achieve when they're free to spend time on more strategic thinking that drives your business forward? ●

TECHNOLOGY

Taking data science beyond the black box

Automated black box systems can help make sense of vast quantities of data, but there are pitfalls for companies

Oliver Pickup

There will be 50 billion devices connected to the internet by 2020, according to Microsoft, while data volumes will be 50 times higher than in 2016. With such colossal – and rising – data resources, the gulf between supply and demand for data scientists and analysts already seems unbridgeable.

“If it is true that data is increasingly changing the world that we live in, it is also true that there is a shortage of individuals to make sense of that data,” says Dr Iain Brown, head of data science for SAS in the UK and Ireland. “As a result, some businesses are turning to automated black box systems to make informed decisions from complex analytical data, replacing people with machines.”

Wael Elrifai, vice principal for solution engineering, big data analytics and Internet of Things at Hitachi Vantara, says: “The dark arts of data science have been an element of this industry since its inception. The tricky part is that some types of data science – deep



learning in particular – are virtually impossible to understand in any detail by their very nature, not only to the layperson, but even to the experts.” This means that while it is possible to understand the “what” that artificial intelligence (AI) might present to the user, the “why” remains elusive.

That elusiveness raises many concerns, especially in those fields in which training or learning from past performance can build in biases, around race or gender, for example. “This is a very human problem, and it will take humans to resolve it,” says Mr Elrifai. “And unfortunately, there aren’t any quick-fix magic potions available.”

Organisations that fail to either understand or display the workings of big data programmes face dire consequences, especially since the introduction of the European Union’s General Data Protection Regulation (GDPR) in 2018. Non-compliant businesses could be fined up to €20 million, or 4 per cent of annual global turnover – whichever is higher.

It is important to bear in mind these potential business-limiting consequences before embracing off-the-shelf AI products or taking shortcuts thanks to the recent push to democratise data science. While algorithms and open-source machine learning libraries can be used to create automated, “hands-free” AI solutions and produce short-term results, it can be a dangerous game, says Dr Brown.

“Organisations are forced to rely on the black box without understanding the logic behind its decision making, and they could risk reputational damage when things go wrong. GDPR requirements state that organisations must be able to demonstrate how a decision about a particular customer has been reached, so there must be clear data lineage and explainability to meet compliance requirements.”

50bn

Devices will be connected to the internet by 2020

Microsoft



Dr Brown says the acronym FATE – fairness, accountability, transparency and explainability – “must be the cornerstone of ethically governed models. Without this, organisations are potentially opening themselves to governance and control risks. Data science should not be seen as a dark art, nor should its produce be completely “black box”.”

Paul Henninger, senior managing director at FTI Consulting, says that if data science seems like a black box to an organisation, they have a problem.

“No one should ever do something that comes out of a machine just because the machine is using a fancy algorithm,” he says. “Patterns and probability need to be put into a business context in a way that decision makers, leaders and consumers understand. If a data scientist hasn’t been able to explain how the pattern works, or why it’s a pattern, a business will never fully realise the benefits of the change it creates.”

Organisations that move beyond the black box of data science and show transparently how their data models are validated are likely to gain favour with customers and, in turn, boost profits, according to Microsoft UK’s “Maximising the AI Opportunity” report, published in October.

Clare Barclay, chief operating officer at Microsoft UK, encourages business leaders to establish a clear set of ethics, commitments and values around the use of AI.

“In other words, don’t ask what AI can do, but what it should be allowed to do,” she explains. “Not only will this ensure ethically grounded innovation, but it can support your bottom line, too. Microsoft research shows companies that consider what AI ‘should’ do have been shown to outperform those that don’t by 9 per cent.”

Evidently, it pays dividends to think outside the black box. ●



Patterns and probability need to be put into a business context in a way that decision makers, leaders and consumers understand

Paul Henninger
Senior managing director, FTI Consulting



Organisations looking to harness the potential of their data are turning to Mind Foundry's human augmented machine learning solution to uncover answers to their business questions. Business problem owners use our easy-to-navigate SaaS platform to prepare their data, optimise it for machine learning, generate a model, test it, and then make predictions for business issues such as lead conversion, buyer profile fit, customer churn, credit risk, clinical trial outcomes and more. We co-create an achievable action plan with each customer, prioritising opportunities for applying machine learning to maximise value creation in the shortest time possible.

Mind Foundry is a portfolio company of the University of Oxford, founded in 2015 by Stephen Roberts and Mike Osborne, two of the greatest minds in machine learning research and development. Investors include Oxford Sciences Innovation, the Oxford Technology and Innovations Fund, the University of Oxford Innovation Fund and Parkwalk Advisors.

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