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THE FUTURE
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STRATEGY

Enter the prophet to create profit

The chief data officer has become an important business leader, unlocking commercial value and influencing company strategy

DAVID COWAN

The future of the chief data officer (CDO) is intriguing as there's a transformational shift happening. Most sizeable companies will have a CDO by next year and the role is becoming better defined. Like compliance and sustainability leaders before them, the CDO was once seen as a policeman telling companies what they can't do or priests telling them to stop and sin no more. However, the role is now moving along a more progressive and prophetic track.

CDOs are increasingly present in the C-suite, showing their bosses where the next opportunities, as well as threats, lie. The top drivers are sales and revenue growth, cost-reduction and efficiency-savings, and the need to improve customer intelligence. This means CDOs need to find new ways of talking to the top.

Richard Merrygold, director of group data protection at Homeserve, a home assistance provider, says: "CDOs need to sell the benefits. The CDO role is one of looking for efficiencies, simplifying needs, demonstrating cost-benefits, and encouraging businesses to be open and transparent."

Change came out of the 2008 financial market meltdown and is being spurred on by the recent big data breaches, most notably the Cambridge Analytica scandal and the new European Union General Data Protection Regulation (GDPR) requirements. While these demonstrate the importance of the CDO role, they are essentially sticks to beat the leadership with, but the role isn't all about fear and risk. It is also about stewardship of the company's data assets.

But Mark Hinds, chief executive of Polymatica, a data science and visual analytics platform, says: "Everyone gets it, but organisations struggle to decide where to land the analytics function."

The CDO role is evolving and shifting rapidly from gatekeeper to business strategist. Historically it involved collecting data and ensuring, at the basic level, data is protected. The role still does this, but the focus is now about unlocking value. Data assets are strategic sources of insight and leverage for a range of business functions, including risk management, regulatory compliance, sales and marketing, product development, and operational performance. Playing a prophetic role means taking a different approach both to the data and business strategy.

Jose Luis Pelaez Inc/Getty Images

Solving this challenge means focusing on opportunities. A CDO needs to understand how information can transform a business and be able to spot opportunities to apply it. Mr Merrygold says: "I try desperately hard in my role as CDO to show the opportunities, not just to get people to understand GDPR. It is a data-driven role, which is not just about telling you not to do something. We need to balance the commercial viability of business, but also warn of the dangers of taking too big a risk."

The role is increasing in sophistication because companies are transforming their data ecosystems in response to fast-moving technology innovation in digital, mobile payments, big data management, advanced analytics, blockchain, robotics, cognitive learning and automation.

The CDO needs to understand the language of the business, and see how data and strategy interests coincide. They also need to talk the language of the analytical community and communicate in ways they appreciate. They need to appreciate the power of technology and know how to push providers to get what they need. This entails a cultural shift for organisations to embrace business analytics and needs to be done top-down.

This all makes the CDO role one of leadership. Mr Hinds believes the CDO "could be the most important role outside of the CEO". The chief executive needs to be the sponsor of the programme, in partnership with the CDO, if it is to succeed.

"What is happening now is that CDOs are rewriting their job description," says Mr Hinds. "Progressive CEOs want CDOs to be on the top table, to show them how to unlock the commercial value of data, but just don't know how. The CDO needs to craft the data journey for them. CEOs are frustrated by the lack of insight, the static view of data; they know there is real value there, but need to be shown how to get there."

Companies through their CDOs are becoming empowered, and the data they work with is funding the transformation of their businesses into truly digital companies, where information is corralled, analytics are powerful and data use is nimble. Everyone needs to speak the language of data. Businesses are embracing artificial intelligence (AI) and machine-learning, and doing so quickly.

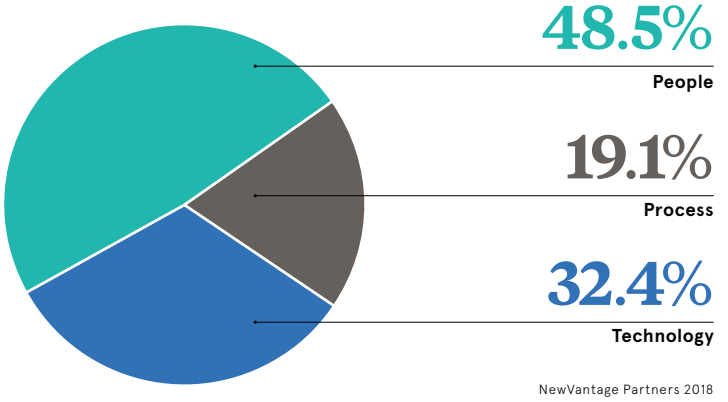
Andrew Barnett, CDO at Legal & General Investment Management, explains: "We have AI and so on, as well as big data, but the question is are we creating value? The CDO needs to challenge the business; can we use these new technologies, not just technically, but culturally as well?"

Perry Krug, principal architect at Couchbase, an engagement database company working with CDOs at companies including Disney and GE, agrees. "The CDO needs to instigate a wider cultural transformation across the business," he says. "This is perhaps the CDO's main challenge, as we're constantly hearing people are often reluctant to embrace change. Putting insights from data into practice is therefore as much of a cultural battle as it is a technical one and it's down to the CDO to lead the charge."

The CDO needs to tell the story of data. Mr Barnett comments: "If we talk about governance, we will lose the room. If we talk prophetically, we will get people in the room." The CDO is the prophet to create profit, as they guide companies through innovation to achieve value for customers and the business, influencing commercial strategy and future success. This makes the CDO no longer a "nice to have", but a "must have". ◆

Challenges creating a data-driven culture

Survey of C-suite and IT decision-makers



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47%

of newly created data records on average have at least one critical, work-impacting error

3%

only of data quality scores can be rated "acceptable" using the lowest-possible standard

10x

more expensive to complete a unit of work when the data is flawed

HBR.org

CDOs must start with the data basics

Chief data officers need to focus on fundamental information quality and management, before attempting complex analytics or machine-learning

Many businesses are running before they can walk with data. As a result, chief data officers (CDOs) often realise too late that they need to go back to basics and get their house in order before progressing with complicated projects.

"There tends to be too much quick use of buzzwords like artificial intelligence, data science, machine-learning and robotics, before a company is ready with the right data to feed into these projects," says Michael Gilmartin, chief executive at consultancy Dufrain.

Michael Gilmartin
Chief executive, Dufrain

"Getting the fundamentals right first is the only way to succeed."

These fundamental factors include basic data management, including checking quality and knowing whether information is accurate or duplicated. It can be an understanding of whether a business's employees can access the necessary information and derive analysis quickly. Getting such steps right early on can also help smaller firms avoid serious problems as they grow.

"Everyone is looking for an amazing dashboard and all sorts of cutting-edge systems, but they often overlook the quality of data. Unless they get their data in good shape, the advanced projects won't help them very much," says Mr Gilmartin.

Accuracy of data is a major problem for many organisations. "There are financial services firms we see where only 60 per cent of data is accurate," says Joseph George, a director at Dufrain. "They may lack accuracy over transactional information or they may have a large amount of duplicated data, such as when a customer's name is spelt different ways in their records."

Many businesses draw in information from multiple locations, including customer, transactional and payment systems. Companies struggle with the different data sources and whether the information is well managed, and they also often lack real control over it. Organising this data, cleaning it and integrating into a central warehouse can enable them to draw analysis from the different elements, and to manage it properly.

Then there is the question of the skills of CDOs and their teams. The CDO has a responsibility for data accuracy and management, and using information to drive the business forward. However, that individual can be very different in disparate organisations. Sometimes the CDO reports to the chief technology officer, sometimes to the chief information officer and sometimes to the chief operating officer. This can lead to a wide variety of outcomes.

"Cutting edge analytics, artificial intelligence and machine learning are the future; but you still must get the data right first.

To achieve a better and organisation-wide strategic gain, CDOs must be able to establish a department with a variety of skills. "This can include ensuring that staff understand data, can play with it and bring information together to answer important questions quickly," says Mr George. "While organisations used to recruit data personnel based on their skills around specific systems, there is now more value in hiring people who are vendor agnostic and have good core data skills that can be applied to different technology."

CDOs also need to make sure staff have softer skills, including how to challenge ways of doing things and how to manage stakeholder expectations. It is important they are able to garner support from across the workforce and this is most easily achieved when businesses go through data by department, collaborating with managers to improve the information. Project management skills are essential so any work around data succeeds on time and on budget, and achieves a clearly defined result.

Businesses with an influential CDO who can drive change stand to perform much better. But Mr Gilmartin adds that it can be hard for CDOs to establish their influence. "There is a real question around how much clout the CDO has in some organisations," he says. "It's a relatively new role and there is great pressure to drive change. Some of them may be pure technologists, while others are born-strategists and influential leaders."

As CDOs look to improve how they work with data, they often seek support. Dufrain works with companies throughout their journey, including from the initial analysis of information accuracy, to improving and making sure data is not duplicated, storing it properly, and right up to advanced projects such as big data analytics and machine-learning. The company works with a number of businesses ranging from banks and retailers to universities and management advisers.

At many firms, one of the triggers for addressing data properly is when the business puts increased value on data because it can help make much more informed decisions. A large retail group, which lacked a single view of performance and struggled to manage £100 million of payments due to it from storecard holders, brought in Dufrain. The consultancy helped the firm clean the data, then improve its analytics and methodology, so it could see all the information and take steps to recover money due much more easily.

Other firms look to harness data to make sure they are able to serve customers in a more personalised way. A banking company recently decided it needed to improve its handling of calls to serve clients in a bespoke fashion. Dufrain worked with the company to develop a "single source of truth" that incorporated internal and external data, enabling detailed client information to be supplied to customer service and sales staff. It could then offer personalised service and more easily cross-sell, while generating automated activity reports for regulators and managers.

CDOs increasingly realise they must get data right to make well-informed decisions more quickly than their competitors. They also have a regulatory imperative to get data protection right and this is motivating improved governance. Only by starting with the basics can they succeed with advanced, real-time data analysis, machine-learning and complex projects.

To get the basics right around data in your organisation, before progressing with advanced data analysis, please visit dufrain.co.uk

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ETHICS


Andrew Harrer/Bloomberg via Getty Images

Stewards of ethical business standards

The Cambridge Analytica scandal has raised the profile of chief data officers and the need for ethical business practices

HELEN BECKETT

Chief data officers (CDOs) are the new standard bearers for ethical business, a responsibility conferred upon their office as organisations from all sectors seek to maintain customers' digital trust.

Until recently, CDOs were the new kids on the block with a nebulous remit. Now these rising stars of digital business have a seat on the board, and the fortunes of their organisations rest on their ability to protect data and extract value from it.

Fine judgment calls are an inherent part of the CDO's role, which is located on the fault line between trust and innovation, and subject to shocks as the tectonic plates of the digital business shift. Whether such competing demands can be reconciled by the CDO or should be divvied up is a very current debate, fuelled by the scandal of Cambridge Analytica's misuse of Facebook users' personal data.

Egil Bergenlind, a former data protection officer (DPO) at Swedish fintech iZettle, argues that maintaining trust and driving innovation are two conflicting duties best served by separate people. "We process data in more advanced ways that pose higher risks. The main driver for the CDO is business gain, whereas the DPO starts from the other end of the spectrum – how to use data in a way that respects the individual," says Mr Bergenlind, founder and chief executive of DPOrganizer.

Other organisations, including the Ordnance Survey (OS), the UK's government mapping agency, believe the interests of customer and business naturally align in a digital age. Guided by this modern perspective, OS created the office of CDO a year ago to fulfil three data-driven missions: the day-job mandate of mapping data, creating new societal value from its data, and adhering to data protection and high ethical standards.

Caroline Bellamy was appointed as CDO to oversee the transition to a data-driven organisation. "Government expects and needs us to provide data for new purposes as we lean into subjects like smart cities, innovation and citizen connectivity. The CDO role is a coalescence of an ongoing role and the changing demands of a digital economy, plus a keen respect for citizens' data – a wrapper that is not only legal but ethical," she explains.

Having a coherent manifesto is certainly a starting point for any CDO, whatever the variations of their remit. Mark Hinds, chief executive of data science company Polymatica, cites the *Channel 4* Viewer Promise as an example that data chiefs can emulate. "It's a bold, visible statement about the corporation's intentions regarding personal data and respect for their customer, and sits alongside their legals, and terms and conditions," he says.

Nonetheless, even the best manifesto or latest legislation can be outpaced by data science and technology, and Ms Bellamy urges CDOs to work with ethics bodies and frameworks. "Our ability to process data and see patterns is way ahead of what we ever imagined. We need to sense-check and work with ethics bodies to serve the public good," she says. "When you do this work in closed rooms with one agenda, you're in trouble."

Christopher Wylie, whistleblower and former employee of Cambridge Analytica, at a Senate hearing in Washington

Artificial intelligence (AI) is an area of data science with the potential to undermine public trust, because outcomes are unpredictable. Mr Hinds points out that it's complicated to get relevant data cleaned and joined together. "It can't happen by accident, but should be in the context of good governance," he says. Ms Bellamy advocates transparency, bringing AI into the organisation and pairing it with the construct of "doing the right things by the customer".

Mark Davison fulfils yet another model of the CDO's role, operating at CallCredit Information Group's bureau within a triumvirate constructed to flush out maximum innovation that respects customer needs. As CDO, Mr Davison is responsible for driving long-term product strategy and innovation, and works alongside his chief technology officer and chief risk officer. The competitive tension between the three ensures a sweet spot of innovation, while maintaining digital trust, he says.

Data encroaches on diverse and challenging terrains of innovation, technology, and customer and citizen rights, and it's hardly surprising no two CDOs have the same remit. Nonetheless, all share a critical duty to hold their organisation to account and promote the ethical use of its data.

As Ms Bellamy at OS concludes: "It isn't something that has to be put in a job description, but it's at the heart of what we do. If we don't take care of it, it will ruin everything going forward, and we'll lose the faith of our customers, the public and society." ◆

> **CDOs share a critical duty to hold their organisation to account and promote the ethical use of its data**


Andrew Harrer/Bloomberg via Getty Images

Insight

Social impact

The scandal surrounding Cambridge Analytica, the now-bankrupt political consultancy, has stepped up the scrutiny received by social platforms over their business practices and monetising of user data.

And yet, in spite of a televised questioning by Congress of Facebook founder Mark Zuckerberg and vocal Twitter campaigns to #DeleteFacebook, it hasn't been all doom and gloom for the social network. New findings suggest the crisis has in fact done very little to dent Facebook traffic, with both unique visitors and time spent on the mobile app continuing to rise, according to Goldman Sachs.

Nevertheless, according to Francesco D'Orazio, co-founder of social listening and analytics company Pulsar, the scandal has taught brands and agencies to "take privacy seriously".

"Personal data is not just another commodity and needs to be handled accordingly," he says. "Personal data is a proxy for identity and, in an age of automation, that's our main currency as humans, so we want to guard it as much as we can or at the very least know exactly who is doing what with the data, which is where most platforms managing personal data fall short."

So how do companies ensure they are obtaining data from social platforms in an ethical way?

Mr D'Orazio says the answer is to "focus on public data and investing on aggregating and anonymising data to support statistical observations at scale, as we do at Pulsar".

Looking ahead, he says the scandal has come as a "very welcome spring cleaning" for the industry as a way of "getting rid of the bad operators".

"We live online as much as in metaspace, so the only way to understand society is to look at the data we generate," says Mr D'Orazio. "That's not going away and turning social platforms into a black hole won't help anyone. That said, scandals like this help raise awareness about the issue and foster a more informed public debate that's going to lead to better regulation."

Chief data officer's secret weapon

Need help with navigating the data industry? An ambitious young consultancy, **Eden Smith**, is positioning itself as the best guide

There's a single message running like a golden thread through this report. And it's this: chief data officers (CDOs) need help. We've heard how 50 per cent of CDOs are predicted to be unsuccessful, according to Gartner. The pressures on the role are extreme.

There is pressure to produce brilliant results, pressure to win the approval of often bemused boards and pressure to cope with the tsunamis of technology which arrive in wave after wave.

At a recent industry panel on the nature of the CDO, one expert declared she saw the role as borderline intolerable. "I've heard some horror stories of companies that got through three CDOs in 18 months," she said. "They found a candidate, appointed them CDO, but with no budget, no job description or resources, and then turned up at their office after six months asking 'Why is the data still rubbish?' The CDO left."

So where can CDOs turn to for assistance? It's a question the consultancy Eden Smith has devoted itself to. Just as the role is new and fresh, Eden Smith is a new company architectured around the needs of the CDO. Its mission is to be the first port of call for the entire CDO profession. It's a unique pitch, for a unique job. Eden Smith is a consultancy, it is a staffing consultancy and it offers a one-stop shop for expertise across the industry.

This last point needs elaborating, because the model is revolutionary. A major challenge for the CDO is wading through the smorgasbord of services offered by the data industry. There are transformation agencies, cloud services, data cleaners, algorithm designers and so on. How can a CDO find the right services?

"We offer a single way in to an ecosystem of partners," explains Jez Clark, co-founder of Eden Smith. "We have 35 specialist data and analytics partners we can introduce you to, in an impartial and fee-free manner. CDOs come to us, discuss their challenges and we find the right partners for them to work with."

The ecosystem is composed of the elite of the data industry, including the leading Gartner MQ [Magic Quadrant] products such as Exasol, the world's fastest in-memory database for analytics; Alteryx, the popular self-service analytics software; and Dataiku, the collaborative data science platform. There's also Cynozure for data strategy and Oakland for data governance.

"We have reciprocal contracts with all our partners in our ecosystem so, for example, we can offer licences and servers for Alteryx to clients as a value-added reseller," says Mr Clark.

If a project needs experts from a variety of service providers, Eden Smith will recruit and organise the team from across the network. "We have access to one of the biggest talent pools in Europe," he says. "If you have a data transformation project, for example, we can work with you to understand your requirement and deliver a programme with our own people, project managing other specialists so you get exactly what you need."

The approach simplifies procurement. A large government agency uses Eden Smith as a single vendor to access all members of the ecosystem. "Setting up a contract with a new supplier can be a massive pain," says Mr Clark. "This way they only have to engage with us. A single-vendor approach eliminates the procurement headache for the CDO."

As a lead actor in the data industry, Eden Smith is naturally well placed to offer staffing services too. In fact, it's how the company began, two-and-a-half years ago. "My co-founder Matt Smith and I have 25 years in IT staffing, managing large teams across the UK and Europe. Our first focus for Eden Smith was to be the first dedicated search consultancy for chief data officers and data professionals," he says.

"The evolution to a full data consultancy, with a partner network, came directly from client demand. Our customers asked us how to get strategic advice, expertise and training around data. We were so immersed in the data community, we said we could make the introductions."

Eden Smith's philosophy and strategy is to be so close to CDOs in the UK and Europe that the consultancy becomes the first port of call whenever they need help. If they need talent, consultancy services, bespoke expertise or to find another challenge, Eden Smith offers the easiest and deepest way to access everything the industry can offer.

The company hosts regular CDO meetups in London, with attendees travelling from across Europe. It is revealing that the CDO Playbook, essential reading for all chief data officers, quotes Eden Smith extensively in its pages.

"If a CEO needs to find a CDO, we are the obvious place to come," says co-founder and director Mr Smith. "Our executive search is the most comprehensive in the industry. We are the exclusive data staffing partner of Big Data London. And the same is true for CDOs too. If they need a new challenge we can help them find the most exciting opportunity."

Graduate talent is a key part of the jigsaw. "We have links with seven top universities," says Mr Clark. "We utilise the skills of MSc data science graduates. We introduce them to our customers and they do work experience, delivering a project. The customer gets priority right to hire. And we feedback from industry to the universities so they can improve the course content for the following year."

The scheme puts Eden Smith at the source of the talent pipeline and builds links with academia. It is a unique approach. And it's why, in just over two years, Eden Smith has won clients such as Lloyds Bank, ING, Sainsbury's, PwC, and Deloitte in the UK, Deutsche Telekom in Germany, and others across the Nordic countries and the Netherlands.

As the role of the CDO matures, there will be greater prestige, trust from boards and larger budgets. But CDOs will still need help to navigate the landscape of the data industry. Eden Smith is positioning itself to be the first number CDOs call, no matter what they need.

"Eden Smith – it's a consultancy, it's a staffing specialist, it's a one stop shop

Jez Clark
Co-founder and director

Matt Smith
Co-founder and director

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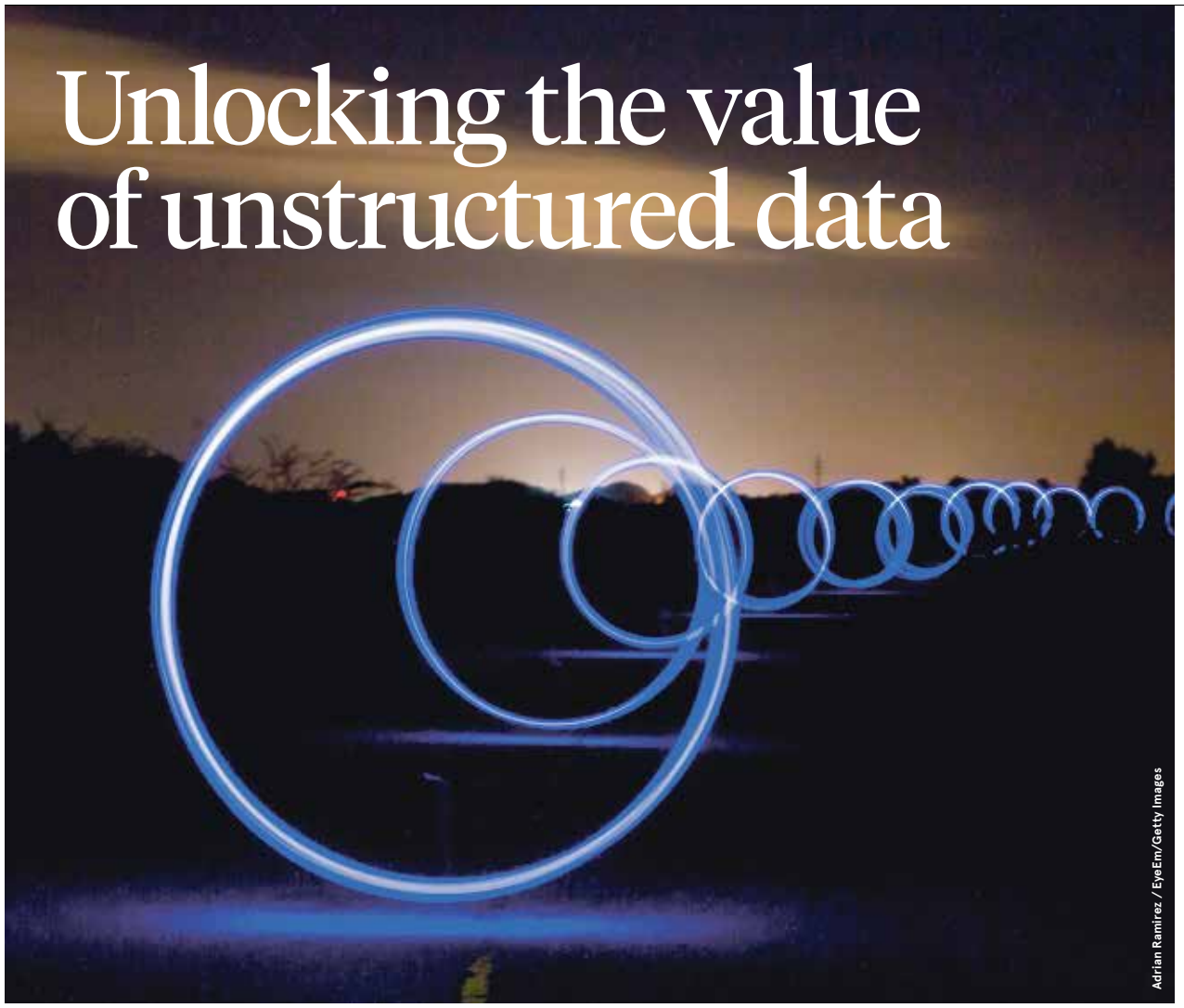
Eden Smith
Making Sense Of Your Data

UNSTRUCTURED DATA

Unlocking the value of unstructured data


Adrian Ramirez / EyeEm/Getty Images

Some data can be hard to penetrate, but may hold valuable information that can be used to drive business growth

SOORAJ SHAH

Emails, instant messaging, social media posts, images, videos, employee login times: all these have one thing in common – they're forms of unstructured data.

"Unlike many other forms of company data, which can be stored and collated in a database, this information is disorganised and difficult, if not impossible, to analyse," says Robert Rutherford, chief executive of IT consultancy company QuoStar.

But the data holds incredible value. In fact, IT analyst company IDC estimates that by 2020, 37 per cent of unstructured data will be useful if properly analysed, resulting in $430 billion in productivity gains for organisations that can properly utilise it. The data can be used to help the way an organisation operates internally, but also can help to provide new products and services to customers or improve existing offerings.

What's more, according to the Veritas' *2017 Data Genomics Index*, 16 per cent of an organisation's data is unknown, unstructured data, and this is growing year on year, with the number of unknown files held by organisations increasing by more than 50 per cent between 2016 and 2017.

So how can the data be unlocked? Mr Rutherford believes that to understand the value of data, companies first need to know what kinds of information they hold. This may seem obvious, but without knowing the different data types and where they are in the organisation, they would be incredibly difficult to mine for value.

So this requires companies to start by categorising their unstructured information. "While this can seem like a simple process, it is often a hidden challenge because systems do not allow companies to classify their data at an inception point, which means the information remains unstructured and hard to analyse," Mr Rutherford explains.

There are artificial intelligence (AI) tools that can help organisations to streamline this process so data can be categorised quickly, but it would still require a human element to understand the data that is being processed. The next step is to be able analyse this data in the same way analytics continues to provide insight from structured data. That insight then needs to be made actionable and delivered to senior decision-makers to act on.

Jeremy Stimson, chief technology officer (CTO) at reputation risk management software company Polecat, says business stakeholders shouldn't have to do the work of discovery themselves and this is why managing unstructured data is complicated.

"This means being able to convey data in ways that would simplify and communicate insights with clarity to vast audiences, through sharp data visualisations, charting, graphs and illustrative models, for example. There's a whole infrastructure at work to turn unstructured data into something a CEO can actually use," he says.

It is for this reason that there needs to be a specific, C-level executive that manages this complexity of data within an organisation; someone who is not necessarily a part of the IT department, but can work alongside a CTO or chief information officer, as well as the chief marketing officer and other C-level executives.

The chief data officer (CDO) is not only a position on the rise, but the role is taking on more importance. According to Gartner, more than half of CDOs report directly to a top business leader and CDOs in general are now not only focused on data governance, data quality and regulatory drivers, but also delivering tangible business value and enabling a data-driven culture.

The CDO can access the information hidden in disorganised datasets, and enable the business to mine unstructured data and incorporate it into part of a wider strategy. Although Nigel Vaz, chief executive of Publicis.Sapient International, points out that a business which hires a CDO needs to ensure they have real scope to make changes within the organisation.

"The CDO role cannot be a surrogate for collective C-suite ownership of data, but must add a set of complementary skills founded on an understanding of data as a driver of organisational efficiency and, crucially, of future customer value," he says.

Wrightington, Wigan and Leigh NHS Foundation Trust is seeking this kind of individual at the moment. "While the NHS is slower than the private sector, with things like GDPR [General Data Protection Regulation] now in force, it's more apparent that there needs to be representation at board level to talk about data and analytics," says the trust's head of business intelligence and acting associate director of information management and technology Mark Singleton.

"We have interviews for our data protection officer who will be reporting to someone at a board level and, depending on who is recruited, they may also become our CDO," he adds.

But different organisations have different ways of approaching how they deal with unstructured data. For example, Adobe implemented a new operating model, where its leaders agreed on a consistent data structure and definitions so the insights they gained from the customer journey could be used to improve and personalise experiences.

Meanwhile, Hotels.com has three different data-related functions. One leads on how data is created, captured and managed, another leads on turning that data into helpful capabilities for its customers by using technologies such as machine-learning and AI, and then it has a CTO who leads on how to act on this and get it in front of its customers.

"The three of us together form a tight-knit community, an ecosystem and workflow," says Hotels.com's chief data science officer Matthew Fryer, who leads the middle function.

Unstructured data, therefore, forms a large part of Mr Fryer's role and he categorises the data in three different groups. The first is where Hotels.com uses data to make predictions and recommendations, whether that is recommending a customer the best hotel, recommending them the best filter or making predictions for internal forecasting.

The second group is where the company is trying to improve on what is often a fragmented and complex travel industry. This means trying to help with a customer's entire journey and their travelling plans, while keeping their preferences in mind.

"This is where we use some newer innovative techniques like displaying the image from a hotel that best suits their preferences, and analysing tens of millions of verified text reviews to give us and the user more insight," says Mr Fryer, who adds that video analysis could be an area of growth in the years to come.

> **The CDO can access the information hidden in disorganised datasets, and enable the business to mine unstructured data and incorporate it into part of a wider strategy**

Another form of unstructured data that Hotels.com is working on being able to use is speech. The idea would be to enable a customer to explain everything they wanted from a hotel by speech to a service such as Amazon's Alexa and for the system or virtual assistant to respond with clear answers.

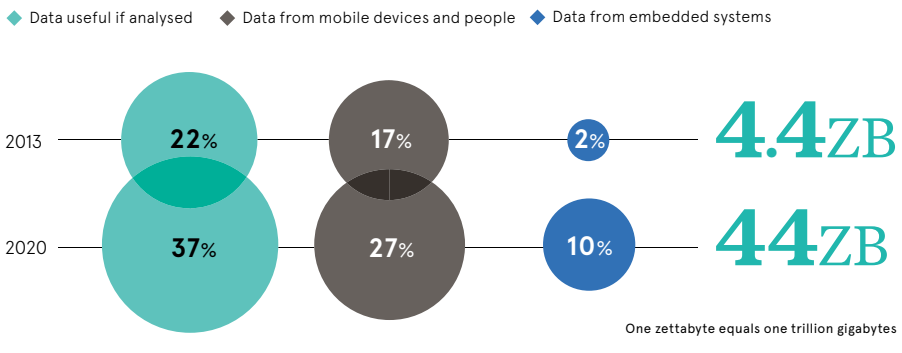
While Hotels.com has a clear workflow in how it uses data and three data leaders within the organisation, some organisations are not hiring a specific CDO, and instead are investing in third-party resources and training to get their existing staff to make better use of the data.

The Serious Fraud Office (SFO), for example, has to deal with unstructured data such as emails, documents and other written communications, and currently has a team of people that support its case teams in making sure they get the best out of the data systems they have, says Ben Denison, the SFO's CTO.

There is clearly no right or wrong answer when dealing with unstructured data, but organisations are tasked with understanding what data they have at their disposal, defining and categorising it, analysing the data for insight, and then acting on that insight. For larger organisations, the logical move is to employ a CDO who can oversee this process and continue to do so as the amount of unstructured data continues to grow. ◆

Expanding data ecosystem

IDC 2016



One zettabyte equals one trillion gigabytes

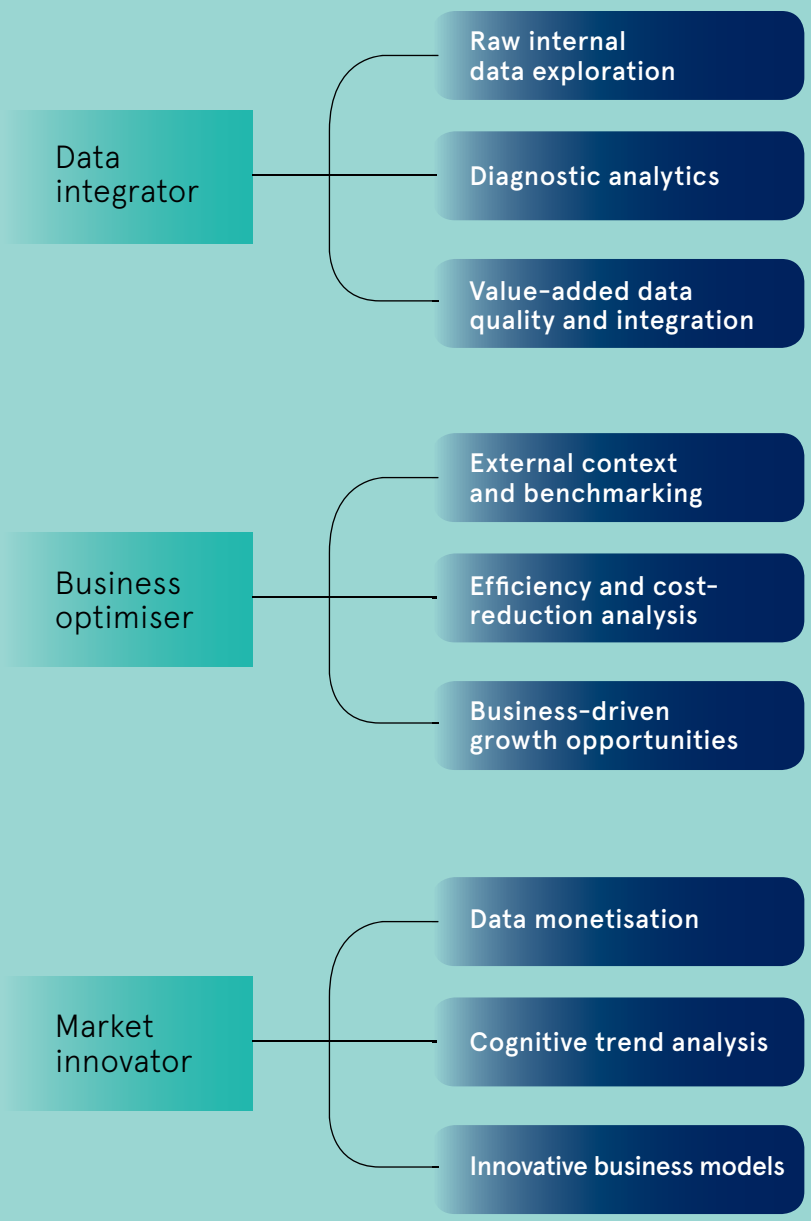
RISE OF THE CDO

The appointment of chief data officers at large organisations has ramped up in recent years as companies realise the importance of data as a fundamental business asset, with nine out of ten enterprises expected to fill this role by next year

CDO mandate

Where chief data officers add value

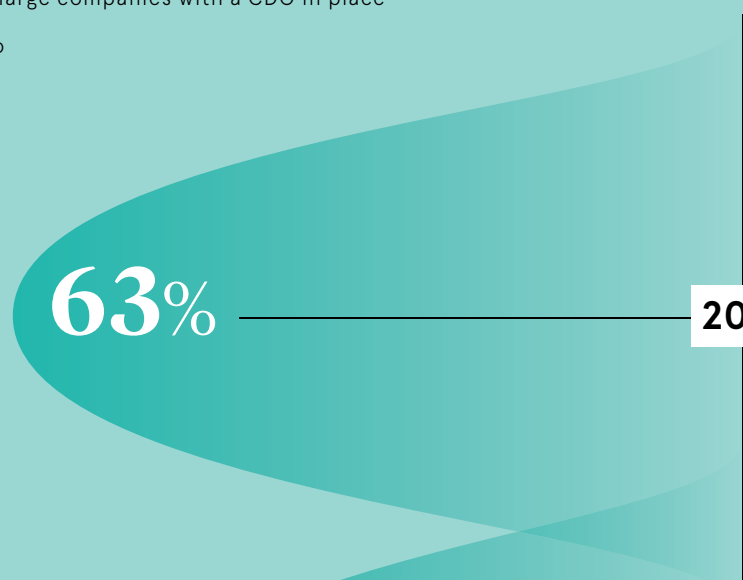
IBM 2016



CDO presence growing

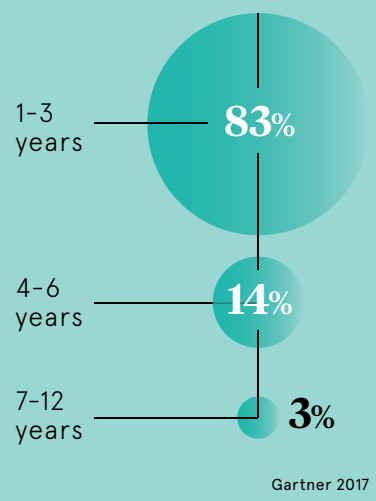
Percentage of large companies with a CDO in place

◆ Yes ◆ No



Tenure of CDOs

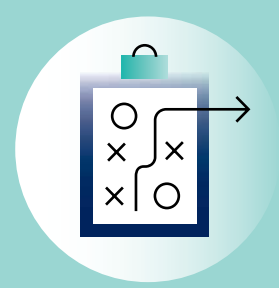
How long current CDOs have been in the role



Gartner 2017

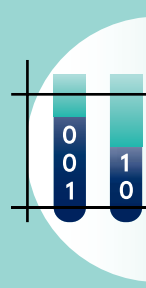
Background of successful CDOs

C-suite and IT decision-makers selected the top requirement for a successful CDO



34%
External change agent

32%
Company veteran



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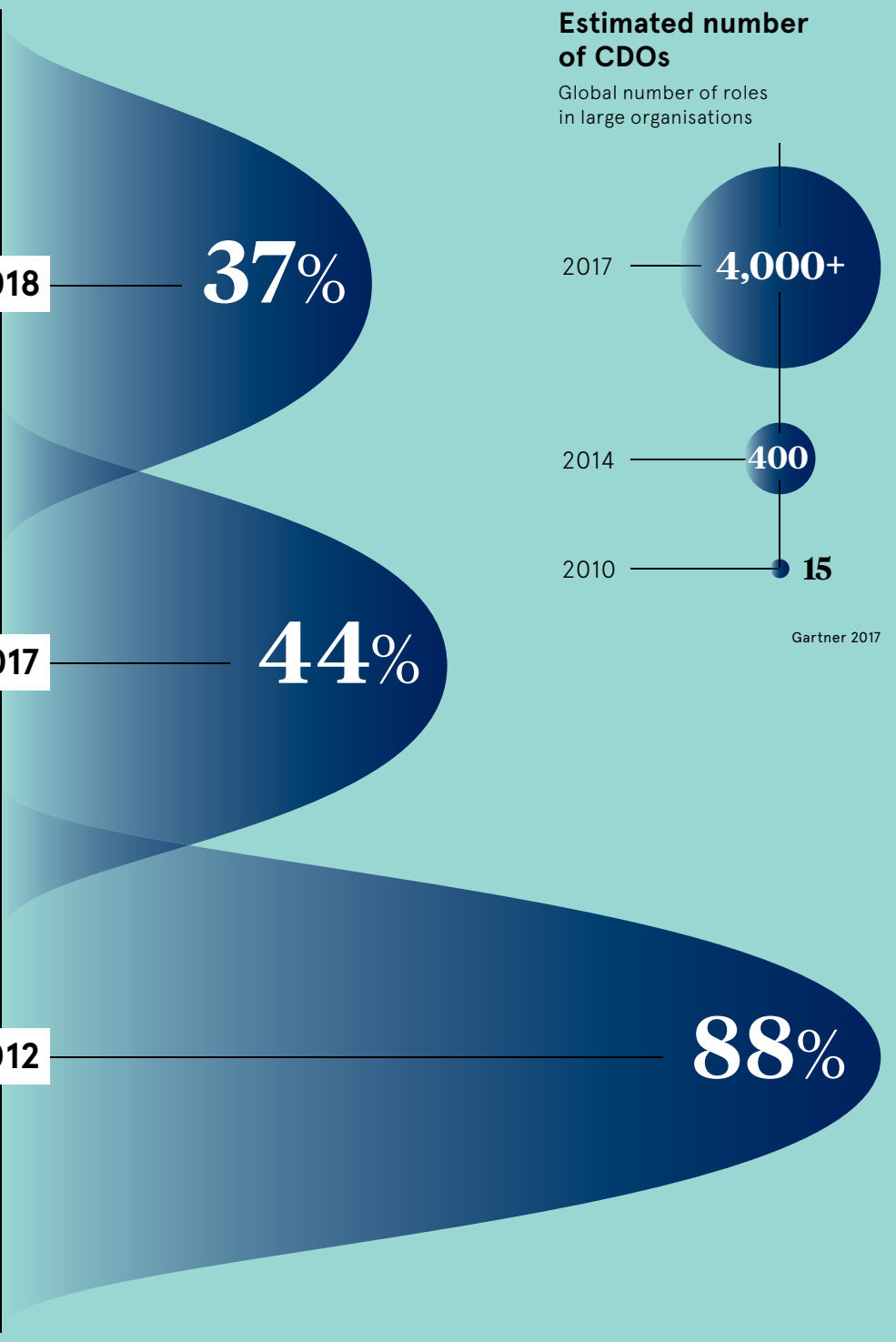
Data s

NewVantage Partners 2018



Estimated number of CDOs

Global number of roles in large organisations

Gartner 2017

90%

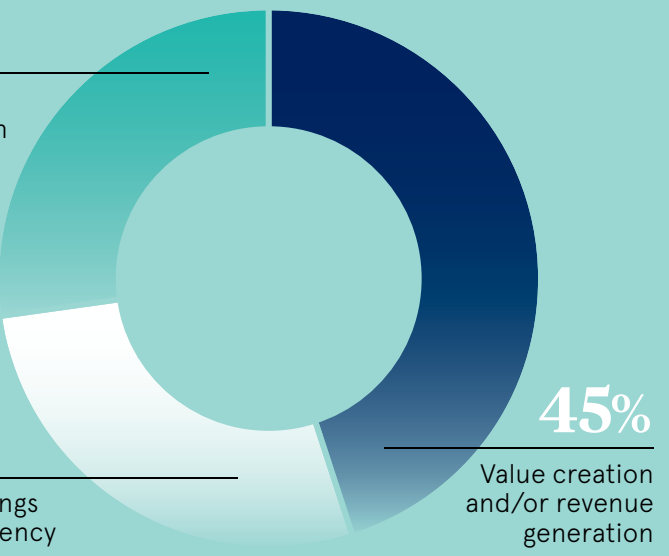
of large global companies will have a CDO by 2019

23%

increase in the average CDO office budget in 2017

How CDOs allocate their time

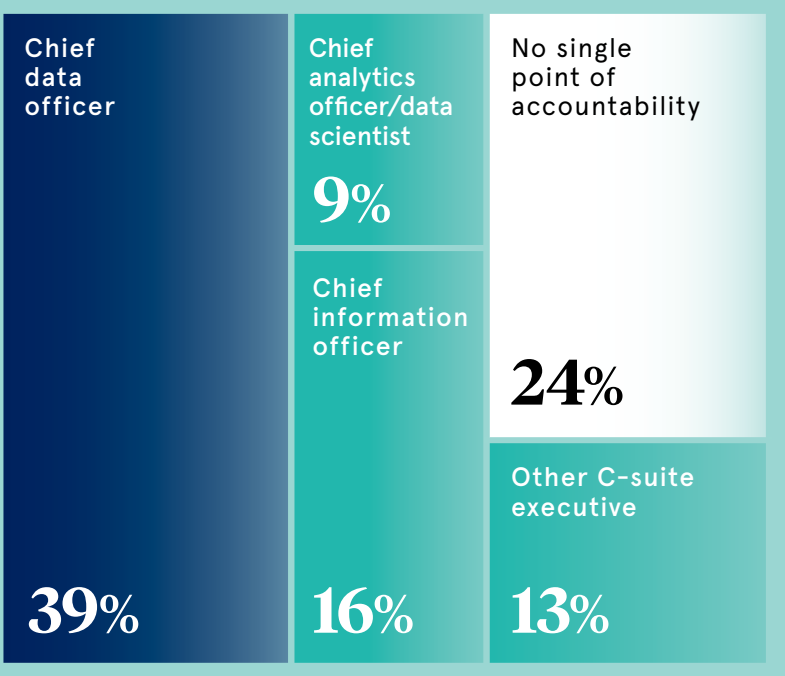
Gartner 2017



Who's responsible for data strategy and results?

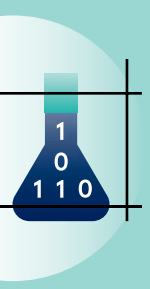
Survey of C-suite and IT decision-makers

NewVantage Partners 2018



Percentages do not equal 100 per cent due to rounding

NewVantage Partners 2018



5%

cientist

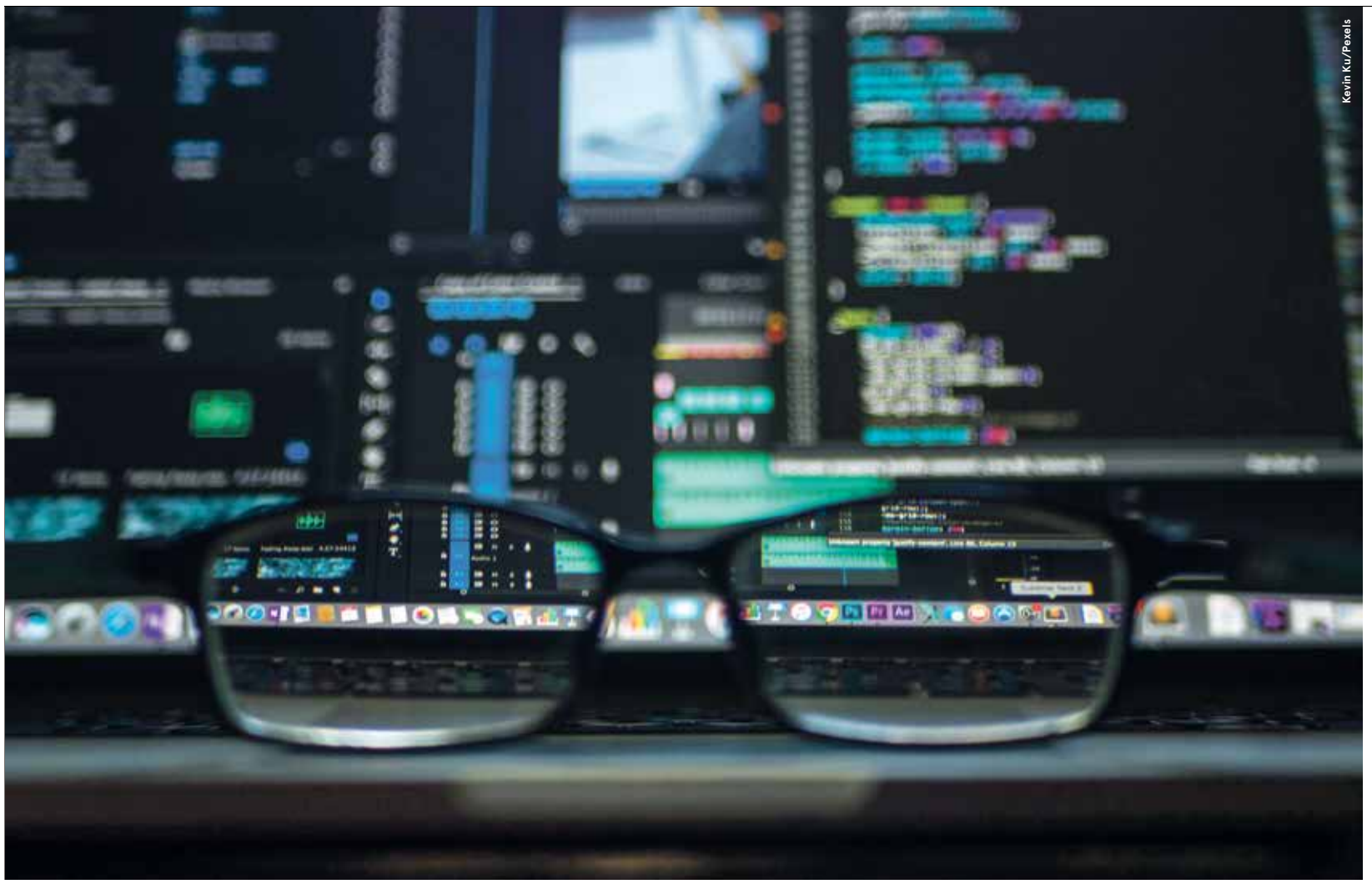
13%

Line executive who has been accountable for results

8%

Technology executive

ASSESSMENT



Kevin Ku/Pexels

Measuring success of using data

Setting targets and measuring the success of a chief data officer will depend on the nature and definition of their role within an organisation

RUPERT GOODWINS

When Gartner's research vice-president Mario Faria said that by the end of 2019, 50 per cent of chief data officers (CDOs) would be seen to fail, it was hardly the stuff of recruitment posters. Yet Mr Faria also said that by that time 90 per cent of large companies would have a CDO – a remarkable rise for a job that didn't exist at the turn of the century.

Success is hard to judge, especially in a role that has yet to be well defined by industry, while failure can be starkly obvious. If your company is on the front pages for a major data breach or privacy violation, it's a bad day to be CDO.

To find out what makes a good day, and how success can be planned for and measured, the views of two CDOs from two very different organisations, one in financial services, the other in scientific research, are informative. Both agree that the bottom line for success is in the overall health of the organisation; from there, things diverge.

Nic Orton is CDO for LexisNexis Risk Solutions, a global data analytics organisation that provides customer insight to the financial services sector and other industries. "The success of my role is considered in the ultimate performance of the business, but more directly I ensure we use the right data in the right way," he says. "There is a consensus that the data universe is doubling every two years, with a 50-fold growth between 2010 and 2020. I promote innovation, but also ensure focus and trust."

To that end, says Mr Orton, his success depends on creating a common language for data between business units inside the organisation, and thence out to customers and partners. "We have four main metrics: uplift to products through added value; insight and intelligence for ourselves on customers, competitors and markets; potential for advanced analytics; and quality."

Quality is judged in seven dimensions, including completeness, validity and consistency. "When you see your language being used elsewhere in the organisation, it builds confidence that there's clarity across the organisation, which means we build trust in ourselves that we are using data correctly," says Mr Orton. "That becomes visible outside the organisation and builds trust in relationships." In this way, governance stops being a hindrance to building a company's use of data and starts to support it; a sign of a job well done.

Brenden Dalton, CDO and chief information officer for the Commonwealth Scientific and Industrial Research Organisation in Canberra, oversees data for more than 5,000 people engaged in disparate research. He focuses on managing data risk against opportunity. "The success criteria for a CDO need to flow from an organisation's digital strategy," he says. "If that pushes disruption, for example, then the CDO needs to work with a higher tolerance to data risk."

Although CDOs have struggled to communicate the nature of data risk in the past, times have changed. "With the help of Facebook CEO Mark Zuckerberg and his evidence to the US Congress, boards are coming to understand risk," says Mr Dalton. "Data risk, particularly impacting reputation and social licence to operate, is a new and evolving area. Organisational governance models are slow to change and don't yet appropriately support the CDO."

> The success of my role is considered in the ultimate performance of the business

While he agrees that success in his role involves bringing different parts of his organisation into a common appreciation of the nature of data, his vastly more heterogeneous world has necessitated a different approach to that of Mr Orton. "Governance is a challenge. Each scientific discipline has its own way of doing data, so we need a novel approach, creating a network of data champions and encouraging each of our business units to institute its own data governance," says Mr Dalton.

The CDO provides the tools for this, he says, such as high-level organisational principles and centralised ethics, privacy and regulatory compliance advice. "We're building a data ecosystem internally and with partners, and we're trialling a social architecture to support this."

So a successful CDO needs to unite an organisation in its appreciation of data risk and decide on the right level of oversight for business units, and how much freedom to give them. But a failure in imagination and innovation can lead to a perception of failure overall, according to Mr Orton.

"Here's an example," he says. "Your bank knows more about you than anyone else; when you buy coffee, who your energy supplier is, how much you get paid, what you like to spend money on. It's a huge data asset, and by and large they do nothing with it. If I were a bank, I'd find ways to leverage that through app-driven recommendations, customer insight – the works.

"Instead, you just have the product division thinking about increasing monetisation and app designers thinking about user experience. The CDO should be able to see the entire business and suggest data-driven innovation."

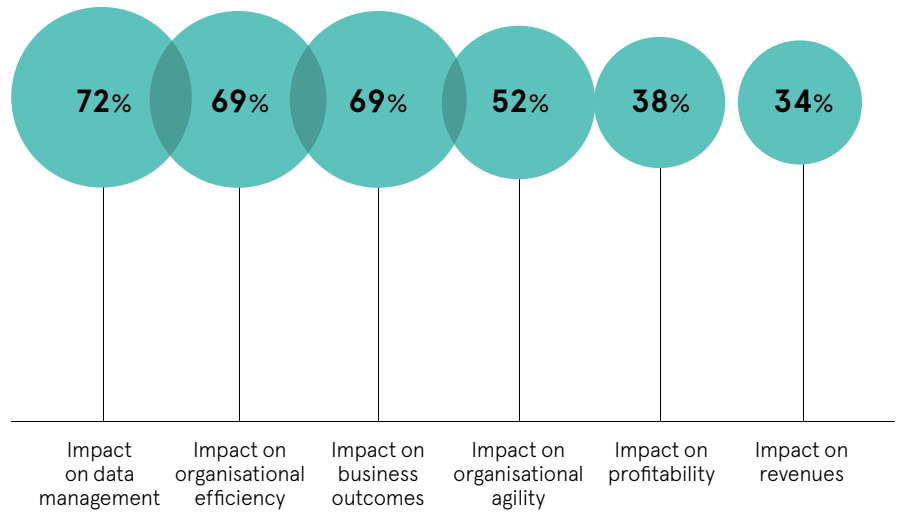
Mr Dalton has his sights set even higher, at entirely new levels of CDO innovation. "We are focusing on data management as a research activity in its own right, working through how we use the internet of things and artificial intelligence to create the future digital industrial platform. We are going to look beyond automating data ingestion, quality analysis, analytics and so on, to providing regulatory assurance, oversight and address social risk."

Whether the ultimate success of the future CDO will be automating themselves out of a job is perhaps a more philosophical than practical concern, at least for now. ◆

IBM 2016

How CDOs' performance is measured

Percentage of global companies measuring the following



OPINION COLUMN

‘Take the lead on quantum computing and how best to leverage the opportunities it presents’

With data seen as a hugely valuable commodity, the emergence and growing importance of the chief data officer (CDO) is only set to continue over the next 12 to 18 months.

For today’s data chiefs, there are no shortage of technologies, regulations and subsequent consequences to be on top of at any one time. The advent of the internet of things, big data, cloud computing and, more prolifically, artificial intelligence means there is a real need to not only fully leverage the information businesses store, but to do so in a safe and ethical way.

There is now, however, an entirely new spectrum of computational technology emerging, machinery which promises unparalleled advances in performance that even the world’s leading physicists are somewhat in the dark to understanding its full and arguably unrestricted potential; welcome to the quantum era.

Classical computers as we know them use the laws of mathematics for storing and processing information in “bits” which can exist in two states, zero or one. Quantum computers, however, use the laws of physics, on a sub-atomic or quantum level, where information is stored in quantum bits.

“Qubits”, as they are known, can exist in all states between zero and one, simultaneously; a phenomenon referred to as superposition. What this means is that whereas classical computers need to use many different sequences of zeros and ones to solve a problem systematically, a quantum computer can use all variances of these sequences at once. The net result enables quantum computers to process information many thousands of times faster than the very best classical machine.

Current market forecasts for commercial quantum computing, according to Technavio, already look set to exceed $500 million by 2023. Leading technology vendors including Microsoft, IBM and Google are rapidly investing in R&D projects and “quantum simulations” to prove the concept and showcase how to harness the technology in real-world applications.

According to Deloitte, over the past three years, venture capitalists have invested more than $147 million in quantum startups and governments globally have invested over $2.2 billion in supporting research. Already enterprises are planning where they can leverage the technology, with leading banks including Goldman Sachs and Barclays looking to implement it in portfolio optimisation, asset pricing and data security, through to large-scale manufacturers Lockheed Martin planning to use quantum computing to accelerate its own machine-learning algorithms for a range of applications.

The sheer scale and speed at which quantum computers promise to solve the world’s most complex problems also raises further questions and concerns over data security. Experts from the Institute of Quantum Computing in Canada believe it will be able to break public key encryption within the decade.

The more positive news is that not all encryption will be vulnerable due to the algorithms they use and the mathematical foundations they are built upon. The industry’s key stakeholders have leapt on to this and are working towards solutions such as “quantum-safe blockchain cryptography” to protect against the looming risks quantum computing poses.

A CDO plays an important role as this new computational era plays out, both in safeguarding an organisation’s data, but also in how to leverage the assets themselves. The rate at which data will be able to be processed, the simultaneous and instantaneous calculations made, mean quantum computing offers a CDO both a huge opportunity and sizeable challenge combined.

Therefore, now is the time to take the lead on what quantum computing means for your business and how best to leverage the huge spectrum of opportunities it presents. A key driver to beat Gartner’s forecast that only one in two CDOs will succeed will be their ability to maximise the quantum opportunity.

Daniel Pitchford
Co-founder, AI Business

Commercial feature

CDO role undergoing rapid transformation

Acting on real-time data is ever more central to businesses’ strategies, finally elevating the role of chief data officer to one of all-encompassing responsibility

Businesses are increasingly placing the chief data officer (CDO) at the hub of their operations, with a responsibility linked to all functions, as the dependence on information and data-driven decision-making increases.

Simultaneously, the CDO role is becoming broader and less technical as it begins to require a full appreciation of the total business picture. In many firms, smarter tools are taking out some of the complex science formerly required.

Whereas only a few years ago CDOs would typically be expected to have a highly technical background, they are now emerging from myriad parts of any large-scale business. CDOs now need to know far more about broader business contexts, strategies and risks than would have been required a decade ago.

“Data today is not just ‘customer data’, it’s everything in a business, and that’s why the role is changing,” explains Mark Hinds, chief executive at software firm Polymatica, whose platform enables firms to visualise vast swathes of data almost instantly. “At a very senior level, the CDO needs to be someone who understands the business, equipping teams with the right tools, and ensuring data accessibility is excellent and simple.”

> For many firms, analytical speed is of the essence and they want visualisations of data in seconds rather than hours

CDOs often now originate from a background of marketing, sales, product management or elsewhere within organisations, not only from technology. Yet they face the same challenge of making sure their teams are properly equipped to understand and act on data, so many are choosing systems that help non-experts make the most of information.

This accessibility is particularly important given the rise of “citizen data scientists”, who are regular employees making savvy use of data to transform effectiveness. Gartner estimates that by next year, citizen data scientists, who do not have a deep technology background, will produce even higher volumes of advanced analysis than CDOs. It is essential they have the accessible tools to succeed.

“A citizen data scientist is someone who is relatively numerate and has probably worked with some basic dashboarding tools, but they’re primarily a business person,” Mr Hinds explains. “These people are looking at things from a strategic perspective and need to be able to interrogate data to inform their decisions.” Polymatica’s system enables businesses to derive answers from data quickly, regardless of whether they have data-science expertise or not.

B&N Bank, one of Russia’s largest commercial finance firms, uses Polymatica software to model data from its marketing campaigns and has seen a 34 per cent increase in response rates after incorporating the system’s models into its workflows.

Mr Hinds says financial services firms are particularly keen on using data to inform their marketing efforts, with the aim of reaching customers with the most pertinent offers during key moments of their lives, such as when they have just bought a house or become a parent.

For many firms, analytical speed is of the essence and they want visualisations of data in seconds rather than hours. International cosmetics company Mary Kay uses the system to save time in compiling sales reports, enabling it to focus on finding the most valuable insights rather than trying continually to derive analysis from the raw numbers and unstructured datasets. After discovering which products are most popular in different areas, Mary Kay has optimised its collection and average order values have increased by 15 per cent.

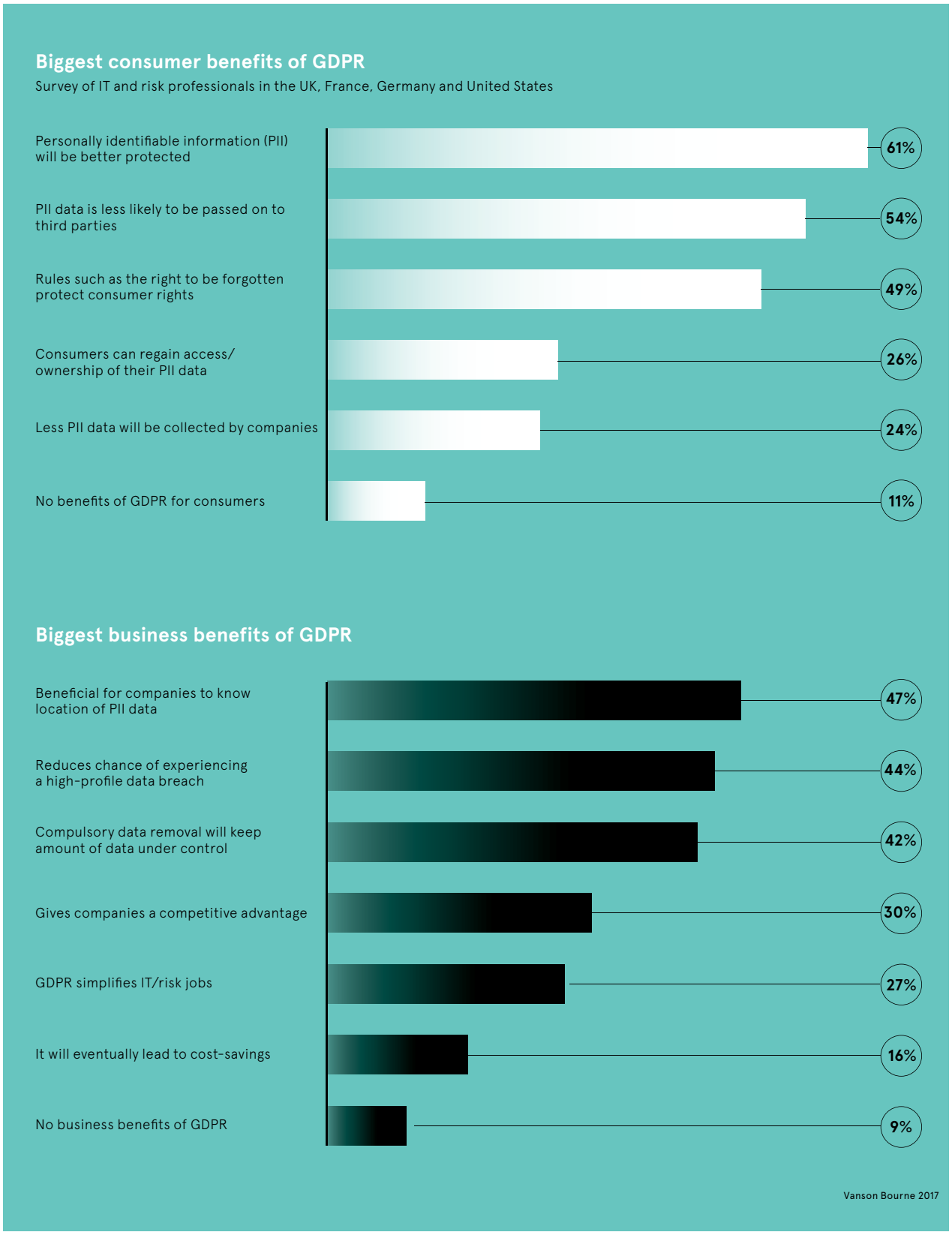
Across industries, with smarter tools, data queries can be answered almost in real time. As companies place their success on targeted use of information, they need the right systems that enable staff throughout departments to work quickly and effectively with data.

To unlock the power of your data to improve operations and meet customer needs, regardless of where you sit in your organisation, please visit polymatica.com

POLY//ATICA

DATA PROTECTION

Europe is taking the lead in data protection



Five days ago, a new European Union data protection regulation came into force which extends EU jurisdiction beyond Europe

DAVID BENADY

Nations around the world are scrambling to update their data legislation to bring it into line with Europe's tough new privacy and data protection law, the General Data Protection Regulation (GDPR).

Under GDPR's strict requirements, any business globally that sells to or targets European Union consumers will need to comply with the new law, wherever that business is based. The EU is effectively making GDPR a global benchmark for privacy regulation. Countries with data legislation that fails to match GDPR's requirements could find themselves shut out of the European market. There is one big exception to this, the United States which has a very different approach to data protection.

"GDPR is interesting because it is the first time that the EU is exporting regulation," says Rashmi Knowles, chief technology officer at RSA Security. "In the past, everything created by the EU applied to the EU. Now we have this regulation, but it is going to apply globally. If anybody wants to use the data of EU citizens or consumers, they have to comply, so it is exporting privacy rules to other countries."

This is causing panic among companies outside the EU, according to Eduardo Ustaran, a partner at law firm Hogan Lovells. He says multinational companies are adopting GDPR standards across their worldwide operations. "That means that irrespective of where in the world that data is being collected, used and analysed, it is being used as if all the data is coming from Europe," says Mr Ustaran.

"Because GDPR is having so much prominence in what organisations around the world are doing to meet data protection requirements, it is becoming the de facto global legal framework."

He says national governments are updating their data legislation to mirror GDPR. His team drafted the new data protection law for Bermuda as the state sought to ensure that its local businesses, particularly insurance, could comply with European laws.

"I've been working in countries in Africa such as Ghana building up the laws in this area for the same reason. A lot of developing economies are looking at technology as a sector they wish to foster and this law is very aligned with that aim," Mr Ustaran adds.

There is mounting pressure on businesses to decide how to implement GDPR globally. Facebook recently said it was ready for GDPR in Europe, but there was uproar from other users demanding similar protection. Facebook then said it would apply the rules of GDPR to all users whether EU citizens or not.

"That is the first domino that will ripple across companies that have mixed user-bases and countries," says Perry Krug, principal architect at database company Couchbase. "Why would they bother making up different rules if they already have a reasonable benchmark in GDPR that is already very public and is already being adopted?"

Many other governments are attempting to introduce privacy legislation that complies with GDPR to enable their businesses to trade more easily with European markets.

Japan has been following developments closely and is looking to make its data laws compatible with European legislation, says Data Protection Network chairman Robert Bond, a partner at legal firm Bristows.

Under EU data adequacy rules, businesses cannot transfer personal data outside the European Union to another country unless its data legislation is deemed to be "essentially equivalent" to European data laws. The alternative is to create a complex contract that protects EU individuals or puts them on an equal footing to local citizens.

Over the years, the EU has given its blessing to the data laws of 12 territories, including Argentina, New Zealand, Israel, the Channel Islands and Isle of Man. Most nations are not considered to have adequate data laws, whether Japan, South Korea, Russia or South Africa.

But with the stringent demands of GDPR, more countries such as Japan are trying to gain data adequacy status. Mr Bond gives the example of Singapore, which has a growing

"Because GDPR is having so much prominence in what organisations around the world are doing to meet data protection requirements, it is becoming the de facto global legal framework

digital economy, with call centres, server farms, digital marketing and advertising technology.

"Their regulators have been following GDPR to make sure they are not disadvantaged in the brave new world," he says. "When you look at GDPR, it says that you can't transfer data to another part of the world that isn't deemed to have adequate protections for the rights of individuals or a decent law.

"In Singapore, they are thinking 'Well we need to get our law in line because currently we are not approved by the EU as a safe place for the data to go to, so it means all our businesses have to jump through the hoops of having all these contracts'."

Meanwhile, South Africa has a new data privacy law which Mr Bond says is modelled on European legislation.

But according to Scott Bancroft, chief information security officer for technology consultancy Capco, many countries will wait to see how GDPR works in practice before moving to adopt it in their own legislation. "There are a few potential blocks to that such as cost and complexity; it may not work so well in low-cost countries and emerging markets," he says.

There are still many questions about how GDPR will work and he expects legal test cases, especially in the US, while there is likely to be further guidance from the European Commission about the working of the legislation. Although some countries might adopt the legislation, others are more likely to adapt it.

"Smaller emerging-market countries are less likely to want to add that level of legislation, compliance and expense to what is not such a big economy and may not be badly affected by not holding that data," says Mr Bancroft.

Harmonising data protection laws across the world will in theory make it easier to do business in the global marketplace. The EU is using its sheer size and market power to make it hard for other countries to resist the pull of GDPR. ◆


Mark Reinstein/Shutterstock

Insight

United States

When it comes to privacy law, the United States is an exception. In most parts of the world, privacy is a fundamental right of citizens and consumers. But this is not universal in America where there are data protection laws that apply to particular sectors.

For instance, there is the Children's Online Protection Act; the Health Insurance Portability and Accountability Act for medical information; and the Gramm-Leach-Bliley Act for financial services.

Each US state makes its own laws, so there are dozens of different interpretations of what constitutes a data breach. "There is a lot of data law in the US, but it is not in one place and it doesn't apply across the board. That is where they are out of sync with almost everywhere else," says Robert Bond, a partner at law firm Bristows.

This will make it hard for the US to comply with the European Union's General Data Protection Regulation (GDPR).

The EU negotiated the Safe Harbour agreement with the US in 2000 to ensure the safe exchange of data between Europe and America. But this was struck down by the European Court of Justice in 2015 following revelations by Edward Snowden that the US National Security Agency was conducting global mass surveillance programmes.

It has been replaced by a new agreement known as the Privacy Shield. However, this is not fully compliant with GDPR. The big question is how the US will respond to the new EU data law. Some states such as California and Massachusetts may be more responsive to the spirit of GDPR than others.

Tomas Lopez Fernebrand, general counsel at travel technology company Amadeus, says the key distinction between US and EU law is that GDPR puts individuals in charge of their own personal data. Under GDPR the issue of data privacy is a fundamental human right and individuals have the right to manage the privacy of their own data, including knowing how it is processed and who has access to it. "It remains to be seen whether the US will follow the lead offered by GDPR," he says.

Commercial feature

CDOs must protect their company from disruption

With data silos inhibiting the speed of conducting business and wasting resources, it falls to chief data officers to ensure traditional organisations are able to keep up with the fast-paced innovation of high-tech companies and startups, says **Dr Ricardo Jimenez-Peris**, founder and chief executive of LeanXcale

Enterprise needs are increasing dramatically to compete with high-tech companies that are taking over traditional verticals driven by superior innovation. Chief data officers (CDOs) are confronted for the first time with a future in which they can no longer be conservative and rely on the inertia of their big enterprise to succeed.

Full of data silos, large organisations do not currently have the technological capability to fight disruption from high-tech companies and startups. On one hand, the separation between their operational databases and data warehouses results in them conducting analytics over stale data, collected the day before in the best case.

On the other hand, they are resorting to using NoSQL databases to handle semi-structured data and combat scalability issues in their traditional SQL databases, resulting in even more data silos and new problems, such as the lack of a powerful query language and full data coherence, the so-called ACID properties.

> **CDOs must take a bet on new database managers or succumb to the high-tech US companies and startups taking over traditional verticals**

With the need to overcome this lack of scalability in existing databases causing enterprises to waste the efforts of their engineers by up to four times, this is no longer a viable option. Yet adopting NoSQL alternatives is also wasting engineering efforts on compensating for their lack of powerful query capabilities, consistency and interoperability with SQL databases.

The huge waste of resources is driven by the fact that all databases are overprovisioned, so computational resources are dimensioned for the highest peak they can expect. For on-premise deployments, this practice means spending a lot of power and cooling in the datacentre without need.

The number of people in operation teams doing shifts in non-working hours is proportional to the number of computers active in the datacentre. In many businesses, the actual load during non-working hours can be an order of magnitude lower than during working hours, meaning organisations can be spending ten times more than needed 80 per cent of the time.

Since all traditional verticals are becoming commodity sectors, reducing the cost of the infrastructure and its engineering resources will become increasingly critical to enable companies to compete with the new high-tech companies and disruptive startups.

Downtime is also a major issue. In businesses with peaks that are hard to plan for, such as ecommerce and travel tech, existing databases often just collapse during extremely busy periods such as Black Fridays, sales and other seasonal flash crowds. Who has not suffered trying to buy something during Black Friday on the website of their favourite retailer? The financial consequences of that retailer losing sales due to unscheduled downtime or an unresponsive website can be huge and damaging.

High availability is a significant source of concern for CDOs. Current databases either offer primary back-up approaches that result in losing data if the primary fails or offer active-active approaches with serious performance issues.

The future of data management lies in converged data management solutions that combine many of the capabilities of different database managers – operational and analytical, SQL and NoSQL – while offering new features that are increasingly critical in today's business landscape such as elasticity and active-active replication in a single database manager.

As their organisation faces more disruption, CDOs must take a bet on new database managers offering solutions to these challenges or otherwise succumb to the high-tech US companies and startups taking over traditional verticals with innovation they cannot compete with.

About the author: Dr Ricardo Jimenez-Peris is a former professor and researcher on ultra-scalable data management, and renowned speaker having been invited to give talks at many Silicon Valley companies such as Facebook, Twitter, Salesforce, ... He is founder and chief executive of LeanXcale, a startup making a next-generation database manager aiming at filling many of the existing gaps.

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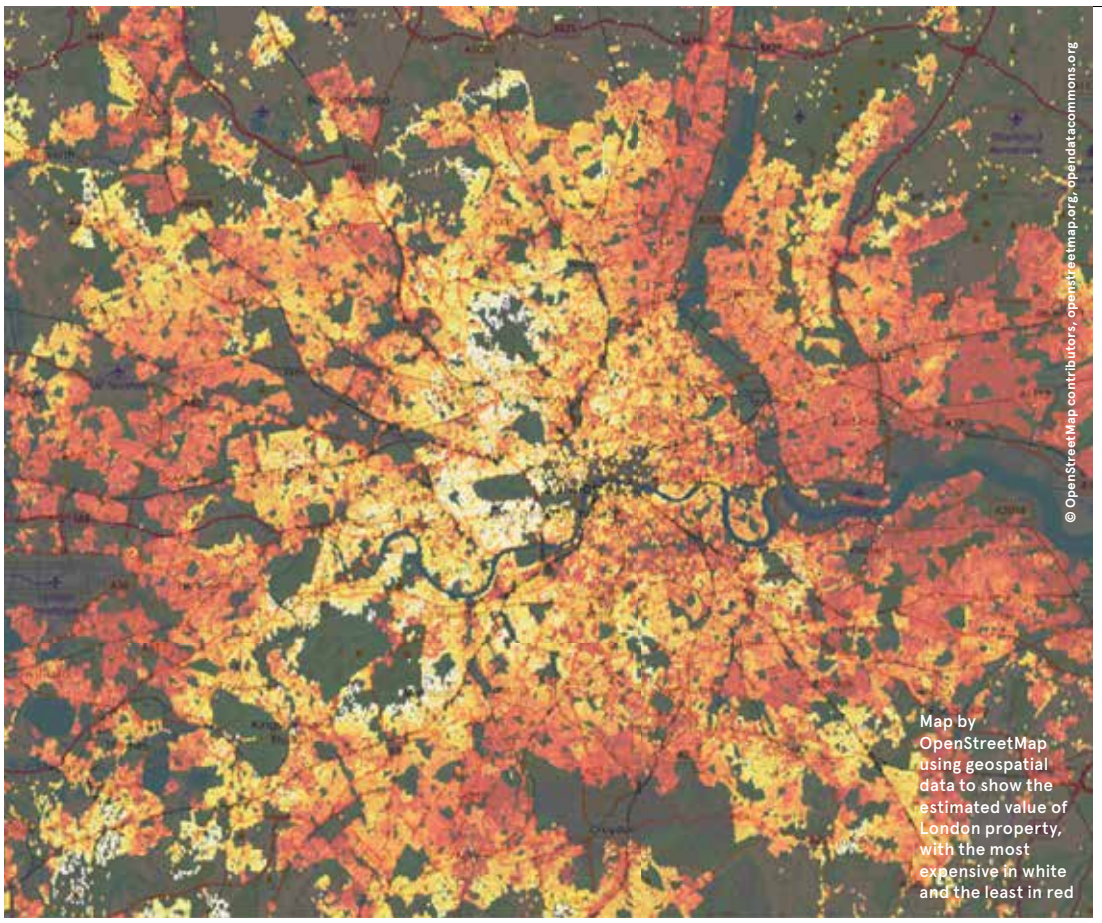
GEOSPATIAL DATA ANALYTICS



Map by OpenStreetMap using geospatial data to show the estimated value of London property, with the most expensive in white and the least in red

Mapping data can reveal its hidden vision

Analysing data to gain geographical or spatial insights has untapped potential which can boost business, change lives and protect the environment

HEIDI VELLA

Predicting flu outbreaks

GlaxoSmithKline (GSK) wanted to anticipate flu outbreaks in Indonesia to create targeted advertising campaigns for relevant vitamin supplements.

To do this, consumer behaviour predictions agency Black Swan used geospatial data derived from social media, such as people complaining of cold and flu online. The agency used this with local weather data, and GSK and government historic prescription information to build a geospatial data model, supported by artificial intelligence, that could accurately predict cold and flu outbreaks across the country four to five days before they became known to local authorities.

According to Steve King, chief executive at Black Swan, deciphering location data from social media was important, but challenging, as it often had to be "enriched with locational clues and mined harder to understand the geographic elements that were not baked in".

When fully functional, the algorithm was linked to marketing servers, so that when an outbreak was anticipated in a particular town, localised adverts promoting relevant vitamin supplements were purchased on mass to encourage people to stock up.

The model, which cost around £80,000 to build, was later provided free to the NHS to predict cold and flu outbreaks to improve management of A&E waiting times.

01

Preserving forests

Global deforestation reached a record 29.7 million hectares in 2016, according to data from the University of Maryland. The UK Space Agency-funded, £14-million Forest 2020 initiative, being developed by Ecometrica, aims to tackle this problem by using geospatial data to monitor 300 million hectares of tropical forests in Indonesia, Brazil, Colombia, Mexico, Ghana and Kenya for illegal mining, logging and fires.

The company harnesses remote georeferenced data from satellites, including the European Space Agency's Sentinel satellites, drones, corporate area networks and social media, which is then analysed in real time using machine-learning and artificial intelligence, and sent to the web browsers of relevant agencies in the partner countries.

The bi-weekly refreshed data creates an up-to-date picture of what is happening on the ground to reduce response times from weeks to days, compared with traditional methods of surveying land with helicopters.

The model could soon be used to monitor natural disaster risk and response, says Gary Davis, chief executive of Ecometrica. "This creates opportunities for everyone to use geospatial data, regardless of their expertise," he says.

02

Better insurance data

In the insurance sector, detailed data creates better predictions and more accurate customer quotes. Yet potential purchasers often don't know the information needed for rigorous risk assessments, such as the distance of their house from water. Furthermore, lengthy and burdensome questionnaires can lose firms business; analysis from HubSpot found, by reducing form fields, customer conversions improve.

PCA Predict uses its Location Intelligence platform to compile free data from the Land Registry and Ordinance Survey, including LiDAR height maps, as well as commercial address data, to determine accurate information on a potential customer's property, such as distance from a river network, height, footprint, if the property is listed and its risk of wind damage. The model is also being developed to determine a building's age using machine-learning and road layout.

"We take disparate datasets and apply different types of analysis to extract easy-to-use attributes for insurers," says Dr Ian Hopkinson, senior data scientist at GBG, the parent company of PCA.

The data can be used to pre-fill application forms automatically, based on address data, or to enable firms to provide a no-questions-asked quote.

03

Mapping the internet

The internet is made up of data flowing around various global networks all stitched together in cyberspace. To give a visual representation of how these networks sit together globally, cloud-hosting company Cogeco Peer 1, in collaboration with CAIDA, an internet monitoring group, has created a map of the internet using geospatial data and technology.

The open-source app allows businesses and educational organisations to perform trace routes to see how many connections a node has and where they themselves sit in cyberspace compared with the networks they want to connect to.

Understanding how data hops across networks from one point to another is important as fewer hops means less transitions between networks and improved speed of data transfer. To improve visualisation of the data, the app also has a virtual reality function.

"Geospatial data and mapping is hugely powerful to take something intangible like the internet and give it a framework geographically," says Tom Adams, director of product marketing at Cogeco Peer 1. "The map shows how networks have grown and evolved over time, representing a visualisation of our economy."

04

Land planning

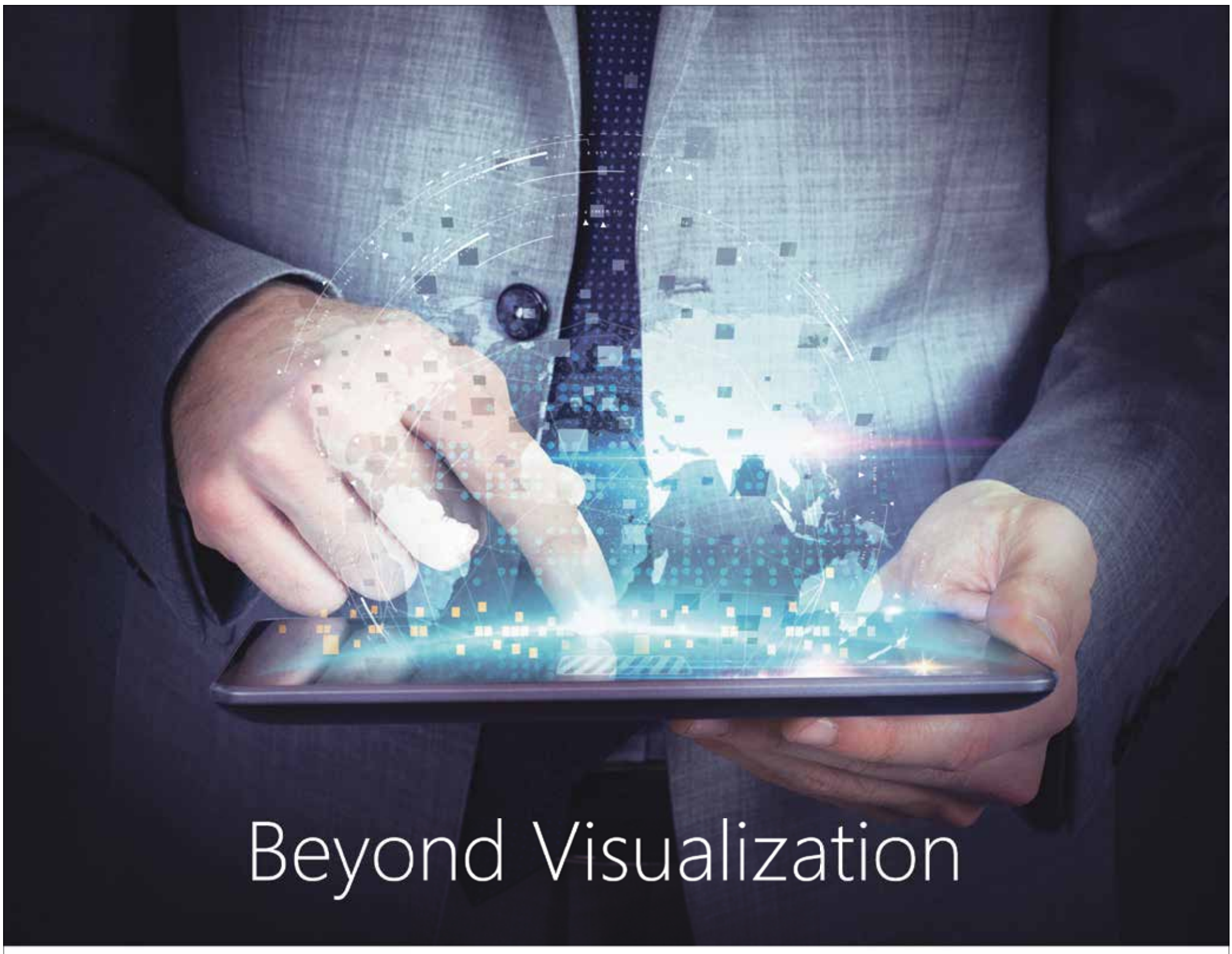
According to the International Longevity Centre, the UK death rate is set to increase significantly over the next 20 years due to the increasing proportion of the population over 65. But, due to fierce competition for land use in the UK, new crematoriums are often built where there is cheap access to land, rather than where they are most needed.

Carter Jonas, on behalf of Horizon Crematorium, used spatial analysis to breakdown Office for National Statistics and Census geography data to determine a spatial distribution of deaths in specific areas.

Using this data, the company created what it calls a "death surface 500m by 500m grid" across the UK and used spatial analytics to determine optimal catchment areas for new crematoriums. To find competitively priced land in a high-demand market, the company used constraint geomapping. Based on this data, it is now building one crematorium and seeking permission for five others.

"We showed it is possible to adapt data collected at one scale for use at another, allowing a national need to be shaped by local commercial and political geography," says Andy Williams, partner and head of geospatial at Carter Jonas. ◆

05



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