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Editor's View

By Phil Alsop

The only certainty is uncertainty

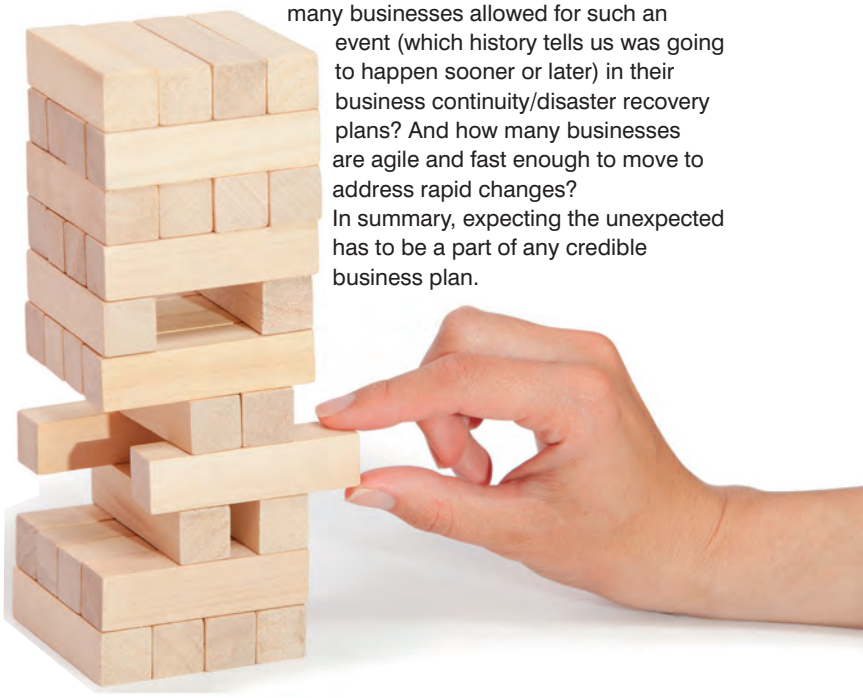
I GUESS that we can still rely on our old friends 'death and taxes' as further certainties, but 2020 has proved that there is no place for complacency in the fast-moving, even chaotic world in which we now live. While the world rushes headlong towards a digital future, we would do well not to ignore a relatively old, established discipline – history. While all manner of algorithms, machine learning and artificial intelligence crunch numbers in an attempt to predict the future of almost everything, a look at the past gives us a pretty accurate picture of what to expect in the future.

Those of a nervous disposition, should look away now. For, much as we like to think that we have never had it so good in the relatively early years of the 21st century, the truth is that we are still wrestling with almost all of the issues which concerned our ancestors, and we have a few new ones added into the mix as well! Massive disparities between the haves and have-nots in society continue to exist; political instabilities across the globe remain a constant – while physical warfare is not always the result, cyber and financial warfare are very much on the rise; technology continues to create massive social change and unrest; dishonesty, corruption and plain old incompetence continue to dog governments across the world; and, a relatively new concept, climate change threatens to overshadow everything.

So, we should not be that surprised or indignant when history repeats itself in so many ways and so regularly. The questions is, do we ever learn from what happened in the past, and use this learning to help us plan for the future?

And the answer to that question is likely to determine the future of your business. Okay, so no one could have predicted the exact timing or the scale of the Covid-19 pandemic, but how many businesses allowed for such an event (which history tells us was going to happen sooner or later) in their business continuity/disaster recovery plans? And how many businesses are agile and fast enough to move to address rapid changes?

In summary, expecting the unexpected has to be a part of any credible business plan.



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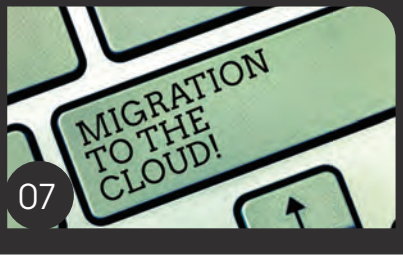

Data is more important since the arrival of the coronavirus

IN RESPONSE to the COVID-19 pandemic, organizations across private industries have become more reliant on data and analytics as a way to better understand and react to the continuously changing global business landscape.

A new research report, commissioned by Teradata, and conducted by independent research firm Vanson Bourne in September 2020, explores global executive sentiment around data analytics and the crucial role this asset is likely to play as industries eye the path to recovery.

Trust in data

The onset of the pandemic ignited a thirst for information that has also exposed how data can be inconclusive, misunderstood and even abused.

The weakness and missteps of data-use in response to COVID-19 has resulted in greater scrutiny from the top-down around data accuracy and trust, as well as a concern that a lack of cloud resources is impacting decision-making.

- 77% of IT decision makers say data accuracy is under greater scrutiny within their organization due to how data was used in relation to COVID-19. China, at 93%, was most concerned about the accuracy of their data, followed by Germany (80%) and the US (77%).
- While 53% of business leaders overall admit trust in data was challenged due to COVID-19 data follies, there is a notable disparity in sentiment when comparing the US (60%) and the UK (28%).
- Nearly half (47%) of business leaders agree decision-making is being hampered amid the current COVID-19 crisis due to a lack of cloud presence, with 66% of respondents in China feeling the strain.

Data is key to recovery

Traditionally, organizations have relied on data and analytics to glean insights and better understand the continuously changing business and technology landscape. With the full scope of COVID-19's impact across every vertical becoming clearer, business leaders are recognizing the necessity of scalable, trustworthy data and are using cloud technologies to survive and adapt in a post-pandemic world.

- 82% of business leaders are now accelerating decisions to move data and key business functions to the cloud as a direct result of the pandemic.
- According to 9 out of 10 (90%) respondents, there is greater realization of the increasing importance of data in the decision-making process since the onset of COVID-19.
- Out of the five countries surveyed, China was most focused on the cloud, with 99% of business leaders accelerating plans to expedite their move to the cloud, while 59% of business leaders in the UK appeared skeptical.

"COVID-19 has completely upended the roadmaps of businesses across every industry, forcing leaders to re-evaluate how they view, use and maximize data to pivot and re-establish the path forward," said Steve McMillan, President and CEO of Teradata. "The companies that will survive – and ultimately thrive – will be the ones that realize data is a key asset for recovery and a competitive advantage to drive the future of their business. This is Teradata's purpose – to transform how businesses work and people live through the power of data."

Data is strategic to our future

With recovery at the forefront of business leaders' minds, data has emerged as the priority asset for nearly all IT decision makers in building the foundation to make it possible – and ensure they're prepared for any future disruptions.

- 88% of IT decision makers view data as astrategicasset to their business,while 95% agree data is anessentialasset and more importantly, key to recovery and the path moving forward.
- Global sentiment about how data will inform future efforts was nearly unanimous, with China (100%) being the biggest advocates of data and its role in recovery, followed by the US (97%), Germany and Japan at 93% and then France and the UK at 92%.

Covid causes a rush to the cloud

VIRTANA METRICS reveal most applications migrated to the public cloud since March were simply "lifted and shifted" without being optimised.
As the Global 2000 accelerate the movement of legacy applications to the cloud due to COVID-19, two thirds (66%) are 'at risk' for unexpected cost/performance issues as a result of having simply "lifted and shifted" applications instead of optimising prior to migrating them. The remaining one third avoided these issues by right sizing their workloads, modernising applications by upgrading them or rearchitecting them to run in the cloud, and decommissioning unnecessary applications prior to the migration. This analysis is based on hundreds of Global 2000 actual multi-cloud performance and cost metrics measured by Virtana, the leading hybrid cloud optimisation platform for digital transformation.

The cost implications of lifting and shifting applications to the cloud has been substantiated by Gartner. The research firm found that organisations with little or no cloud cost optimisation plans overspent on cloud services by up to 70%.

Shares Scott Leatherman, Chief Transformation Officer at Virtana, "Not surprisingly, the majority of companies had little choice when the pandemic hit. Their data center capacity was not built for the instant tsunami-sized jolt of increased load. Procurement of new on-premises hardware in the timeframe necessary wasn't practical nor in their long-term plans. Their desire was always to move more to the cloud, but not overnight."

Accelerated cloud migration

The Virtana analysis also revealed that Global 2000 companies were implementing hybrid cloud strategies long before the COVID-19 global pandemic. In working with hundreds of organisations, Virtana found that 80% of large enterprises initiated their hybrid cloud migrations at least three years ago. Yet, in being prudent, they had migrated less than 10% of planned workloads.

With COVID-19 as the catalyst, cloud migration has had noticeable

acceleration. Virtana had previously projected that it would take five years for 50-60% of workloads to be migrated. The company now estimates that the timetable could be shortened by up to two years.

Gartner has also substantiated Virtana's metrics of Global 2000 cloud migration growth, reporting that by 2025:

- 85% of large organizations will have engaged external service providers to migrate applications to the cloud, up from 43% in 2019
- 85% of large organisations will use external service providers to migrate data/storage to the cloud
- 80% of organisations will use external service providers to move an application/compute infrastructure from one environment to a different cloud environment

Leatherman added, "Public cloud migrations during the past few months have exposed the need for cloud cost optimisation across the board. For their most important applications, organisations are now well aware that they need an investment in re-platforming the application to take advantage of cloud efficiencies. Companies that created and executed a thoughtful cloud migration optimisation plan were able to avoid increased cost and degradation in performance of applications."

Cloud-Smart versus Cloud-First

In analysing companies' cloud migration strategies, Virtana found that organisations used either a "cloud-first" or "cloud-smart" strategy. A cloud-first strategy grants broad authority to adopt cloud-based solutions, but only works well for workloads and applications specifically designed for the cloud.
A cloud-smart strategy takes a more thoughtful approach, leveraging practical guidance to actualise the full potential of cloud-based technologies while optimising for cost, performance, and risk.

Those applying cloud-smart techniques and tools gained visibility into the following:

- Application discovery and dependencies
- Workload profiling
- Correct instance sizing
- Workload replay in the cloud to validate performance and cost before migrating

"Most companies that executed a cloud-smart strategy leveraged partners to help with this journey, using their expertise and tools," said Leatherman.

As background, an early adopter of a cloud-smart strategy was the Federal Reserve. In its June 2019 Federal Cloud Computing Strategy report, The Fed noted: "Cloud Smart equips agencies with actionable information and recommendations gleaned from some of the country's most impactful public and private sector use cases."

Leatherman concluded, "This recent broad adoption of the public cloud by the Global 2000 is actually a refresh of their infrastructure. The maturity of public cloud providers has reached a point where these large organisations have confidence moving their workload there. COVID-19 has accelerated the timeframe of those plans, but not initiated them."

More than one third of workers ‘feel closer to colleagues’ despite Covid-19 lockdown

OVER one third (35 per cent) of workers have reported feeling closer to colleagues, and communicating more frequently on a daily basis, than ever before during the Covid-19 pandemic, according to new insight from FDM Group, a global leader in the recruit, train and deploy sector.

The findings were contained in a poll of 2,000 workers in large and medium sized companies, commissioned by FDM Group and conducted by independent polling agency, Censuswide in October 2020.

Thanks to web conference and other communication technology, lockdown has given international colleagues, workers who have relocated, or those who would usually operate in a different environment to their colleagues, an outlet to communicate with each other which they otherwise wouldn’t have, if not for lockdown and remote working. Similarly, 51 per cent of workers admitted that they would like to see flexible working remain an option in 2021 and beyond, and 51 per cent agreed that they would be interested in improving their digital skills in the next year.

In fact, 37 per cent of workers agreed that they would like their company to invest more heavily in online collaboration tools, so that they can work even more closely with their colleagues – especially since remote working looks like it’s here to stay on a permanent basis until at least 2021.

Interestingly, just over one-third of workers said that they are using their own personal devices, such as laptops and mobile phones, to work, despite a move to a WFH environment.

Additionally, employee concerns about job stability have evidently not subsided, as almost one-quarter (24 per cent) admit that they expect to be made redundant next year, and nearly one-third (32 per cent) have refused to take annual leave during the pandemic through fears of losing their job.

Sheila Flavell CBE, COO of FDM Group, comments: “Transitioning to a remote environment has been a bumpy ride for many companies, and whilst it’s satisfying to see that such a large portion of workers feel closer to their colleagues than ever before, it’s essential that companies continue to invest in training and collaboration to bring remote workforces closer together.

“Key to this is continuing to implement effective and open communication channels, facilitated by remote working technology and staff IT skills training, so that all employees have an outlet to air any concerns or stresses, which will inevitably be the case during these extremely difficult times.

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CMO and CIO partnership can boost profitability

NEARLY 44% of top-tier companies expect a collaborative CMO-CIO relationship to boost profitability by 5% or more.

Infosys has unveiled its market study titled, 'CMO and C-Suite: The DNA of Partnership.' This latest research by the Infosys Knowledge Institute focuses on how the pandemic has influenced CMO and CIO roles to converge and digitally transform multiple dimensions within an enterprise. The survey revealed that a CMO's people-centered skill set and CIO's insights into enterprise IT systems are vital to the success of this new collaborative ecosystem. The research identifies both current and future initiatives that can serve as a guide for CMOs and CIOs in their endeavor to build adaptability and resilience within their organizations.

In the era of pervasive data intelligence, data is becoming more dynamic and transformative. The COVID-19 pandemic was a wake-up call, and enterprises have begun to embrace the opportunities presented by digital technologies to survive and thrive in this new normal. Two of the core business disciplines are at the fore front of this digital transformation: IT and Marketing. The pandemic has accelerated the need for marketing and IT teams to interconnect and radically transform the business. The CMO-CIO collaboration will serve as a force multiplier to drive revenue and digital maturity while evolving the organizational DNA in this digital age.

For this study, Infosys surveyed 970 business leaders and interviewed CIOs and CMOs to get insights into the crisis-induced collaboration between the two departments, and to test the proposition of stakeholder capitalism as a viable path forward:
Key findings:

- **A push for stakeholder capitalism:** The drive to include stakeholder capitalism is clearly coming from the top as 83% of surveyed senior executives strongly agree that CMO-CIO collaboration can play a pivotal role in mapping and aligning business needs with stakeholder demands.
- **Evolving CX (customer experience) to HX (human experience):** Although

51% of IT respondents believed the CMO role would be replaced altogether, this is not the twilight of the CMO – the role instead will evolve beyond CX to delivering HX.

- **Understanding collaboration and culture:** IT demonstrated a higher rating in grasping the significance of collaboration between the departments to drive digital transformation across the enterprise (62% IT vs. 46% Marketing). IT and Marketing in tandem can plan and model the future, creating a culture that fosters collaboration in any situation, remote or in-person.
- **Weight on the ESG scale:** CMOs must work with CIOs and the wider C-Suite to deliver on ESG (Environmental, Social, and Governance) and stakeholder capitalism strategy. CMOs are in a unique position to ensure the human experience is at the center of everything a company does. They are also well-placed to communicate the company's social purpose to stakeholders
- **Collaboration for profitability:** Nearly 44% of top-tier companies expect a collaborative CMO-CIO relationship to boost profitability by 5% or more. In comparison, only 20% of lowest-tier and 15% of middle-tier companies share these expectations.
- **Challenges in the shifting operating environment:** Compared to IT, Marketing respondents identified agility (69% vs. 46%) and CX to HX evolution (58% vs. 35%) more critical.

Sumit Virmani, CMO at Infosys said, "As the marketing spend on digital channels continues to grow in this new normal, human experience has taken center stage across businesses. The pandemic has not only altered the way engagement is viewed across every touch point, it has also accelerated digital transformation, creating a need for relevant and personalized experiences. Now is the time, more than ever, for CMOs and CIOs to collaborate to deliver tangible business outcomes. When the dust settles, companies that will emerge stronger will be the ones where the marketing and technology functions took joint ownership to drive digital transformation and engage customers in a meaningful way."

Carol Kruse, Former CMO of ESPN and Cambia Health and former Head of Global Digital for The Coca-Cola Company said, "The work styles tend to be very different between a technical person and a marketing person, which leads to work culture differences. Traditionally, this cultural difference has hindered collaboration and that's what this report highlights -- that intense collaboration between the CMO and the CIO has to be our new reality. Fostering a culture of collaboration between these two groups brings tangible benefits, and the report proves that working together, across the C-Suite, has never been more critical."

Max Chan, Chief Information Officer, Avnet commented, "During the pandemic, we learned just how quickly we could implement cloud technology and scale digital transformation. Now we need to make the most of that rapid scaling. We are working with the marketing team to align our digital strategy with our business strategy. One of the focuses is to redesign our digital customer journey. Instead of providing an alternate digital channel for our customers to interact with us, we are working with marketing to redesign our customer interaction by making digital as an integrated aspect of our end-to-end process."

Skyler Mattson, President of WONGDOODY added, "Since the pandemic began, companies see that the personal is powerful. HX puts the consumer, client or employee at the center of everything we do -- end to end. This research shows that companies that have excelled in digital transformation have mastered HX, resulting in greater digital maturity than their peers."

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Cybersecurity:

The importance of communication and trust

Working with Kaspersky on its upcoming enterprise campaign, security practitioner Naveen Vasudeva, Founder and CEO of The CyberTree Paradox LLC , addresses the current disjoint which exists between cybersecurity vendors and their customers. Naveen believes as companies wrestle with the complexities of security in the digital age, they need trusted partners, such as Kaspersky, who will work with them to help identify and implement best cybersecurity practice.

AS MANY END USERS STRUGGLE to understand the complexities of cybersecurity, it seems right to ask whether the vendor community is doing enough to help customers (actual and potential) with this challenge. I think they are, but only to a certain degree and for a specific audience segment: The very technically minded. Unfortunately within businesses this segment rarely makes decisions as they don't have access to budgets and aren't held to account because of that.

So, I would raise another question - Where's the thought leadership in the way that these technology companies are actually talking about cybersecurity and applying it to real life problems that these businesses face?

Vendors and end users must come together and find a way to communicate better. In particular, vendors have a key role to play when it comes to helping end users understand the key pillars of an end to end security

strategy - many of whom may well be somewhat in the dark as to what these should be.

So, do end users fully appreciate cybersecurity strategies within their businesses? The answer depends on whether they're an SMB enterprise, or a large corporate; if they're regulated or not regulated; if they are compliance or not compliance driven.
I believe that organisations have an absolute responsibility to ensure that their end users are educated, are made aware and are trained correctly. It is then the responsibility of vendors that supply and support those tools and technologies - that help prevent particular breaches or malware or viruses or conducting penetration testing. They have to find a way of communicating what they're doing so that the end user is again made aware and educated.

Within the wider conversation about responsibility, it's important to acknowledge the importance of individual accountability. If a person works for a large organisation, they might argue that the company has a couple of "IT people" that are responsible for cybersecurity. Actually, a company of 250 employees has 250 people that are responsible for cybersecurity. This is where the mentality has to shift. I think we all have a good understanding of what it means to protect ourselves and to protect those around us, so it's time to make sure that understanding is put into action.

In my opinion, vendors and customers need to address how they communicate with each other. Communication needs to flow both ways to ensure that the other is informed enough about a business' functionality to service their cyber security needs adequately. Individuals within organisations may not have the necessary skills to understand all that they need to and that's where a vendor should step in to educate and mentor, but I acknowledge that this is a lot of responsibility to put on individual vendors.
The perfect situation would be where there is a symbiotic relationship between vendor and customer – Where the vendor understands the pain points and can suggest cost-effective fixes. At the same time the customer accepts these suggestions and takes the advice of the vendor, this is why these companies outsource their security to a third party, right?
To make this sort of relationship work, vendors need to be transparent in what they're trying to achieve and I think that's what's really great about Kaspersky, the level of transparency in the way that they're trying to deliver products and services. It's not about selling a product. It's about supporting a business in the delivery of the right cybersecurity strategy that's going to help them.

In terms of moving forward, there needs to be a better way of vendors and end users working together. That's one of the reasons why I teamed up with Kaspersky - to address this particular issue. And I'm so happy that they stepped up to take on the challenge, which is effectively: Chief Information Security Officers (CISOs) or anyone that's accountable for cybersecurity with an organisation have to start having more transparent, open dialogues with vendors. So let's start with the practitioners.

The whole world has seen a massive shift come about in 2020 due to the global pandemic. We have all been affected in one way or another, and more people than ever are working from home. This change has resulted in a digital transformation for many businesses who suddenly found themselves desperate to transform and secure their systems to make remote working safe and efficient.

So if you think about organisations compressing what would have been two to three years' worth of digital transformation into months' worth of work, that's a huge change in security landscape. And therefore, you require a huge pool of vendors to help support the delivery of that transformation.

One thing that we might have missed in the rush to make home-working cyber secure was the communication piece. What I was witnessing within the industry was people complaining about the number of vendors trying to contact them, the number of people trying to sell them stuff, the number of people not listening to them. And you could sense the hostility, vendors were saying 'we're trying to help you, we're trying to provide services. But businesses saw it as another affront by the vendors wanting to take up their time. One is not listening to the other and vice versa.

So what would I recommend? We need to stop and assess what that relationship actually is, because it's about trust. Forget the tools and the technology and the processes for a second. If I believe in what somebody is trying to tell me about a solution, I want

So if you think about organisations compressing what would have been two to three years' worth of digital transformation into months' worth of work, that's a huge change in security landscape. And therefore, you require a huge pool of vendors to help support the delivery of that transformation

to build a relationship with that individual, and I want to trust them. So let's distil it down to simple human engagement. Everyone's time is valuable but when there's something important to get across, that is worth taking the time to press pause.

Once that relationship is built, a company can then go on to build a business case because they believe in the solution being presented. The customer needs to understand how it all works so that they can become your representative in-house and defend that spend. There's a level of patience vendors need to have with businesses, and especially now we're entering into a period of economic uncertainty. Cybersecurity has never been more important and businesses need to continue to invest to protect their assets.

My final piece of advice for any vendor wishing to create a relationship with their customers is to engage with working groups. Effective working groups that debate and challenge what vendors are doing. I actually sit on multiple working groups for particular vendors, whether it's governance, risk compliance, threat intelligence or penetration testing. The idea is, is that as part of a CISO group, I can say what works, what doesn't work, at a technical level, at an operational level, at a strategic level.

Moving on from this, it makes sense to understand what a basic checklist for end users looks like, when assessing a cybersecurity vendor, such as Kaspersky. What is the sort of language you want to hear from them when they're talking to you?

There are a lot of vendors out there. I think at the last count, in the UK alone, there are probably about 7000 cyber security vendors, so it's hard for customers to know who to trust. There are a couple of pieces of advice I have to impart on this. One is, there are many different ways customers can be informed about what cybersecurity tools and services are out there. It is a really complex market. There are a couple of organisations that are trying now to challenge that. But people's dependency has mainly been on the likes of Gartner and analytics. Businesses often rely on Magic Quadrant, then, for a lot of the boards and CEOs, they're going to look at that and say, OK, you know, let's go in this direction. I don't necessarily think that always gives an accurate picture of whether something is good or not. The individuals that are then having the responsibility for going down that path must ensure they do their own discovery and their own homework and their own assessment of the applicability of any solution.

My advice for customers is to reverse this to the vendor - tell me whether I need this or not. Is this actually appropriate for me? As an example, I'm worried about my intellectual property being stolen because I'm working on some top secret engineering project, but I've only got 10 people working in my company. So what do I need to do? Do I need some intelligence because I'd be worried about spies coming in and stealing that data.

Do I need any additional protection to add to any malware or antivirus solutions I might have? Do I need to encrypt stuff? An opportunistic vendor would say, yes, sure, you need them. And then, before you know it, you can't operate as a business because you're so locked down that it's non-functional. What I would like to see is those vendors saying, well, actually, there are multiple different things that you can see here that you need to achieve. Let's break it down and do it in such a way that you understand what those business critical assets are. And let's look to see how we can then apply that to tech. And see what that solution is. I still think it's just too much about the products. And, as practitioners, we switch off when we start hearing about products, because there are 10 other products that do exactly the same thing.

I want a vendor's expertise. I want Kaspersky expertise when it comes to intelligence because they are one of the key players in threat intelligence. All the efforts that they're making in terms of transparency of their operations is key. And they are one of the only vendors I know who are doing that, which is excellent.

It makes sense to understand what a basic checklist for end users looks like, when assessing a cybersecurity vendor, such as Kaspersky. What is the sort of language you want to hear from them when they're talking to you?

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Gartner unveils top predictions for 2021 and beyond

Gartner, Inc. has revealed its top strategic predictions for 2021 and beyond. Gartner's top predictions explore the role of technology in resetting, restarting, and responding to a world of uncertainty.

"TECHNOLOGIES are being stressed to their limits, and conventional computing is hitting a wall," said Daryl Plummer, distinguished research vice president and Gartner Fellow. "The world is moving faster than ever before, and it's essential that technology and processes are able to keep up to support digital innovation needs. Starting now, CIOs can expect a decade of radical innovation led by nontraditional approaches to technology.

"The future technologies that will lead the 'reset of everything' have three key commonalities: they promote greater innovation and efficiency in the enterprise; they are more effective than the technologies that they are replacing; and they have a transformational impact on society."

By 2024, 25% of traditional large enterprise CIOs will be held accountable for digital business operational results, effectively becoming "COO by proxy."

After years of decline, the chief operating officer (COO) role is rising in prominence among born-digital companies. A COO is an essential component for digital success, as they understand both the business and the ecosystem in which it operates. The CIO, with an in-depth knowledge of the technology that facilitates business impact, can increase enterprise effectiveness by taking on components of the COO role to fuse technology and business goals.
"As more CIOs become accountable for the enterprise's digital performance results, the trend of CIOs in highly digitalized traditional businesses reporting to the CEO will become a flood," said Mr. Plummer.

By 2025, 75% of conversations at work will be recorded and analyzed, enabling the discovery of added organizational value or risk.

Conversations at work are shifting from traditional, real-time, face-to-face communications, to taking

place over cloud meeting solutions, messaging platforms and virtual assistants. In most cases, such tools are keeping a digital record of those conversations. Analytics of conversations happening in the workplace will be used to not only help enterprises comply with existing laws and regulations, but also to help them predict future performance and behavior. As the use of these digital surveillance technologies increases, ethical considerations and actions that bring privacy rights to the forefront will be critical.

By 2025, traditional computing technologies will hit a digital wall forcing the shift to new paradigms such as neuromorphic computing.

CIOs and IT executives will be unable to deliver on critical digital initiatives with current computing techniques. Technologies such as artificial intelligence (AI), computer vision and speech recognition, which demand substantial computing power, will become pervasive, and general-purpose processors will be increasingly unsuitable for these digital innovations. "A variety of advanced computing architectures will emerge over the next decade," said Mr. Plummer. "In the short-term, such technologies could include extreme parallelism, DNN-on-a chip or neuromorphic computing. In the long-term, technologies such as printed electronics, DNA storage, and chemical computing will create a wider range of innovation opportunities."

By 2024, 30% of digital businesses will mandate DNA storage trials, addressing the exponential growth of data poised to overwhelm existing storage technology.

As humanity's computing needs evolve, more advanced systems will be required, capable of radical adaptation and resilience in complex and hostile environments. DNA is inherently resilient, capable of error checking and self-repair, which makes it an ideal data storage and computing platform for a range of applications.

"More information is being collected than ever before, but today's storage technology has critical limitations on how long data can be stored and remain uncorrupted," said Mr. Plummer. "With DNA storage, digital data is encoded in the nucleotide-based pairs of a synthetic DNA strand. This provides a longevity that traditional storage mechanisms simply do not have."

By 2025, 40% of physical experience-based businesses will improve financial results and outperform competitors by extending into paid virtual experiences.

The increasing capability of internet of things, digital twins and virtual and augmented reality (VR/AR) is making the provision of immersive experience more attractive and affordable to a wider range of consumers. This trend has been accelerated as the social effects of the pandemic have positively altered people's attitudes towards remote and virtual engagement. Physical experience companies must begin building and acquiring skills in disciplines related to creating, delivering and supporting immersive, virtual experiences.

By 2025, customers will be the first humans to touch more than 20% of the products and produce in the world.

New technologies are automating an increasing number of human tasks, a trend that has been hyper-accelerated by the pandemic. This leads to new opportunities to rethink product design, material use, plant locations and use of resources. As automation becomes the new imperative, customers will increasingly become the first humans to touch manufactured products and agricultural produce. "Automation is a new source of competitive advantage and disruption," said Mr. Plummer. "For example, an intelligent machine may not squish the grapes in the same way a human packing them might. CIOs should see hyperautomation as a principle, not a project, as they move forward in updating their processes for the future."

By 2025, customers will pay a freelance customer service expert to resolve 75% of their customer service needs.

Traditional customer service methods create bottlenecks and pain points for customers. Resolving service issues outside of official company channels is often more effective and creates a better customer experience. Rather than contacting the company directly, customers will increasingly turn to freelance customer service professionals who are experts in the technology for which they are seeking assistance. CIOs must look to partner with these freelancers early on to reduce the customer experience, brand and monetization risks created by third-party customer service providers.

By 2024, 30% of major organizations will use a new "voice of society" metric to act on societal issues and assess the impacts to their business performance.

The "voice of society" is the shared perspective of people in a community that drives the desire to represent and shift ethical values toward a commonly acceptable outcome. Business measurement tactics are expanding to include a focus on opinion-based metrics, such as voice of society, equal to that of more tangible metrics like click-through rates. Such measurement will become a C-Suite imperative so that business composition can react quickly to societal change.

"As we've seen time and time again, being tone deaf to societal issues can rapidly and irreparably hurt a brand," said Mr. Plummer. "By responding to the voice of society, more product brand names or messages are going to be changed or dropped through next year than in the previous five years combined."

By 2023, large organizations will increase employee retention by more than 20% through repurposing office space as onsite childcare and education facilities.

Global worker demand for childcare assistance is still unmet. This will become even more challenging in the wake of COVID-19, as Gartner predicts that by early next year, one-in-five private childcare centers will have closed their doors permanently. To meet increased demand, large companies will begin repurposing empty facility spaces for offerings that have a societal value-add, such as childcare or educational services. This will significantly increase employee satisfaction, productivity and retention, particularly among women in the workforce. By 2024 content moderation services for user generated content will be surveyed as a top CEO priority in 30% of large organizations.

With the social unrest of the past year, content volatility on social media has increased. For brand marketers and advertisers, this creates brand-safety concerns and other related challenges. Investing in content moderation, enforcement and reporting services will be critical for enterprises to understand the providence of the content on their sites. "In many cases, brands are going dark altogether on user-generated content platforms until appropriate policing measures are in place. Yet site and app publishers must walk the line between enforcing policies to provide a safe environment and being accused of censorship. Therefore, brand advertisers will become responsible for neutralizing polarizing content, and industry standards for content moderation will emerge," said Mr. Plummer.

Six forces that will impact tech providers through 2025

Six forces in the IT industry will present a fundamental threat to technology and service providers (TSPs) through 2025, according to Gartner, Inc. "Forces outside of a TSP's control demand a response – adapt to thrive or struggle to survive," said Rajesh Kandaswamy, research vice president at Gartner. "Impact from six forces are already being felt by providers today, but over the next five years Gartner expects these forces to accelerate trends and pose problems that will demand providers create new models, products and relationships to survive and ultimately succeed."

The six forces Gartner expects will have the greatest impact on TSPs into 2025 are:

Disruption from Geopolitics and World Events

Increasing global trade tensions are the most significant geopolitical risk in terms of impacts to global markets. As providers seek to serve global customers and drive geographic expansion, both global trade tensions and the erosion of U.S.-China relations become significant influences in terms of product strategies, customer acquisition, business performance management, and corporate development. TSPs expecting to approach global

markets in 2025 as they do in 2020 will be displaced by competition that incorporates these new realities into their business and operating models.

COVID-19 has made remote work become the standard across many organizations. While the increasingly digital nature of human interactions presents numerous benefits to providers, including reduced travel expenses and improved relevance and responsiveness to buyers, it can present some negative side effects. Gartner predicts that by 2025, loneliness, collaboration and communication obstacles will be the top workplace struggle for 50% of remote workers. TSPs must adapt their talent management strategies to mitigate this risk and be aware that this trend influences not only their employees and contingent workers, but customers and buyers alike.

Changing Customer Demand and Expectations

Through 2025, TSPs must adapt to changing buyers and buying conditions driven by transformed organizations and technology buyers within them. Business-driven and line of business (LOB)-resident technology buyers will drive more purchases, hastening moves to cloud products and platforms, investing more in automation and online interactions in order to optimize business processes and compete more effectively. Products will address a broader variety of vertical market requirements through tighter partnerships and integrations among providers. Additionally, customers who will demand a clearer picture upfront of the value such solutions will deliver will also require technology providers to measure results postimplementation. Those that can't prove realized value will fail to grow or renew their customers.

Disruption from Emerging Technologies and Trends

Emerging technologies enable TSPs to enter new markets, strengthen their products and services, ward off competition, and become more efficient. The proliferation of new technologies present opportunities and challenges for TSPs. The right levels of investments in the right emerging technologies at the right time are crucial for creating and capturing the most value from them.

Changing Industry Dynamics

Over the next five years, changing industry dynamics will force technology providers to adjust their strategies, routes to market, and their willingness to simultaneously collaborate and compete with other providers.

Challenges from New (and Old) Entrants

Changing industry dynamics and rapid development cycles make the dedicated pursuit of competitive intelligence an absolute must for technology providers. However, following the known list of competitors no longer is enough – TSPs must be particularly mindful of challenges from new entrants to the market. In some cases, providers in adjacent markets may move into new markets as a way of growing revenue and mind share.

TSPs should not only prepare for new and different types of competitors, but also consider ways to stay competitive. This may mean assessing purchasing models, ease of doing business, customer experience, generational demands and offerings – especially when many technology products and services will be built by nontechnology professionals.

"In the era where 'every company is a technology company,' product leaders will have to compete harder with former nontech providers, end users and megavendors for market share," said Mr. Kandaswamy.

Disruptive Business Models

Through 2025, technological advancements, availability of capital and shorter development cycles will provide opportunities for innovative vendors leveraging disruptive business models. For example, leading providers will create generative solutions which create new value beyond traditional approaches through new combinations of information, technology and operations across an extended ecosystem. Gartner predicts that by 2025, the fastest

As organizations journey from responding to the COVID-19 crisis to driving growth, they must focus on the three main areas that form the themes of this year's trends: people centricity, location independence and resilient delivery. Taken together, these trends create a whole that is larger than its individual parts and focus on social and personal demand from anywhere to achieve optimal delivery

growing major tech providers will generate 50% of revenue from generative or platform business models leveraging cloud computing.

The top strategic technology trends for 2021

Gartner, Inc. has revealed the top strategic technology trends that organizations need to explore in 2021. "The need for operational resiliency across enterprise functions has never been greater," said Brian Burke, research vice president at Gartner. "CIOs are striving to adapt to changing conditions to compose the future business. This requires the organizational plasticity to form and reform dynamically. Gartner's top strategic technology trends for 2021 enable that plasticity. "As organizations journey from responding to the COVID-19 crisis to driving growth, they must focus on the three main areas that form the themes of this year's trends: people centricity, location independence and resilient delivery. Taken together, these trends create a whole that is larger than its individual parts and focus on social and personal demand from anywhere to achieve optimal delivery."

The top strategic technology trends for 2021 are:

Internet of Behaviors

The internet of behaviors (IoB) is emerging as many technologies capture and use the "digital dust" of peoples' daily lives. The IoB combines existing technologies that focus on the individual directly – facial recognition, location tracking and big data for example – and connects the resulting data to associated behavioral events, such as cash purchases or device usage.

Organizations use this data to influence human behavior. For example, to monitor compliance with health protocols during the ongoing pandemic, organizations might leverage IoB via computer vision to see whether employees are wearing masks or via thermal imaging to identify those with a fever.

Gartner predicts that by year-end 2025, over half of the world's population will be subject to at least one IoB program, whether it be commercial or governmental. While the IoB is technically possible, there will be extensive ethical and societal debates about the different approaches employed to affect behavior.

Total Experience

"Last year, Gartner introduced multiexperience as a top strategic technology trend and is taking it one step further this year with total experience (TX), a strategy that connects multiexperience with customer, employee and user experience disciplines," said Mr. Burke. "Gartner expects organizations that provide a TX to outperform competitors across key satisfaction metrics over the next three years."

Organizations need a TX strategy as interactions become more mobile, virtual and distributed, mainly due to COVID-19. TX strives to improve the experiences of multiple constituents to achieve a transformed business outcome. These intersected experiences are key moments for businesses recovering from the pandemic that are looking to achieve differentiation via capitalizing on new experiential disruptors.

Privacy-Enhancing Computation

CIOs in every region face more privacy and noncompliance risks than ever before as global data protection legislation matures. Unlike common data-at-rest security controls, privacy-enhancing computation protects data in use while maintaining secrecy or privacy.

Gartner believes that by 2025, half of large organizations will implement privacy-enhancing computation for processing data in untrusted environments and multiparty data analytics use cases. Organizations should start identifying candidates for privacy-enhancing computation by assessing data processing activities that require transfers of personal data, data monetization, fraud analytics and other use cases for highly sensitive data.

Distributed Cloud

Distributed cloud is the distribution of public cloud services to different physical locations, while the operation, governance and evolution of the services remain the responsibility of the public cloud provider. It provides a nimble environment for organizational scenarios with low-latency, data cost-reduction needs and data residency requirements. It also addresses the need for customers to have cloud computing resources closer to the physical location where data and business activities happen.

By 2025, most cloud service platforms will provide at least some distributed cloud services that execute

The cybersecurity mesh enables anyone to access any digital asset securely, no matter where the asset or person is located. It decouples policy enforcement from policy decision making via a cloud delivery model and allows identity to become the security perimeter. By 2025, the cybersecurity mesh will support over half of digital access control requests

at the point of need. "Distributed cloud can replace private cloud and provides edge cloud and other new use cases for cloud computing. It represents the future of cloud computing," said Mr. Burke.

Anywhere Operations

Anywhere operations refers to an IT operating model designed to support customers everywhere, enable employees everywhere and manage the deployment of business services across distributed infrastructures. It is more than simply working from home or interacting with customers virtually – it also delivers unique value-add experiences across five core areas: collaboration and productivity, secure remote access, cloud and edge infrastructure, quantification of the digital experience and automation to support remote operations.

By the end of 2023, 40% of organizations will have applied anywhere operations to deliver optimized and blended virtual and physical customer and employee experiences.

Cybersecurity Mesh

The cybersecurity mesh enables anyone to access any digital asset securely, no matter where the asset or person is located. It decouples policy enforcement from policy decision making via a cloud delivery model and allows identity to become the security perimeter. By 2025, the cybersecurity mesh will support over half of digital access control requests. "The COVID-19 pandemic has accelerated the multidecade process of turning the digital enterprise inside out," said Mr. Burke. "We've passed a tipping point — most organizational cyberassets are now outside the traditional physical and logical security perimeters. As anywhere operations continues to evolve, the cybersecurity mesh will become the most practical approach to ensure secure access to, and use of, cloud-located applications and distributed data from uncontrolled devices."

Intelligent Composable Business

"Static business processes that were built for efficiency were so brittle that they shattered under the shock of the pandemic," said Mr. Burke. "As CIOs and IT leaders struggle to pick up the pieces, they're beginning to understand the importance of business capabilities that adapt to the pace of business change."

An intelligent composable business radically re-engineers decision-making by accessing better information and responding more nimbly to it. For example, machines will enhance decision making in the future, enabled by a rich fabric of data and insights. Intelligent composable business will pave the way for redesigned digital business moments, new business models, autonomous operations and new products, services and channels.

AI Engineering

Gartner research shows only 53% of projects make it from artificial intelligence (AI) prototypes to production. CIOs and IT leaders find it hard to scale AI projects because they lack the tools to create and manage a production-grade AI pipeline. The road to AI production means turning to AI engineering, a discipline focused on the governance and life cycle management of a wide range of operationalized AI and decision models, such as machine learning or knowledge graphs. AI engineering stands on three core pillars – DataOps, ModelOps and DevOps. A robust AI engineering strategy will facilitate the performance, scalability, interpretability and reliability of AI models while delivering the full value of AI investments.

Hyperautomation

Business-driven hyperautomation is a disciplined approach that organizations use to rapidly identify, vet and automate as many approved business and IT processes as possible. Although hyperautomation has been trending at an unrelenting pace for the past few years, the pandemic has heightened demand with the sudden requirement for everything to be "digital first." The backlog of requests from business stakeholders has prompted more than 70% of commercial organizations to undertake dozens of hyperautomation initiatives as a result.

"Hyperautomation is now inevitable and irreversible. Everything that can and should be automated will be automated," said Mr. Burke.

10 ways to reduce IT costs in tough times

The COVID-19 pandemic has had widespread impact on the global economy, leaving many CIOs with the challenge of making immediate IT cost savings, according to Gartner, Inc.

IT SPENDING is forecast to contract across all categories and regions in 2020. While businesses in most industries have begun to reopen, pandemic mitigation measures such as lockdowns, social distancing, travel restrictions and border shutdowns have created financial burdens, with the transportation, manufacturing and natural resources industries the most severely impacted.

Speaking at the recent Gartner IT Symposium/ Xpo APAC, Chris Ganly, senior research director at Gartner said COVID-19 has fundamentally transformed the way people are spending their money, and organizations simply have to respond. Gartner advocates a strategic cost optimization approach, which is a continuous discipline to managing spending while maximizing business value, rather than simply cutting costs.

"Difficult times call for difficult actions," said Mr. Ganly. "But even in organizations fighting to survive, CIOs need to approach cost cutting in the least damaging way to the medium-and long-term health of the business. This will help them recover faster in 2021 and beyond."

Gartner advises CIOs to follow 10 rules when faced with the need to cut IT budgets quickly (see Figure 1).

1. Target immediate impact

Eliminate, reduce or suspend items that will hit the budget in weeks or months, not in years. Examples

include expenses that are incurred and paid monthly or quarterly on a "pay as you go" basis, rather than annually.

2. Reduce, don't freeze
Focus on costs that can truly be reduced or eliminated, not just frozen for the current period, only to reappear again further down the line.

3. Cash is king
Target items that will have a real cash impact on the profit and loss statement rather than noncash items like depreciation or amortization.

4. Plan to do it once
Most organizations don't cut deeply enough the first time, which means they often need to revisit costs and do it again. This is particularly relevant for staff cuts, where cycles of ongoing reductions can be very damaging.

5. Carefully inspect accounts
Work with your finance partner to obtain a solid view of the expense level detail, such as expense accounts, accruals and prepayments. Use this view to identify specific cash reductions that will immediately have an impact.

6. Target unspent and uncommitted expenses
Unless payments (or commitments) can be recovered or prepayments returned, the most immediate impact will be on unspent or uncommitted payments. Evaluate contracts for renegotiation and termination clauses.

7. Be Holistic: Include Capital
Typically, operating expenditures are the easiest to impact, but capital expenditures can also be reduced. Gartner's IT Key Metrics Data shows that 25% of the average IT budget is spent on capital, so ensure that the complete range of IT spend is considered for rapid reductions.

8. Sunk costs are irrelevant
When it comes to saving money, it is commonly said that "sunk costs are irrelevant," meaning that future spend should be considered without relation to past

Figure 1: Ten Rules for Rapid IT Cost Reduction

Source: Gartner (October 2020)

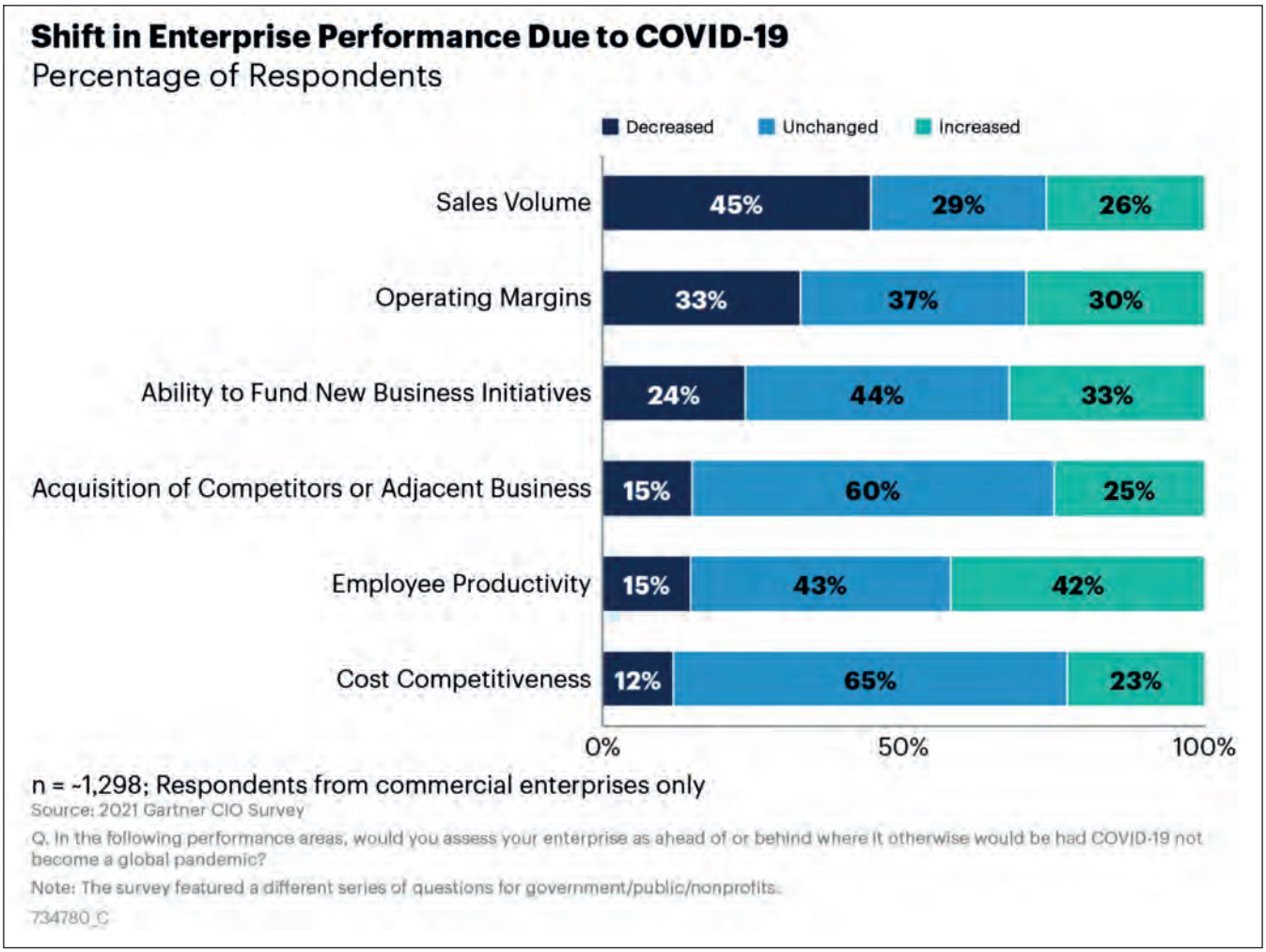

Figure 1. Shift in Enterprise Performance Due to COVID-19 (% of Respondents)

Source: Gartner (October 2020)

spending or "sunk costs." From a rapid cost reduction standpoint this is certainly true, but it's still worth considering whether the saving will be more than the benefit that can and will be delivered by continuing.

9. Address discretionary and nondiscretionary cost

Discretionary spending, such as for new projects, additional capability or services, is often seen as an easier place to cut. However, even nondiscretionary "run the business" expenses such as IT infrastructure and operations can be cut by reducing usage or service levels.

10. Tackle both variable and fixed costs

Fixed costs are expenses that remain constant, regardless of activity or volume, such as office rent, subscriptions and payroll. For fixed costs, focus on elimination. Variable costs change with activity or volume, for example, telecommunications, contractors and consumables. For variable costs, focus on both reduction and elimination.

Top performing enterprises are prioritise digital innovation during the pandemic

Top performing enterprises are accelerating digital innovation and leveraging emerging technologies to come out stronger on the other side of the COVID-19 pandemic, which has arguably been the most significant "turn" in 2020, according to Gartner, Inc.'s annual global survey of CIOs. 2021 will be a race to digital, with the spoils going to those organizations that can maintain the momentum built up during their response to the pandemic.

"Nothing, yet everything, has changed for the CIO," said Andy Rowsell-Jones, distinguished research vice president at Gartner. "The support for remote work that the COVID-19 pandemic brought on might be the biggest win for CIOs since Y2K.

They now have the attention of the CEO, they have convinced senior business leaders of the need to modernize technology, and they have prompted boards of directors to accelerate enterprise digital business initiatives. CIOs must seize this moment, because they may never get another opportunity like it."

The 2021 Gartner CIO Agenda survey gathered data from 1,877 CIO respondents in 74 countries and all major industries, representing approximately $4.7 trillion in revenue/public-sector budgets and $85 billion in IT spending.

Survey reveals four ways cios can seize the moment

The 2021 Gartner CIO Agenda survey revealed four ways in which CIOs can make a difference both in digital business acceleration and in long-term agility: win differently, unleash force multipliers, banish drags and redirect resources.

Win Differently

CIOs can help the enterprise anticipate the increasingly digital interactions expected by customers. Seventy-six percent of survey respondents said that demand for new digital products and services increased in 2020, with even more respondents (83%) reporting that it will increase in 2021. "This is a watershed moment for CIOs," said Mr. Rowsell-Jones. "There is no going back to the way business used to be."

The survey uncovered two areas of customer digitalization where top performers* are significantly more aggressive than typical performers: the use of digital channels to reach customers and achieve citizen engagement, along with the rate of introduction of new digital products and services. Nine out of ten of the top performers are pursuing digital channels, and almost three-quarters are introducing digital products faster.

Organizations that have increased their use of digital channels to reach customers are 3.5 times more likely to be a top performer than a trailing performer. "Those at the top have gone all-in on digital business, and they have developed the capabilities to allow them to do it," said Mr. Rowsell-Jones.

Unleash Force Multipliers

Respondents were asked to characterize certain changes related to enterprise IT leadership trends as a result of the pandemic. Roughly 70% of CIOs deepened their knowledge of specific business processes to advise the business, and the same proportion did more to measure and articulate the value of IT. "Although the COVID-19 response appeared to be a simple exercise of deploying PCs, it created profound opportunities for CIOs," said Mr. Rowsell-Jones. "CIOs were able to refocus IT leadership around digital business acceleration and remodel the enterprise's core technology. At one point or another, every CIO got a chance to shine during COVID-19."

Banish Drags

The survey found that CIOs can help accelerate digital by systemically seeking out and eliminating drags (e.g., detrimental supplier performance during COVID-19). While most respondents reported they were behind in sales volumes during the pandemic, only 29% of top performers reported a decrease in sales volume versus 45% of typicals and 62% of trailings.

However, there were still a few areas that stood strong: Respondents reported increased performance for new business initiatives, acquisitions, cost competitiveness, and employee productivity (see Figure 1).

"Although revenue took a big hit, CIOs decided to fight back rather than go into a defensive crouch," said Mr. Rowsell-Jones.

When asked about shifts in demand, 58% of top performers reported an increase in demand from new post-COVID customers versus 49% for the typical group and 37% for those trailing.

Redirect Resources

Survey respondents projected a 2% IT budget increase for 2021, on average – slightly down from

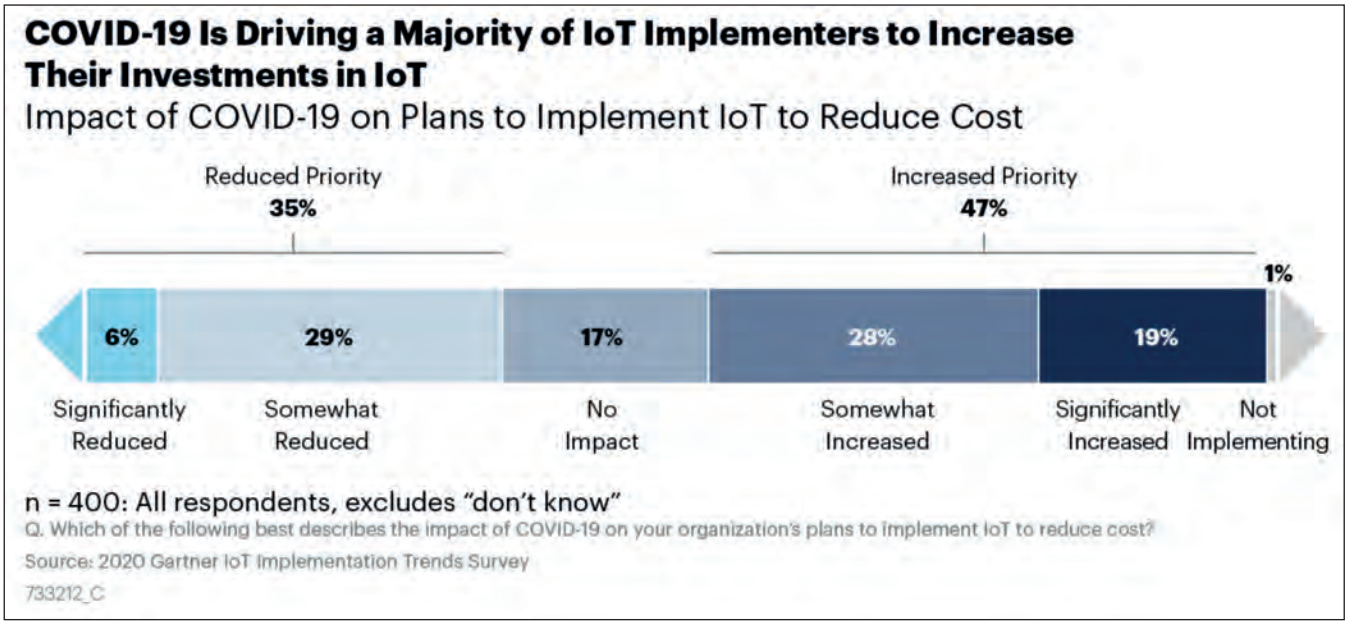

Figure 1. Impact of COVID-19 on Plans to Implement IoT to Reduce Costs

Source: Gartner (October 2020)

Table 1. Worldwide IT Spending Forecast (Millions of U.S. Dollars)

	2019 Spending	2019 Growth (%)	2020 Spending	2020 Growth (%)	2021 Spending	2021 (%) Growth (%)
Data Center Systems	214,911	1.0	208,292	-3.1	219,086	5.2
Enterprise Software	476,686	11.7	459,297	-3.6	492,440	7.2
Devices	711,525	-0.3	616,284	-13.4	640,726	4.0
IT Services	1,040,263	4.8	992,093	-4.6	1,032,912	4.1
Communications Services	1,372,938	-0.6	1,332,795	-2.9	1,369,652	2.8
Overall IT	**3,816,322**	**2.4**	**3,608,761**	**-5.4**	**3,754,816**	**4.0**

Source: Gartner (October 2020)

the 2020 survey (2.8%). In order to direct investments and people toward new business priorities in the Renewal phase, top performers are leaning into this shift more than typical or trailing performers, with 63% of top performers stating funding for digital innovation has increased and only 52% of typical performers reporting the same.

Organizations that have increased their funding of digital innovation are 2.7 times more likely to be a top performer than a trailing performer.
"Top performers got a head start because their CIOs faced fewer constraints," said Mr. Rowsell-Jones. "They were more likely to secure additional IT funding to support experimentation than their typical and trailing counterparts."

CIOs are continuing to prioritize cybersecurity investments

CIOs reported investment shifts toward technologies that support digitalization. With the opening of new attack surfaces due to the shift to remote work, cybersecurity spending continues to increase. 61% of respondents are increasing investment in cyber/information security, followed closely by business intelligence and data analytics (58%) and cloud services and solutions (53%).

"Last year, I told CIOs that success in 2020 meant increasing the preparedness of both the IT organization and the enterprise as a whole to withstand impending business disruption," said Mr. Rowsell-Jones. "This truth came at enterprises full force with the COVID-19 pandemic. In 2021, CIOs must build on the momentum they created for their enterprises and continue to be involved in higher-value, more strategic initiatives. The better CIOs perform for the business, the more the business will ask of them next year."

IoT investments to increase

Despite the disruptive impacts of COVID-19, 47% of organizations plan to increase their investments in the Internet of Things (IoT), according to a recent survey from Gartner, Inc.

Following the COVID-19 lockdown, the survey found that 35% of organizations reduced their investments in IoT while a larger number of organizations are planning to invest more in IoT implementations to reduce costs (see Figure 1).

One reason behind the increase is that while companies have a limited history with IoT, IoT implementers produce a predictable ROI within a specified timeframe. "They use key performance indicators (KPIs) to track their business outcomes and for most of them they also specify a time frame for financial payback of their IoT investments, which is on the average three years," said Benoit Lheureux, research vice president at Gartner.

In addition, as IoT investments are relatively new, most companies have plenty of "low hanging fruit" cost-saving opportunities to pursue, such as predictive-maintenance on commercial and industrial assets like elevators or turbines, and optimization of processes such as increasing manufacturing yield.

Digital twins and AI drive IoT adoption

As a result of COVID-19, 31% of survey respondents said that they use digital twins to improve their employee or customer safety, such as the use of remote asset monitoring to reduce the frequency of in-person monitoring, like hospital patients and mining operations.

The survey showed that 27% of companies plan to use digital twins as autonomous equipment, robots or vehicles. "Digital twins can help companies recognize equipment failures before they stall production, allowing repairs to be made early or at less cost," said Mr. Lheureux. "Or a company can use digital twins to automatically schedule the repair of multiple pieces

of equipment in a manner that minimizes impact to operations."

Gartner expects that by 2023, one-third of mid-to-large-size companies that implemented IoT will have implemented at least one digital twin associated with a COVID-19-motivated use case.

The enforcement of safety measures has also fueled the adoption of artificial intelligence (AI) in the enterprise. Surveyed organizations said they have applied AI techniques in a pragmatic manner. Twenty-five percent of organizations are favoring automation (through remote access and zero-touch management), while 23% are choosing procedure compliance (safe automation measures) in order to reduce COVID-19 safety concerns. For example, organizations can monitor work areas using AI-enabled analysis of live video feeds to help enforce safe social distancing compliance in high-traffic areas such as restaurants and manufacturing lines.

Gartner expects that by 2023, one-third of companies that have implemented IoT will also have implemented AI in conjunction with at least one IoT project.

Worldwide IT spending to grow 4% in 2021

Worldwide IT spending is projected to total $3.8 trillion in 2021, an increase of 4% from 2020, according to the latest forecast by Gartner, Inc. IT spending in 2020 is expected to total $3.6 trillion, down 5.4% from 2019.

"In the 25 years that Gartner has been forecasting IT spending, never has there been a market with this much volatility," said John-David Lovelock, distinguished research vice president at Gartner. "While there have been unique stressors imposed on all industries as the ongoing pandemic unfolds, the enterprises that were already more digital going into the crisis are doing better and will continue to thrive going into 2021."

All IT spending segments are forecast to decline in 2020 (see Table 1). Enterprise software is expected to have the strongest rebound in 2021 (7.2%) due to the acceleration of digitalization efforts by enterprises supporting a remote workforce, delivering virtual services such as distance learning or telehealth, and leveraging hyperautomation to ensure pandemic-driven demands are met.

Spending on data center systems will experience the second highest of growth of 5.2% in 2021 as hyperscalers accelerate global data center build out and regular organizations resume data center expansion plans and allow staff to be physically back onsite.

Despite the increase in cloud activity in 2020 as organizations shifted to a remote-work-first environment, enterprise cloud spending – which falls into multiple categories – will not be reflected in vendors' revenue until 2021.

"The spending slowdown that took place from roughly April through August of this year, coupled with cloud service providers' 'try before you buy' programs, is shifting cloud revenue out of 2020," said Mr. Lovelock. "Cloud had a proof point this year — it worked throughout the pandemic, it scaled up and it scaled down. This proof point will allow for accelerated penetration of cloud through 2022."

"With revenue uncertainty promoting cash from being King to being Emperor, CIOs are now prioritizing IT projects where the time to value is lowest," said Mr. Lovelock.

"Companies have more IT to do and less money to do it, so they are pulling money out of the areas they can afford, such as mobile phone and printer refreshes, which is why there will be less growth in the devices and communications services segments," added Mr. Lovelock. "Instead, CIOs are spending more in areas that will accelerate their digital business, such as IaaS or customer relationship management software."

Moving forward, digital transformation will not be subject to the same ROI justification it was pre-pandemic as the mandate for IT becomes business survival, rather than growth.

IDC reveals 2021 digital transformation predictions

Accelerated DX investments create economic gravity as companies build on existing strategies and investments, becoming digital-at-scale future enterprises.

INTERNATIONAL DATA CORPORATION has unveiled IDC FutureScape: Worldwide Digital Transformation 2021 Predictions. According to the new report, despite a global pandemic, direct digital transformation (DX) investment is still growing at a compound annual growth rate (CAGR) of 15.5% from 2020 to 2023 and is expected to approach $6.8 trillion as companies build on existing strategies and investments, becoming digital-at-scale future enterprises.

The predictions from the IDC FutureScape for Worldwide Digital Transformation are:

Prediction 1: Accelerated DX Investments Create Economic Gravity

The economy remains on course to its digital destiny with 65% of global GDP digitalized by 2022 and will drive over $6.8 trillion of direct DX investments from 2020 to 2023.

Prediction 2: Digital Organization Structures and Roadmaps Mature

By 2023, 75% of organizations will have comprehensive digital transformation (DX) implementation roadmaps, up from 27% today, resulting in true transformation across all facets of business and society.

Prediction 3: Digital Management Systems Mature

By 2023, 60% of leaders in G2000 organizations will have shifted their management orientation from processes to outcomes, establishing more agile, innovative, and empathetic operating models.

Prediction 4: The Rise of the Digital Platform and Extended Ecosystems

By 2025, driven by volatile global conditions, 75% of business leaders will leverage digital platforms and

ecosystem capabilities to adapt their value chains to new markets, industries, and ecosystems.

Prediction 5: A Digital First Approach
While "digital first" prevails in every experience, 60% of enterprises will invest heavily in digitalizing employee experience in 2021, transforming the relationship between employers and employees.

Prediction 6: Business Model Reinvention
By 2021, at least 30% of organizations will accelerate innovation to support business and operating model reinvention, fast-tracking transformation programs to future-proof their businesses.

Prediction 7: Sustainability and DX
By 2022, the majority of companies will realize greater value by combining digital and sustainability, giving rise to digitally-driven and sustainably-enabled projects as the de-facto standard.

Prediction 8: Digitally Native Cultures
To thrive in digital supremacy economy, 50% of enterprises will implement the organizational culture optimized for DX in 2025, based on customer-centric and data-driven.

Prediction 9: Accelerating Digital Experiences
By 2022, 70% of all organizations will have accelerated use of digital technologies, transforming existing business processes to drive customer engagement, employee productivity, and business resiliency.

Prediction 10: Business Innovation Platforms
By 2023, 60% of G2000 companies will build their own business innovation platform to support innovation and growth in the new normal.

According to Shawn Fitzgerald, research director, Worldwide Digital Transformation Strategies, "Organizations with new digital business models at their core that are successfully executing their enterprise-wide strategies on digital platforms are well positioned for continued success in the digital platform economy. Our 2021 digital transformation predictions represent areas of notable opportunity to differentiate your own digital transformation strategic efforts."

Worldwide CIO agenda 2021 predictions

While technology is critical factor, protecting and promoting the health, safety, and welfare of all key stakeholders is lynchpin to gaining trust and loyalty, foundations of business success today. As the COVID-19 pandemic unfolded, CIOs faced epic challenges and the road to recovery stretches ahead. For many business leaders, recovery isn't just a return to their former state, but a top to bottom rethinking of what business they need to be in, and how they must be run.

To support CIOs and IT leaders in this endeavor, International Data Corporation (IDC) has unveiled the IDC FutureScape: Worldwide CIO Agenda 2021 Predictions. As the chief owners of the digital infrastructure that underpins all aspects of modern enterprises, CIOs must play pivotal roles in the road to recovery, "seeking the next normal" while still performing their traditional roles.

This new IDC study outlines concrete actions that CIOs can and must take to create resilient and adaptive future enterprises with technology.

IDC analysts Joe Pucciarelli and Serge Findling recently presented the key predictions that will impact CIOs and IT professionals worldwide over the next one to five years. With the insights and guidance of IDC's global CIO Agenda team, senior IT leaders and line-of-business executives will be armed with the tools and strategies needed to effectively manage and communicate their IT investment priorities and implementation strategies, leading IT through the "next normal."

"In a time of turbulence and uncertainty, CIOs and senior IT leaders must discern how IT will enable the future growth and success of their enterprise while ensuring its resilience," said Findling, vice president of Research for IDC's IT Executive Programs (IEP)."The ten predictions in this study outline key actions that will define the winners in recovering from current adverse events, building resilience, and enabling future growth."

The predictions from the IDC FutureScape for Worldwide CIO Agenda are:

Prediction 1 - #CIOAIOPS:
By 2022, 65% of CIOs will digitally empower and enable front-line workers with data, AI, and security to extend their productivity, adaptability, and decision-making in the face of rapid changes.

Prediction 2 - #Risks:
Unable to find adaptive ways to counter escalating cyberattacks, unrest, trade wars, and sudden collapses, 30% of CIOs will fail in protecting trust – the foundation of customer confidence – by 2021.

Prediction 3 - #TechnicalDebt:
Through 2023, coping with technical debt accumulated during the pandemic will shadow 70% of CIOs, causing financial stress, inertial drag on IT agility, and "forced march" migrations to the cloud.

Prediction 4 - #CIORole:
By 2023, global crises will make 75% of CIOs integral to business decision making as digital infrastructure becomes the business OS while moving from business continuation to re-conceptualization.

Prediction 5 - #Automation:
To support safe, distributed work environments, 50% of CIOs will accelerate robotization, automation, and augmentation by 2024, making change management a formidable imperative.

Prediction 6 - #RollingCrisis:
By 2023, CIO-led adversity centers will become a permanent fixture in 65% of enterprises, focused on building resilience with digital infrastructure, and flexible funding for diverse scenarios.

Prediction 7 - #CX:
By 2025, 80% of CIOs alongside LOBs will implement intelligent capabilities to sense, learn, and predict changing customer behaviors, enabling exclusive customer experiences for engagement and loyalty.

Prediction 8 - #Low/NoCode:
By 2025, 60% of CIOs will implement governance for low/no-code tools to increase IT and business productivity, help LOB developers meet unpredictable needs, and foster innovation at the edge.

Prediction 9 - #ControlSystems:
By 2025, 65% of CIOs will implement ecosystem, application, and infrastructure control systems founded on interoperability, flexibility, scalability, portability, and timeliness.

Prediction 10 - #Compliance:
By 2024, 75% of CIOs will absorb new accountabilities for the management of operational health, welfare, and employee location data for underwriting, health, safety, and tax compliance purposes.

Cloud to be a $1 trillion market in 2024

The COVID-19 pandemic has largely proven to be an accelerator of cloud adoption and extension and will continue to drive a faster conversion to cloud-centric IT. According to a new whole cloud forecast from International Data Corporation (IDC), total worldwide spending on cloud services, the hardware and software components underpinning cloud services, and the professional and managed services opportunities around cloud services will surpass $1.0 trillion in 2024 while sustaining a double-digit compound annual growth rate (CAGR) of 15.7%. "Cloud in all its permutations – hardware/software/services/as a service as well as public/private/

hybrid/multi/edge – will play ever greater, and even dominant, roles across the IT industry for the foreseeable future," said Richard L. Villars, group vice president, Worldwide Research at IDC. "By the end of 2021, based on lessons learned in the pandemic, most enterprises will put a mechanism in place to accelerate their shift to cloud-centric digital infrastructure and application services twice as fast as before the pandemic."

The strongest growth in cloud revenues will come in the as a service category – public (shared) cloud services and dedicated (private) cloud services. This category, which is also the largest category in terms of overall revenues, is forecast to deliver a five-year CAGR of 21.0%. By 2024, the as a service category will account for more than 60% of all cloud revenues worldwide.

The services category, which includes cloud-related professional services and cloud-related management services, will be the second largest category in terms of revenue but will experience the slowest growth with an 8.3% CAGR.

This is due to a variety of factors, including greater use of automation in cloud migrations. The smallest cloud category, infrastructure build, which includes hardware, software, and support for enterprise private clouds and service provider public clouds, will enjoy solid growth (11.1% CAGR) over the forecast period.

While the impact of COVID-19 could have some negative effects on cloud adoption over the next several years, there are a number of factors that are driving the cloud market forward.

- The ecosystem of tech companies helping customers migrate to cloud environments, create new innovations in the cloud, and manage their expanding cloud environments will enable enterprises to meet their accelerated schedules for moving to cloud.
- The emergence of consumption-based IT offerings are aimed at leveraging public cloud-like capabilities in an on-premises environment that reduces the complexity and restructures the cost for enterprises that want additional security, dedicated resources, and more granular management capabilities.
- The adoption of cloud services should enable organizations to shift IT from maintenance of legacy IT to new digital transformation initiatives, which can lead to new business revenue and competitiveness as well as create new opportunities for suppliers of professional services.
- Hybrid cloud has become central to successful digital transformation efforts by defining an IT architectural approach, an IT investment strategy, and an IT staffing model that ensures the enterprise can achieve the optimal balance across dimensions without sacrificing performance, reliability, or control.

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Key technology investment trends

Recent IDC data shows that actual market performance has been stronger than suggested by survey and market indicators, especially in the U.S., due largely to cloud and remote work support. Service provider investments to meet demand for cloud and digital services are stable compared to other sectors and remote work/learning has driven stronger PC volume and a greater focus on security for the year. "Overall information and communications technology (ICT) spending is expected to have a 5% compound annual growth rate (CAGR) through 2024. In terms of total IT spending, we are seeing a more shallow V-shaped drop this year. Total IT spending will drop to about 1% growth this year, but this is far stronger than the 3% decline that was expected earlier in the year," said IDC President Crawford Del Prete.

In a recent IDC survey, 42% of technology decision makers indicated that their organizations plan to invest in technology to close the digital transformation gap. "The pandemic created a business necessity for increasing technology investment and accelerating digital transformation timetables," said Meredith Whalen, Chief Research Officer at IDC. "What we are learning is that many of these initiatives that started

as ways to mitigate the economic impact of COVID-19 have become permanent roadmap requirements for Future Enterprise success in the digital economy." IDC's outlook for the Future Enterprise identifies three overarching initiatives that directly link technology investment to digital transformation efforts – creating digital parity across the workforce, designing for new customer demands, and accelerating automation initiatives.

Creating digital parity

Before the pandemic, organizations, on average, had only 14% of their employees working from home. That percentage has increased dramatically – to 45% – and many organizations anticipate that work-from-home employees will remain a large proportion of the workforce going forward. Supporting hybrid workforces and ensuring that remote and work-from-home employees have the same sets of connectivity and productivity tools as their in-office counterparts will be essential to long-term success.

- **Prediction:** By 2023, 75% of the G2000 will commit to providing technical parity to a workforce that is hybrid by design rather than by circumstance, enabling them to work together separately and in real-time.
- **Prediction:** By 2022, an additional $2 billion will be spent on desktop and workspace as a service by the G2000, as 75% of them incorporate employees' home network/workspace as part of the extended enterprise environment.

Designing for new customer demands

Almost half (47.6%) of all U.S. consumers are "very concerned" about their personal health as it relates to the COVID-19 virus, according to IDC's recent U.S. consumer survey. This concern for safety has spurred many businesses to create new contactless consumer experiences, including curbside pickup. Enterprises will also invest in design and user interface requirements for contactless process automation with an emphasis on voice-based experiences and self-service options through mobile apps.

- **Prediction:** By 2023, 75% of grocery ecommerce orders will be picked up curbside or in store, driving a 35% increase in investment in onsite or nearby micro-fulfillment centers.
- **Prediction:** In 2021, 40% of development activities will reprioritize design and user interface to support contactless process automation.

Accelerating automation initiatives

Enterprises will increasingly adopt automated IT operations practices to support the greater scale required for digitally driven enterprises. Robotic process automation (RPA), robotics, and artificial intelligence (AI) technologies will play a more important role in labor automation while a continued focus on autonomous operations will drive investment in Digital Engineering organizations and digital operations technologies.

- **Prediction:** By 2022, 45% of repetitive work tasks will be automated and/or augmented by using "digital co-workers," powered by AI, robotics, and RPA.
- **Prediction:** By 2023, 75% of Global 2000 IT organizations will adopt automated operations practices to transform their IT workforce to support unprecedented scale.

COVID-19's impact on industries

The COVID-19 pandemic has created unique situations for specific industries, including healthcare, hospitality, retail, and small and medium businesses (SMBs), requiring them to rethink the way they use technology to engage with customers.

- **Healthcare:** Telemedicine will be a permanent fixture going forward. With nearly a third of consumers interested in having a telemedicine option post-pandemic, healthcare providers are predicted to increase spending by 70% on connected health technologies by 2023.
- **Hospitality:** Despite being an industry known for people-based services, 85% of hospitality brands will implement self-service technologies by 2021, changing how they engage with guests.
- **Restaurants:** Restaurants have taken the economic brunt of the pandemic and many have turned to home delivery out of necessity. Post-pandemic, 30% of restaurants using third party delivery platforms will deploy native delivery options to eliminate third-party fees, increasing profit by 25%.
- **Retail:** Contactless payments have seen increased adoption during the pandemic and will be viewed as a customer experience imperative going forward, causing 85% of retailers to offer at least two contactless payment options by 2023.
- **SMBs:** At least 30% of SMBs will fail by 2021 leading to a new wave of microbusiness-powered and ecosystem-first disruptors by 2023. These microbusinesses will be single employees that leverage the power of a digital platform to obtain and fulfill work.

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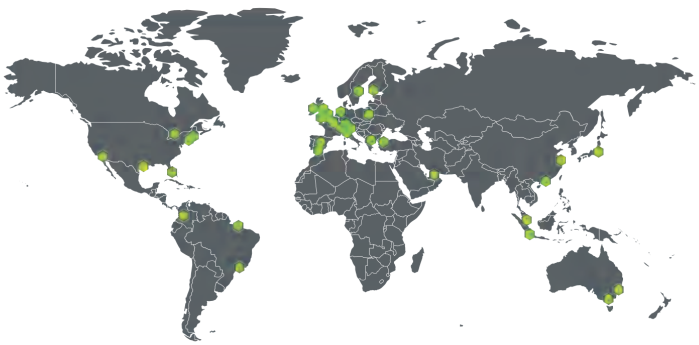

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How to get AI into production

You know you need AI. You have already committed to delivering AI, and you're working to build your organisation into an AI-driven enterprise. To do so, you have hired top-notch data scientists and invested in data science tools – a great start. Yet, somehow your AI projects are still not getting off the ground.

BY SIVAN METZGER, MANAGING DIRECTOR OF MLOPS & GOVERNANCE AT DATAROBOT

RESEARCH shows that the share of AI models deemed 'production worthy' but never put into production is anywhere between 50 and 90%. A recent survey by NewVantage Partners showed that only a mere 15% of leading enterprises have deployed any AI into widespread production. These are staggering figures that mean models are indeed being built and then not going anywhere. So, why is this actually so difficult? What are leaders and teams actually missing? What can they do to finally obtain the long-anticipated value from AI?

Data scientists typically do not see their role as including production rollout and management of their models, and IT or Operations, who usually own all production services across the company, are reluctant to take ownership for machine learning services. This is actually pretty natural from their perspective, as neither group is even remotely familiar with the others' concerns and considerations. However, without bridging the gap between them, progress will simply not happen. Enter MLOps. MLOps precisely solves this challenge by bridging this inherent gap between data teams and IT Ops teams, providing the capabilities that both teams need to work together to deploy, monitor, manage, and govern trusted machine learning models in production without introducing unnecessary risk to their organisation.

What is MLOps?

MLOps, which takes its name from a mature industry process for managing software in production by the name of DevOps, is a practice for alignment and collaboration between data scientists and Operations professionals to help manage production machine learning. This ensures that the burden of productionalising AI does not entirely rest on the data scientist's shoulders. It also ensures that a data

scientist doesn't just throw a model 'over the wall' to the IT team and then forget about it.

Additional issues stem from the fact that machine learning models are typically written in various languages on MLDev platforms unfamiliar to Ops teams, while these models also need to technically run in complex production environments that are unfamiliar to the data teams. Therefore, typically the models ignore the sensitivities and characteristics of those environments and systems. Needless to say, this only amplifies the gaps.

What problems does it solve?

With MLOps, users have a single place to deploy, monitor, and manage all of their production models in a fully governed manner, regardless of how they were created or where they are to be deployed. This is essentially the 'missing link' between creating and writing machine learning, to actually obtaining business value from machine learning.

MLOps removes the inherent business risk that comes with deploying machine learning models without monitoring them, ensuring processes for problem resolution and model replacements. These capabilities become increasingly important particularly during these tumultuous times. It also ensures that all centralised production machine learning processes work under a robust governance framework across your organisation, leveraging and sharing the load of production management with additional teams you already have in place. DataRobot's MLOps centralised hub allows you to foster collaboration between data science and IT teams, while maintaining control over your production machine learning to scale up your AI business adoption with confidence.

How do organisations derive value with AI?

With the right processes, tools, and training in place, businesses will be able to reap many benefits from AI using MLOps, including gaining insight into areas where the data might be skewed. One of the many frustrating parts of running AI models, especially right now, is that the data is constantly shifting.

With MLOps, businesses can quickly identify and act on new information in order to retrain production models on the latest data, using the data pipeline, algorithms, and code used to create the original.

The outline above is what allows users to scale AI services in production, while also minimising risk. Scaling AI across the enterprise is easier said than done. There can be numerous roadblocks that stand in the way, such as lack of communication between the IT and data science teams or lack of visibility into AI outcomes. With MLOps, you can support multiple types of machine learning models created by different tools, as well as supporting software dependencies needed by models across different environments.

Adopting MLOps best practices, processes, and technologies will get your AI projects out of the lab and into production where they can generate value and help transform your business. With MLOps, your data science and IT Operations teams can collaborate to deploy and manage models in production using interfaces that are relevant for each role.

You can continuously improve model performance with proactive management and, last but not least, you can reduce risk and ensure regulatory compliance with a single system to manage and govern all your production models. Put it all together and you can lead a true transformation throughout your organisation. By bridging the gap between IT and data science teams, you can truly adopt AI and demonstrate value from it, while ensuring that you can scale production of your models, eliminating all unnecessary AI-related risk for your company.

Scaling AI: a key route for recovery

COVID-19 has widened the gap between digitally advancing and digitally struggling organizations. Our recent research found that when it comes to AI, 78% of high-performing AI organizations – those who had deployed AI at scale within their organization – continued to progress their initiatives at the same pace as before the pandemic. On the other hand, more than half of the organizations who were struggling to implement AI had to pull their projects.

BY VALERIE PERHIRIN, MANAGING DIRECTOR, INSIGHT-DRIVEN ENTERPRISE, CAPGEMINI, INVENT

HOWEVER, the demand for AI-based technologies is soaring, even among the general population. Almost two thirds of consumers expect to increase the use of touchless interactions through voice assistants, facial recognition, or apps to avoid human interactions and touchscreens post-COVID-191. These technologies, of course, rely on scaled AI.

Businesses need to understand the impact that AI can have on the bottom line and how it can support their recovery strategy as they bounce back from the impacts of COVID-19. Adding AI to business processes speeds up decision making and creates the essential companion for symbiotic operations. When used correctly, the true value of AI is that people can delegate not just processes, but also decision making, and this has a significant impact on efficiency and productivity. But, as many organizations have already discovered, implementing AI at scale is a challenging journey.

Data quality, skills gaps and ethics are all vital considerations to building an AI-powered enterprise. Our recent research also found that seven in ten organizations find a lack of mid to senior-level talent a major challenge for scaling AI. Less than one third of struggling AI organizations feel they have a detailed knowledge of how and why their AI systems produce the output they do. Moreover, nine out of ten organizations believe that ethical issues have resulted from the use of AI systems over the last 2-3 years. To overcome these barriers and harness the power of AI, there are four principles essential to successful implementation which organizations must consider:

Strategize: While the promise of AI might make IT leaders excited to delve straight into implementation,

Given the complexity of achieving scaled AI many organizations choose to work with service providers to address the challenges of this structural and cultural transformation

strategy is key. It's important to think beyond just the short-term goals of implementing AI and consider what the potential goals are for the next 3-5 years. Laying the necessary foundations before commencing wide-scale deployment is also essential. AI needs access to vast amounts of quality proprietary and third-party data which has to be stored and managed properly; deciding how to do so is a fundamental building block to effective AI implementation. However, legacy IT systems can delay the collection, analysis and understanding of data. To resolve this, data needs to be managed as a strategic asset in an organization. Establishing data governance to design, set up, scale, and continuously monitor the data in a firm has clear benefits in supporting the scaling of AI use cases. IT estate modernization also addresses the challenges of fragmented and legacy IT systems and provides faster access to information within a secure environment.

Ethical considerations must also be woven into an organization's strategy from the outset. Customer and employee privacy in particular are a prerequisite. The mindset among IT leaders must be one of transparency, accountability and fairness, building AI systems with ethics-by-design in mind. To do this, the right governance structures must be put in place, as well as building diverse teams to prevent AI bias, with the aim of empowering people in the knowledge that they are interacting with AI – and that the AI systems themselves are trustworthy.

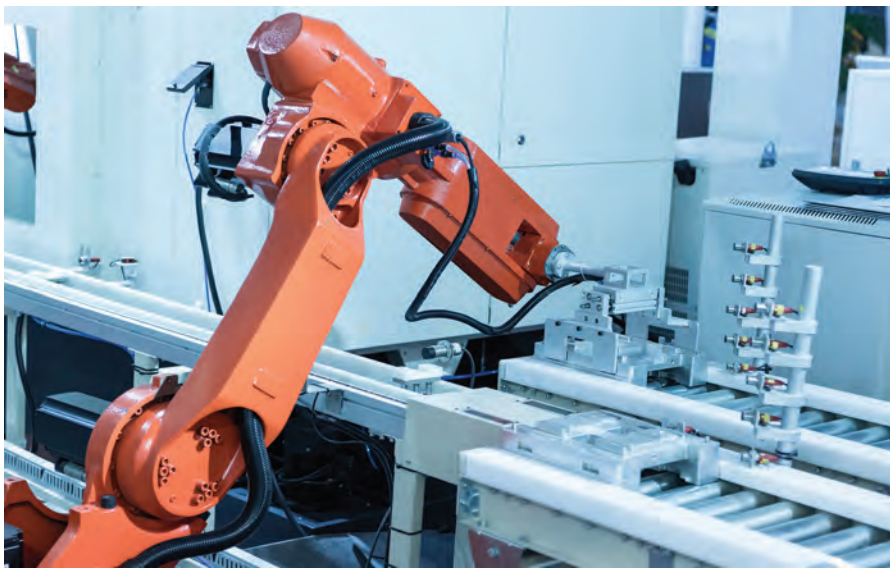
Operationalize: By creating a tiered responsibility system, organizations can ensure that AI implementation is pushed forward at a steady pace. It's recommended to have a central team for policy and strategy; a center of excellence (CoE) for optimizing resources, embedding ethics and facilitation of ideas; helping to weave AI initiatives into the enterprise's wider business goals. After all, AI initiatives are not scaled in silos. They impact multiple business units, so wider involvement makes sense if the aim is to have buy-in across the business.

Nurture: AI requires a new host of skill sets within an organization, from data architects to designers to data scientists. To keep implementation initiatives on track for the long haul, business leaders must also consider a range of business and change management roles including data strategists, AI ethicists and process and automation engineers. While data literacy is important, so are the soft skills to communicate the importance of the new technology to an organization and make sure the whole business is on board. Training and upskilling are key here. Given the complexity of achieving scaled AI many organizations choose to work with service providers to address the challenges of this structural and cultural transformation. This can help to alleviate the workload for internal teams while also bringing fresh perspectives, knowledge, and guidance to AI initiatives.

Monitor: AI models cannot be left to run without intervention. Variations in the nature of data and new information can change outcomes, leading to mistakes and vulnerabilities in AI algorithms. In response, organizations should systematically rate AI models based on the likelihood of them making mistakes and determine appropriate action plans, such as the frequently of monitoring or updating, or which modelling technique to implement.

Once these four principles have been established, businesses must create a collaborative digital workplace that's fit to embrace AI at scale. This means eliminating information silos and enabling self-organizing teams for better collaboration and faster decision making. Combining AI with agile cognitive systems makes business processes more automated and intelligent, driving both decision-making and execution forwards to boost performance.

COVID-19 has put the onus on organizations to embrace AI faster than before. Adopting AI is a complex journey, but the benefits are transformational both in the short- and long-term. No matter where organizations are on their journey, they must invest now to build resilience and agility – and so the future can be AI-enabled.



Using hyper-automation to navigate the new normal

It's no understatement to say businesses are currently navigating one of the most difficult and extended periods of uncertainty in recent history. Coronavirus has turned the world of work upside-down, with many businesses committing to become fully or partially remote for the foreseeable future.

BY NIGEL SEDDON, VP NORTHERN EUROPE, IVANTI.

IN FACT, according to a new survey from the British Council for Offices, the majority of employees now expect organisations to adopt a flexible approach that allows a mixture of remote and onsite working, even when there is no longer a need for social distancing. IT is responsible for making the process of shifting to long-term flexible working as seamless and efficient as possible while helping employees adapt to the new normal and continue to work productively. On top of this, remote working has led to a huge increase in the number of endpoints and IoT devices, which in turn, has led to a more complex data landscape for IT and security teams to manage.

For many organisations, this period has resulted in budgets being severely hampered. However, it has

never been a better time to invest in IT tools, which can drive cost and business efficiencies whilst supporting innovation, as well as helping IT and security to better secure the business from cybercriminals, who are finding more opportunities to infiltrate company networks due to the increase in WFH.

Getting started with hyper-automation

As rapidly growing complexity, security issues and high user expectations are already impacting businesses, it's time to consider hyper-automation as a solution. According to Gartner, 'hyper-automation refers to the combination of multiple machine learning, packaged software and automation tools to deliver work'. This represents a move away from simple automation to more complex, augmented artificial intelligence and machine learning. Implementing hyper-automation with deep learning capabilities will allow businesses to digitally mature.

Hyper-automation is an innovative concept that allows any organisation to proactively and continuously self-heal, using predictive capabilities. Not only this, but it allows businesses to self-secure devices and end users to self-service. The collaboration of the human intelligence of IT teams and hyper-automation bots will guarantee a smooth user experience not only for employees, but consumers and customers too.

Self-healing, self-securing, self-serving

Hyper-automation allows device management to progress from reactive to autonomous, enabling businesses to become truly self-healing. The first step in achieving this is implementing a shift-left approach, whereby problem resolution should be as close to the end user as possible. This means automating resolutions and empowering the user to fix the solution independently. The next step is hyper-automation, which enables devices to autonomously manage themselves without input from a support analyst or user. Time is then freed up within the IT team, allowing them to sideline unnecessary tasks, and prioritise more pressing work. Adopting hyper-automation ultimately provides employees with the ability to continue working uninterrupted, without realising that an issue ever occurred.

Self-securing is the next step in the process, which is an adaptive security approach that utilises automation and machine learning to react swiftly to security threats. When hyper-automation is a part of a layered security approach, autonomous discovery can take place that will continuously monitor for changes and emerging threats, such as a new, unauthorised device being introduced to the network. A predictive algorithm can anticipate threats before they even occur, and prioritise them by responding to the highest risk threats first. Such an algorithm can offer prescriptive guidance and remediation in a proactive, adaptive and fully automated manner. When cyber criminals are increasingly using automation, security teams cannot afford to overlook this innovation. Automation tools are key in speeding up response times and reducing the risk of human error.

The final stage is self-serving. Hyper-automation evolves self-service past the basic self-service portal that users are already familiar with. The current technological innovation in self-service allows users to utilise systems such as virtual agents, chatbots and even automatic phone systems or mobile apps. However, with hyper-automation self-service is only getting more efficient and automated. Hyper-automation enables devices to autonomously create service tickets that can be fulfilled and resolved before the user is even aware there was an issue. This allows employees to work uninterrupted and enables service desk staff to focus on more complex tasks.

Set your business apart

With 2021 on the horizon, businesses are looking for their next competitive advantage in order to survive economic hardship and strengthen themselves for the future. Leveraging hyper-automation can offer businesses a necessary competitive edge. End users are provided with a seamless experience that also optimises performance, understands users' needs and keeps the network secured, all whilst ensuring a smooth-running IT environment. Investing in hyper-automation is vital for IT organisations looking for new ways to maximise productivity whilst keeping employees happy and avoiding wasting resources.

Organisations that prioritise continued digital transformation will find themselves strengthened against further uncertainty and economic strife. The shift from basic automation to hyper-automation is key in navigating the new normal.

Fieldside Assistance:
The agricultural vehicles embracing IoT to fix themselves

When you're responsible for feeding the nation, there's no time to lose. Every farm has a tight schedule to maintain and it's a race against time to ensure that the crops are sown, grown and harvested effectively. No farmer has 20-20 foresight and no existing system is 100% efficient. That's why the future of farming is digital, with connected tractors part of the new way of getting more value from farming manpower.

BY JONATHAN HENRY, UK&I MD, JOHN DEERE.

TIMINGS are particularly important because you can't tell mother nature to hold her horses when you're not ready. A missed window could be disastrous for the profitability of a farm. For example, if you only have a week to sow a specific crop and your planting system breaks down, this could have huge implications for the yield.

This year in particular was a key one for the agriculture sector. The harsh winter meant there was a greater concentration of work that had to be done in the spring. Workers couldn't get it done any earlier. It resulted in the biggest spring sowing campaign in 20 years. And bearing in mind the fact that in the UK, around 50% of arable farms would be winter cropping, there was a huge demand for resource in the spring. And then COVID-19 hit and things got even worse. COVID-19 has upturned supply chains around the world. Retailers have grappled with spikes in demand or uneven supply. Meanwhile, farmers have struggled with both labour and demand, as travel restrictions and restaurant closures hit home. This year's harvest continues under difficult conditions in the UK and Ireland. Although the global pandemic has provided a rude awakening for the entire industry, there are also lessons to be learnt. And there is in fact optimism for the future in the way farmers can adopt technology and become better connected with their operations, their crops and their bottom line as a result.

Socially distanced yet empowered

Whilst we're all familiar with the notion of a connected car; one that can be remotely monitored and controlled from your smartphone – a quiet connected revolution is occurring in our fields too. Today's modern farming equipment is connected and self-managing. Professionals can remotely monitor fleets across farms for hardware issues or performance malfunctions. Farmers can identify faults in real-time and manage them before they become serious. And when maintenance is done pre-emptively using real-time data, before a tractor breaks down unexpectedly, it means there's no need to miss a vital sowing window due to machinery down time.

It isn't just the performance monitoring aspect of connected tractors that is innovative. Farmers, particularly in the COVID-19 context, have benefitted from the connected way that problems are fixed. Aside

from the biggest farming enterprises which may run their own control centres, most entrust the ongoing maintenance and servicing of their machines to an external operator. In these cases, even though many of the technicians were working from home during the lockdown, they could carry out diagnostics remotely.

That's where the flexibility lies; technicians can do tasks like this anywhere in the world, as long as they have an internet connection. And in the cases where they do have to come on site to perform a physical fix, they can arrive with foreknowledge of the problem their fixing and therefore can show up with the correct parts with them. They can use GPS to find the relevant tractor instantly, which can be a huge time-saver on a large farm. This also enables them to observe social distancing.

Then there are those who are just getting into the world of connected tractors. We've been able to carry out socially distanced training to users without even being on site. Trainers can gain remote access to the cab screen in the new machinery and deliver live training that helps workers to make the most of their new tractors straight away. We've seen an increased interest in connected products during the pandemic as more people investigate ways of becoming smarter by overcoming the obstacles thrown at them by COVID-19.

Automation fuels accuracy

In an industry where businesses manage acres of space and produce enough crops to feed hundreds of people, a few centimetres can make all the difference. Farmers are fighting harder than ever before to protect their ever-tight margins and know the slightest of tweaks can make a world of difference. The most efficient farms know that they can no longer rely on brute force to increase their yield. There's only so many workers you can employ, there's only so many hours in a day. With this in mind, finding the best ways to use the people and the acreage you already have, will be the key to the future.

That's why farming is changing for the better. Solutions are available to reach this objective and new technologies are coming on-stream to help farms make efficiency improvements. Automation will give huge amounts of benefit to farmers looking for this enhanced level of precision. Combining autonomous tractors with GPS and correction signals directs vehicles through a field with complete accuracy. At the same time, the driver is given the capacity to work on other tasks while in the cab. Thanks to networking with other machines and consultants, the driver can plan further cultivation measures, for example. All of this saves time which farmers can use to sell their next harvest, safe in the knowledge that the task at hand is inch perfect.

More autonomy in the farmer's job means the industry will become more sustainable, more economical and more environmentally friendly - because every plant will and must be treated in the best possible way.

The AI future

Then there's artificial intelligence, which can have huge benefits for farming. Everything from soil analysis to weed detection to plant health management can be carried out using smart technology. In doing so, it becomes possible to treat local conditions for individual plants or each harvested grain.

AI works in farming by removing the guesswork and relying on data gathered from the field. This means farmers can make decisions based on intelligence rather than 'red sky at night' -type generalities. For instance, the farm's sensor and information systems can permanently analyse the development of yield or yield potential. If the result is not optimal, the intelligent systems can suggest to the farmer what measures they should take or change to achieve an economically better harvest result.

Take it one step further. Camera shots from the field can distinguish crops from weeds, and after comparing those images with pictures on a database, AI can order plants to be sprayed selectively with herbicides. This puts an end to broad area application which is both time consuming and wasteful.
On one hand, farmers will feel as those they've been beaten from pillar to post with merciless obstacles to profitability. This is truer now than ever for many in the industry who are languishing thanks to COVID-19 and other market forces. But on the other hand, we've never had at our disposal the tools to be smarter and get more for less – the Holy Grail of farming. Demands are being placed on farmers not just to produce more, but to do so responsibly. The introduction of connectivity to farms makes them more efficient but also more accountable, with more data and insights than ever.

Trusted Cloud:

Overcoming the tension between sovereignty and innovation

In a world where 80% of businesses depend on globalised supply chains and with an irreversible march towards the cloud, organisations and governments alike are faced with a dilemma. How can we protect our intellectual property at an international level?

BY CÉDRIC PRÉVOST, ORANGE BUSINESS SERVICES

THE CLOUD – which by nature is a cross-border and intangible space – has blurred the notion of territory and borders. With data rapidly becoming one of the world's most valuable resources, the cloud increasingly represents both an economic and a diplomatic challenge.

The restrictions of sovereign cloud

It is now more important than ever that businesses and governments control and understand their data journey at every stage, from producing and sharing data to creating value from it. The move towards the cloud has been followed closely by a dramatic rise in cyber-risks both foreign and domestic. Meanwhile, the manufacturing of electric components, the writing of software's code and the people with the implementation skills needed to address these issues are spread widely across the globe. Currently no solution on the market can claim to combine the broadest possible security guarantees for all these different components, tailored to each companies' regulation framework, while maintaining both maximum scalability of their functionality and the most competitive prices.

As a result, companies are now choosing between different cloud solutions that – to a greater or lesser degree – they "trust". They also roll out and use the highest-performing technologies and services, regardless of their country of origin as and when it is necessary. In the context of the cloud, this raises important questions around data sovereignty. And this is especially true with regards to where their data is stored and the different regulations around data protection. But can we really blame companies for acting this way, when access to the latest technologies is integral to remaining competitive in today's market?

The challenge for governments is to find a way to foster access to modern and effective digital technologies, while protecting the regional interests of their companies and respecting borders. This means protecting the competitiveness of their domestic companies, their intellectual property and the rights of workers operating in their borders. Governments trying to address these issues often turn to sovereign cloud as the solution. The problem is that until recently conversations around sovereign cloud often narrowed down to concerns about data localisation.

This definition is overly restrictive and can lead governments to act hastily without addressing the core issues, and in doing so to stifle innovation. When countries examine the questions of sovereign cloud, it is understandably tempting to impose restrictions on foreign technologies or services while promoting domestic ones. This strategy however is flawed. Most countries lack the resources needed to create national digital champions that can compete with foreign players, many of whom are already well established. Additionally, this restrictive response will hinder domestic companies that have a global presence – or global ambitions.

Finding the right balance

The concerns raised by the cloud are numerous and legitimate, and there are as many solutions as there are industries, data types, or levels of information sensitivity. Yet they all have something in common; realising the full potential of these solutions requires trust. The concept of trusted cloud solutions encompasses that of sovereign cloud solutions and can help solve a challenge inherent to sovereignty, namely that each company has its own definition of it and this definition often differs from that of governments.

A trusted cloud framework needs to take multiple aspects into consideration. Who designs, builds and implements these services and platforms? Who operates them and who keeps them secure?

The concerns raised by the cloud are numerous and legitimate, and there are as many solutions as there are industries, data types, or levels of information sensitivity

How do we ensure that the resources and levels of expertise are available to sustain a European ecosystem of trusted providers and operators? In Europe, a milestone was reached with the launch of Gaia-X, an initiative that will allow us to move beyond the debate on data localisation. The initiative aims to return to Europe its “digital and technological autonomy”. Behind this concept of autonomy is the ability for businesses in Europe to choose with better clarity which services and platforms to use, and for Europe to support its existing industries without turning its back on the rest of the world.

The Gaia-X project is to that extent a great opportunity to steer us in the right direction; we can think regionally to boost local competitiveness and innovation, but we must be careful not to turn inwards by blocking innovations created outside Europe, as we must allow companies to remain successful on the international stage.

Employee wellbeing and Covid-19:

Driving automation within IT support services

The unprecedented impact Covid-19 has had on everyone is well documented, and as the world grapples to find a sense of normality despite the ever-changing circumstances, businesses face the responsibility of protecting employees in this unfamiliar new normal.

BY KEVIN TURNER, DIGITAL WORKPLACE STRATEGY LEAD, EMEA, UNISYS.

TECHNOLOGY is playing a vital role, and the vast growth of remote working has accelerated digital transformation investment in many businesses. The sophistication of automation – artificial intelligence (AI), machine learning and robotics – is driving this digital transformation, with the practical applications of these technologies fast becoming part of daily life. Yet, that's only part of a wider wellbeing picture, with employer responsibility for protecting their teams from localised virus outbreaks under increasing emphasis and scrutiny. IT support must adapt rapidly to enhance both employee experience and wellbeing as well as customer experience for the business.

How will automation impact those who provide support services and the workforce they serve, amid

such challenging times? The future of IT support in the digital workplace is brighter than lights-out predictions, with automation enabling providers to deliver better support experiences to end users.

Does working from home work?

The change in working patterns brought on by the pandemic has caused mass upheaval for businesses, with latest reports indicating such disruption is leading to increased risk of employee mental health issues. In fact, the number of tech workers who say they are currently worried about their own mental health has jumped from 16% before the pandemic to more like three in five. In addition, the majority which accounts for 87% of workers who had started working remotely during the crisis, said they felt pressured to be more productive to "prove the case for working from home post Covid", while 36% employees reported their mental health and wellbeing had suffered as a result of working longer hours during lockdown.

IT workers have felt this pressure more than other areas of the business – their function is crucial to the smooth operation of a distributed workforce. Technology has become central to every effective Covid-19 mitigation strategy, and this remains true for employers operating or reopening their workplace. In particular, automation can play a vital role in the short and long term.

Driving employee wellbeing through automation As we now know, remote workers will no longer "touch base" as often, and the physical worker may well never come into the office. This means that the experience offered by the IT team will need to ensure high level of performance in systems and support so that business as usual in a digital world continues – the performance of the business now rests on their shoulders.

But with the new dispersed workforce, IT teams have been met with a huge increase of tickets and support requests which have added to their workload, and made it more difficult to work on strategic initiatives. This is where automation can play a part in easing the strain felt by IT teams.

By monitoring and analysing IT consumption in a business, IT teams can deploy automation to pinpoint the causes of frequent IT issues, and deploy fixes quickly and easily, allowing them to take a more proactive approach to their day-to-day tasks. Automation gives workers time for more higher-value tasks such as problem-solving, finding solutions and developing new ideas. This will empower employees, and generate a more engaging and challenging work experience, and play a part in alleviating the pressure that the IT team is under.

Technology is by no means a perfect substitute for direct human contact and presence. But we have already seen the rapid development and deployment

Driving employee wellbeing through automation As we now know, remote workers will no longer "touch base" as often, and the physical worker may well never come into the office. This means that the experience offered by the IT team will need to ensure high level of performance in systems and support so that business as usual in a digital world continues – the performance of the business now rests on their shoulders.

of technologies that can enable colleagues, customers, friends, and family to connect in new ways, from virtual planning sessions, new business pitches, right through to virtual Friday drinks and even birthday celebrations.

As we continue to adjust to the new normal, it is vital that businesses harness the power of technology to mitigate risks to employee health and business operations. Business leaders must harness the power of automation to empower IT teams to deliver the support needed for employees during such testing times, to build confidence, boost trust, and give leaders the insight needed to make the right decisions.

The age of the software development novice: how no-code tools can inspire innovation in businesses

Philip White, Managing Director at Audacia, discusses the evolution of low-code and no-code software and how they enable users to realise creative ideas through technology

ONE OF THE GREATEST challenges for businesses today is balancing the need for essential digital transformation with smaller budgets, less time and fewer internal software development skills.

Even though internal IT departments are usually the ones to turn to for this level of digital development, accelerated demand paired with significant skills shortages in the UK technology sector means they are unable to keep up or are simply saying no. Fortunately, there is an alternative solution. No-code platforms enable end-users without coding skills to build cloud-based software. With the help of no-code platforms, users can build a completely bespoke interface with functionality tailored to solve or address a specific business requirement.

Depending on the size or resource of individual businesses, leaders must consider whether a no-code or low-code platform is best suited to their needs as both types of platforms serve different purposes and meet diverse requirements.

No-code exists on one end of a spectrum, with no manual coding or developer required, whereas low-code development speeds up the production of software but still requires intervention by a programmer due to the degree of coding required. In fact, some low-code platforms require such a degree of manual programming skill to deliver complete products that they require full – and sometimes very expensive – development programmes.

The low learning curve associated with no-code development means it can be applied to most businesses at all ages and for employees with different ranges of technical abilities. Most notably, no-code development is great for new business or SMEs because it removes the costly, exhaustive software development process and places the project in the hands of the business. There are, however, actions and decisions businesses still need to take when introducing a no-code platform into their business operations. These include:

- Making a definite decision to move towards more flexible enterprise software
- Planning smaller software development projects you want to get over the line that otherwise would never happen
- Empowering your employees with no code platforms

Once businesses have embraced these, they will be able to target and improve a number of areas within the business.

The first area of improvement affected by no-code applications is internal operations. Back office applications bolster internal operations because they provide the functionality to streamline your business' data for internal use. Some no-code platforms allow larger companies with several departments to tailor operations functionality to suit their specific needs.

For example, finance departments can build interfaces with filter/search and import/export functionalities embedded and analytics departments are able to build grids, forms, and workflows into their no-code platforms.

No-code platforms provide end-users with the ability to tailor user interfaces, delivering a fit-for-purpose, appropriate customer experience. With off-the-shelf software, businesses must factor in training sessions to learn about the platform and its functions, as well as allocating additional time following the sessions to get acquainted with the software.

Placing the design in the user's hands removes the need for this extra time spent and improves overall employee sentiment when using the application.

Business transformation and overall scalability is also supported by implementing no-code platforms. Adaptability is a key factor in achieving business growth and, with some businesses still turning to internal IT departments updating legacy systems, these same businesses often run the risk of being left behind and becoming obsolete. Utilising no-code platforms allows businesses to accelerate app creation and deployment – while not falling behind in an ever-evolving market.

From a project management standpoint, no-code delivers many of the same benefits as any digitisation project, just a lot faster and far more cost-effective. There are many benefits to using a no-code platform, these include:

1. Higher degree of control
No-code platforms offer more control than setting up and sharing a spreadsheet by allowing the user to document workflows and entity models, establish the fields that need to be included and invite the people who need to be involved.

2. Relieves capacity in the IT department
Empowering employees to develop the software they need enables your business to move forward at speed, allowing the IT department to focus on other priorities.

3. Drives innovation and closes technical skills gap
Empowering your organisation's employees with no-code platforms will enable them to realise creative ideas through technology.

Examples of these include solving problems directly related to their work or scaling-up solutions to organisational problems; ideas can be rapidly formulated, tested, and prototyped, further plugging the software development skills gap with which many organisations struggle.

4. Less risk, more functionality
Unlike offline spreadsheets, no-code developed software is backed-up in the cloud and offers granular auditing, change controls, rolling back and versioning. Permissions can also be granted giving the right people access to the information they need, and decision-making workflows can be introduced providing control over the way work is completed and next steps taken. All these factors combine to offer a far more advanced solution to spreadsheets.

5. Increased productivity
Many tasks can be digitised through an application, automating processes, reducing manual intervention, and streamlining work. With far less risk of hand-coding errors, no-code is also a quick and easy option to use – up to 10 times faster[2] than traditional software development according to Forrester.

6. Data and system integration
If you have an existing platform that needs to be integrated with new functionalities, no-code is a great choice. By using APIs and web extensions, you can link to multiple systems extending the scope of your new and existing software and ensuring data is always up to date.

7. Cost effective
While monthly user licences typically cost hundreds of pounds per person, no-code is far more cost effective because of its speed and build standard, giving your teams everything they need and stripping out the elements they don't need.

No-code platforms not only empower employees to learn a new skill and take control of their workplace outputs through innovation, but they also prove to be beneficial in increasing company security and productivity while lowering company costs.

As awareness increases, no-code and low-code platforms are becoming a popular trend in the wider 'digital transformation' movement.

The Future of WANs:

How will their performance improve?

Going back to the latter months of last year, it would have been incomprehensible to know what effect Covid-19 was going to have on the way we work. Some say it will continue, with staff working from home and the way we use and now rely heavily on wide area networks (WANs), internet and the cloud. This has created a major shift in the use and management of WANs.

BY DAVID TROSSELL, CEO AND CTO OF BRIDGEWORKS.

INDEED, the increase in remote working has seen a renewed interest in cloud services as the key tool for promoting the facilitation of cloud services, says Bruce Reid, Head of Service Provider Partnerships at Vertel in his article for Security Brief Australia. Cloud-based applications offer a high level of flexibility, enabling people to work from almost anywhere on a laptop, tablet, or smartphone.

However, these benefits can be hindered by poor wide area network (WAN) performance caused by latency, packet loss and poor bandwidth utilisation. Downtime, network security and privacy are all factors that can also cause significant issues. For example, poor network security and data privacy can lead to some significant financial penalties as a result of data security breaches and, therefore, a failure to comply with regulations, such as the European Union's General Data Protection Regulations (GDPR).

Application downtime Continuity Central reports that the Efficient iP sponsored IDC 2020 Global DNS

Threat Report says, “59 percent of financial services companies suffered application downtime as a result of a DNS attack over the past year”.

Continuity Central adds: “Efficient iP has published survey results that show that organisations in the financial services sector suffer the highest cost per DNS attack, compared to organisations in other industries. Financial services respondents to the 2020 Global DNS Threat Report survey experienced DNS attacks that cost on average $1.275 million per attack, compared to $924,000 per attack across all sectors. While overall costs for DNS attacks in the financial sector have slightly gone down in the past year, financial organisations continue to be an attractive target for DNS attacks.”

Reid is therefore right to suggest that organisations should take a fresh look at how they manage wide area networks, particularly as it’s worth remembering that downtime has a burdensome financial cost to it.

As with all new technologies, SD-WAN has gone through the Wild West days of competing technologies and diverse management features, which to all mature data centres was a little bit of a worry when trying to compare and manage different products. However, we’re now approaching a level of maturity in the industry, which is now standardising many of the features’ functionalities and management through industry standards

These costs include lost revenue, lost profits, lost reputation, lower productivity and loss customers. He adds: “Resilience and availability of the WAN is critical for businesses. Every minute of downtime can cost businesses profits, customers, and productivity. A WAN that can’t adequately manage and direct traffic, one drops out at critical moments or causes video conferencing and other collaboration tools to freeze up, is useless for businesses trying to compete effectively in a new business landscape where connectivity is more important than ever.”

Future-proofing WANs

Organisations, he argues, must therefore future-proof their WANs to “improve network performance and address security vulnerabilities.” His answer to improving, like that of many vendors, is to promote software-defined wide area networks (SD-WANs). He describes them as being, “overlay management technology that provides businesses with dramatically increased visibility and control.”

He also claims: “This improves the speed and connectivity of the network while giving businesses the ability to dictate and prioritise network traffic, delivering performance and price advantages, greater flexibility and easier management to optimise application functions.” He also finds that SD-WANs can simplify organisations’ relationships with their telecommunications carriers by, “making carrier network migration and multi-supplier network management simpler and lower-risk.”

Industry standards

As with all new technologies, SD-WAN has gone through the Wild West days of competing technologies and diverse management features, which to all mature data centres was a little bit of a worry when trying to compare and manage different products. However, we’re now approaching a level of maturity in the industry, which is now standardising many of the features’ functionalities and management through industry standards.

The MEF 3.0 standard is a major step forward to creating, testing and managing SD-WAN products. “The standard aims to provide businesses with confidence that certified MEF3.0 SD-WAN services meet a set of fundamental requirements based on business connectivity and performance”, explains Reid. With the move of many companies to remote working and to enable them to continue trading, this has heaped considerable pressure not only on the infrastructure staff, but also the WAN infrastructure.

Improving connectivity

So, what are the best ways to provide connectivity to the remote user? Where possible, many organisations have taken this opportunity to move applications to the cloud. This pushes the emphasis for providing the bandwidth and infrastructure for security and connectivity from the organisation to the cloud provider, leaving the organisation to manage only the traffic to and from the cloud.

Where there is a higher level of functionality, reliability and security required that cannot be satisfied via the cloud strategy, there is a growing industry of SD-WAN products coming to the market that have been specifically designed for the remote user. Through the use of SD-WAN and its ability to quickly set global policies, this is a massive step forward in allaying many security fears.

Latency and packet loss

How will artificial intelligence and machine learning play an increasing role in WAN magazine, including to mitigate the impact of latency and packet loss?

Moving the focus out to the more traditional WAN infrastructure; it's good to see many vendors implementing artificial intelligence and machine learning in their products, offering the ability for their solutions to learn and configure as they analyse the data traffic from and to the destination. AI and ML will be invaluable to network engineers as they come under increasing pressure to maximise the performance over the WAN.

However, one myth that surrounds SD-WANs is their ability to reduce latency – they do not. Latency can have a dramatic effect on performance. Just 20ms of latency can reduce your throughput by 80% - even more if you have packet loss as well as latency. The only way you can reduce latency is to move the two end points closer or you employ latency mitigation techniques.

WAN Optimisation

Many organisations turn to WAN Optimisation as their go-to solution and many SD-WAN products have some WAN-OP inbuilt. However, we now include many other types of file, such as compressed or deduplicated or encrypted data file such as backups videos, images etc. Rather than your typical "office product" files, this technology struggles to dedupe these files and starts to plateau out at around 1Gb/s which, with many companies implementing 10Gb/s and above WAN, maximising the performance becomes a problem.

On their own SD-WANs that use AI and ML go some way to improve WAN performance, but they can achieve more performance than on their own with WAN Acceleration, which more efficiently mitigates latency and packet loss while increasing bandwidth utilisation.

Adding an overlay

SD-WANs can benefit from a SD-WAN overlay, enabling organisations to exploit the full bandwidth of their WANs, as well as increase the throughput of files that include compressed or deduplicated images, video and encrypted data that scales up to 40Gb/s WANs. This takes a different approach to maximising the throughput of the WAN by using parallelisation techniques and AI to manage the process. It is not untypical for users to see 98% WAN utilisation with these products.

With the ability to maximise the data flow across the WAN or SD-WAN, WAN Acceleration opens up many opportunities to achieve higher service levels, reduce downtime, ensure regulatory compliance and data protection. Cloud has some issues with availability. Having a dual or triple cloud strategy could therefore pay dividends for remote users and customers alike. To forestall cyber-attacks, it is also advisable to have an offsite, air-gapped remote backup of sensitive data, which could be a life saver.

Tips: Improve your WANs

To help organisations achieve service continuity, here are Bridgeworks' top 5 tips on how to improve WAN performance:

- SD-WANs: Segment the non-urgent traffic to the most appropriate connections, saving contention with the more important traffic.
- Use inbuild WAN-Op facilities for "Office" data.
- Avoid sending compressed, deduplicated and encrypted traffic through WAN-OP products, as this will increase storage usage and add no benefit to throughput.
- Use SD-WAN and WAN Acceleration technology for the long-distance, high capacity WAN connections.
- As bandwidth performance is increasing as bandwidth cost decreases, ensure your WAN-Op and SD-WAN have the capacity to grow in line with the bandwidth.

Ever-changing needs

Bruce Reid, Head of Service Provider Partnerships at Vertel, concludes: "The future will be characterised by ever-changing needs of workers and businesses and a greater demand for services that can cater to disparate teams and remote working arrangements. SD-WAN will be a critical component for businesses to operate via a resilient and available network."

In addition to SD-WANs, organisations should consider WAN Acceleration overlays to further improve WAN performance. Together, SD-WAN and WAN Acceleration will be key to maintaining a competitive advantage. They will bring benefits to operational performance, customer experiences and the digital transformation efforts of businesses. As for latency and packet loss, even if WAN technology does improve over the course of time, they will still need to be mitigated.

So, the future of the WAN may require more than one technology to work together to improve egress (bandwidth utilisation) and to mitigate the effects of latency and packet loss. WAN Acceleration, which is also known as WAN Data Acceleration, can also help to improve regulatory compliance, as in the case of Investec Private Bank, which used the technology to ensure compliance to GDPR by ensuring that its databases were fully synchronised.

This technology, as well as having the ability to improve

SD-WAN performance as an overlay, can also enhance data security as encrypted data can be transmitted at speed. Arguably, then, WAN Acceleration is a must-have when considering the future of WANs. Without it, even the performance of traditional WANs can't improve.

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Research reveals the impact of lockdown on business and IT

As the COVID-19 crisis took effect, businesses rushed to deploy technology that would help their teams work remotely and continue to be effective. The situation created widespread concern around a range of issues, from the ability of employers to deliver home working infrastructure, to productivity levels and the impact of lockdown on existing IT projects.

BY CHRIS PONT, CEO AT IJYI

IT'S ONLY NOW that we can begin to assess how well UK companies and their employees were able to adapt, and what the lasting effects will be on long-term tech strategies and working culture.

A recent study has helped to shed light on many of these issues, among the most notable being the potential damage done to strategic IT projects, where the research revealed that half of UK businesses are facing delays in the delivery of strategic IT projects, with a one-in-ten now "considerably behind plan".

But what's also clear is despite the impact of lockdown on existing IT projects, employers in general reacted quickly and effectively to the need to deliver remote working. Nearly three quarters (73%) of respondents said their organisations were immediately able to adapt processes to enable remote working.

Half were forced to deploy new technologies, such as collaboration and video conferencing services, with 74% reporting that these investments had proved very reliable. Despite widespread speculation that remote working would negatively impact productivity, 94% said it had either improved (42%) or was unchanged (52%). Only 6% said it had got worse. As a result, the vast majority of businesses plan to retain home working, with only 4% stating it will cease completely in a post-lockdown setting. A massive 98% said that technology had enabled them to work effectively during the pandemic.

The impact of the business response to COVID-19 on technology strategy has been significant. Despite the economic impact of the pandemic, 29% of businesses have spent more on IT since the onset of COVID-19, while exactly half of organisations believe their technology strategy is now in a better position than it was before the onset of the pandemic. No respondents said that it had become worse, with 44% stating that it was 'unchanged'.

However, 47% said their organisation was not currently thinking about or has established a digital transformation strategy. Just under a third (32%) say they are focusing on digital transformation, either in the planning or implementation stages. A fifth (21%) didn't know the status of digital transformation within their organisation.

When lockdown was announced, the stakes for UK businesses could not have been higher, and this research reveals how effectively they have adapted to the challenges brought about by this unprecedented situation. But businesses should also be careful to take this experience as a signal to focus on digital transformation, not only to prepare for the unexpected, but to place them in a stronger competitive position in an environment that is always changing.

Looking positively to an uncertain future

So, what can we expect to see as the situation continues to develop? With the government recently returning to the 'work from home if you can' policy, many organisations that can't fully meet that requirement will instead adopt a hybrid approach. This means office-based and remote-workers will need to collaborate effectively on an ongoing basis. Technology tools such as Microsoft Teams and Zoom, or in the case of development teams, Trello, Atlassian JIRA or Microsoft Azure DevOps can allow cross-location teams to work with the same assets. However, hot-desking brings its own set of challenges in a post-COVID world and maintaining hygiene on a daily, or even hourly basis may not be achievable.

As with the 2008 recession, with many businesses putting a pause on recruitment or looking to downsize, automation will be a focus to ensure existing staff can work as efficiently as possible. Organisations will want to make the most of their data by using technology to ingest, process, and communicate findings, with artificial intelligence and machine learning applied to find patterns, behaviours and insights.

Collaboration tools have been a focus since lock-down started, and people have needed to get to grips with them quickly. These will continue to be a big part of business, with many companies deciding to hold meetings using video conferences rather than travel. Data from Ofcom shows the significant uptake and acceptance of personal video conferencing use in the UK, and business use has also grown dramatically.

The ability to use remote collaboration tools effectively will also play a huge part in ensuring that organisations take full advantage of new technology. Teams will need training on new systems, new processes and new ways of working. You'll need time for that to bed-in and for any conflicts with existing systems or processes to come to the surface. Although many organisations will be heading back to the office when possible, a hybrid model will develop with a healthy mix of both remote and office-based staff. According to a recent Gartner report almost three in four CFOs plan to shift at least 5% of previously on-site employees to permanently remote positions post-Covid 19. This is just one example of the lasting impact that the Covid 19 pandemic will have on everyday working practices.

Technology that was once considered nice to have has suddenly become essential, and with this in mind, it is vital that organisations make the most of the investments that they have made in cloud and collaboration technologies over the last three months and build this into their future planning.

On an interpersonal level we see difficulties around how to maintain relationships between groups. There will also be physical challenges relating to how remote workers can use the office by hot-desking while remaining "COVID-Secure" (the government's guidance on managing the risk of COVID-19). Social distancing may dictate that a subset of remote workers is necessary due to lack of space, and many organisations will need to tape-off desks to ensure that distances are maintained.

Technology has played a massive part in our reaction to the COVID-19 crisis, which has taken the growth in digital transformation and accelerated it to a point where many businesses have been revolutionised - some virtually overnight. The ability of organisations to collect, process, and share information has improved dramatically, helping governments to monitor and contain the virus, and helping businesses to continue to operate during these testing times. We're not at the end of this adversity by any means, but companies that use the tools at their disposal will find it easier to collaborate, plan and make informed decisions to see them through to brighter times. For many, there will be no turning back.

Test automation
getting the balance right

Anybody involved in software delivery will tell you that automation is an inherently good thing. But can a devotion to test automation for its own sake throw the software lifecycle out of balance?

BY CLINTON SPRAUVE, DIRECTOR OF PRODUCT MARKETING AT TRICENTIS

THE MORE COMPLEX and distributed software becomes, the more potential failures appear. Test automation, therefore, is becoming ever more important for static analysis, regressions, performance, and functional validation. However, if too much test automation is applied, for the wrong reasons and at the wrong times, an organisation's software delivery, and its business agility, can be pushed out of balance.

According to recent research, approximately 67 percent of the test cases being built, maintained, and executed are redundant and add no value to the testing effort.

It's vital, then, that test engineering and development practices achieve a healthy balance of test automation - automating the right kinds of tests, at the right place, at the right time, and with the right resources.

Bad habits

As agile software development and delivery accelerate, it would seem obvious that we should conduct continuous automated testing as much as possible. After all, without it, there's no way of knowing whether software will meet requirements. But, without a strategic approach, an organisation can fall into bad habits that could cause test automation to become counterproductive and undermine its business agility. For example, test automation goals should always be tied in with customer goals. Every instance of test automation that's introduced should directly align with a customer's need for better software functionality, reliability, security, and performance. Otherwise, resources and money will be wasted on little more than a box-ticking exercise.

Test automation can also result in a false sense of security. The execution of hundreds of thousands of static code checks, unit tests, data comparisons, and regressions can inspire claims of 99 percent or higher levels of test coverage. This doesn't necessarily translate to a better user experience, though, and even that level of coverage may not be entirely adequate across a complex application portfolio.

Furthermore, if a test strategy isn't architected for change, then every new update, component, or contribution will make test automation unusable, test data invalid, and test results hard to reproduce. And given that brittle tests, unable to survive changes, are responsible for between 60 and 80 percent of the false positives and negatives seen by testers, teams will soon come to see repairing existing tests and building new ones as a wasted effort, and simply give up.

Finally, the reflexive response to imbalanced test automaton is to create more of the easy tests, or slight variations of existing ones. But such test bloat can result in higher system costs and cloud expense for running test workloads, and gathering and cleansing test data. It can also result in a higher labour burn rate. Integration partners, incentivised to make more tests, can quickly make their way through an organisation's budget, while its internal testers can experience a higher burnout rate.

These challenges all consume costly resources, and can erode an organisation's confidence in testing. Ultimately, this can have a serious impact of its ability to rapidly release software of the quality its customers expect. It's possible, however, to apply balanced test automation, and break this vicious cycle.

Right time, right place, right resources

Perhaps the most important thing is to test early and often. While it will always be necessary to carry out performance testing and acceptance tests on the right side of the software development lifecycle, the "shift left" approach is key to agile development. That said, ways should be found to weave critical functional, regression, integration, performance, and security testing into every phase of the lifecycle in order to avoid an imbalanced or potentially unhealthy situation for any one type of testing at any one phase of development.

Test automation can also result in a false sense of security. The execution of hundreds of thousands of static code checks, unit tests, data comparisons, and regressions can inspire claims of 99 percent or higher levels of test coverage

Flexibility matters, too, to ensure testing remains resilient and useful wherever there is risk throughout the application architecture. UI testing, for example, needs to be more business context-aware, requiring test authors to validate business outcomes rather than specific on-screen results. An end-to-end data testing approach can help provide that business context, enabling data to be validated as part of a workflow, rather than only testing for specific results. The test automation technology also needs to be flexible and intelligent enough to recognise a range of success and failure conditions.

Lastly, there's the question of resources. The best-performing companies are always looking to improve the productive capacity of all their team members, balancing a cultural combination of professional achievement, organisational design, education, and skill development with the procedures, tools, and infrastructure they need to ensure their success.

Smart, strategic automation

Over-engineering and over-automation are natural human responses to the level of chaos inflicted upon applications in the real world. But test automation needn't be unhealthy.

Indeed, smart, strategic automation is both the best preventative measure and the best treatment for all the issues facing software delivery. A properly incentivised team, taking a balanced approach to testing, can overcome the burnout, bloat, and bad habits that can impact an organisation's agility. By creating a balanced software test automation practice that uses intelligence to concentrate on the more crucial challenges will free up human resources and lead to less risk, more - and faster - output, and greater innovation.

How storage is changing for the data age

Consumers everywhere are sharing data at lightning fast speeds and with extraordinary frequency — from videos and photographs to personal data, creative musings and medical records, with virtually everything being stored digitally for future reference. There are billions of mobile phones in the world, emitting 18 exabytes (1 billion gigabytes) of data each month.

BY RICHARD WALSH, HEAD OF MEMORY MARKETING, SAMSUNG SEMICONDUCTOR EUROPE

AS MORE DEVICES continue to connect to the Internet of Things, we will continue to see more sensors being added to new devices, from automobiles to home appliances that will increase the data output even more.

And as 5G connectivity ushers in the era of cloud computing, artificial intelligence, and virtual reality, it is changing both the lives of consumers and the infrastructure on which they rely. New use cases have shifted demands for the global server market and changed the direction of technology infrastructure. So how is the world of storage changing in light of these trends?

Stronger servers, faster networks

This digital transformation has meant optimizing servers with fast, high-density memory and storage

solutions that can support both traditional and hybrid cloud workloads while maintaining cost efficiency. It has also meant that network bandwidth and reliability are more important than ever as businesses shift to the cloud or put an emphasis on edge computing. Power and performance must be at the heart of semiconductor solutions for servers and networks, ensuring enterprise users always have fast, reliable, cost-efficient infrastructure solutions.

Performance meets reliability

Because the world is trending towards data-heavy workloads, enterprise server and storage administrators face a serious challenge in building stable, mission-critical infrastructure on a budget. New storage solutions need to bring reliability and superior performance to server solutions with end-to-end integration and complete quality control. As we strive to improve SSDs they will require a variety of interfaces and form factors to deliver maximum performance no matter what kind of ecosystem you are operating in.

Mobile devices need memory systems that can read and write at the same pace as the network to avoid creating a performance bottleneck while processing UHD content. Not only will mobile devices require more RAM to handle 5G-enabled multimedia applications and tasks, but increased download speed will also drive the need for faster and larger storage.

Unlocking the potential of 5G

The era of 5G, incorporating everything from augmented reality to IoT, is increasing the demand for edge computing and distributed cloud capabilities. And while the demands of 5G on storage in terms of reliability, performance and speed will be immense, storage systems themselves are only as effective as the networks that connect systems and transport data. 5G requires complex, scalable networks that are capable of supporting high capacities and a variety of connections.

Three key technologies are enabling 5G networks to take giant leaps in improving speed, latency and connectivity – enhanced mobile broadband (eMBB), ultra-reliable and low latency communications (URLLC), and massive machine-type connectivity (mMTC).

Ultra-high speed is undoubtedly one of the key features of 5G, which is enabled by eMBB. While a high-definition film takes minutes to download on 4G, it requires just seconds to complete with a 5G connection. With eMBB support, 5G can transmit data 20 times faster than 4G.

With URLLC, 5G networks can be ten times more responsive than 4G, opening up new real-time experiences that require quick responses, such as self-driving cars and drones.

The arrival of 5G will initiate a new connectivity paradigm in which a large number of devices connect to the internet. Instead of relying on people to manage communications between devices, mMTC will allow IoTs to interact with one another autonomously for a seamless consumer experience.

Unlocking the power of cloud computing

Cloud computing has become a technology buzzword in recent years, and for good reasons. For businesses and organisations of all sizes, the technology offers greater flexibility, enhances collaboration between employees, improves efficiency and much more. Analysts estimate that 90 percent of organisations will adopt cloud services by 2022.

Despite the tremendous advantages it offers, cloud computing faces a number of challenges as it continues to expand, building on industry-leading SSD technology. To do so we must ensure that we are maximising the performance of SSDs that offer greater speeds than previous generations whilst providing single and dual-port options for diverse server and storage applications.

As we continue to see more and more devices become connected to the IoT, ensuring that we have the technology in place to keep the user experience seamless and efficient everywhere will be more important than ever. To do so we must keep investing relentlessly in R&D and ground-breaking technologies that allows to keep up with the continued exponential increase of data usage around the globe.

Data uses that deliver best benefits and return for retailers

An interview with Anthony Morris, ex Director of Data, Analytics and Insight at Dixons Carphone, who helps us to understand how retailers can better use data to their advantage, and why a pragmatic and intelligent approach is crucial.

DW: What are your biggest frustrations when it comes to how retailers use their data?

AM: Firstly, it's the ability to bring together efficiently multiple data sources to make faster, more effective decisions. Retailers typically have rich sources of data, but often it's not readily available in a structure that can be easily combined to deliver actionable insights. This lack of prescriptive insight is one reason why historically retailers have had to rely a lot on gut instinct to make decisions.

Retailers need to be responsive to their customers and previously it wasn't easy to be able to use data fast enough to adapt. Whether it's prices, promotions, product range – retailers need to be able to efficiently respond to and anticipate customer needs.

Now data has become more prevalent and more sophisticated tools, like AI, are available to mine the data, retailers need to develop their advanced analytics capabilities to ensure they can make smarter, customer-led decisions. It can be challenging to build a deep understanding of customers and behaviour – having the ability to look forward rather than backwards with predictive reports. Data is more often used to hone the existing offer and make incremental refinements than to drive more radical changes to the overall customer proposition. The key to enabling more effective use of data is ensuring that it reaches decision makers in a timely manner and can be easily used by the people making day to day decisions. Data maturity is a perpetual process and needs to become part of the DNA in any business – minute by minute, hour by hour retailers are amassing more data from which they can optimise all aspects of their customer and product lifecycles.

Something many are missing is effective marketing measurement – when we can understand customer behaviour across channels we can more effectively shape propositions. It's easy to look at the wrong metrics – often, companies focus on the metrics available to them and try and optimise them. You can't easily measure the underlying drivers of customer satisfaction, so you put that aside and do it less often – but then you won't get under the skin of that data. Instead you focus more on sales, stock, margins. It's easy to get into that routine with the blinkers on, only focused on what you can see meaning you effectively put aside the things you should be looking at.

Another issue is the blind use of tech when interacting with customers. All too often personalisation is clunky – whether it's emails missing names or excessive retargeting. There are some AI techniques offering great potential, but we need to ensure we get good value from them. A poorly designed chat bot is worse than an interaction with a human. It's vitally important that businesses can keep customer experience in

mind at all times rather than blindly chasing tech for the sake of it because they are conscious of the importance of personalisation - even though it's great they're trying to utilise innovative solutions.

Last but not least, it's the inability to be able to measure what really works. There are often many tests going on within retailers at any time, but without a robust testing methodology, experimentation strategy and platform they typically default to that confirmation bias or look at tests and pick those you like the answer to rather than selecting them based on validity and accuracy. In the vacuum of having reliable robust data it's too easy to make the wrong decision.

DW: Do you think that confirmation bias (and other biases) are a problem for retailers when they analyse their data?

AM: Confirmation bias is an interesting concern, because everyone has a natural tendency to seek information that confirms their existing beliefs. Unfortunately, this type of bias can prevent us from looking at situations objectively, impairing the decisions we make and ultimately leading to poor or faulty choices. The key here is going back to that measurement aspect – being able to use the data intelligently and honestly to support decision making. Being able to run good experiments and having timely access to data is really critical.

In terms of other biases, something that is closely related to confirmation bias is the belief that what has worked in the past will work again – and conversely what hasn't worked won't work in the future. Preferences change and evolve – the way people interact with your business changes. The last decade or so has seen a dramatic change in the channels people are shopping through, how different segments behave – so the precedent is no longer there. Old approaches to forecasting are no longer so valid which creates challenges, but also opportunities provided you can efficiently manage and tailor your approach.

DW: What would be your top three recommendations to retailers to help them improve how they use their data?

AM: The first involves creating a single source of the truth, a platform that is dynamic and enables new data to be quickly and easily ingested. Not just consolidation for the sake of it – but a live platform that enables new assets to be brought in and effectively utilised.

Second would be a shift in how organisations use their people – bringing in that cultural change and awareness of what tools are available. In some ways advancements in technology make it easier to use and exploit AI, but there's much more businesses can do to be open minded and find ways to explore that potential. This cuts across a number of things whether it's training and reskilling for competence or looking at the use of new tools - breaking down barriers to the adoption of new ways of working.

Thirdly I recommend focusing on building or acquiring effective and efficient platforms for decision making. In a world where cloud enables us to consolidate data and we have a lot of fantastic tools at our disposal, we need to have the right types of decision forums so that we can unlock the benefits quickly. As we've moved online dynamics have changed – and we're still working on how best to use some of those different decision-making platforms. This affects and informs all kinds of decisions - from training and upskilling and ideating for a new project down to run of the mill budgeting. Retailers need to consider a model that really works to take advantage of differences of opinion, but at the same time find conformity in decisions.

DW: How do you predict data will be used in the future to strengthen a retailer's market position?

AM: I think critically we'll see data analysis used to achieve that deeper understanding of the customer – better anticipation of consumer demand, what they want, how they want to shop. That information shapes all aspects of a retailers' propositions, whether it's price, products, placement.

Now more than ever it's key that customers feel they are getting goods in a convenient (and safe) manner. AI will undoubtedly help as we move away from 'one size fits all' mentality. Instead of all stores of a same size having the same core products, we'll increasingly see stores which better serve their local catchments. We'll see online propositions that feel more immersive than the catalogue formats of old. Ultimately this is good from a consumer perspective, but will require ongoing innovation from retailers.

One positive for businesses is that as technology develops and evolves, it naturally becomes more accessible financially. This means that technology costs are no longer a barrier preventing businesses from becoming data driven. Now there are innovative solutions available to a wider range of retailers which don't require significant investment upfront.

ANTHONY MORRIS spent 10 years as a Management Consultant across a number of different businesses, supporting with different types of challenges from growth strategies and cost reduction to turnaround. This led him to Dixons where he spent 12 years in a strategy role, which soon developed into a specialist position unlocking the value within the business through increasing the use of analytical data. There he built a 100-strong team focusing on business insights and intelligence, supporting all areas of the company to make better use of their data.

What it really means to become ‘Cloud Native’

Dave Chapman, Head of Strategy and Professional Services at Cloudreach, looks at the accelerated shift to cloud computing in 2020, what it means to be a cloud native company, the cloud ripple effect and successful case studies.

The global pandemic has accelerated the shift to cloud computing this year, but businesses have been transitioning toward cloud-based solutions since the early 2000s.

Early moves to the cloud were predominantly ‘lifted and shifted’, a term that describes how applications and data are moved to the cloud without stopping to redesign the app, operational process and ways of working. Alternatively, it could be a business unit experimenting with a new SaaS tool.

These often achieved cost savings or local value, but also created disruption and did not have the effect of being truly transformational or moving an organisation toward becoming ‘cloud native’.

What does it mean to be a cloud native company and why bother?

Using definitions from the Cynefin framework, in a ‘complicated’ world a company makes annual plans and strategies, and everybody understands everything about how they work; things may be difficult, but methods to solve problems are understood and can be planned. However, in today’s fast-moving and more ‘complex’ world, the ways of working need to change and we need to move faster. Planning must occur more regularly, perhaps on a quarterly, rather than annual basis, and be more adaptable to direction and action required.

Being an adaptable organisation means you can thrive in a ‘complex’ world. It involves sensing and

responding to what your market is doing, provoking it and hearing what it does, and then finally tuning your direction. It must then be done iteratively and continually.

Being 'cloud native' helps remove constraints, allowing a company to be more adaptable. It means moving the infra and apps from legacy IT stacks to the new capabilities available in the cloud. Cloud native technologies support adaptability. They're quick to stand up and change, and you can connect your technical innovation to your business innovation much more effectively.

Beyond the tech, most organisations today struggle to adapt to change, and even big change programs often resist what is needed to become truly agile, as it can be uncomfortable. To achieve this, you need to think differently about organisational structure and governance, your processes and ways of working, and your supporting technology.

Making the change

Cloud modernisation in businesses starts in one of two places, although sometimes in both. It could begin in the IT department with a cost-driven business case – for example, existing data centres. Or it could start as a business experiment within a business unit, or sometimes joining up a number of experiments to drive a bigger change in the business. To achieve a full cloud-driven transformation, IT transformation and business experiments need to be joined up.

Turning a business into a cloud native one is a conversation for the Chief Executive and the leadership team, which should include the Chief Information Officer, as it involves so many aspects of how a business is run. The change needs to be strongly sponsored at that level.

To begin the change, we recommend creating a lighthouse experiment around a particular product to try something really different, and then take learnings from that. Then it's all about adapting to those learnings. When you feel like you've got a model working, you can begin to scale that model out within the organisation. A key consideration is the governance structure of your organisation: who can make what decisions over what subjects? Can they implement those decisions within their own teams quickly, supported by the appropriate process, like DevOps or Agile? Then, underneath that, how is it supported by the appropriate technologies of a cloud provider that's innovating fast enough to provide you with functional uplift to use for business advantage?

The cloud ripple effect

The moment businesses start to implement the underlying technology and different ways of doing things, challenges emerge around governance, finance, processing and technology.

The way to get optimal results is not to push back on the changes, but to accept them as new ways of working. For example, if you want to initiate 50 releases a day of a product on a consumer-facing platform to provoke your market, then the person who leads the team around the platform needs to have the decision rights to make those releases and respond to the market feedback.

That person probably needs to have full stack control of that release, which means being close to or part of their business innovation group. They need access to the technology innovation group, and they need the people in the development team, or the DevOps team, to implement those changes. This will almost certainly break existing governance structures, traditional IT release processes and many other things. Make no mistake: cloud modernisation has profound ripple effects across the business.

Unmanaged, all of those impacts can be experienced as unconstructive disruption: everyone gets annoyed and thinks that the big transformation is creating lots of noise, with the organisation resisting the change. There are other risks of doing this badly – it can cost too much money if you do it without a clear strategy, and you can expose yourself to operational or security risk.

To deal with this, it's important to get a partner that has been through it before. They can help business leaders, Chief Information Officer, and leadership teams be aware of the scale of the challenge they're about to take on, the implications, and plan a track through it. This makes it very transparent to the rest of the organisation, so they all know what they're getting themselves into.

BP success

One success story in terms of chief information officers converting their legacy company to a fully modernised IT organisation, is BP. This multinational energy company is currently navigating a large-scale digital transformation journey, with the goal of modernising its IT organisation, becoming more innovative, adopting agile methodologies, and creating a world-class engineering team.

Over the past seven years, BP has adopted a 'cloud first' strategy. This has involved building brand new applications and workloads in the public cloud, as well as moving, transforming, and modernising existing applications and services from its data centres to the public cloud.

This year has accelerated many companies to becoming cloud native, and it's a trend that we will continue to see as we move into 2021. As long as businesses know exactly who is in charge of the operation, understand the risks, and have a clear strategy alongside it, becoming a cloud native business will be a success.

Bad security hinders productivity, Good security enables it

For a long time many have thought of identity security as a necessary burden. All those passwords, all those access denials, all that budget drained away from the profit centres of the enterprise - that's how many business leaders view this aspect of IT instead of recognising its benefits. The truth is quite different.

BY SAIRA GUTHRIE, SENIOR PRODUCT MARKETING MANAGER, PING IDENTITY

BAD IDENTITY SECURITY without a doubt will hinder the productivity of an organisation - weighing it down with excessive login requests, inconsistent policies and visibility, and force frustrated users into poor security habits. Good identity security doesn't hinder productivity - it helps.

This is perhaps best expressed within enterprise authentication. More specifically, in the difference between those enterprises that have to constantly shuffle between a decentralised sprawl of apps and authentication systems, and those that opt for a single authentication authority to provide a consistent, secure experience on both the front and back end.

An all too common problem

Perhaps part of the reason for this misapprehension is how widespread it is. A Vanson Bourne survey from 2017 bears out what has long been believed by many - 74 percent of CISOs said that employees believe cybersecurity to hinder, not help productivity and 81 percent said they saw it as a further hindrance to innovation. In many cases, cybersecurity may well halt productivity in certain situations.

The average enterprise has 130 apps deployed. If each has their own method of authentication, it must be nothing less than a headache for everyone involved. That inconsistency trickles down throughout the enterprise too.

The more passwords employees have to enter, the more they're likely to produce easy to guess, forgettable or duplicate passwords. The average employee wastes 11 hours a year messing with passwords - entering, resetting and managing them. Not to mention the wasted time for IT and help desk departments who have to deal with and scrutinise those requests. Unfortunately employees are often considered the greatest threat to IT security. Surveys

even show that enterprises see them as greater threats than even cybercriminals. There's a great deal of truth to that - but the fact is that people can only remember so many passwords, and rightly see authentication as a time drain when they have to do it multiple times a day. In the failure to understand that fact - resentment and frustration breed.

Burdensome security lowers its own value

Security doesn't just have to fight against cyber-threats, it has to fight a PR battle within the workplace too. Security practitioners find themselves in an unenviable position. When they do their job correctly, you'll hardly know they're there - so they seem like a burden which does little more than divert budget away from revenue generating parts of an enterprise.

That same Vanson Bourne survey from 2017 said that 77 percent of CISOs feel as though they're caught between securing their workplaces and allowing people to do their job.

When security frustrates a user experience they are far more likely to override the necessary - if burdensome - controls and endanger the organisation. They create weak passwords and they'll reuse old ones. Insider threats are more common than external and they often come from oversights like this.

On a broader level, when security becomes seen as a burden - it alienates other parts of the business and erodes the collective belief in security. What starts in people's minds is likely to trickle down to budgets too - when security is seen as an obstacle to profit - executives are less inclined to hand out necessary budgets for improvements and operational costs.

Bad IT security halts digital transformations

Bad identity security can quickly turn from a productivity drag to a real obstacle to innovation. This disjointed system of authentication doesn't just amount to unneeded complexity around security and usability but actually halts digital transformations in their tracks as well.

As long as old, inconsistent systems aren't cloud ready - and they often aren't - organisations struggle to extend authentication services to the cloud. This is a fatal drawback at a time when the cloud is transforming the way the entire world does business. They'll run into problems when it comes to the IoT too. As tempting an opportunity as the IoT is for many - secure seizure of that opportunity requires a way to manage the potentially thousands or even millions of device identities that might make up a deployment.

The same goes for APIs and DevOps - their increasing use within the enterprise means yet more complex identity and access management requirements. Without an authority to protect this growing mass of complexity, enterprises invite risks and security problems further down the line.

The same is true of the general expansion of IT within the enterprise. Enterprises increasingly have to deal with more systems, users, apps and data - without a way to get the authentication processes under control - they'll struggle to transform as long as they're weighed down by yesterday's systems.
What does productivity-boosting security look like? This problem is not about security - it's about mismanagement.

As aforementioned - the average enterprise has around 130 apps deployed. That's a frustration for users to log into and remember passwords for, it creates an unnecessary amount of work for IT security and 130 potential points of entry for an attacker. Not to mention a huge productivity drag for the enterprise at large.

The solution is to establish an authentication authority as the single source of truth within the enterprise. This primarily allows enterprises to manage the sprawl of inconsistent identities and authentication methods within the enterprise so IT security can become agile. It allows the enterprise to accelerate application onboarding and provides a central hub for stronger step-up authentication that is adaptive and risk-based. From there, application management can be handed over to business application teams and relieve burdened IT teams and promote productivity and speed that were so previously lacking.

Which, of course, brings us to the user experience which will be vastly simplified and made more productive by replacing the scores of authentication systems with one single source of truth. That productivity boost can be supplemented by largely removing the burden of passwords through things like single sign-on or passwordless authentication which leverages security factors like push notifications or biometrics.

Furthermore, continuous authentication allows the authority to work behind the scenes, leaving users alone during low risk activities and making smarter decisions when requesting step up authentication. This intelligent approach leverages real-time, dynamic security factors to authenticate users on an ongoing basis and doesn't add friction to the user experience, allowing them to do their job largely uninterrupted by authentication prompts.

IT security often gets an unfairly bad rap but it doesn't have to be that way. IT security isn't just about defending from outside attacks, but inside compromise too. When it doesn't work in tandem with the rest of business - and obstructs productivity - it weakens its legitimacy inside the enterprise which in turn diminishes its ability to do its job.

COVID-ushered digital transformation makes companies adaptable and resilient

COVID has triggered a massive digital shift, encouraging more businesses to migrate their operations online to the cloud, and well away from legacy systems. Not only does the move toward digitalization streamline organizational processes, but it makes companies more resilient, more robust, and, most importantly, more adaptable to unforeseen events such as the coronavirus.

BY EMMA MASLEN, AN EXECUTIVE COACH AND ADVISER TO START-UPS

Going Digital

To say the shift to digitization was entirely due to COVID is somewhat disingenuous. There were, after all, plenty of innovative firms undergoing a tech-centric restructure before the pandemic. Now, however, companies that were previously lagging their contemporaries are leveling the playing field.

In light of coronavirus restrictions, and the need to protect employees and serve customers, C-level execs led the charge toward digitalization, implementing remote working conditions and instilling infrastructure to support digital access. This was reflected by data from McKinsey, which shows that global business digital adoption leaped forward around five years in just eight weeks during the onset of the pandemic.

For example, the education sector found refuge online with learning courses and digital classroom technology skyrocketing in use. Brick and mortar shops followed a similar model, shifting their usual

For consumers, the appeal to stay digitized is even more apparent. During the original lockdowns, 75% of people using digital channels for the first time, opted to maintain them once restrictions had ceased – providing additional impetus for companies looking to increase reliance on tech

over-the-counter paradigm to online ordering and delivery. Health services likewise harnessed new telecommunication tech, providing online assessment and treatment. And manufacturers who were particularly impacted by supply chain disruptions are increasingly trying to forge their own connections with their customers.

This forced digital leap has left many enterprises struggling to keep up on security, customer experience, or privacy fronts.

This isn't just a passing fad either; this digital pivot is likely here to stay. With a second wave looking like a sure-fire bet and further lockdowns likely to follow, businesses are keeping new infrastructure close at hand.

For consumers, the appeal to stay digitized is even more apparent. During the original lockdowns, 75% of people using digital channels for the first time, opted to maintain them once restrictions had ceased – providing additional impetus for companies looking to increase reliance on tech.

The obligation to go digital may have been coerced by the coronavirus, but the benefits shouldn't be underplayed. Engaging with new tech can transform a company entirely, making them more agile and malleable by removing inefficiencies. Moreover, there are many factors—competitor innovation, market shifts, new technology, or others—that can make it extremely beneficial for companies to be agile enough to out-maneuver their competition and stay ahead of market trends.

Identity: The Foundation of Enterprise Agility

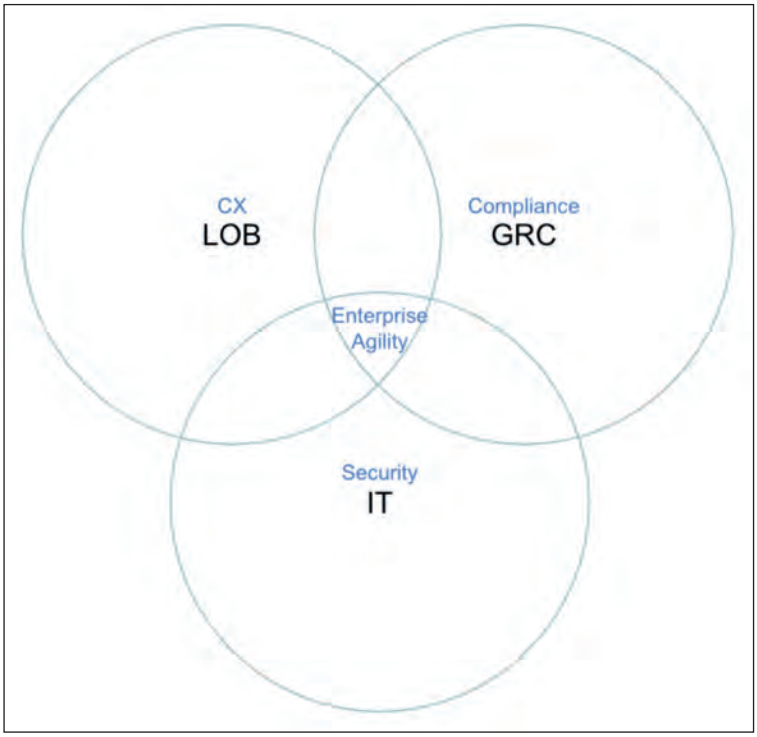
How can enterprises attain such agility? There is a common thread in privacy, security, and customer experiences. If that foundation is there, you can quickly shift the digital innovations built on top of it. That common thread is pretty simple: You have to know who your users are. That is the entire premise of identity and access management (IAM).

While embracing identity and knowing who your digital customers and employees are seems like a no-brainer, it's imperative that your organization sees the value in such an investment.
If the concept of identity isn't advocated throughout your enterprise, its impact on your organizational agility can be overlooked. With any digital transformation initiative there are three core things to consider:

- Are our users (customers and employees) and the data they have access to secure?
- Are we maintaining extraordinary experiences?
- Are we in compliance with privacy regulations?

There is plenty of software out there to address each of these three areas, but identity is the fabric that ties it all together. Identity can ensure that customers and employees are instantly recognized and remove the friction associated with sign-ons and registrations. It can also make the process secure and protect customer data, and ensure that employees who have access to that data are securely authenticated. It can also enforce consent to protect privacy and control the way customer data is shared.

With a comprehensive identity solution in place, enterprises can instantly pivot to react to any market trend thrown at them. And they can do so without sacrificing security, privacy, or user experiences.



Getting your data analytics in order, no matter where your data lives

In order to survive and thrive in the "new normal" of 2020 almost all businesses have had to relook at their digital strategy in order to ensure they're able to keep pace with fluctuating consumer behaviour.

BY PAUL MACKAY, EMEA CLOUD LEAD AT CLOUDERA.

JUST RECENTLY, successful supermarket chain Aldi announced its plans to add an online service, in response to the changing shopping habits of customers. This shift to digital across the world, has led to an astronomical growth in cloud investment. In fact, Gartner forecasts worldwide public cloud revenue to grow 6.3% this year. For the majority of enterprises, going digital is the answer to survival, but this decision brings with it a whole new challenge – a data storm.

Businesses, some of which have never been digital and others who considered themselves digital-first, have very suddenly had to deal with an unparalleled influx of data. The fallout of the data storm – lots, and lots, of questions. How do I capture all this data? How can I analyse it faster? How do I protect it and share it with more people? How do I understand it and get meaningful insights from it?

But these questions aren't always so simple to answer. This is because, whilst a cloud based approach certainly has its benefits, mainly when it comes to scalability of infrastructure, the reality remains that many businesses – particularly those who are larger and more well-established – are still having to operate partly on-premises or in a hybrid model. With the amount of data created in just the next three years, due to surpass that created in the past 30 years, managing these vast streams of structured and unstructured data is going to be the biggest challenge, especially when it is sat across numerous platforms, in an even bigger data storm. The good news is it's not an insurmountable challenge.

Organisations have already taken the first step to building the flexibility their operations need and have done this by recognising that data, and the way in which it is analysed and then utilised, is what will help them to not only recover but also grow in the future. Now, these organisations have to take the next step. They need to implement technologies that will support the entire data journey, regardless of where the data resides, allowing a business to derive the greatest value from all the data sets it has and those that are still to come.

Getting all your (data) chips in a row

The need for a single point of view on all analytics in order to navigate the data storm, regardless of where the data resides, is the draw for adopting an Enterprise Data Cloud (EDC). An EDC is a hybrid and multi-cloud platform that uses the full data lifecycle to help organisations extract the true value from their data. It can be defined by four key pillars:

- **The ability to run analytics in any cloud**
  An EDC is optimised for private cloud, multiple public clouds, and hybrid cloud environments. It delivers the same data management capabilities across all of these disparate environments. This means businesses have flexibility and choice over where they host their data and don't have to be dictated to by any provider.

- **Analytics across the full data lifecycle**
  Whether that's right at the beginning when a business is trying to ingest streaming data, to transforming the data, to querying and reporting on their data, and transacting on their data, right through to AI guided decisions and actions, an EDC can be used by any business to address their most pressing challenges.

- **Providing a single and consistent security and governance**
  In the world we find ourselves living in, it's simply not acceptable to not know who has access to your data. In some cases, it is illegal and can lead to significant fines and damage to a company's brand. An EDC provides organisations with consistent data security, governance, and control that will safeguard data privacy and meet regulatory compliance across different environments.

- **Based open source**
  This is one of the most important features of an EDC because open source has an extremely fast rate of innovation allowing customers to gain the benefits of a robust community developing advanced technologies. Open APIs and storage formats ensure companies are able to use the tools that are relevant to their business and always have access to their data.

Using the tech to build competitive advantage

Recognising the value in data, and lining up the very best technology are brilliant first steps in overcoming the challenges of a data storm. There is however more to do. Businesses have to become more agile. Leadership, working with the technology teams, have to identify the factors that produce optimal performance. Once these factors (and the data that relates to them) have been identified, they can then be monitored in real-time. This will allow organisations

to become more responsive and create, for example, better customer experiences or enable them to respond to fluctuations in the market.

The more agile and responsive a business is, the more competitive advantage it can gain – all through data.

- **Make your data work harder, so you don't have to**

At Cloudera, we've personally seen this approach work across a wide variety of industries, and all around the world. Companies are using an EDC to analyse data in order to guide their decisions, gain competitive advantage, and grow. We've seen companies use an EDC to reassess their entire data infrastructure and modernise it, therefore dramatically reducing costs. We've also seen industry-specific applications, for example in healthcare, where a client was able to use an EDC in a way that meant they could onboard new use cases in hours, rather than the months it used to take — thereby saving lives.

In 2020, and beyond, it is no longer enough to reactively recover from change, businesses have to proactively prepare for it. Recognising the challenge, having a platform in place that will empower a business to gain clear and actionable insights from its data, and changing attitudes towards agility will be a cornerstone in success.

Recognising the value in data, and lining up the very best technology are brilliant first steps in overcoming the challenges of a data storm. There is however more to do. Businesses have to become more agile

The future of fan engagement: How blockchain is transforming the sports industry

Recently, the news emerged that Cyprian football team Apollon FC used fan tokens leveraging blockchain technology to allow supporters to vote on the team's lineup and formation for an upcoming match. It seemed that fans really did know best — the team won their match.

BY LARS RENSING, CEO OF ENTERPRISE BLOCKCHAIN PROVIDER PROTOKOL

THIS WAS A SMART MOVE on Apollon FC's part. Right now, sports teams are having to work harder than ever to engage their fans. Covid-19 is the most obvious culprit; it has impacted long-reliable revenue sources for clubs, such as tickets, merchandise and concessions. This isn't the only challenge clubs have been facing though. The sports industry has an increasingly global reach, meaning that teams now have a much more global fan base who, while unable to attend games, want to be engaged with their team. As if this wasn't enough, clubs also have a new generation of fans to consider, who have grown up digitally native. This generation is more naturally drawn to industries with higher levels of fan engagement, such as eSports and gaming, so traditional sports teams need to adapt their offering to engage this younger fanbase or risk falling behind. Blockchain-based fan tokens like Apollon FC's are a great solution to these concerns. Created using blockchain technology, fan tokens act as a club's own digital currency.

Apollon Limassol FC player team pose for a photo during the Uefa Europa League

Fans can purchase tokens for fiat currencies, like dollars, euros, and pounds, making them a viable revenue stream for teams, especially in the current climate where revenues from live events are non-existent. These tokens can then be traded for merchandise or exclusive experiences. Fan tokens can also help supporters feel more connected with their teams, creating an exclusive community of fans who can interact, vote and unlock exclusive interactions utilizing the tokens.

Fan tokens also allow clubs to overcome the challenges of distance when communicating with fans and engaging a wider, and younger, audience. For instance, FC Barcelona has an estimated 450 million fans worldwide, who are now within their reach thanks to blockchain fan tokens. Fan tokens are already in demand; FC Barcelona's $1.3 million initial round of fan tokens sold out in under two hours.

Blockchain-based fan tokens are certainly an exciting solution, but there is even more that clubs can do with blockchain to open up new revenue streams and increase fan engagement. Clubs can use the technology to create the next generation of digital collectibles. Provably-unique digital collectables can be bought using fan tokens, appealing to the younger

Apollon Limassol FC player Farley fight for the ball with Borussia Monchengladbach's Martin Stranzl during the Uefa Europa League game

digital-native fanbase, as well as opening up new revenue streams for teams. In baseball, for instance, Major League fans can purchase All Star cards at a range of prices, generating new income for the club. In the same way, clubs can create loyalty programmes to further engage fans. Unlike traditional reward and loyalty programmes, reward programmes that use blockchain are cheaper to set up, and incentivise engagement on a higher level by providing real-time prizes and pay-outs when fans interact with the team. This encourages fans to continue interacting with the club, ensuring a steady revenue stream.

Blockchain reward systems also allow for the creation of ecosystems of partners outside of the team, which enables fans to spend tokens awarded by the team at a sponsor's store, for instance. Clubs can even use blockchain technology to combat long-standing problems such as ticket fraud. Ticket touting and counterfeiting is a huge problem for live events, but blockchain's transparent nature means that anyone can verify the origins of a ticket, allowing clubs to trace tickets back to the point of sale to ensure they are valid. Transferring tickets is also made easier on the blockchain, allowing peer-to-peer transfers of tickets without intermediaries, making it easier, and more secure for fans to pass tickets on to others if they can't attend a game, and making it easier to reschedule cancelled or delayed sports fixtures.

Technology has been key during the pandemic for keeping us connected, and this is equally true for sports fans who want to feel more connected to their club while they can't see them live.

Apollon FC's fan voting shows the great potential that blockchain brings to fan engagement. Whether it be for revenue or engagement, sports teams can look to blockchain to bring fans together in innovative new ways, even after game attendance recommences.

Apollon FC's fan voting shows the great potential that blockchain brings to fan engagement. Whether it be for revenue or engagement, sports teams can look to blockchain to bring fans together in innovative new ways, even after game attendance recommences.

My journey into the data centre business

By Cem Yildiz, Project Engineer @ FläktGroup, Bochum, Nordrhein-Westfalen, Deutschland

EVERYTHING STARTED after my diploma in mechanical engineering with a trainee program at the GEA Group, the former organisation of FläktGroup, in 2013 where I have studied CRAC units from the perspective of different departments.

The introduction included a first market analysis of the European data centre market within the product management department in order to discover potentials and opportunities as well as to identify sales channels for our key account managers.

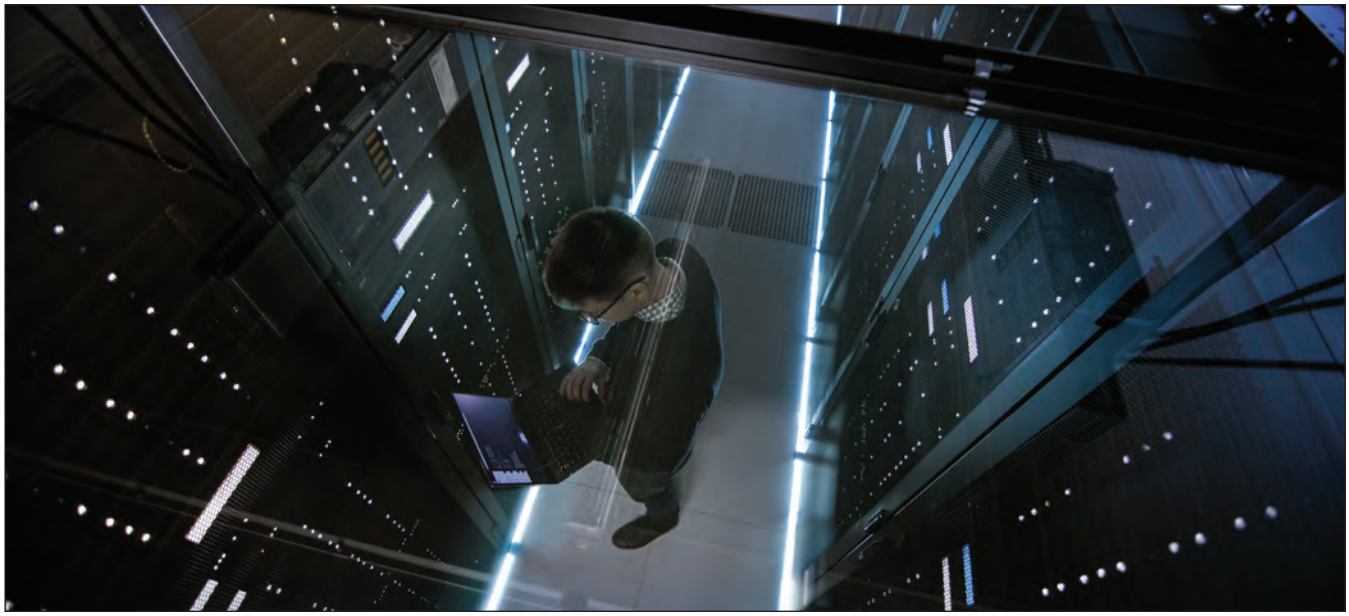
After the completion of the study I have changed to the R&D department which allowed me to understand the technology behind the different products and the application specific requirements. In this context I have obtained insights with simulation and selection software. Especially the technology of the indirect evaporative cooling systems (IEC) fascinated me as a very efficient approach to cool data centres.

The next logical step was to gain experience within the production which I have gathered at our specialised production facilities for CRAC units in Hereford, UK. Beside the video documentation of the production steps I have acquired further knowledge in lean manufacturing principles. My return to Germany marked the start of my time within the central marketing department where I have designed the new reference page on the website including the lighthouse projects for data centres. After the completion of the 18 months consisting of several trainee stations I have started as a technical expert for data centre cooling units. The range of my responsibilities included the technical sales support all over the globe and product management tasks such as trainings, representation on exhibitions and maintaining selection software.

My first own unit design was sold to China which was the first IEC unit in the country and enabled the data centre to be awarded as the most efficient system within the republic. These were very exciting times for me. With increasing project experience I was entrusted with the responsibilities for large hyper scale ventures where I have supported our sales and service from the initial design over the commissioning up to maintenance.

For the next step of my development I have started a MBA program which I have accomplished successfully this year in order enhance my managerial capabilities and commercial knowledge. With these new skills my next goal is to become a key account manager in the growing and exciting data centre market.

Comment from David Kyle, Business Development Director - Data Centre Solutions, FläktGroup
"I have worked with Cem for approximately 5 years within FläktGroup (previously GEA). Cem is a very conscientious individual, technically gifted, always supportive and fully understands the business and the market. Cem is an asset to the company and presents himself very well to his colleagues and with clients."



How I found my initial roll in the datacentre industry

The Data Centre Alliance spoke to Mercy Mahinda, Mechanical Engineer at Safaricom PLC about her experience of the Data Centre sector so far and discover how she found her initial role in the industry

DCA: What attracted you to the DC sector?

MM: Before joining Safaricom PLC as an intern I had no previous exposure to the data centre field. In most organisations data centres are not easily accessible to the public due to their sensitivity. On joining Safaricom I was fascinated by how much effort/supporting infrastructure goes into making it possible to complete that call, to make that M-PESA*, to access that e-commerce site.

DCA: Was it difficult to gain entry to the industry, was it through an internship or apprenticeship?

MM: I got into the industry through Women in Technology internship. When I applied for this internship I didn't quite know where I would fit in having undertaken a Bachelor of Science in Mechatronics Engineering. From an outsider point of view Safaricom picked students who has undertaken courses in IT, telecommunications and electrical engineering. To get through the interview process I had to study topics in telecommunications as it required that one passes a written examination. During placement in the various departments and sections I was taken to energy planning where I was working under the guidance of a mechanical engineer who would later leave the organisation opening up a vacant position which I currently hold.

DCA: Have you had any DC specific training - If so can you tell us what it entailed?

MM: I have undertaken the Accredited Tier Designer certification by Uptime Institute. This certification is on the tier classification system for data centres that looks at data centre designs for redundancy and uptime. I am also a Certified Energy Manager(CEM) and Certified Measurements and Verification Professional both by Association of Energy Engineers(AEE).

While these certifications are not DC specific they deal with energy. Data centres are energy guzzlers these certifications therefore come in handy with regards to energy management.

Have you decided upon an area of specialization? Having been in the industry for four years, I am still exploring everything there is to do with the data centres. I am particularly keen on fire suppression systems, IoT and energy management.

DCA: Planning for the future, do you plan to develop your career further in the DC sector?

MM: Absolutely, I want to increase my knowledge and skills in certain domains to expert level. Am also keen on the role of renewables in the sector and excited to see the growth being experienced in the African market (I want to be part of that growth). In my later years, I would like to transfer knowledge acquired over the years as the world evolves in terms of skills required.

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Dedicated to the data centre sector

From Sports Technology Degree to OEM Sales Manager with one of the UK's leading electrical solutions provider, Scolmore Group, Steven Bettson charts his journey.

IT WAS 14th March 2016 when I first heard the term Data Centre. I had no idea what it was but it sounded intriguing. What does it mean? What does it do? How does it work?

My route into the data sector was something of a happy accident and perhaps not a 'traditional' path through education. However the industry certainly gripped me - there is always more to learn in such a fast-developing industry.

I graduated from University in 2005 with a BSc Hons degree in Sport Technology. This was a new course focusing on the physical and mechanical design revolving around the improvement of sporting equipment. I then worked at as an installation engineer at a Fire and Security company for 7 years before moving to Scolmore to work as a support engineer in the technical department.

After 3 years in the technical and design department at the Scolmore Group, I had developed an in-depth knowledge of an array of products that are used in many industries. This presented an opportunity to help represent Scolmore and its award-winning IEC Lock range of unique and patented locking C13 and C19 power leads, connectors, and outlets, at CeBIT in Germany. CeBIT is an international trade fair specialising in IT and technology and perfectly suited our products and offered a great opportunity for us to learn more about this particular sector. It was during a conversation about our IEC Lock range with a visitor at CeBIT that I asked the question "what is your role?" and the reply was "Data Centre Manager". This is where I began my journey into the Data Centre industry.

Fast forward 16 months and I moved from a technical role into an OEM sales position, supplying various power products to the data centre industry, one of which is the IEC Lock. In July 2017, Data Centre Transformation in Manchester gave me an excellent opportunity to learn more about the industry, the people, how it works, and what it does. It is here is that I became immersed in the data centre world, after meeting Asperitas and discovering their innovation.

For me, entering the data centre sphere was relatively smooth. At Data Centre Transformation I also met with the Data Centre Alliance and a few industry experts. The assistance and generosity shown by those in the industry has meant that I have built a much better understanding of how, where, and why our products were used in data centres.

The IEC Lock is used directly in data centres and server rooms connecting power to the critical equipment within the rack. There are various components of a data centre, such as; the facility itself, power, cooling, connectivity, racks, PSU's, PDU's, and Servers. For the IEC Lock, we link the PSU/PDU and the connecting power whilst mitigating risk by locking it into place.

For me, learning more about the application of our products in data centres has meant that there is a need to keep abreast not just of the advances in the equipment, but also external factors such as climatic impacts and energy usage which affect how the industry moves forward.

The landscape is evolving with the emergence of new technologies driven by sustainability and reducing energy consumption, whilst at the same time increasing capacity. With the Open Compute Project, the community is collaborating to help reach a more sustainable future by sharing design ideas to amplify innovation. These innovations enable more and more data to be processed and this is only going to increase as we live in a more connected world.

Up until now, my understanding has been self-taught, gathering information by speaking to professionals and research. To have a better understanding of the industry and its future direction means we can look at ways of improving our products or developing innovations that will be of benefit not just to data centre owners or operators, but also those who depend on them the most, the users.

So, what attracted me to this industry? What I personally find fascinating about the data centre sector is the fact that it is forward looking; fostering innovations in communications, infrastructure, and technological developments. There are huge aspects of our daily lives that feed in and out of a data centre such as IoT, social media, streaming services, online banking, AI, travel, online services, etc. Our day to day activities are intertwined with the industry, we are all connected to it and yet few people realise it exists or even understand the basics of what it does.

Data Centres will help us understand critical changes to the planet's climate, create smart cities, map the roads for driverless cars, simplify manufacturing processes, improve healthcare, develop new drugs to treat or even cure diseases. Who honestly wouldn't want to be part of that?

The perfect fit

Zac Potts, MEng MIET ATD, Associate Director at Critical Infrastructures Sudlows describes how the Data Centre Industry as a graduate was an exciting prospect

APPROACHING my final year studying for an MEng in Mechanical Engineering, I was still relatively open about the specifics of where I wanted my future career to develop. I knew what I found interesting, but I didn't have a "career" in mind.

Whilst attending career fairs, I recall there was a clear and strong engagement from sectors such as Defence, Oil and Gas, Automotive and Aerospace etc. Other options were sometimes a little harder to see, and even then, difficult to understand.

When I came across Data Centres, I had no real concept or appreciation for the sheer variety of engineering services which it entailed. Yes, I knew what a Data Centre was; I could guess by extension that they needed cooling, and surely reliability would be important, but I didn't really appreciate the complexities, challenges and opportunities which were involved.

When I saw the role advertised for a Mechanical Engineer at a Manchester based Data Centre specialist, I was certainly intrigued but still not fully aware of what type of engineering this would actually be. Fortunately, during the interview process, I was able to speak to several enthusiastic and technically competent members of the Sudlows team and quickly gained a good understanding of the type of projects and engineering involved, the challenges, and the significant opportunities to deliver interesting and innovative solutions to the problems faced.

For me, it was the sustainability angle which really engaged me; how could the current approach be sustainable? If it wasn't, what could be done? Due to the rate of growth of the already substantial energy needs, it was clear that even small incremental improvements to the engineering approach in this sector had the potential to save substantial amounts of energy. It was also clear that it would take more than just marginal advances to make a real impact. Larger scale changes, innovation and vision would be needed to deliver a sense of sustainability. This incredible challenge simply invoked too much interest to ignore.

Entering the Data Centre industry was exciting, fast paced, and varied. At Sudlows, I was straight into interesting projects, working with extremely talented Engineers. My early roles focused on energy efficiency and alternative technologies, developing concepts and assessing the return on investment possible. The interconnected nature of a Data Centre meant that it was impossible to consider systems entirely in isolation – although difficult, in hindsight, this was an amazing opportunity to gain a level of exposure to all aspects of Data Centre design. Basic concepts quickly required the assessment of other systems; aisle containment required review against the fire detection system; elevated temperatures for the space considered the IT and how it would react; assessing alternatives to static UPS systems would be pointless without considering how each would be cooled, the ongoing maintenance, and the anticipated load profile. It was clear that a single system could rarely be looked at in isolation.

Data Centres have an interesting dynamic as a naturally risk adverse environment, but one where there is a keen desire for innovation. This may be driven by a simple desire to differentiate through cost, efficiency or quality of service in what is often a competitive marketplace, or may be motivated by a strong desire to be a leader in environmental efficiency. Regardless of the driver, there is always one overriding factor: If the perceived risk is too great, the attractiveness of the overall solution reduces very rapidly. All decisions are underlined with the knowledge that the impact to the wider business of an unplanned outage would be severe; either in loss of earnings or productivity or time. Where the service level of the end product is affected, whatever that might be, the loss of confidence and associated brand damage can have long lasting impacts to the business. This is particularly true for businesses where high availability, critical white space itself is the product.

In the decade that I have been working in the Data Centre industry, I've been privileged to work on a number of critical facilities for some of the largest household names in IT & Digital Services, from Social Media and Streaming Services to Cloud Computing, as well as facilities which form a lesser known but critical part of digital infrastructure. Each and every one of them has been a different challenge. Whatever the area of expertise, when working in Data Centre engineering, engaging all elements with one-another is essential. The core needs of the Data Centre need to come first, and everything has a potential to affect something else.

In my current role, I work closely with all parties to establish the requirements and constraints for the space itself, and the building and site surrounding it. This involves working closely with Engineers and specialists in Cooling and Environmental Control, Critical Power, Fire Systems, Controls and BMS, as well as IT and Network designers, to name just a few.

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