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# 5G: The future, the present and the channel opportunity

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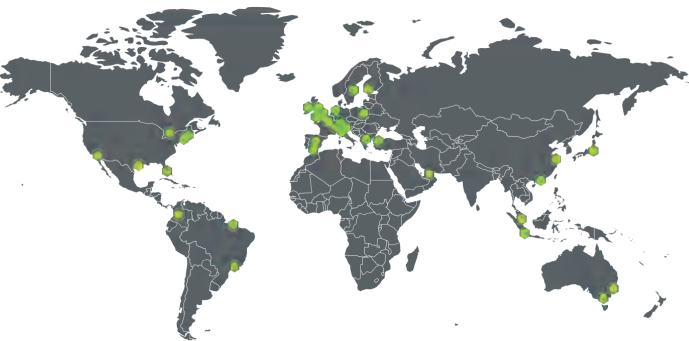
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Editor's View

By Phil Alsop

It's a fair COP!

I SUSPECT THAT, for many, if not all, the recent COP26 Summit was something of a self-fulfilling prophecy. For the ardent environmentalist, it didn't go far enough; for the ardent deniers/objectors, it went far too far; and for what I imagine is a rather silent and bemused majority in the middle, there seemed to be some good initiatives, but maybe nothing much has changed or will be noticeable day to day for quite some time to come.

Most noticeably, I thought that there was a complete lack of understanding or initiatives around the fact that, if we are serious about the environment, all of our lives will have to undergo some major, potentially disruptive changes but that, as the pandemic has demonstrated, many of these changes will actually be for the long term good, not just of the planet, but for individual lives and society as a whole.

The world of work is a great example. What the pandemic forced many of us to do – work from home, and then combine office and homeworking through the week – seems like a no brainer when it comes to reducing our carbon footprint. Less travelling has to make more sense. Okay, so city centres might notice the permanently reduced footfall but, if this means giving a boost to local communities business-wise, is that such a terrible outcome? Not so much a loss of revenue across an economy, more a redistribution. And the redistribution of income between physical and virtual businesses was

allowed to happen, so why would a geographical re-distribution be any different?

Happily, the folks who work in the IT space are not required to decide how society will function into the future to address, or not, the challenge of climate change. But they do offer a spectacular range of innovative solutions which can help leaders across the globe make crucial decisions about developing more sustainable economies

It will be fascinating to see which countries best leverage the technology at hand to re-focus their economies in this way. Or, will the carbon can be kicked down the road a while longer, until that road becomes impassable owing to flooding?

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AI, ML, Cloud and 5G take centre stage in 2022

CHIEF INFORMATION OFFICERS, chief technology officers and technology leaders globally surveyed on key technology trends, priorities, and predictions for 2022 and beyond. IEEE, the world's largest technical professional organisation dedicated to advancing technology for humanity, has released the results of "The Impact of Technology in 2022 and Beyond: an IEEE Global Study," a new survey of global technology leaders from the UK, US, China, India, and Brazil.

The study, which included 350 chief technology officers, chief information officers and IT directors, covers the most important technologies in 2022, industries most impacted by technology in the year ahead, and technology trends through the next decade. To learn more about the study and the impact of technology in 2022 and beyond, visit **https://transmitter.ieee.org/impact-of-technology-2022/**

The most important technologies, innovation, sustainability, and the future Which technologies will be the most important in 2022? Among total respondents, more than one in five (21 percent) say AI and machine learning, cloud computing (20 percent) and 5G (17 percent) will be the most important technologies next year.

Because of the global pandemic, technology leaders surveyed said in 2021 they accelerated adoption of cloud computing (60 percent), AI and machine learning (51 percent), and 5G (46 percent), among others.

It's not surprising, therefore, that 95 percent agree – including 66 percent who strongly agree – that AI will drive the majority of innovation across nearly every industry sector in the next 1-5 years.

When asked which of the following areas 5G will most benefit in the next year, technology leaders surveyed said:
- telemedicine, including remote surgery and health record transmissions (24 percent)
- remote learning and education (20 percent)
- personal and professional day-to-day communications (15 percent)

- entertainment, sports, and live event streaming (14 percent)
- manufacturing and assembly (13 percent)
- transportation and traffic control (7 percent)
- carbon footprint reduction and energy efficiency (5 percent)
- farming and agriculture (2 percent)

As for industry sectors most impacted by technology in 2022, technology leaders surveyed cited manufacturing (25 percent), financial services (19 percent), healthcare (16 percent) and energy (13 percent).

As compared to the beginning of 2021, 92 percent of respondents agree, including 60 percent who strongly agree, that implementing smart building technologies that benefit sustainability, decarbonisation and energy savings has become a top priority for their organisation.

Workplace technologies, Human Resources collaboration and COVID-19 As the impact of COVID-19 varies globally and hybrid work continues, technology leaders nearly universally agree (97 percent agree, including 69 percent who strongly agree) their team is working more closely than ever before with Human Resources leaders to implement workplace technologies and apps for office check-in, space usage data and analytics, COVID and health protocols, employee productivity, engagement, and mental health.

Among challenges technology leaders see in 2022, maintaining strong cybersecurity for a hybrid workforce of remote and in-office workers is viewed by those surveyed as challenging by 83 percent of respondents (40 percent very, 43 percent somewhat) while managing return-to-office health and safety protocols, software, apps and data is seen as challenging by 73 percent of those surveyed (29 percent very, 44 percent somewhat).

Determining what technologies are needed for their company in the post-pandemic future is anticipated to be challenging for 68 percent of technology leaders (29 percent very, 39 percent

somewhat). Recruiting technologists and filling open tech positions in the year ahead is also seen as challenging by 73 percent of respondents.

Robots rise over the next decade Looking ahead, 81 percent agree that in the next five years, one quarter of what they do will be enhanced by robots, and 77 percent agree that in the same time frame, robots will be deployed across their organisation to enhance nearly every business function from sales and human resources to marketing and IT.

A majority of respondents agree (78 percent) that in the next 10 years, half or more of what they do will be enhanced by robots. As for the deployments of robots that will most benefit humanity, according to the survey, those are manufacturing and assembly (33 percent), hospital and patient care (26 percent) and earth and space exploration (13 percent).

Connected devices continue to proliferate
As a result of the shift to hybrid work and the pandemic, more than half (51 percent) of technology leaders surveyed believe the number of devices connected to their businesses that they need to track and manage – such as smartphones, tablets, sensors, robots, vehicles, drones, etc. – increased as much as 1.5 times, while for 42 percent of those surveyed the number of devices increased in excess of 1.5 times.

However, the perspectives of technology leaders globally diverge when asked about managing even more connected devices in 2022. When asked if the number of devices connected to their company's business will grow so significantly and rapidly in 2022 that it will be unmanageable, over half of technology leaders disagree (51 percent), but 49 percent agree.

Those differences can also be seen across regions – 78 percent in India, 64 percent in Brazil and 63 percent in the U.S. agree device growth will be unmanageable, while a strong majority in China (87 percent) and just over half (52 percent) in the U.K disagree.

Silos stopping digital transformation

NEW RESEARCH from Virtana reveals that 70% of cloud decision makers view silos across teams as a hindrance to IT's ability to maximize business value. The research shows that a lack of executive involvement in cloud efforts, along with cross-functional stakeholder participation, correlates with escalating challenges for enterprises.

Notably, only 26% of cloud decision makers claim C-suite executives are actively involved in their organizations' hybrid cloud efforts. This is a key finding of a survey of 350 IT/cloud decision makers in the United States and the United Kingdom commissioned by Virtana and fielded by Arlington Research.

Charles Araujo, Principal Analyst of Intellyx commented, "There is a definitive competitive chasm developing within traditional enterprises between those that see the cloud as merely a part of the IT infrastructure, and those that see it as a strategic business enabler. Those that see it as the latter are investing both resources and executive engagement in leveraging the cloud to drive competitive advantage, and have recognized that doing so requires managing it from a business as well as technical perspective to deliver transformative business results."

Organisations that reported a lack of cross-functional cloud stakeholders are less likely than the overall respondent pool to have what they need in terms of cloud management tools and optimization capabilities. In particular, only 16% reported having billing visibility tools (compared to 40% of the overall respondent pool), 30% have usage dashboards (compared to 44%), and 38% have capacity/usage planning tools (compared to 53%).

Organisations where IT is the exclusive cloud stakeholder are also more likely than the overall respondent pool to report a variety of cloud visibility and management challenges. In particular, there is a double-digit difference in the number of respondents who reported the following:

- 85% agree or strongly agree that limited visibility across their hybrid cloud environment creates inefficiencies and wastes time (vs. 71% of the total respondent pool)
- 79% agree or strongly agree their team works in silos (vs. 67%)
- 78% agree or strongly agree that it's hard to understand whether they are delivering the service levels required for business success (vs. 66%)
- 75% agree or strongly agree that it's difficult to identify the overall business impact of an issue (vs. 65%)
- 73% agree or strongly agree that they are unable to make data-driven IT investment decisions (vs. 63%)

Jon Cyr, VP of Product Management for Virtana, shared, "With growing cloud costs and the buzz around the cloud enabling digital transformation (not to mention the strategic importance of cloud), you would think execs would be all-in on breaking down siloed cloud procurement and management. This research shows that most organizations aren't there yet, but we expect this to change dramatically in the coming year. As organizations gain more insight into cloud costs and management, the C-suite is sure to take notice."
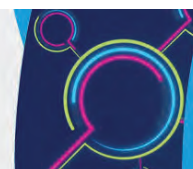
Gaps in IT staff skills causing increased stress levels and decreased productivity

SKILLSOFT has released its annual Global Knowledge IT Skills and Salary Report, exploring the current state of skills gaps, training and development, compensation, and job satisfaction in the IT industry. Based on responses from more than 9,300 IT professionals, the report found that 76 percent of IT decision makers worldwide are facing critical skills gaps in their departments – a 145 percent increase since 2016. While still a significant challenge, this represents the second consecutive year of slight improvement (79 percent in 2019, 78 percent in 2020).

 "Today's digital-first economy has presented significant opportunities for organisations. However, it has also created a dire need for new skills in cloud computing, cybersecurity, AI, DevOps, and many other critical tech areas," said Michael Yoo, General Manager, Technology & Developer, Skillsoft. "Gaps in skills don't just disappear, they only grow wider if not properly addressed.

While it is encouraging to see early signs of closing the gap, work is far from done. Organisations must place a bigger emphasis on investing in employee training, empowering professionals to earn new certifications, and filling vacant roles with diverse candidates."

To continue closing the skills gap, understanding the reasons behind it, and its impact, is critical. As digital transformation accelerates, 38 percent of IT decision makers cited the rate of technology change outpacing their existing skills development programs as the primary driver, followed by difficulty in attracting qualified candidates (35 percent) and lack of investment in training resources (32 percent).

In addition to the direct effect these gaps have on organisations' bottom lines – IDC predicts the financial impact growing to $6.5 trillion worldwide by 20251 – respondents also said they increase employee stress (55 percent), make it difficult to meet quality and business objectives (42 percent and 36 percent, respectively), and create project delays (35 percent), among other challenges. Of note, organisations are increasingly recognising the role that professional development plays in combating skills gaps and raising employee morale and retention, with 56 percent of IT decision makers saying they have a plan in place to train existing team members. And, given that 80 percent of IT professionals report a myriad of benefits after achieving

new skills and certifications – including improved quality of work (49 percent), higher levels of engagement (32 percent), and faster job performance (27 percent) – providing upskilling opportunities is a win-win for both organisations and employees alike. Additional takeaways from the Global Knowledge IT Skills and Salary include:

- IT staff crave learning and development and will move on if they are not getting it.
- For the third consecutive year, respondents that switched employers within the past year cited a lack of growth and development opportunities as their top reason for doing so (59 percent), taking precedence over better compensation (39 percent) and work/life balance (31 percent).
- When training, 66 percent of respondents said they prefer a formal, instructor-led approach, while the remaining third gravitate toward informal, peer-to-peer methods, underscoring the value of providing personalised and blended learning experiences.
- Salaries are on the rise and opportunities exist for even bigger paychecks.
- The average annual salary for IT professionals has increased across all regions. Aside from executives and those in sales, the higher-paying positions are in cloud, risk management, security, and IT architecture and design.
- 52 percent of respondents said they received a raise in the past year. Of those, 60 percent attributed it to job performance, developing new skills, or obtaining an industry certification.
- More IT professionals are certified than ever and are boosting the bottom line.
- 92 percent of all respondents said they have at least one certification, a 5 percent and 7 percent increase compared to 2020 and 2019, respectively.
- 64 percent of IT decision makers say certified employees deliver $10,000 or more in added value compared to non-certified team members, demonstrating the positive impact that investment in training has on organisations' bottom lines.

Business leaders and employees disagree significantly on future of work

79% of organisations believe employees prefer to work in an office – but just 39% of employees would prefer to work from an office full time.

NTT Ltd. has released the 2021 edition of the Global Workplace Report, providing vital insight into the future of work as businesses around the world prepare for a post-pandemic reality. The report finds that business leaders are significantly more satisfied with how they have adjusted to new working norms than their employees are, and points to the need for clearer organisational insight into how employees have reevaluated what they need from their workplace.

Shared awareness, divergent outlooks Conducting 1,146 interviews across 23 countries, NTT found near-universal agreement that remote working has introduced difficulties, with 84% of UK & Ireland (UK&I) respondents saying that it has challenged organisational performance and 86% saying that it has been challenging for employees. 68% of organisations in UK&I, meanwhile, say that employee wellbeing has deteriorated over the course of the pandemic.

Broad awareness of the issue is not always translating into a realistic assessment of organisational capability, however. Compared to operations staff, CEOs are 20 percentage points more likely to believe that their organisation is very effective at managing working hours, 28 points more likely to believe that they are effective at preventing burnout, and 41 points more likely to be very satisfied with their organisation's employee experience (EX) capabilities.

This awareness gap mirrors a serious lack of employee confidence, with just 38% saying that their employer fully values their health and wellbeing, and only 23% saying they are very happy working for their employer.

The great work-life reassessment
Underlying the satisfaction gap between employers and employees, the research found a significant degree of diversity in employee attitudes towards their own future working preferences.

Voice of the Employee (VoE) data shows that, when offered a choice of at-home, hybrid, or in-office working arrangements, employees are relatively evenly split between the three, at 30%, 30%, and 39%, respectively.

This finding contradicts the belief, shared by 79% of organisations, that employees prefer office working – when in fact, VoE data finds that just 39% of employees desire full time office working.

"Currently, the narrative is all about remote working – but the reality of employees' needs is much more complicated, and any failure to accurately assess and respond to that fact presents a serious risk to organisations", comments Alex Bennett, Global Senior Vice President, GTM Solutions at NTT Ltd. "These are not mild preferences: we found that work-life balance and commute times are now the two biggest factors people look at when deciding where to work, and so performing well on workforce and workplace strategy will be a real competitive advantage."

The need to lead by EXample
Acting on the basis of a clear view of employees' outlooks is being made more difficult by a lack of thorough data and insight collection. In terms of data priorities, 49% of UK&I businesses report VoE being the top focus, closely followed by workplace analytics at 41%.

In spite of this, however, just 37% of UK&I organisations have structured VoE programs, and 26% employ real-time

sentiment analysis, compared to 64% utilising employee surveys.

The research also demonstrated that the application of these kinds of data for improving an organisation's EX needs to go much further than day-to-day quality-of-life improvements; at 40%, a company's purpose and values is now the third most important factor for choosing where to work. In this area, employees and business leaders are in sync, with 82% agreeing that environment, social and governance (ESG) objectives are at the heart of the organisation's agenda.

"I would look at this as a call to shift our thinking from being about actions to being about outcomes", concludes Bennett. "What's important is not what we do to improve the workplace, but how it actually benefits the workforce – and an organisation cannot know that without a mature approach to measuring employees' sentiment. Surprisingly, two thirds of employees say they're not yet equipped with all the tools they need to work from home, and just 44% of UK&I organisations say they are strongly satisfied that office spaces are ready for hybrid working. Nonetheless, 88% of UK&I organisations are engaged in reshaping their office space over the next 12 months to foster an environment of innovation and social connection. Clearly, there's an awareness on some level that immature workforce strategies will lead to employee discontent, and that work should be led by what people actually need."

Businesses are not in sync with their IT departments

AS DIGITAL TRANSFORMATION accelerates a disconnect between IT decision makers and non-IT decision makers is evident.

Dae.mn, the consultancy that helps businesses to get the most out of technology, finds that although almost all respondents (94%) agree that the speed of digital transformation (DX) has accelerated over the last year, decision makers outside of IT departments fail to recognise the extent of change.

Of the respondents that believe they have fully implemented their digital transformation strategy (35%), only 20% are decision makers outside the IT Department and 80% are IT decision makers. This disconnect continues when respondents were asked about the implementation of specific technologies:

- 79% of ITDMs agree that they have undergone significant DevOps adoption, compared to 61% of non-ITDMS.
- 79% of ITDMs agree that they have undergone significant adoption of cloud services, compared to 58% of non-ITDMS.
- 80% of ITDMs agree that they have undergone significant data analytics adoption, compared to just 42% of non-ITDMS.

The Dae.mn study canvassed the opinions of 200 decision makers across a range of industries including retail, manufacturing, financial services, professional services, energy, media and leisure in Q3 of 2021. It also found that the majority (58%) of respondents say that their organisation is only in the very early stages of implementing their digital transformation strategy or has only partially implemented it.

The data suggests that some organisations are further ahead with their implementation of a DX strategy, as well as internal misalignment. A recent IDC report predicted that direct digital transformation would total over $6.8 trillion USD between 2020 and 2023.

As both the speed of DX investments and implementations accelerates, ITDMs are struggling to demonstrate the impact of DX despite it being a priority. Of the respondents, 92% consider "proving business value of IT services" a high or top priority.

"These revelations come at a time where businesses rely more on technology to streamline operations, as a point of differentiation, or even just to function at a basic level than ever before," says Calum Fitzgerald, Co-Founder of Dae.mn.

"As a result, demonstrating ROI has never been more important, but is clearly proving difficult. If decision makers outside of IT are struggling to see the impact that investment is having, especially whilst technology is playing a pivotal role, then this could be down to internal communication."

Fitzgerald continues: "Ultimately the solution lies in making sure that the objectives are agreed upon in the preliminary stages of any digital transformation project, and that they are measurable. Additionally, allowing leadership across the entire organisation to maintain visibility over digital transformation and communicating with them in terms that they will understand is crucial in mollifying any concerns that they may over budgets, implementation, or general disruption."

Lack of controls and visibility is a major security risk

80 PERCENT of organisations report employee misuse or abuse of access to business applications.

New research released by CyberArk reveals that organisations continue to operate with limited visibility into user activity and sessions associated with web applications, despite the ever-present risk of insider threats and credential theft. While the adoption of web applications has brought flexibility and increased productivity, organisations often lag in implementing the security controls necessary to mitigate risk of human error or malicious intent.

The global survey of 900 enterprise security leaders found that 80 percent of organisations experienced employees misusing or abusing access to business applications in the past year. This comes as 48 percent of organisations surveyed said they have limited ability to view user logs and audit user activity, leaving a blind spot for catching potentially risky behaviour in user sessions.

The new research coincides with the general availability of the first-of-its-kind CyberArk Identity Secure Web Sessions, a cloud-based solution that enables organisations to record and protect user web application sessions.

Consider financial, healthcare, marketing or developer web applications that contain sensitive, high-value data like financial records, customer or patient information or intellectual property. Most security and compliance teams have limited resources, visibility and control over how confidential data is being handled, or what is being done during a user session.

According to the research, in 70 percent of organisations, the average end-user has access to more than 10 business applications, many of which contain high-value data – creating ample opportunity for a malicious actor. To that end, the top-three high-value applications that organisations were most concerned with protecting against unauthorised access were IT service management apps such as ServiceNow, cloud consoles such as Amazon Web Services, Azure and Google Cloud Platform and marketing and sales enablement applications such as Salesforce.

For many security teams, investigation into questionable user activity represents a significant investment of time and drag on thin resources, and must be balanced with other priorities such as improving incident response and enforcing consistent controls across applications to reduce threat of credential theft.

According to the research:
- More than half (54 percent) of organisations investigate user activity stemming from security incidents or compliance at least weekly vs. 34 percent of organisations that investigate monthly
- 44 percent of organisations said they need to enable the same security controls across all applications amid disparate built-in application controls
- 41 percent of respondents said that better visibility into user activity would enable them to identify the source of a security incident more quickly

"Ensuring security and usability is key. As more high-value data migrates to the cloud, organisations should make certain the proper controls follow suit to manage risk accordingly while enabling their workforce to operate without disruption," said Gil Rapaport, general manager, Access Management, CyberArk. "Today, any user can have a certain level of privileged access, making it ever more important that enterprises add security layers to protect the entire workforce as part of a comprehensive Identity Security strategy and Zero Trust framework."

Secure Web Sessions Adds Layers of Security to High-Risk User Activity
CyberArk Identity Secure Web Sessions helps enterprises gain visibility into user activity within web-based applications protected by CyberArk Workforce Identity and third-party Single Sign-On (SSO) providers. Secure Web Sessions enables organisations to:
- Record and search every click and data change made within a protected app while maintaining a frictionless user experience
- Implement continuous monitoring and re-authentication, such as when a user steps away from a device during a session, reducing risk of abuse
- Protect web sessions from threats originating on the endpoint and restrict data exfiltration actions, such as copying of data and file downloads.

The need for new way to discuss business risk

TREND MICRO has published new research revealing that 90% of IT decision makers claim their business would be willing to compromise on cybersecurity in favor of digital transformation, productivity, or other goals. Additionally, 82% have felt pressured to downplay the severity of cyber risks to their board.

 "IT leaders are self-censoring in front of their boards for fear of appearing repetitive or too negative, with almost a third claiming this is a constant pressure. But this will only perpetuate a vicious cycle where the C-suite remains ignorant of its true risk exposure," said Bharat Mistry, UK technical director for Trend Micro.

"IT decision makers should never have to downplay the severity of cyber risks to the Board. But they may need to modify their language so both sides understand each other," said Phil Gough, Head of Information Security and Assurance at Nuffield Health. "That's the first step to aligning business-cybersecurity strategy, and it's a crucial one. Articulating cyber risks in business terms will get them the attention they deserve, and help the

C-suite to recognise security as a growth enabler, not a block on innovation."
The research reveals that just 50% of IT leaders and 38% of business decision makers believe the C-suite completely understand cyber risks. Although some think this is because the topic is complex and constantly changing, many believe the C-suite either doesn't try hard enough (26%) or doesn't want (20%) to understand.

There's also disagreement between IT and business leaders over who's ultimately responsible for managing and mitigating risk. IT leaders are nearly twice as likely as business leaders to point to IT teams and the CISO.

49% of respondents claim that cyber risks are still being treated as an IT problem rather than a business risk. This friction is causing potentially serious issues: 52% of respondents agree that their organization's attitude to cyber risk is inconsistent and varies from month to month. However, 31% of respondents believe cybersecurity is the biggest

business risk today, and 66% claiming it has the highest cost impact of any business risk – a seemingly conflicting opinion given the overall willingness to compromise on security.There are three main ways respondents believe the C-suite will sit up and take notice of cyber risk:
- 62% think it would take a breach of their organization
- 62% it would help if they could better report on and more easily explain the business risk of cyber threats
- 61% say it would make an impact if customers start demanding more sophisticated security credentials

Hybrid hang-ups?

USER DEVICES acting as gateways for malicious attacks (42%) and employees being less attentive to risks when at home (42%) named joint-first in biggest security risks as a result of greater hybrid working.

New research from Europe's leading provider of cloud infrastructure and cloud services, IONOS Cloud, has highlighted the biggest security risks businesses are facing when it comes to hybrid working, and views and attitudes on how to ensure organisations stay safe and secure. When IT decision makers (IT DMs) were asked about the biggest risks hybrid working is causing businesses, user devices acting as gateways for malicious attacks (42%), employees being less attentive to risks when at home (42%), and user devices being away from the corporate network for too long (40%) topped the list.

The evolution of working habits is also causing additional stress, with over two thirds (69%) of respondents saying

hybrid working is putting more pressure on teams to ensure the business is prepared for cyber security threats. The research, which was conducted by Censuswide on behalf of IONOS Cloud, polled 557 IT decision makers who currently have a hybrid working approach. When it came to improving security around hybrid working practices, almost three quarters (74%) of respondents agreed that their business must communicate more regularly about the increased cyber security risks caused by hybrid working. In addition, a further 70% agreed the business needs to invest in more education for employees on cyber security risks, and nearly seven out of 10 (69%) of those asked agreed that the business must put longer term strategies in place.

Focusing on data protection standards, over a third (35%) found working from home means employees are not adhering to data protection standards and nearly three in 10 (29%) say hybrid working has made it hard to manage

data protection standards.
Positively, some businesses are already taking action to implement change, with 67% of IT DM's agreeing that the business they work for is putting enough funding into updating its cyber security strategy in the face of hybrid working. Commenting on the findings, Peter Prahl, SVP International and Digital Cloud for IONOS said: "Although it has many benefits, hybrid working can create a variety of technical challenges. With clear education and knowledge gaps within businesses, and companies still managing the impact of the COVID-19 pandemic, it's a time when many organisations are more vulnerable than ever before."

Exploring the hybrid working impact on a business's cloud strategy, 38% of respondents have increasingly looked at cloud-based IT operating models, 38% will increase the use of hybrid cloud management and 35% are moving workloads and applications to the private cloud.

IPC

AI and Natural Language Processing
Faster and more efficient trading

Connecting opportunities

Predictions take pride of place

IDC takes a look into the future across a range of technology and business related topics.

Top 10 predictions for the Future of Operations

The top 10 predictions for the Future of Operations from International Data Corporation (IDC) speak to the rapidly expanding world of remote operations, the growing role of digital engineering, and the need to prioritize sustainability.

The COVID-19 pandemic created some unique operational challenges and opportunities. Demand for many products plummeted and then accelerated past previous levels. Companies were forced to send workers home and then struggled to staff back up. At the same time supply chains developed numerous choke points, some internally created and some externally imposed.

The crisis forced rapid changes in operations – what would normally have emerged over a decade, took place in a matter of months – that accelerated the move to more remote operations, the development of more distributed decision-making processes, and a shift to data-driven operations. New sensor technologies, wireless connectivity options, the rise of artificial intelligence, and the maturation of cloud platforms have all combined to open up the possibility of much better visibility and predictability of operational performance. They have also broken down the technology barriers to data sharing and

collaboration around that data. The bigger challenge remains the organizational changes necessary to take advantage of these innovations.

As the world gets greater control over the pandemic, organizations will need to decide whether to hang on to the traditional way they have run operations or to embrace more data-driven, collaborative, and responsive models.

The top 10 Future of Operations predictions for 2022 and beyond are:
Prediction 1: By 2023, only 25% of G2000 companies will have moved beyond using their digital engineering organization for the enforcement of IT policies in operations, resulting in limited ability to extract more value and insights from their operational data.
Prediction 2: By 2023, 40% of G2000 companies develop all new processes as remote operations first, compared with the very limited number of remote operations processes in 2020.
Prediction 3: As compared to 2% in 2021, by 2024, 35% of G2000 companies will use their Digital Engineering capabilities to sell remote operations, data, and other services to peers, partners, and customers.
Prediction 4: Compared to less than 5% today, by 2027, 40% of consumer value chains will share real-time capacity information based on increased

consumption and demand transparency.
Prediction 5: 60% of G2000 companies will use sustainability KPIs and data as primary operational control parameters by 2026, compared to less than 20% in 2021.

Prediction 6: By 2026, 40% of G2000 companies will have used AI, data governance, and a transformed organization to develop a resilient and distributed operational decision-making framework that drives 25% faster change execution.

Prediction 7: By 2025, 30% of brand owners/managers will bring operations back in house or closer to demand to exercise greater operational control, improve supply transparency, and reduce operational risk.

Prediction 8: By 2024, the use of data and analytics will have enabled a 3% reduction in global CO2 emissions by the industrial and commercial sectors (a net reduction of over 400 million metric tons of CO2).

Prediction 9: From 2021 to 2027, the number of new physical assets and processes that are modeled as digital twins will increase from 5% to 60% resulting in operational performance optimization.

Prediction 10: Compared to less than 10% in 2021, by 2025, 60% of companies will use some form of remote expert to support operational staff with AI and knowledge management.

Top 10 predictions for the Future of Work

The Future of Work predictions from International Data Corporation (IDC) signal an enduring adoption of hybrid work models by a majority of G2000 organizations, supported by broad adoption of automation and artificial intelligence and machine learning (AI/ML) technologies.

To keep pace with accelerating digital transformation initiatives and the realities of global health, climate, and social challenges, organizations must adopt more dynamic and hybrid ways of working. Workers must redefine themselves as members of dynamic and reconfigurable teams that can adapt quickly to business demands and new market requirements – anytime, anywhere, and from any physical location. Driven by senior executives and executive boards, Future of Work initiatives will be enterprise-wide imperatives. Rapid adoption of more automated, cloud-based, and AI-enabled work practices will improve work productivity and introduce new, more agile ways of working. The insights gained from these digital-first ways of working will enable organizations to respond to the needs of customers and employees, driving improvements in employee retention and customer satisfaction.

"As organizations continue to define and refine work models best suited for their industries, they inevitably will need to calibrate the right deployment of automation, digital and physical workspace, and place technologies," said Amy Loomis, research director, Future of Work. "Far from being a means to an end, deployment of these technologies is sparking new leadership conversations around empowering workers to be more autonomous and innovative working with IT, across functions and with clients." IDC's Future of Work 2022 top 10 predictions are:

Prediction 1: By 2024, 80% of the G2000 will use AI/ML-enabled «digital managers» to hire, fire, and train workers in jobs measured by continuous improvement, but only 1 of 5 will realize value without human engagement.

Prediction 2: By 2023, G2000 line of business employees will use tools to automate their own work using codeless development, but 90% of these programs will fail without supporting COE and adoption methodology.

Prediction 3: 40% of the G2000 will see a 25% improvement in information usage by 2026 due to investments in intelligent knowledge networks that turn structured/unstructured data into findable and actionable knowledge.

Prediction 4: By 2023, digital transformation (DX) and business volatility will drive 70% of G2000 organizations to deploy remote or hybrid-first work models, redefining work processes and engaging diverse talent pools.

Prediction 5: 70% of enterprise businesses will have extensively invested in diversity, equality, and inclusion data, tools, and benchmarking by 2024 to define recruitment and human capital strategies.

Prediction 6: By 2023, 60% of G2000 businesses will deploy AI- and ML-enabled platforms to support the entire employee life-cycle experience from onboarding through retirement.

Prediction 7: DX-related IT skills shortages will affect 90% of organizations by 2025, costing over $6.5 trillion globally through 2025 due to delayed product releases, reduced customer satisfaction, and loss of business.

The Future of Work predictions from International Data Corporation (IDC) signal an enduring adoption of hybrid work models by a majority of G2000 organizations, supported by broad adoption of automation and artificial intelligence and machine learning (AI/ML) technologies

Prediction 8: By 2025, 90% of new commercial constructions/renovations will deploy smart facility technology supporting flexible workplaces and sustainably improving occupant experiences and operational performance.

Prediction 9: By 2023, 70% of connected workers in task-based roles will use intelligence embedded in adaptive digital workspaces from anywhere to engage clients/colleagues and drive enterprise productivity.

Prediction 10: G1000 firms will use intelligent digital workspaces with augmented visual technologies (hardware/software) in 8:10 regularly scheduled meetings by 2024 to enable high-performance distributed global teams.

Top 10 predictions for the Future of Connectedness

International Data Corporation (IDC) has announced its Future of Connectedness predictions for 2022 and beyond. Over the past 18 months, organizations have had to adapt to a new normal, where employees require anywhere-anytime access to mission critical systems and processes; customers are more digitally guided; and business leaders must align technology, policy, and operations to drive agility and revenue. IDC defines the Future of Connectedness as enabling the timely movement of data across people, things, applications, and processes to create seamless digital experiences. The technology path to connectedness requires seamless connectivity across networks, IT systems, and the cloud to keep data moving. As employees, businesses, and consumers increasingly seek digital experiences that are supported by ubiquitous, reliable, and robust connectivity, organizations will make connectivity an investment priority.

"Businesses have been forced to adapt to more distributed operations in addition to their workforces, highlighting the importance of a robust strategy in place that embraces a wireless-first and cloud-enabled connectivity architecture," said Paul Hughes, research director, Future of Connectedness at IDC. «As the future enterprise transforms to become more agile,

IDC expects future investment initiatives to focus on eliminating physical infrastructure silos, adopting a greener and more cloud-centric roadmap, improving workforce productivity, and ensuring more resilient operations.»

IDC's Future of Connectedness 2022 top 10 predictions are:

Prediction 1: By 2023, mid-sized to large enterprises will transition 50 percent of IT staff driving connectedness from tactical legacy network support operations towards strategic business outcomes, technology innovation, and service delivery.

Prediction 2: By 2024, 45% of contact centers supporting finance, retail, and hospitality industries adopt Branch of One architectures, enabling efficient and secure enterprise-class work-from-anywhere experiences.

Prediction 3: In 2024, wireless-first becomes mainstream for wide area connectivity, accelerating 65 percent of enterprise, industrial, and public sector organization investments to «untether» their operations.

Prediction 4: By 2025, G2000 organizations are still experiencing two to three systemic service provider network outages per year, showcasing the importance of added investments in connectivity redundancy and service resiliency.

Prediction 5: By 2024, 20% of organizations will use a joint telco/cloud provider sovereign cloud running on local infrastructure to ensure compliance and limit extraterritorial connectivity, access, and data movement.

Prediction 6: By 2023, 60% of enterprises will implement hybrid, intelligent connectivity that links physical marketplaces to digital storefronts and supply chains to facilitate seamless commerce transactions.

Prediction 7: By 2023, 75% of enterprises will expect sustainability goals to be addressed in RFI responses, demonstrating responsible supply chain principles and secure IT asset disposition capabilities.

Prediction 8: By 2024, 80% of enterprises will

need to transform their networks and processes to deliver more personalized and interactive online rich media experiences that meet and satisfy customer expectations.

Prediction 9: By 2025, 60% of mid-sized to large enterprises will adopt network as a service (NaaS) to enable operational agility, service customization, and flexible consumption models that support complex network and multi-cloud environments.

Prediction 10: In 2022, more than 30% of organizations will prioritize connectivity resiliency to ensure business continuity, resulting in uninterrupted digital engagement for customers, employees, and partners.

Top 10 predictions for the Future of Innovation

Delivering innovative digital products can help businesses satisfy customers and create stronger competitive differentiation. Organizations that can then take the next step and transform their software innovation to into value engines will spawn additional business value, such as data monetization, new partnerships, or entrance into new markets. As business leaders consider ways to leverage software innovation and transform their businesses into digital innovation factories, International Data Corporation (IDC) offers its top 10 predictions for the Future of Digital Innovation.

Profitable digital innovation requires alignment across the organization, combined with a strategic selection and application of proprietary or community source tools. Most of all, digital innovation requires a clear understanding of what customers want, as well as the ability to anticipate what they will need – even before they do.

"One notable impact of the COVID-19 pandemic is that many enterprises now recognize that their ability to build innovative digital products and services will determine whether they succeed or fail in the market," said Nancy Gohring, research director, Future of Digital Innovation at IDC. «The imperative to develop innovative digital offerings is influencing an array of strategic decision making in the enterprise, including significant changes to business models, organizational models, distribution models, and revenue streams.»

IDC's top 10 predictions for the Future of Digital Innovation address topics related to shifting business requirements and enabling more efficient software development:

Prediction 1: By 2026, enterprises that successfully generate digital innovation will derive over 25% of revenue from digital products, services, and/or experiences.

Prediction 2: By 2022, organizations that allocate 50+% of their software development projects to customer-facing initiatives will see revenue grow 15%

faster compared to those that focus more on internal projects.

Prediction 3: To help alleviate the developer skills shortage, 55% of organizations will use cloud marketplaces and tech startup acquisitions as their most important approaches to software sourcing by 2024.

Prediction 4: By 2024, companies that have already invested in building a developer ecosystem will expand their customer base by 25%.

Prediction 5: Securing the software supply chain will be a core competency embraced by 75% of large digital innovators by 2023.

Prediction 6: By 2023, traditional distribution models crumble as 20% of businesses in some sectors use technology to go direct to customers, seeking to improve customer satisfaction and product development.

Prediction 7: By 2026, 30% of software development teams will be focused on turning traditional products into outcomes as a service.

Prediction 8: Half of the Global 500 will have insourced software development significantly by 2025, exacerbating the software engineering skills shortage and fueling interest in software development efficiencies.

Prediction 9: By 2024, 55% of successful digitally innovative products will be built by teams that include people with creative, critical thinking, analysis, and automation skills, as well as software engineers.

Prediction 10: By 2025, 75% of newly developed applications will include some automatically generated code, freeing up humans to focus on development tasks that are not easily automated.

Top 10 predictions for the Future of Intelligence

Results from the International Data Corporation (IDC) Future of Intelligence survey reveal a significant positive correlation between enterprise intelligence and better business outcomes. By investing in enterprise intelligence, organizations can achieve first-order benefits – improved decision-making, higher knowledge, and more efficiency – which in turn result

in improved financial outcomes, employee outcomes, customer outcomes, and offering outcomes.

Enterprise intelligence is a key driver for growth for organizations of all sizes, across all industries and geographies. IDC's research shows that 60% of organizations that scored highest in its enterprise intelligence index scale saw major improvements in decision making compared to 1% of organizations with poor enterprise intelligence. Also, 47% of organizations that scored well in enterprise intelligence increased customer acquisition by 10% or more, compared with 10% of those with poor enterprise intelligence.

"IDC FutureScape predictions highlight key trends that will occur over the next five years," said Chandana Gopal, research director, Future of Intelligence. "These predictions will help guide business leaders as they strive to improve enterprise intelligence to become leaders in their markets and outpace their peers."

IDC's Future of Intelligence top 10 predictions impact the four pillars of enterprise intelligence:
- The ability to synthesize information
- e capacity to learn from the information
- The ability to apply those insights at scale
- A data-driven culture built on a foundation of technology that enables all of the above

Prediction 1: By 2025, 10% of F500 companies will incorporate scientific methods and systematic experimentation at scale, resulting in a 50% increase in product development and business planning projects – outpacing peers.
Prediction 2: By 2023, 70% of F1000 enterprises will be involved in intercompany intelligence sharing based on common standards, values, and goals, strengthening mutualism in ecosystem relationships by 50%.
Prediction 3: 40% of the G2000 will double the use of intelligent automation in knowledge retention, dissemination, and information synthesis by 2026, filling the skills vacuum in the data to insights life cycle.
Prediction 4: By 2026, 30% of organizations will use forms of behavioral economics and AI/ML-driven insights to nudge employees' actions, leading to a 60% increase in desired outcomes.
Prediction 5: A lack of meritocracy-based data culture will erode trust in management, reducing employee satisfaction and increasing turnover in two-thirds of mid-size to large enterprises by 2024, exacerbating skills gaps.
Prediction 6: By 2023, 60% of enterprise intelligence initiatives will be business specific, purpose built for business, shortening the data to decisions time frame by 30%, driving higher agility and resiliency.
Prediction 7: By 2024, 30% of the G2000 will leverage post-pandemic automation initiatives, with the role of the middle manager evolving to that of a visionary, curator, and connector, driving collective intelligence.

Prediction 8: By 2025, to reduce reputational risks, 40% of G2000 companies will be forced to redesign their approaches to algorithmic decision making, providing better human oversight and explainability.
Prediction 9: By 2026, advances in computing will enable 10% of previously unsurmountable problems faced by F100 organizations to be solved by super-exponential advances in complex analytics.
Prediction 10: By 2025, three-fourths of large enterprises will face blind spots due to a lack of intelligent knowledge networks and the harmonization they provide between localized and centralized intelligence.

Top 10 predictions for the Future of Digital Infrastructure

International Data Corporation's (IDC) top 10 predictions for the Future of Digital Infrastructure point to a digital infrastructure strategy that addresses resiliency and trust; data-driven operational complexity; and business outcomes-driven sourcing and autonomous operations. Organizations must invest in and foster a digital-first culture that leverages trusted industry ecosystems, generates profitable revenue growth, provides empathetic customer experiences, and demonstrates an ability to adapt operating models to complex customer requirements. In the coming years, organizations will deploy, operate, and scale digital infrastructure to ensure consistent security, performance, and compliance across all resources, regardless of where and how they are deployed. These organizations will invest in more intelligent, autonomous operations and take advantage of flexible consumption and strategic vendor partnerships to promote agility and ensure that the business, and its digital infrastructure, can continue to perform in the face of a wide range of unexpected scenarios – social, geopolitical, economic, climate, or business related.

"Digital infrastructure spans compute, storage, network, and infrastructure software, including virtualization and containers, and the automation, AI/ML analytics, and security software and cloud services needed to maintain and optimize both legacy and modern applications and data," explained Mary Johnston Turner, research vice president, Future of Digital Infrastructure. "IDC's 2022 predictions for the future of digital infrastructure identify critical shifts in governance, operations, architecture, and sourcing that need to be factored into enterprise digital transformation strategies going forward."

The top 10 predictions from the Worldwide Future of Digital Infrastructure 2022 report are:
Prediction 1: By 2023, G2000 leaders will prioritize business objectives over infrastructure choice, deploying 50% of new strategic workloads using vendor-specific APIs that add value but reduce workload portability.
Prediction 2: In 2023, over 80% of the G2000 will cite business resiliency to drive verifiable infrastructure

IDC Top Strategic Priority Based on 2021 Market Share (Value (Constant))

- Innovate, Scale, Operate Other
- Back-Office Support and Infras...
- Smart Manufacturing
- Customer Experience Other
- Digital Supply Chain Optimizat...
- Others
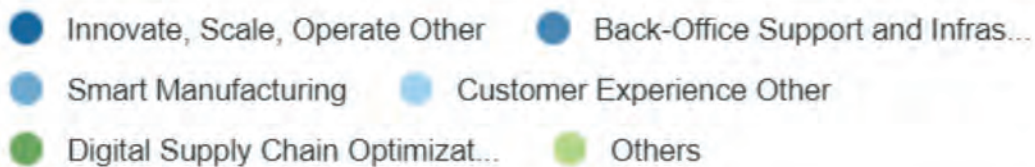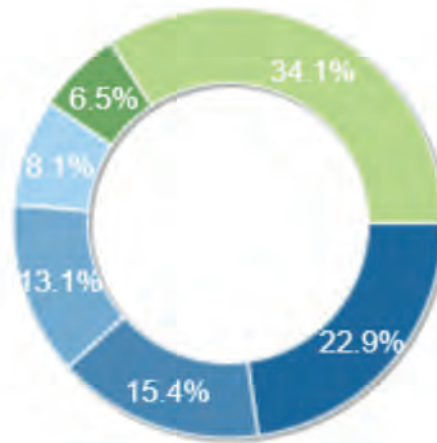
Source: IDC Worldwide Digital Transformation Spending Guide – Use Case Forecast 2021

supply chain integrity as a mandatory and non-negotiable vendor evaluation criterion.

Prediction 3: By 2023, most C-suite leaders will implement business critical KPIs tied to data availability, recovery, and stewardship as rising levels of cyber-attacks expose the scale of data at risk.

Prediction 4: By 2024, 75% of G2000 digital infrastructure RFPs will require vendors to prove progress on ESG/Sustainability initiatives with data, as CIOs rely on infrastructure vendors to help meet ESG goals.

Prediction 5: By 2024, due to an explosion of edge data, 65% of the G2000 will embed edge-first data stewardship, security, and network practices into data protection plans to integrate edge data into relevant processes.

Prediction 6: By 2025, a 6x explosion in high dependency workloads leads to 65% of G2000 firms using consistent architectural governance frameworks to ensure compliance reporting and audit of their infrastructure.

Prediction 7: By 2025, 60% of enterprises will fund LOB and IT projects through OPEX budgets, matching how vendors provide their services with a focus on outcomes that are determined by SLAs and KPIs.

Prediction 8: By 2025, 70% of companies will invest in alternative computing technologies to drive business differentiation by compressing time to value of insights from complex data sets.

Prediction 9: By 2026, 90% of G2000 CIOs will use AIOps solutions to drive automated remediation and workload placement decisions that include cost and performance metrics, improving resiliency and agility.

Prediction 10: By 2026, mid-market companies will shift 65% of infrastructure spending from traditional channels towards more app-centric trusted advisors.

Continued growth for Digital Transformation

Global spending on the digital transformation (DX) of business practices, products, and organizations is forecast to reach $2.8 trillion in 2025, more than double the amount allocated in 2020. According to a new update to the International Data Corporation (IDC) Worldwide Digital Transformation Spending Guide, DX spending will have a compound annual

growth rate (CAGR) of 16.4% over the 2021-2025 forecast period as organizations pursue a holistic digital strategy for people, processes, technology, data, and governance.

"For the first time, IDC has forecast global DX spending to exceed $10 trillion over a five-year period," said Craig Simpson, senior research manager with IDC's Customer Insights and Analysis Group. "While most DX projects remained on track in 2020 and into 2021 during the pandemic, IDC forecasts DX technology investments to accelerate in 2022, with a renewed drive towards more long term strategic digital objectives. Beyond operational DX investments, customer experience is garnering some of the largest DX technology investments from consumer-oriented industries such as securities and investment services, banking, and retail."

Organizations allocate their DX investments toward a number of strategic priorities that align with what they expect to accomplish over an extended period in pursuit of their digital mission. Many of these priorities coalesce around operational objectives, including back office support and infrastructure for core business functions such as accounting & finance, human resources, legal, security and risk, and enterprise IT. Similarly, innovate, scale, and operate priorities refer to a broad area covering large-scale operations, including making, building, and designing activities. Core business functions comprising this area include supply chain management, engineering, design and research, operations, and manufacturing plant floor operations. Finally, customer experience is a specific area covering all customer-related functions and related technologies supported by DX. Core business functions comprising this area include customer services, marketing, and sales. While the back office support and infrastructure and innovate, scale, and operate priorities will see significantly larger spending totals throughout the forecast, customer experience investments will see faster investment growth.

SThe DX use cases – discretely funded efforts that support a particular program objective – that will receive the most spending will be spread across the three strategic priorities. Investment in robotic manufacturing will grow to $120.6 billion in 2025, followed by autonomic operations and 360-degree customer and client management at $90.9 and $74.7 billion, respectively. The DX use cases with the fastest spending growth will be virtualized student workspaces (43.8% CAGR), mining operations assistance (39.1% CAGR), and augmented design management (34.5% CAGR). Of the more than 300 DX use cases identified by IDC, only five will have five-year CAGRs of less than 10% over the forecast period. The industries that will see the largest DX spending throughout the forecast are discrete and process manufacturing, followed by professional services and retail. Combined, the two manufacturing industries will account for nearly 30% of all DX spending, totaling more than $816 billion in 2025. The industries that will experience the fastest growth in DX spending over the 2020-2025 forecast are construction (21.0% CAGR), securities and investment services (19.2% CAGR), and banking (19.0% CAGR). All 19 industries covered in the DX Spending Guide are forecast to deliver double-digit growth over the five-year forecast.

The United States will be the largest geographic market for DX spending, delivering roughly one third of the worldwide total throughout the forecast. Western Europe will be the second largest region for DX spending, following closely by China. China will also deliver the strongest year-over-year growth in DX spending with a five-year CAGR of 18.4%. Latin America will be the region with the second fastest growth with a 17.5% CAGR.

"By 2025, DX spending in Europe will reach $653 billion, which is more than double the amount spent in 2020. Moreover, by 2023, DX spending will overtake non-DX spending, confirming the strong commitment of European companies toward digital transformation," said Angela Vacca, senior research manager, European Industry Solutions, Customer Insights & Analysis. "In this context, European finance, healthcare, and professional services companies will grow their DX spending the most with strong variations across use cases as priorities keep shifting with recovery mostly in place, and companies consequently moving away from emergency needs to more strategic and longer-term bets."

> Organizations allocate their DX investments toward a number of strategic priorities that align with what they expect to accomplish over an extended period in pursuit of their digital mission. Many of these priorities coalesce around operational objectives, including back office support and infrastructure for core business functions such as accounting & finance, human resources, legal, security and risk, and enterprise IT

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5G: the future, the present and the channel opportunity

It's time for the IT channel to lead from the front, engaging the market and building an ecosystem of expert partners that can steer and enable the distributed computing revolution.

BY GIORDANO ALBERTAZZI, PRESIDENT OF VERTIV IN EUROPE, THE MIDDLE EAST AND AFRICA (EMEA), AND GLOBAL CHANNEL BUSINESS LEADER

SINCE the commercial launch of 5G in 2019, networks have started being deployed globally and the ecosystem has grown significantly. Beyond the very much increased consumer handset experience and faster speed, the 5G era brings with it use cases and benefits for both public and private sectors, as digitalisation enhances every interaction we make. According to a global study by Accenture, 79% of businesses believe 5G will have a significantly positive impact on the way their organisation works, with 57% of those saying it will be revolutionary. Here, we are already seeing the impact of 5G on applications such as high-definition video, ultra-low latency gaming and advanced telemedicine.

Propelled by the adoption of 5G, multiple new opportunities are emerging for distributors, partners and resellers in the channel. With this in mind, let's

take a look at what they are and the considerations to bear in mind.

An opportunity for the channel

The pandemic changed most things, but in the case of our relationship with technology – certainly in the IT channel – it has been more of an accelerant than a catalyst. As such, we're seeing demand for more sophisticated products, deployment-friendly systems, edge use case applications and rapidly deployable prefabricated edge data centre solutions.

Whether the enterprise looks to use digitalisation to understand its business and customers with better granularity, offer new ways of communicating and interacting with its supply chain, manage its data from its facility or use a hybrid on-premise/cloud model, new IT tools will be critical to ensuring relevance and competitiveness in the 5G era.

Where we once saw the propagation of the communications networks, we now see the same for data processing – which has moved closer to the end-user or the point of data collection, known as an edge location.

The channel is well placed to help its customers take greater advantage of this opportunity by providing both the technical and logistical scope needed to deliver a full solution tailored to fit their specific needs. This requires a strong and deep partnership with vendors.

What does this mean for the rollout of 5G? Well, Ericsson is ready to offer secure on-site connectivity with its private 5G network and Deutsche Telekom and partners have successfully trialled the world's first 5G voice over new radio (VoNR) call. Already, we are seeing plenty of tangible examples of 5G's application, but, be sure, we are just scratching the surface of opportunity.

5G on the edge

If we look at edge computing, the use cases are almost endless – everything from smart security to smart cities, digital health, automated cars, drones, and extended reality. All have the potential to be accelerated by 5G.

As the main enabler of 5G networks, edge computing should be considered a key driver in the way we

use, consume and distribute data in the coming decades. It will be the foundation for many emerging technologies, for example, Internet of Things (IoT) and Artificial Intelligence (AI), which are set to propel businesses into an era of data awareness and automation.

Using the edge for this purpose ensures that critical microseconds are not lost when processing large volumes of data, making the art of automation a real-time experience. Information is on hand and continuously updated while it is being accessed. As a result, the demand for dispersed, highly secure, private 5G networks has increased to provide the data sovereignty and privacy needed for effective remote operations.

5G efficiency

The implications for 5G go even further. As a global community, we are increasingly mindful of sustainability and the impact we are having on the planet. Here, 5G is widely recognised as being more energy-efficient than 3G or 4G when it comes to the power required to transmit data.

According to our research with STL Partners, 5G networks can be up to 90% more efficient per unit of traffic than their 4G predecessors.

However, it should also be remembered that 5G deployments will increase to fully propagate the technology, meaning overall energy consumption is expected to rise. So, equipment manufacturers and telecom operators will be under increased scrutiny on energy sourcing and looking for solutions to minimise their carbon footprint and energy consumption.

The business case for channel partners

The advent of edge computing and the need to ensure the sustainable use of new technologies present a strong business case for channel partners too. Indeed, as businesses decentralise and move towards either a smaller, more local data centre facility or an on-premise solution, they will be looking to leverage 5G to increase the speed of data processing and decrease latency.

For partners, this implies a considerable opportunity to extend their scope to critical infrastructure – including racks, power distribution networks, cooling, integrated solutions, and edge data centres – to support data

Using the edge for this purpose ensures that critical microseconds are not lost when processing large volumes of data, making the art of automation a real-time experience. Information is on hand and continuously updated while it is being accessed.

processing on a local scale. They will have the opportunity to offer simplified, modular and self-managed solutions to accommodate 5G networks. Three types of approaches are pivotal for edge computing success – making application, legacy, and geographic or dynamic measures key here.

Firstly, resellers have an opportunity to upgrade customers' existing infrastructure in their IT rooms – using more efficient and innovative power and cooling topologies to support more demanding digital resources. Resellers can also help customers understand where and how energy is being consumed through monitoring technology that can increase efficiency and assist with carbon accounting, never having to compromise on system resilience.

Secondly, resellers can take advantage of geographic edge applications. Data, and data processing, is becoming decentralised and is increasingly being placed closer to the end-user. Placing the facility within a short reach from the end-user is extending the data centre ecosystem to a more local level, in locations previously unseen in the current landscape. The edge data centre or micro data centre is exactly that, everything that is contained within and expected from its giant counterpart, miniaturised and suitably configured for a locality.

This makes it ideal for the municipality looking to move millions of people around a city at peak times with public transport, for the manufacturer wanting to real-time understand the status of their supply chain and production flow. Consumers benefit too, by being able to interact with their environment, goods and services in a more intuitive and immersive way.

Thirdly, the dynamic edge deals with two-way traffic between applications – an application type that takes advantage of 5G and mobile devices. Here we should remember that 5G is not only for the handset and consumer. The expectation is that the number of machine-to-machine subscriptions will overtake human subscriptions by 2026, meaning that most 5G traffic will be invisible to the consumer. The resulting torrent of data will be the enabler of applications and services yet unseen, as 5G bridges the gap between the advances of technologies like AI and the advantage of mobility.

Being able to process and track objects as they move, or being able to connect to technology without wires, or within a limited area, is the key to unlocking insights that have been out of reach to date. 5G will enable ten times the number of subscribers we see today, giving the possibility and scope to capture information from almost anything.

Leading the 5G era Possibly buoyed by its recent success, Ericsson predicts that 5G will penetrate every market on the globe by 2026. Notably, 5G subscriptions with capable devices grew by over 70 million during the first quarter of 2021, reaching 290 million. What's more, Ericsson anticipates there will be 580 million 5G subscriptions by the end of the year. Whether one chooses to look at the numbers or the multitude of potential applications for 5G technology, one thing is clear: the channel opportunity is huge, and it must be seized sustainably.

As the expansion of the edge continues to force data processing into decentralised and smaller data centres, the need for IT channel partners with a broad range of capabilities, local commercial roots and strong vendor relationships to support these systems will be pivotal.
It's time for the IT channel to lead from the front, engaging the market and building an ecosystem of expert partners that can steer and enable the distributed computing revolution.

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Building back better:
Accelerating Industry 4.0 digital transformation

There's always a point with technological trends where the conversation switches from "what could be" to "what is". That's happening with Industry 4.0 right now, driven by real-world deployments of the industrial internet of things, automation, artificial intelligence, edge cloud, and 5G that are rapidly revealing the value Industry 4.0 technologies can deliver organizations in a wide range of sectors.

BY CHRIS JOHNSON, HEAD OF THE GLOBAL ENTERPRISE BUSINESS AT NOKIA

THE UNDERLYING VALUE proposition for industrial transformation hasn't changed much. It's still about making dramatic gains in efficiency and productivity with streamlined processes and automation, situational awareness, and predictive technologies. But deployment experience and the COVID-19 pandemic have prompted a re-evaluation of what matters most when it comes to building the mission-, business- and society-critical networks that will take us into the Industry 4.0 future.

Building back digitally resilient The global pandemic accelerated the digitalization goals of industries and governments alike. It left no business or society untouched – highlighting the need for more resilient operating models and demanding new "virtual" ways to maintain productivity despite lockdowns and new health protocols.

For some companies, the business impacts of the pandemic were devastating. Others found ways to

adapt and overcome with the help of Industry 4.0 technology, adjusting their business and operating processes to "build back better" with agility and strength.

Whether because of planned progress or pandemic-driven imperatives, many organizations have seen what digitalization can do for them – and they want more of it. They see that the value goes beyond simply connecting things to each other: digitalization can shed light on the relationships between connected things and generate predictive insights. Communications, banking and insurance have embraced their digital potential and are reaping the benefits. Companies in these sectors have increased their capacity, resilience, and flexibility – with tremendous impact on the bottom line.

Industries such as manufacturing, agriculture, mining, and logistics that rely more heavily on physical equipment, vehicles, infrastructure, and other assets aren't as far along, but are increasingly aware of just how much they stand to gain. Incorporating digitalization into their operations promise's exponential increases in safety, productivity and efficiency – up to 11 times current performance levels in these areas according to Bell Labs Consulting. The proof is being seen in more and more pilot projects and active deployments around the world every day. No wonder, then, that a recent survey found 68% of CEOs are planning for major investments in data and technology in the next year, and 63% believe accelerating technology and digital innovation is having the greatest impact on their companies. Sustainability is key to building back better.

Sustainability is not just an environmental imperative, it's a financial imperative and an opportunity. Aggressive zero-emission targets and environmental regulations must be met for a sustainable future. Failing to meet these targets can not only result in financial penalties from regulators but also can cause lost deals for companies that can't meet their customers' sustainable supply chain targets. Organizations in industries that depend on finite resources have to protect and conserve resources while finding new ways to do business or shift their business models toward more sustainable resourcing - models which could bring more profitable outcomes for their future.

Other elements bubble up into the sustainability equation as well, such as universal access to broadband, healthcare and education, economic growth, innovation and resilient infrastructure. Digitalization holds the key to helping industries and governments meet sustainability goals while strengthening their overall performance.

Putting Industry 4.0 into practice
Customers in a wide range of industries make major strides on the Industry 4.0 front. Digitalization

> Lufthansa Technik initiated 5G private wireless in its operations just before the pandemic. When faced with travel restrictions, it found those capabilities key to business continuity, allowing it to offer high-definition virtual table inspections of aircraft engines

is allowing Peru's Minera Las Bambas, one of the world's largest copper mines, to expand autonomous and remote operations so it can ultimately reduce the number of workers exposed to dangerous conditions while increasing productivity.

Companies use digital technology and advanced connectivity in new ways to shift their operating models and become more adaptable. Lufthansa Technik initiated 5G private wireless in its operations just before the pandemic. When faced with travel restrictions, it found those capabilities key to business continuity, allowing it to offer high-definition virtual table inspections of aircraft engines. The New York Power Authority, the largest state public power utility in the United States, is using private wireless as part of their communications backbone digitalization initiatives to improve situational awareness and other applications that enhance the operation of the grid. Municipalities and governments in many countries are also deploying broadband network technologies to build smarter, more sustainable, and more inclusive cities.
It's not just about rebuilding, it's about reinvention Maybe there was a time when a company had a single challenge and needed one solution to address it. That's not the case anymore. Today's need for resilience and adaptability comes as companies and governments are under pressure to meet increasingly stringent sustainability standards and productivity targets, while delivering consistently high-quality service.

Part of what makes digitalization such a powerful tool is its versatility to handle all of those transformation needs at once. Smarter, faster, more resilient Industry 4.0 networks already in full swing are proving more than capable of meeting the unique requirements of a wide range of industries – including those that rely heavily on physical assets. Beyond rebuilding, these networks, and the high-performance, purpose-designed solutions they deliver offer the ability to accelerate future visions and, in some cases, even reinvent industries for a profitable post-pandemic future.

How businesses can reap the full benefits of private 5G networks

5G is anticipated to be one of, if not the most adopted technology by enterprises in the coming decade, providing the foundation for true connected experiences.

BY MUKESH BAVISI, MANAGING DIRECTOR, EXPONENTIAL-E

MORE THAN EVER, people expect effortless access to their data – anywhere and anytime – in both their personal and professional lives. Considering this alongside the now-widespread acceptance of hybrid working, and the many organisations exploring the possibilities offered by cloud transformation, big data, and the internet of things (IoT), the demand for high-quality, always-on connectivity has never been higher. 5G private networks offer an answer to this demand, and will prove transformative for a number of industries, including manufacturing, utilities, retail, public transport and healthcare, providing staff with effortless access to the tools they need, whether they're at home, on site, or on the move. This will, in turn, drive new innovations in customer service,

technological innovation, and the way we collate, analyse, and act on our critical business data.

At first glance, 5G may seem like a simple update to 4G, offering increased bandwidth, greater reach, and minimal latency. But while this is certainly true, its potential benefits extend far beyond this. Ultimately, while 4G was a brilliant evolution for consumers, it is businesses who will reap the greatest benefits from 5G. While it has been suggested that we are still some way off from truly experiencing these benefits, the early successes 5G has already delivered paint a different picture.

The current state of 5G: why private networks are key for the here and now

The widespread implementation of public 5G is still reaching maturity and perhaps won't do so for some time. However, one area developing much more quickly is private 5G. Ofcom recently released a small amount of spectrum for these private networks in the UK and it's quickly being trialled by many businesses. Critically, 5G enables large-scale connection to a single cell from multiple locations.

These private networks are perfect for connecting geographically dispersed sites, providing consistent performance for business-critical applications. For example, most energy companies manage massive substations, power stations, solar and wind farms. Such sites are typically highly dispersed, but still require reliable, secure, and private connectivity – the kind provided by a private 5G network.

Why 5G allows us to live and breathe the phrase 'data is king'

Deploying 5G for these huge areas also means organisations don't need expensive cabling, which

requires a lot of manpower to install. As a result, a 5G private network is frequently more cost-effective, cheaper, quicker to install, easier to set up, and – crucially – more reliable and secure. This not only ensures devices and staff can access critical applications from wherever they are operating, but also provides the power and performance required for resource-intensive big data and IoT projects.

With staff connecting remotely across numerous sites, utilising a wide range of software-defined solutions and IoT devices, organisations generate increasing volumes of data on a daily basis – a trend that shows no sign of slowing down. Private 5G networks allow this data to be securely gathered, stored, and analysed, providing a clear picture of the entire ecosystem, and delivering insights that lead to sustainable, long-term growth.

This might include manufacturers, who can monitor the performance of IoT devices across their entire network of sites, healthcare organisations capturing and centralising data at the point it is created to enhance patient outcomes, or retailers tracking customer behaviour throughout visits to their sites to deliver tailored marketing and better service delivery. With a private 5G network as the foundation, and the support of the right technology partners, all these

possibilities (and more) become not just possible, but highly achievable.

Find a partner that can support your own 5G journey
Despite private 5G networks being much easier to implement, the process nonetheless requires specialist engineers that are accredited to work in challenging or remote environments, and are able to offer hands-on advice around system integration, ensuring the new network has ample room to scale and evolve.

When looking for the right partner, businesses should not only be looking for one with the in-house networking capabilities, but one that can underpin and support a holistic 5G ecosystem, enabling the delivery of those all-important connected experiences. This should be supported by sector-specific knowledge, ensuring the assigned project teams understand their specific requirements around compliance, security, and performance and ensure these are inherent in the design of the solution.

By working with a tech-savvy partner that can help to implement and support this full ecosystem, organisations will be in a much better position to leverage all of the current and future benefits of 5G, leading us into the next era of network modernisation.

Location Intelligence:
Enabling 5G to thrive

What new benefits might develop as 5G hits the mainstream over the course of the next few years?

BY SHOBHIT JAIN, SR. DIRECTOR PRODUCT INNOVATION, HERE TECHNOLOGIES
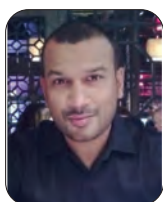
THE IMPORTANCE of fast and reliable connectivity has never been more evident than in recent months. With people confined to their homes, communications networks have helped them stay connected and, in many cases, employed, while giving countless businesses continued access to the digital infrastructure they have required to weather the crisis. At the same time, modern network technologies also hold the key to a global recovery. In the post-pandemic era, nearly all industries will seek to accelerate their efforts to automate, digitise and enhance their capability to operate remotely.

For this, the continued advance of 5G, presently still in the early stages of a multiyear build-out, is critical. But there are other pieces to the puzzle too. In particular, Multi-Access Edge Computing (MEC) technology, which brings cloud computing to the edge of the mobile network, is gaining recognition as a vital component of the networks needed in the future. Today, several commercial and pilot deployments are in operation globally. When combined with 5G, MEC promises unprecedented levels of compute and network performance, with high bandwidth data transfers and ultra-low-latency connections, the kind of connectivity that can power the autonomous services of the future.

However, commercial success is far from assured. 5G MEC requires high upfront investment and comes with significant risks. Cloud processing and storage capabilities will need to be deployed closer to where the consumers, workers, cars, robots and industries of tomorrow will be. The question is, where will they be? Getting the most out of these promising technologies will require the help of another: location intelligence.

Navigating 5G MEC with location intelligence

For a long time, location intelligence has played a mostly peripheral role in enterprise decision-making and application development. In recent years, however, it has exploded with context richness, considering surrounding circumstances as a part of the technology, fuelled by affordable, low-powered sensors, big data analytics, and artificial intelligence. This new generation of location intelligence is now at the core of the next wave of digital transformation and helping drive better real-world outcomes.

Its emergence is also perfectly timed to meet the needs of 5G MEC deployment. The physics of millimetre wave spectrum and beamforming technologies require the infrastructure to be different from earlier generations of mobile networks. Instead of today's spaced-out cell towers, 5G MEC will leverage a dense and complex network of small cells along with

optimally placed edge servers. Fortunately, rich layers of visual and informational geospatial context can now be folded into the process of network planning and optimisation.

There are numerous ways that mobile network operators and others involved in the deployment of 5G MEC can benefit from location intelligence. With 3D geometry and rich mobility data, 5G MEC topology will be correct from the offset, keeping costs down to enable efficient network planning and deployment. High-definition location data hosted at the edge will also support accurate 'always on' positioning in real-world mobility and virtual control in remote environments, providing hyper-precise positioning for machines on the move. Edge-computed location context places every consumer at the centre of the universe, fuelling innovation and offering developers new paths to monetisation, while location will become key in managing privacy preferences as data transfers become instant.

In fact, once 5G MEC is rolled out, it will actually in-turn benefit location intelligence and services. While location intelligence will act as a catalyst for enabling 5G MEC, the subsequent advancements in MEC will help fuel location intelligence in the future. Both industries and consumers alike will gain advantages from wider network coverage, lower latency, reduced transfer costs and the ability to better handle surges in data traffic, as the technology is increasingly adopted and developed.

A leap in positioning accuracy and latency

Organisations across numerous industry sectors invariably need to locate something, be it devices, personnel, goods, vehicles or customers, in order to implement their business model successfully. In some cases, they will need to do so quickly, precisely and continuously. New network technologies make this possible, working in tandem with precise mapping to deliver unprecedented levels of positioning accuracy and enabling a multitude of new use cases.

Positioning technology has been something of an 'add-on' feature in previous generations of mobile networks. The 4G standard, for example, has primarily been deployed to serve smartphones and fairly modest positioning requirements. With 5G, however, positioning technology has been baked into the development of this newest generation standard from the beginning. This is no accident; the authors of the 5G standard have sought to ensure that future networks will be able to serve the demanding positioning requirements of a wide range of vertical industry use cases across outdoor and indoor environments.

Additionally, they have resolved that future solutions must be able to seamlessly harness multiple positioning technologies to deliver the best possible performance in terms of accuracy, power consumption, cost and scale. After all, not every application will have the same requirements. The 5G standard integrates a broad spectrum of positioning technologies, including 4G, GNSS, Wi-Fi, and Bluetooth LE.

5G NR (New Radio) itself is a welcome addition to the positioning toolset, with the ability to provide greater positioning accuracy and availability than 4G. Much depends on how dense those formations of millimetre wave small cells will be. Industry estimates suggest that building out sufficient coverage of 5G signals could result in between four to ten times as many cell sites per square kilometre compared to 4G networks. This kind of density significantly increases a device's visibility to multiple beacons, while wider bandwidths at high frequencies, together with enhanced antenna solutions, can theoretically enable more accurate location estimations. Positioning accuracy can be further enhanced by algorithms running in MEC servers.

Most location services today are enabled through a combination of on-device processing of positioning data and the transfer of some data for processing by a server in a remote central cloud. Calculating a position this way tends to involve multiple hops and takes time. While 5G devices can perform calculations to work out their own location, including drawing on terrestrial and satellite signals, doing so can quickly drain the battery. 5G MEC networks allow for the computing effort involved to be offloaded from the device to nearby edge servers. This enables devices to be continuously positioned in real-time by the edge network. By having the network do the processing work, more computationally intensive positioning techniques and algorithms can also be utilised to support novel use cases.

5G MEC and location intelligence: a happy coexistence

Location intelligence will be crucial to the deployment of 5G MEC networks, at a time when they are needed more so than ever before. But the capabilities of the technology are set to expand further beyond simply building out the infrastructure. Once 5G is rolled out, networks will continue to benefit from location services as they enable a new generation of use cases across both enterprise and consumer industries.

So, a cycle has effectively begun, whereby existing location intelligence will allow for the 5G MEC deployment, while the low edge compute of MEC will allow for everything to be tracked far more easily, in turn strengthening location intelligence. It is a prime example of how innovation and technology has advanced to improve itself, with both location intelligence and MEC enhancing the other as their use increases. And what new benefits might develop as 5G hits the mainstream over the course of the next few years? Only time will tell.

How will 5G reshape the landscape for Industrial IoT?

5G is more than a new generation of technologies, it's a springboard to a new era of connectivity that could completely revolutionise and reenergise the world of manufacturing and engineering.

BY ALEXANDER SCHEBLER, CO-FOUNDER & VP CARRIER RELATIONS, EMNIFY

INDUSTRY 4.0 is poised on the threshold of a new breakthrough. Production is becoming increasingly digitised, optimised and customised to keep pace with the demands of the marketplace. Automation and human-machine interactions continue to escalate, while measurement, data flow and connectivity play a pivotal role in smart manufacturing.

But how can factory automation take full advantage of real-time, closed-loop robotic and machinery control to allow businesses to reap the maximum benefit? Enter 5G. With ultra-reliable low latency communications (UTLLC), it could be the key that unlocks the full potential of Industrial IoT.

What is 5G and why is it different?
5G is nothing more than a term to describe the fifth-generation mobile network. It's been designed to deliver:

- Higher speeds
- Superior reliability
- Ultra-low latency
- Massive network capacity
- Increased availability

In short, 5G is far more capable than previous mobile network solutions. Before 5G, wireless technologies couldn't deliver the robust low latency performance needed for industrial automation and process control

systems. That's why there's been heavy reliance on wired technologies for time-critical applications.

Now, with the rise of 5G and its URLLC service category, there's an opportunity for industrial premises to move away from wired connections. That means more deployment flexibility, long-term reliability, and reductions in the costs of manufacturing, installation and maintenance.

The 5G opportunity for industrial applications Potential industrial applications include cloud control of robots and machines, with factory automation virtualised and moved to the edge. This opens the door for wirelessly controlled production processes, managed in real-time, and at a significantly reduced cost. Data is also a major factor in factory decision making processes. Collection, collation and analysis at scale creates a significant time lag when trying to build an objective view of operations. With a 5G deployment, all that data can be processed and acted upon almost immediately, improving predictive maintenance, extending efficiencies in manufacturing lines and reducing barriers to profitability.

The data challenge is compounded by the increasing number of connected devices deployed across a factory. Wired networks are expensive and inflexible, but Wi-Fi networks can become congested, prone to interference problems and riddled with latency issues. As more devices are added and data transmission accelerates, the problems intensify.

With 5G, endpoint density – the number of devices connected to the network per unit area – is no longer an issue. And with 5G millimetre wave broadband (MMB), the increased spectrum availability allows greater data throughput. That enables video and detailed machinery data to be transmitted, as well as improved beamforming and a substantial reduction in the price per megabyte.

These are just a few of the opportunities that 5G will bring to IIoT, and they can be delivered using private 5G networks, which provide a level of control and security that's comparable to wired networks. For many, private 5G networks could be the only option, as industrial premises are frequently located in remote areas where 5G cell towers may not yet be available. But even when a public 5G infrastructure already exists, deployment of private on-premise 5G base stations gives maximum network coverage while providing a private network that ensures the utmost levels of security.

The importance of a SASE framework
The design, implementation and development of 5G networks and infrastructures for IIoT need to place security at the forefront. SASE (pronounced 'sassy') is a network security model proposed by Gartner in 2019. It was formalized to address the drawbacks of centralized data centres, such as high latency,

uncontrolled and less secured communication to third-party software services outside the centralized security zone, and the increase in globally distributed users overloading the central infrastructure. The same applies for IoT, where the cloud has become the centralized data centre, and devices are deployed globally. However, traditional security approaches that require on-prem datacentres and dedicated endpoint clients are complex to set up and manage. Security is moving to the cloud for higher flexibility, scalability and reduced latency, and SASE is the framework that supports this opportunity.

SASE combines multiple network and security functions into a unified cloud security platform. By adopting the SASE model and its integrated services, companies can enjoy highly advanced security from their 5G networks, all from a single management platform, and without hindering 5G's flexibility and speed of delivery.

With SASE, secure, low-latency IIoT communications can be delivered at the edge, without the security concerns. SASE brings together cloud-based, centralized policy management that reduces complexity and localized security enforcement that minimizes network latency and allows for local data processing and high-performance security at the edge. And because SASE services are identity-driven, security policies are enforced at distributed points of presence based on device markers, such as a specific attributes or individual location.

Some of the key pillars of a SASE architecture include Firewall-as-a-Service, cloud access security broker, DNS security, and threat detection. Firewall-as-a-Service ensures secure communication between authorised devices and applications, filtering out illegitimate traffic. Cloud access security broking ensures secure data encryption to prevent eavesdropping and protect data confidentiality. In terms of threat detection, traditional security software and metrics can be a burden for IIoT devices, slowing them down. SASE services combine threat detection capabilities with event measurement and sophisticated metrics that ensure outstanding security capabilities without creating service bottlenecks.

The future of 5G
Although the development of the 5G standard is not yet complete, and URLCC is one example of the enhancements still required, it is becoming an IIoT reality. According to the GSMA, by 2025, 5G networks are likely to cover one-third of the world's population. The impact on commercial operations will be profound, with applications and performance tailored to precisely match the accelerating needs of industry 4.0.

5G is more than a new generation of technologies, it's a springboard to a new era of connectivity that could completely revolutionise and reenergise the world of manufacturing and engineering.

Is 5G ready for manufacturing?

5G has been in the news recently for all the wrong reasons. But beyond the media controversy, the technology has the potential to bring about a fundamental change in the way manufacturers operate. Here **JONATHAN WILKINS, DIRECTOR AT OBSOLETE INDUSTRIAL PARTS SUPPLIER EU AUTOMATION,** explains how 5G can benefit manufacturers

HIGH PROFILE SCANDALS aren't typically good for the technology sector. Whether it's diesel emissions, large data breaches or cyber-attacks on mission-critical infrastructure, scandal has the power to cripple a technology even before it's gotten off the ground. Despite what recent headlines may have you thinking, 5G has the potential to be a hugely positive force in the world of manufacturing, heralding in a new era of technological innovation. While 3G and 4G offered incremental improvements in speed and bandwidth, 5G will be the first cellular, wireless platform to truly offer reliable integration with machine-to-machine and industrial IoT systems.

It will do this in three ways. The first is enhanced mobile broadband (eMBB); 5G offers peak data rates of 10 Gbps and can handle 10,000 times more traffic than its predecessors.

Secondly, it offers Ultra Reliable Low Latency Communications (URLLC). This means it has a radio latency of less than 1 ms and an availability of over 99.9 per cent, making it ideal for industrial use where uptime is critical.

Thirdly, it offers Massive Machine-type Communication (eMTC), allowing it to handle a density of one million devices per square kilometre. It can also deliver ultra

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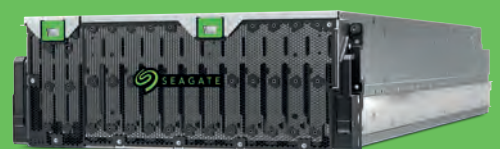
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low-cost machine-to-machine communications and can last up to 10 years on battery, great for battery operated low power devices.

So, what does this mean for industry? Well, not only will 5G open the door for real-time wireless sensor networks and location and asset tracking, it will also enable plant managers in smart factories to rely on seamless communication with a fleet of autonomous guided vehicles (AGVs) without worrying about network dropouts.

What's more, manufacturers that may have been sceptical of adopting the likes of augmented and virtual reality technologies will be able to take full advantage of them for real-time simulation and predictive maintenance.

In industrial automation, 5G networks will eventually be able to replace wired connections in even the most demanding applications such as motion control and high throughput vision systems. Ethernet protocols are still being standardised by organisations such as 3GPP and IEEE to accommodate time sensitive networks (TSNs) into 5G architecture, which will allow 5G to achieve the low latency and high availability of its ethernet counterparts.

Making the switch to 5G is not a cheap one, with significant investment needed in upgrading infrastructure to accommodate it. Because 5G operates on the less crowded higher frequency spectrum, around 6 GHz – or by using millimetre waves on new radio frequencies anywhere between 30 GHz to 300GHz – it can easily be blocked by obstacles and absorbed by the likes of rain and even humidity.

This will require the installation of small cell networks with smaller antennas placed closer together. As a

result, one question that we hear all the time is, is 5G worth all the investment in upgrading technology and equipment to facilitate it?

At this point I'd like to take the chance to discuss a relatively recent experiment that was carried out by Ericsson, one of the world's largest 5G equipment suppliers. Ericsson, in collaboration with the Fraunhofer Institute for Production Technology in Germany, conducted a test in a factory that makes metal bladed disks for jet engines. The large components are milled in a process that can take 20 hours to complete and involves extremely precise cuts to be made to the metal parts.

The procedure has a high error rate of up to 25 per cent because of faults caused by small vibrations. However, mistakes are not usually detected until the end of the process, leading to a significant amount of wasted time and money. By adding 5G sensors to the machines, Ericsson was able to reduce the error rate to 15 per cent. Because it can transmit data in under a millisecond, the integration of 5G into high-value manufacturing processes will enable errors to be detected and prevented on a scale that is not possible using other wireless communication methods.

"With one millisecond latency, you can sense whether there is a deviation in the process before the tool even hits the blade and you can stop the machine before the error happens," explained Åsa Tamsons, a senior vice president at Ericsson.

Using 5G to reduce the error rate from 25 per cent to 15 per cent lowered the overall production cost of each blade by €3,600.The results of Ericsson's test were certainly impressive, but it is important for us to remember that 5G alone will not solve all the problems with inefficiency in our factories.

Manufacturers need to be prepared to invest in infrastructure upgrades – early adopters will face the technical support challenge of retrofitting 5G with existing legacy equipment and networks. This will require work to manage obsolescence and ensure that plants can continue to make productivity gains without overhauling their entire plant machinery and equipment.

There is no doubt that 5G will revolutionise manufacturing as we know it, but it's important that manufacturers understand that it's not a magic pill to solve their productivity woes. That will still require careful obsolescence management, selective infrastructure upgrades and a willingness to explore the features of the new technology in a diverse range of applications. So, despite the scandals, manufacturers should give 5G serious consideration. For more information on upgrading your factory, while still carefully considering obsolescence management, visit **www.euautomation.com**

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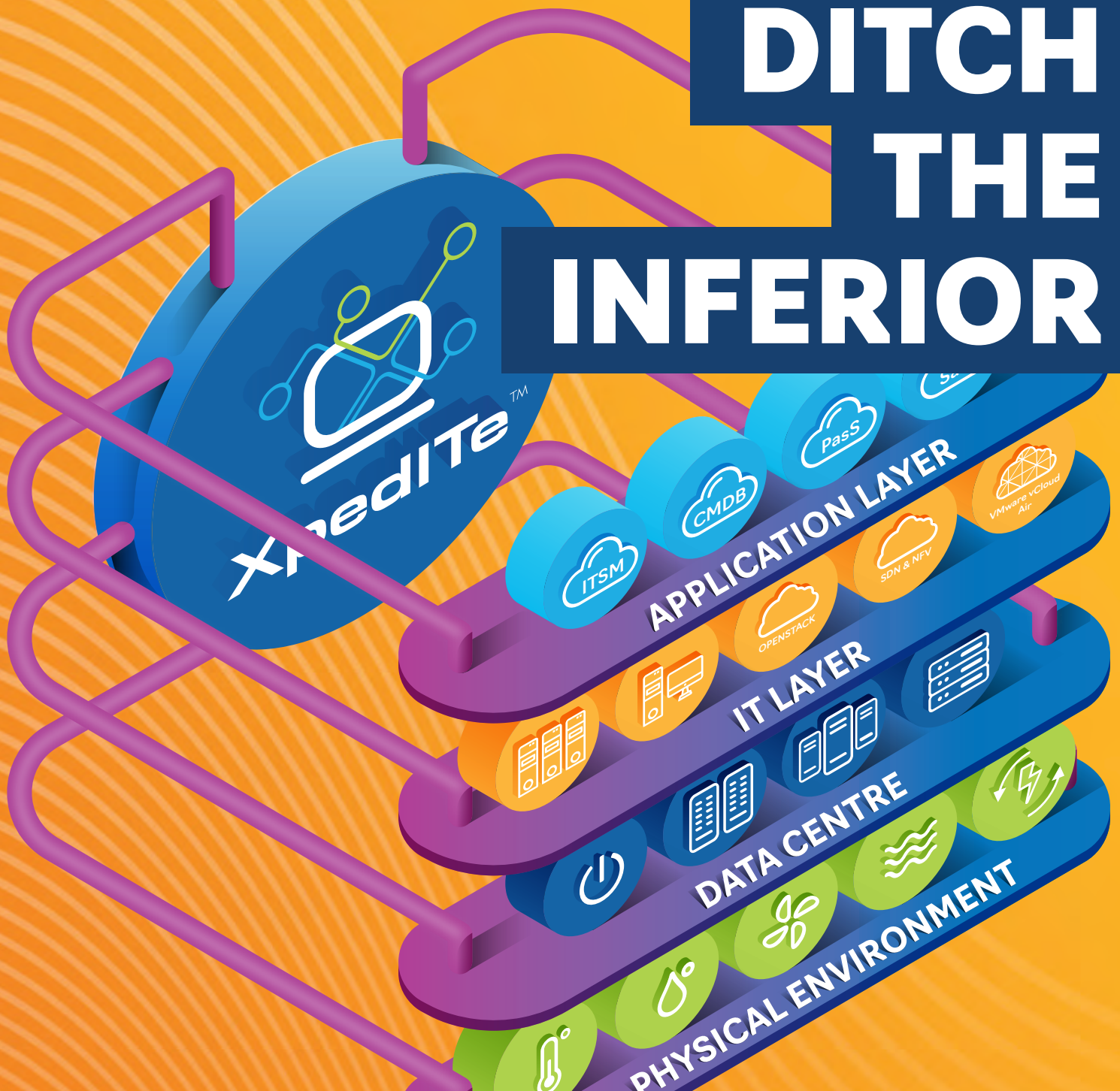
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How the right data management choices will be key in driving next generation IoT

The first kind of the first generation of IoT apps were all about pulling the data to the middle and doing something a bit limited with it, says database expert **MARTIN GAFFNEY, VICE PRESIDENT, EMEA, YUGABYTE.** But the new generation is going to be all about pull + push, highly interactive applications, which puts a completely different burden on data management capability: distributed, dynamic and automated.

WITH US IN ONE FORM or another since 1982, the Internet of Things (IoT) has a long and, so far, perhaps patchy history. Defined by Wikipedia as physical objects, or groups of such objects embedded with sensors, processing ability, software, and other technologies that connect and exchange data with other devices and systems over the Internet or other communications networks, early IoT was mostly about collecting data from sensors, aggregating it and analysing it: smart meters, smart cities or smart utility grids are the classic examples here.

Which is all well and good, and there are many first-generation IoT success stories out there (analysts estimate it to have been around $251 billion in 2019, after all). But things are changing, very fast, and a new, very different, and very, very interesting and commercially exciting wave of IoT is coming along: mobile, and most especially 5G-empowered and extended, IoT.

With more use cases eating up the bandwidth, where is the data going to and coming from?

What's different in this form of IoT? A lot, as mobile IoT isn't just about data collection anymore – it's also about running applications, e.g., connected vehicles. That shift opens up many more use cases, from industrial to consumer cases, and to be honest the sky's the limit in what we might soon be able to achieve here (Ericsson talks about everything from much cleaner, safer mining to fully automated factories to 5G-connected ambulances able to provide new, super-fast ways to connect patients, ambulance workers and remote medical experts in real time). Fantastic: but there is a new challenge here. And it's not the physical composition of the IoT nodes or the sensors, or even the network connecting them--it's the data side of it that's suddenly becoming the frontier of possibility here.

With more use cases eating up the bandwidth, where is the data going to and coming from, for example? Do we now need to move the data closer to the consumer, wherever they are, to improve responsiveness? How does database residency impact all this? Why is it important to have the great new IoT data you want replicated where needed, compared to all the data replicated everywhere? and so on.

5G is the game-changer here

So, some important considerations of scalability, distribution, low latency/speed, open source and multi-cloud to deliver the growth of these IOT services effectively are coming to the fore. And they are doing so because all that smart city and what have you stuff, where it did get implemented or worked, was really very simple, one-way activity: it was always very much just 'push' notifications from devices, many millions though you may have had: a lot of traffic, but most of the applications were to just collect it and then process it afterwards – so our big technology challenges were about being able to handle streaming data.

We had some excellent data innovation there, and that's where a lot of the streaming data technology start-ups came along – big data storage, data lake that could ingest bazillions of meter readings a utility provider could process that later for bills, and perhaps also do some clever analytics to show you where your peak spots are so that you can then predict a load on the network and things like that.

But 5G is the game-changer here (and, in case you don't know it, 5G is not really a consumer play at all—its impact will come from business, manufacturing and industrial innovation, including IoT). The short version of why: suddenly, IoT teams have a lot more bandwidth to play with now. That means they can (and are) starting to build way more interactive

devices; instead of just collecting and retrieving data, much more can go on in the device itself (and its neighbours).

Suddenly, the IoT data problem stops being about collecting data and tipping it into a big data store and securing it as quickly as possible; if the device wants to talk back and make a decision itself about what it's seeing (think, smart traffic controls that tweak the behaviour of a network according to what's happening in it in real-time without the need for, and time cost of, asking for, human intervention, and so on).

IoT 2021, then, is marked by smarter devices running applications that are more interactive. And that very many changes what you need to do with the processing capability and the data management capability behind that. That's where the whole idea of Edge Computing comes to the fore – the idea of taking computer power to the edge of the network (telcos are now putting processing power into the mobile masts so they can offer local, very low-latency services that just weren't possible before). What that means: smart homes can get smarter. Smart networks can get smarter, because they can do more. But to do all that, and more – to provide all these amazing 5G-powered IoT low latency interactive applications, you need to move the right data to the right place.

> some important considerations of scalability, distribution, low latency/speed, open source and multi-cloud to deliver the growth of these IOT services effectively are coming to the fore. And they are doing so because all that smart city and what have you stuff, where it did get implemented or worked, was really very simple, one-way activity: it was always very much just 'push' notifications from devices, many millions though you may have had: a lot of traffic, but most of the applications were to just collect it and then process it afterwards

Data has got to be capable of following use

Put like that, sounds like a trivial problem, right? Unfortunately, getting data right in as highly distributed a context as a cloud network like IoT needs to use has been rather tricky. Smart meters fixed in houses which are not going anywhere and where all you needed to do was provide the data relevant to that one application wasn't that big of a problem, in hindsight.

This new form of IoT is so different (and we want it to be); just putting a disk on those little processing nodes so they each have a little database, for example, is no good because the essence of 5G Edge is that you don't know who's going to connect where: you can't put all the data that might be needed for this app on this network on this mast here or on that local downtown mini-processing unit there, because you don't know who is going to connect, which vehicles are going to be driving through that town, and so on.

Therefore the data has got to be capable of following us – and the only way you can do that is some kind of auto-balancing, distributed database capability, as otherwise you end up with all kinds of complexity (e.g., copying things around and then collecting them back because they might've been updated here and there might've been updated there, trying to figure which update happened first and if we'll keep that one or both of them, and so on and so on).

All in all, these new data needs make this next phase of IoT your application development massively more complex. As a result, the teams and companies adopting these mobile interactive, 5G-powered IoT applications are all looking for ways to have a distributed data layer that can manage as much of the complexity at the software level as possible.

What has emerged as the best solution for doing this is something called distributed SQL, which is essentially a fantastic marriage of the certainties of the old 'monolithic', RDBMS enterprise database discipline, which was so good at things like international banking transactions and making ATMs work, and newer-style 'microservices' style cloud-native data layer approaches.

That's really good news, as it's essentially arrived in the nick of time for any business that wants to take the IoT+ 5G step and open whole new sets of industrial opportunities. You may have been (rightly?) sceptical about IoT before, but this really is the real deal now: and it's going to be fast, exciting, destabilising, disruptive – and really, really important to get ready for.

5G – Changing the shape of data centres?

With the long awaited arrival of 5G comes the dawn of a new era in connectivity and data sharing.

BY MICHAEL J. JENNINGS, DIRECTOR, PRODUCT MANAGEMENT, PARK PLACE TECHNOLOGIES
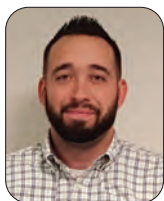
5G WIRELESS NETWORKS are set to offer more bandwidth, lower latency and far faster speeds deploying 5G-enabled devices to the edge. But is the UK's traditional on-prem hard wired and cloud data centre infrastructure ready to work alongside the increase of edge servers in next generation 5G communications networks? Once universally established, 5G adoption sets the stage for a revolution in the way businesses and enterprises handle applications and allows for full promise of the Internet of Things (IoT) to materialise with billions of edge devices set to be connected globally.

Edge data centres will sit at the heart of 5Gs success, enabling lightning-fast delivery of applications bringing compute power closer to the point of connectivity by effectively limiting the distance between the data source and the end user.

With the 5G rollout already starting across two

hundred UK towns and cities, deployment of compute in 5G cellular base stations is already occurring, hosting applications for local subscribers, and effectively bypassing sending data through fixed infrastructure networks. As the rollout progresses, edge servers will be linked together to form mini-clusters to deal with the unprecedented data deluge from edge devices. Under this format, moving data between locations will be even easier, opening business to new innovations that were previously impossible to implement, like self-driving cars.

Whilst 5G looks uncompromisingly fast for optimal speed, transfer and minimal latency, resultant data issues need to be carefully considered. Alongside such anticipated growth in 5G data usage and increased sharing needs, comes compounded management overheads - not least in the securing the movement of crucial data between locations. Moving data – and processing data - to the edge, will have a knock-on effect on how data is stored centrally, impacting resourcing, storage, networking, and processing capabilities in core data centres.

Technology analyst firms have mapped the impending transition from the data centre with IDC[1] noting that by 2023, more than half of new IT infrastructure will be deployed at the edge. Likewise, Gartner[2] predicts that by 2025, that the majority of enterprise data will be generated and processed outside of traditional centralised data centres in edge and cloud settings.

Additional cyber security, interoperability and regulatory concerns also need detailed consideration with 5G edge data centres. The explosion of edge devices will bring greater data exposure points and therefore increased risks. Will edge devices be as physically secure as IT hosted within centralised data centres? Equally, the increased data transmission between devices means sensitive data will be on the move far more frequently. It's obvious therefore that advanced security software and solutions will need to be selected and added to the enterprise that increase secure data sharing between edge devices themselves and when connecting with the data centre. Greater security goes hand in hand with greater regulatory, auditory and fulfilment requirements, so resources will need allocating in these areas to overcome risk.

Substantial changes will be needed in the centralised data centre which will need to process data in near real-time to match 5G speeds. Once 5G is ubiquitous, edge, data centres and the cloud will all need enablement to work collectively not individually. More data generated equals greater capacity planning across the board. Edge applications will need advanced computing power, more storage, and improved connectivity equipment to handle demanding workloads, denser volumes of data, and faster transmission of data to and from the data centre. The accepted microsecond latency of

today will be viewed as unacceptable in 5G enabled tomorrow.

The arrival of 5G will herald improvements across cloud, core and edge infrastructures as they each play a part in handling data at speeds previously unseen. However, these changes are unlikely to happen overnight. Even when the regulatory, licensing and security issues are satisfied, 5G requires a massive amount of new physical fibre and transmission equipment to be installed, including thousands of 5G mobile masts and antenna in a three phase programme that ends in the rollout of Ultra-Reliable Low Latency Communications across operators.

This will still take a few more years. Once established though, this new comms infrastructure will drive meaningful growth in the quantity and geo-location of the critical infrastructure to enable next-generation applications which will be deployed gradually across a number of years. But at Park Place Technologies we advise our customers not to waste this time.

Plan now, not for a redesign of the data centre, but for enablement of a gradual distributed data centre architecture that spans from the core to the edge and will allow new technologies to be provisioned fast when they come online. If it all goes to plan, we'll all soon be reading this article while travelling in autonomous vehicles to our smart homes and places of work!

SOURCES

IDC[1]: https://www.idc.com/getdoc.jsp?containerId=prUS47941621 https://www.idc.com/getdoc.jsp?containerId=US47308121

Gartner[2] https://www.gartner.com/smarterwithgartner/what-edge-computing-means-for-infrastructure-and-operations-leaders

Why 5G hasn't yet met the hype? It needs full fibre

More recently, the slower rate of adoption of the latest generation of mobile technology has given rise to questions from the British public such as "why did 5G take so long to take off in the UK?" and "why is 5G adoption in the UK so poor compared to other countries?".

BY MIKAEL SANDBERG, CHAIRMAN, VX FIBER

WHILE THERE is no doubting the potential of mega-fast on-the-go internet, there does appear to be an underlying frustration around how quickly we'll be able to utilise it. In truth, the reality of 5G hasn't yet met up to its enormous hype.

It should be noted that the physical process of upgrading to 5G is a lot more demanding in comparison to its predecessor, 4G. Furthermore, the UK government-mandated swap out of Huawei kit due to security concerns will also have had an impact on rollout. Digital Secretary at the time, Oliver Dowden claimed the supply ban would delay the UK's 5G rollout by a year. However, there is another barrier preventing 5G from reaching its potential - full fibre.

In order to work, 5G requires a robust full fibre network.

The high frequency spectrum the carriers are planning to use travels incredibly short distances and gets interfered with easily. It might travel a few hundred metres, but only through clear air; water, foliage, buildings, and even people all get in the way of this spectrum. A user would need to be very near a base station to get the kind of bandwidth the carriers are talking about, and that base station will, in turn, have to be connected to full fibre in order to carry the sheer amounts of data that people and sensors will be generating and using. This is why wireless and fibre are not the same. Even if a wireless

connection can carry data over a few metres, fibre optic cables can carry virtually unlimited data for tens of kilometres - perfectly unthreatened by interference - without needing a boost. They're complementary technologies, not substitutes for one another.

In an article for Digitalisation World in 2020, we explained 5G's reliance on full fibre in some depth. Yet it seems, over a year later, the same misconception remains. To this date, multiple articles tout 5G as the end of fixed line broadband. Ultimately though, 5G alone can only ever be a stop-gap, as the majority of valuable 5G applications will only become possible once full fibre becomes available.

For this reason, full fibre technology is the most future-proof investment, as its reliability, longevity, and performance is far superior to other gigabit-capable technologies enabling it to support the UK's long-term digital ambitions. A strategy that encourages public and private investment into any other technology will only need to be uprooted and replaced, likely by the end of this decade.

If the intention of the Government is to expand the availability of future proof connectivity across the UK, then FTTP is the winning option. In fact, because 5G will require fibre infrastructure to connect masts to the rest of the network, 5G should be used to drive the rollout of fibre, which can and should be shared with mobile networks and consumers alike.

However, the challenges of rolling out a truly nationwide full fibre network cannot be underestimated. Meeting the Government's 2025 target - a minimum of 85% - never mind ubiquitous coverage, will require the rapid removal of barriers such as the planning framework, certainty on policy, vendor diversification, and digital championing at a local level. Open Access provides a solution. Open access typically means multiple Service Providers

sharing the same physical network. In this model, municipalities and other fibre owners are able to build the physical infrastructure using existing assets such as cable or ducting laid down for security cameras, traffic management, and district heating – and importantly retain ownership of this lucrative fibre asset. Contributing to that, and enabling private investors to leverage existing infrastructure, will lower costs and speed up deployment.

ISPs then operate in a competitive market using the same physical network, giving incentives to innovate instead of simply locking out competitors with a de facto monopoly. Open access networks spur competition between Service Providers - lowering both costs for the subscribers and the barriers to new

Service Providers entering the market - increasing choice and service.

By working hand-in-hand, fibre operators and local governments will be able to bring better connectivity to all and drive a smarter future. High-quality infrastructure has been cited as crucial to economic growth and has been selected by the Government as one of the three pillars of investment on which we'll base recovery from Covid-19 in its plan to 'Build Back Better'. Ensuring that everyone has fast, reliable, and affordable broadband access by facilitating full fibre rollout will futureproof local businesses to evolve with the digital economy and support critical public services and community assets.

5G has been so hyped by the industry because it is expected to have a huge impact on our everyday lives. From personal use to advanced new apps ranging from automated vehicles, first responder services to the raft of benefits that can be derived from smart cities. In fact, some of the more exciting applications will be ones we haven't even foreseen yet. But 5G can't do it alone, it's not quite the silver bullet, we are still going to need full fibre to fire that gun.

5G crucial to the safety of autonomous vehicles

While 5G will enable data to move to and from the vehicle with low latency, data storage devices enables all of the in car applications from infotainment to ADAS to autonomous to work seamlessly.

BY RUSS RUBEN, GLOBAL AUTOMOTIVE SEGMENT MARKETING DIRECTOR, WESTERN DIGITAL

MOST OF US tend to understand 5G connectivity best when it relates to personal devices, like a phone or tablet. However, not only does 5G introduce possibilities for innovative new health, edge and industrial applications, it also has the potential to impact an area that is close to many people's everyday lives – their cars. The dramatic increase in speed and low latency, powered by 5G, will offers us a multitude of benefits across the automotive field; one of the most important focuses being safety.

Connected cars and increasingly autonomous vehicles are beginning to look more and more like small data centres and, as they develop, they'll move from the current figuration of a distributed architecture in the car, to one that is more like a central 'brain' – or data hub, with various sensors connecting to it. The 5G network enables the transfer of data at a quicker rate, empowering data hubs to be continuously pushing and receiving different kinds of data, thereby enhancing the information available to the driver and vehicle reaction times.

Safety use cases:
1. Next-Generation Maps
Many drivers already experience maps that are updated with current traffic conditions. However, the advent of 5G will enable maps to absorb and deliver much more information in real-time. Vehicles equipped with IoT sensors and cameras, powered by 5G's high speed connectivity, will constantly survey the road and their surroundings. These devices will act as essential eyes and ears for the car, noticing changes in the environment including road conditions, construction, a change in the number of lanes or potential hazards. This data will then be sent to the cloud, where the central database will be updated and information will be pushed out to vehicles, and potentially others in the road network (like pedestrians and the roadside infrastructure, and it will happen almost in real-time.

2. C-V2X communication
Rather than sending data from cars to the cloud, and then back to other vehicles, an even faster and

safer process would be enabling cars to directly communicate with each other. This requires a robust and responsive 5G infrastructure.

V2X (Vehicle-to-Everything) communication is the technology that allows cars to communicate with the different parts of the traffic system that the vehicle may encounter, and vice versa. This includes, not just pedestrians, bikes, public transit, and cars, but roadside units that are like small base stations on the sides of the road that can send information to a car. Until 5G infrastructures have sufficient coverage, and are tested to meet automotive standards, V2X will be rolled out as DSRC (Dedicated Short Range Communication). DSRC allows vehicles to communicate with low latency (<100ms) directly with other vehicles or roadside units (RSU) with a line of site range of up to 300m.

With 5G, however, C-V2X (Cellular V2X) can be rolled out, enabling cars to use a direct PC5 interface (where a device can communicate with another device over a direct channel) as well as the network Uu interface, which uses cell towers for radio access network.

This will enable cars to communicate up to 600m using the direct interface, and up to 2km with Uu, all with an even lower latency. This larger distance means that vehicles will be able to communicate to other C-V2X enable things further away, providing more time to react to road conditions ahead such as accidents, lane closures, icy or wet roads, and debris.

Furthermore, the direct interface allows the vehicle to not only communicate with other cars and roadside units, but it will also have the potential to communicate with pedestrians and cyclists via their cell phones and potentially, other devices. This kind of connectivity is crucial to enhancing safety, as it could prevent accidents from blind corners, or detect people entering the street between cars. Such technology could notify the vehicle and pedestrian/cyclist of any upcoming potential collisions, and the vehicle could take appropriate action.

3. Software Updates and Services
Several vehicle manufacturers have already enabled over-the-air (OTA) software updates to cars. However, with the acceleration of 5G, this feature will become standard.

As we look at the cars of the future, the number and types of applications, sensors and cameras will continue to increase, and they will all rely on interdependent services connected to the central hub. All these applications will need to regularly be maintained and updated.

The algorithms behind autonomous and smart vehicles will continue to learn and mature as they capture data and push it out to cloud data centres for analysis. As these software elements get smarter, they

will then be updated and dispatched over 5G to the vehicles via an OTA module. 5G will enable updates to be installed at a more rapid pace, ensuring that vehicles are constantly operating with the most up-to-date safety features.

These updates will likely become as common, and frequent, as our smartphone OS updates.

The role of data storage
What role does data storage play in all of this? Firstly, maps, V2X security keys, application software, data logging, OTA buffering and the millions of lines of software code that already exist in vehicles are, and will continue to be, stored in the vehicle on highly reliable NAND flash-based products.
As vehicles move towards the model made up of multiple zones with a central brain, this hub will act as the central storage for the architecture from which each zone will access data. This central hub requires high capacity and highly robust storage architecture. This is where solid state drives (SSD) will be a strong solution to meet this requirement.

Not only is high capacity storage required to contain the data for each zone, it's also required to retain any data if accidents do occur. Images or video recordings from an accident are crucial to preserve in order to help authorities investigate incidents and inform prevention of those in the future.

As cars begin to capture more data and act on it, data needs to be able to move optimally and reliably between the different systems. Advancements to NAND-based storage will help alleviate performance bottlenecks that result from these large amounts of data, increase capacity and offer more system reliability.

While 5G will enable data to move to and from the vehicle with low latency, data storage devices enables all of the in car applications from infotainment to ADAS to autonomous to work seamlessly.

Channel can play a pivotal role

"According to the IMARC research company, the global edge computing market produced robust growth during 2015-2020. So, what's driving this growth and where is it taking organisations in their IT strategies?

BY STEPHEN NOLAN, SENIOR VICE PRESIDENT, TECH DATA EMEA

IN THEIR ADOPTION of edge computing, what organisations are realising is that this solves network computing challenges through reducing the number of processes running on the cloud by moving them to local devices. These can be a user's computer, an IoT device, or an edge server. By minimising volume of long-distance communication between the client and the server, there is a noticeable reduction in latency or congestion and an improvement in process efficiency. This translates into some significant business outcomes such as lowering bandwidth use, associated costs, and server resources.

There is a bigger picture to consider as well. Over the same period, companies across all markets have been undergoing digital transformations and the way to execute this successfully is process efficiency. This is where edge computing is so key because it is a significant enabling force as it breaks down data centre walls and pushes cloud capabilities outwards. In this respect, edge needs to be treated as part of the hybrid cloud infrastructure, of which technologies are already being used by employees to provide a seamless and secure user experience.

After GDPR came into action in 2018, data sovereignty and security measures also became major focuses. Managed edge services assist companies in maintaining regulatory compliance while pursuing better customer experiences.

The momentum for edge computing is not slowing down. IMARC forecasts the global edge computing market will grow at a CAGR of 30% from now until 2026.

There are several factors for this. For example, edge computing is critical to help companies seamlessly transition from traditional workplaces to the future of work and remote offices. Edge can be deployed on-premises and privately, which makes it suitable for adoption at production plants and healthcare facilities. Equally, there is huge potential for the technology to be further leveraged in augmented reality and virtual reality applications, industrial automation, and telecommunications.

There is an increasing number of use cases where edge computing is critical because of its requirements for low-latency processing, big data, AI adoption, IoT, smart devices, and 5G. As well as, partnerships and acquisitions with hyperscalers, telcos, and start-ups.
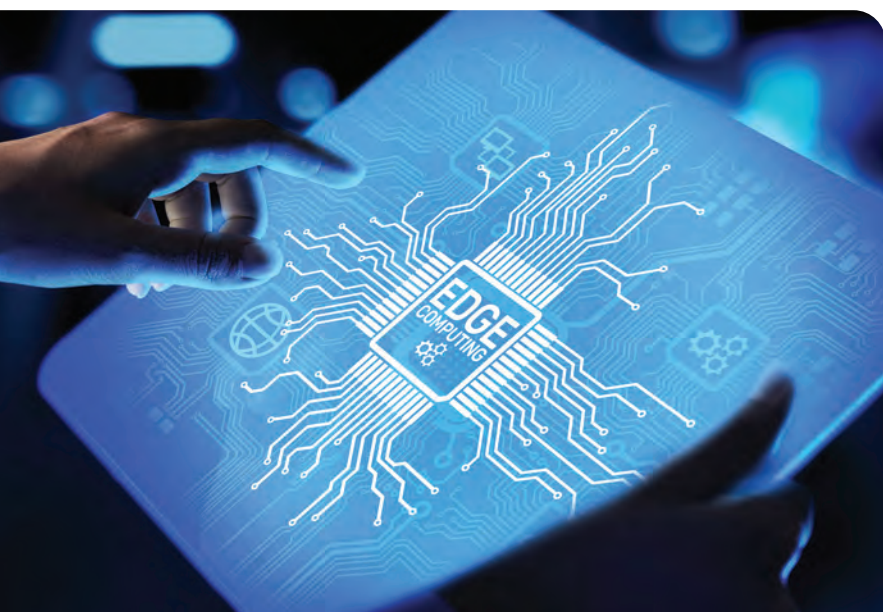
Companies can become more time- and cost-efficient by having the processing done locally, minimising the amount of data that needs to be processed in a centralised or cloud-based location

And, don't forget, edge computing was developed thanks to the exponential growth of IoT devices, which generate enormous amounts of data during the course of their operations. There is a positive correlation between the IoT and edge computing markets.

Like everything else the impact of the pandemic is shaping future of edge comping. This is due to how it is accelerating digital transformation and best practices for managing data and applications when a large majority of the global workforce is now working remotely. Edge computing has particularly grown over the last year as it provides the ability to optimise and extend the capability of cloud computing by bringing computation and data storage closer to the devices where it's being gathered. This is more secure for both the business and their customers; it gives them the reassurance of business continuity - a key technology to futureproof the new workplace environment.

5G and IoT adoption will continue to grow, which means an influx of data needing to be processed in centralised cloud computing and storage solutions. Normally, businesses would struggle with latency, bandwidth, and security issues. However, cloud adoption becomes a viable option thanks to edge computing. This brings computation and data storage closer to the IoT device, rather than relying on a central location that can be thousands of miles away. In this way, data will become more secure and not suffer from network latency concerns that can affect an application's performance. As such, edge computing can optimise IoT applications, in particular ones that require real-time actions.

Furthermore, companies can become more time- and cost-efficient by having the processing done locally, minimising the amount of data that needs to be processed in a centralised or cloud-based location. As organisations review their edge computing options, channel partners can play a pivotal role in providing and supporting solutions that aggregate the end point devices, software and cloud resources needed to maximise the benefits of greater adoption of edge computing."
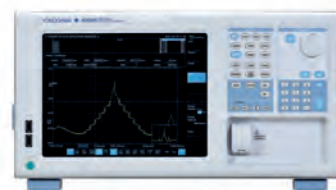
Cybersecurity and connectivity:

Going to the edge and moving to the cloud

Is the shift to the edge a good thing or a bad thing for the Channel?
BY JOHN BROWN, EMEA CHANNEL DIRECTOR, MENLO SECURITY

The world of work is changing
Today, the business landscape is scattered with hybrid and remote working models, where employees are empowered to work where they want, when they want, and how they want.

Here, the internet has become the place where work happens – in browsers, email, and shared files – and, as a result, users are now the new perimeter. As the perimeter has moved, IT and security must follow suit. The browser is the new office, but how safe is that browser? The answer is it's not.

Addressing this is not as simple as flicking a switch. On-premise security policies, technologies and protocols don't offer the same levels of protection in a remote, cloud-based, perimeter-less arena.

Many organisations initially turned to vendors for VPNs, yet their weaknesses were quickly exposed. Applications and internet access used to be centralised, so a VPN was the only way to access data, and while nothing really scaled, it was secure. But now, 52% of employees work remotely or have a hybrid arrangement, accessing applications and data

in a direct, distributed manner.

Legacy solutions were not designed for this environment. VPNs are simply unable to deliver the support needed in a new edge computing-based world, and continuing to rely on security solutions focused on detect and respond won't work, let alone scale.

Why the channel should look to SASE

With change comes opportunity

Channel partners have the chance to shift away from traditional detection and response-based security products and offer solutions that both offer genuine and suitable protection.

In the case of edge computing, such opportunity exists in networking and security convergence, commonly known as SASE (Secure Access Service Edge). SASE is a concept centred around delivering both networking and security as a single cloud-based service directly to the source of a connection, removing the need for a centralised enterprise data centre.

Security becomes an extension of the user, creating a series of meaningful protection and productivity benefits. It allows organisations to better guard against sophisticated threats while reducing the potential for unplanned data loss, and enables employees to access critical data and applications in real time, wherever they are.

Where organisations may have previously considered security-related investments as a cost, offering little by way of return on investment, SASE demonstrates unprecedented capabilities that allow them to capitalise on advancements in cloud and SaaS technology.

In this sense, it's both a security improvement and a business enabler.

Four key considerations

So, is this shift to the edge a good thing or a bad thing?

For the channel, it depends on mind-set. It can be great news for any partner out there prepared to adopt new approaches and demonstrate that what they are proposing delivers tangible business benefit to their customers. But, it's bad news for those partners who can't (or won't) change and evolve with this maturing market

Security vendors and partners that can demonstrate a track record of sound digital transformation projects and clearly articulate a strong cloud story will put themselves in a position of strength versus their competitors. Meanwhile, those that can't will lose ground and business. By continuing to rely on selling solutions focused on detect and respond, you may lose out. In this new edge computing world,

> In the case of edge computing, such opportunity exists in networking and security convergence, commonly known as SASE (Secure Access Service Edge) SASE is a concept centred around delivering both networking and security as a single cloud-based service directly to the source of a connection

centralised security won't work and won't scale.

Businesses need security that is cloud-native to protect all users, the data and applications they use, and how they communicate. For the channel to show that they can offer this, it's important to demonstrate awareness of four key considerations.

- Security has to be scalable in order to support rapid changes in user traffic as and when needed.
- It needs to embrace the principles of zero trust, to ensure the pitfalls of detect and respond don't result in a successful attack.
- It must be converged to support multiple security needs, including email, web, isolation, CASB and DLP.
- It must be high-performance to provide a seamless user experience.

Those that can cover these will have a strong role to play in a future on the edge. Those that don't, could be left behind.

Deriving value from data

The emergence of 5G and proliferation of connected devices is contributing to an exponential growth in the volume and velocity of data streaming across our machines and systems, with sensors able to monitor everything from chemical changes, vibration, pressure, voltage to amplitude and much more.

BY PRZEMEK TOMCZAK, SENIOR VICE-PRESIDENT IOT AND UTILITIES, KX

BUT WHILE the amount of data we collect is increasing, our ability to derive value from all of it is not. For many companies and their applications, it is costly to work with and maintain, as well as difficult to act on such large amounts of data. The case for intelligent edge systems – which ingest distributed information and enable localised decision making – has therefore never been stronger, especially in industries such as manufacturing where even the smallest degrees of latency can disrupt machine lines; reducing quality and output and costing millions in lost production time.

But with this growth comes challenges. Before businesses can reap the benefits and start their industrial digital transformation, they must consider factors such as connectivity, data capture, data quality, data access and the timeliness and quality of the insights being given.

For example, sensor data quality issues have been a long-standing problem in many industries, such as utilities where organisations collect sensor data from electric, water, gas, and smart meters. Here they use a process for maintaining data quality called "validation, estimation and editing," or VEE. It is an approach that can be used as a model for other industries as well when looking to ensure data quality from high volume, high-velocity sensor data streams. This process ensures data is of a standard where it can be used to feed into business processes.

When it comes to data access, availability is key. To support the applications and use cases of intelligent edge devices, sensor and related contextual data must be ingested, processed, and analysed in the right place, at the right time and provided to the right people.

Analytical efficiency is also important as in many cases data processing and analytics lean on insight derived from a range of locations including devices, factories, vehicles etc. Legacy technologies and systems struggling to cope with the data deluge will therefore need to be replaced by a bridging together of edge computing and cloud computing platforms which can prove truly transformational in providing significantly faster and cheaper processing capabilities.

Finally, there's the cost of traditional data management. Simply put, most platforms and analytics solutions were not designed for IoT use cases. They have been limited to storing and logging raw data, as opposed to what is needed to operate effectively today: a platform that can stream and analyse historical data in the context of reference data. This is key because the true value from these data sets comes in blending them and making decisions based on the well-rounded understanding they create. With tens if not hundreds of sensors and IoT systems sharing data all day and night, the cost of storing all the generated data is going to continually rise. Therefore manufacturers need a streaming analytics platform in place that can process data in real-time and deliver relevant insights, in the right place, context, and time, efficiently and cost-effectively. Additionally, this platform also needs to be able to handle the vast amounts of time-series data generated from sensors, but also relational and semi-structured data that helps describe what is being measured and how it relates to the physical world. Then they can unlock the true potential of intelligent edge.

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Cloud storage – what's hot, what's not. Navigating the complicated landscape of cloud storage

MICHAEL DEL CASTILLO, SOLUTIONS ENGINEER, KOMPRISE, looks at how to design a cloud storage strategy based on data type, age (hot versus cold) and user requirements

IT GOES WITHOUT SAYING that 2020 was an unforgettable year. It was unforgettable in a different way for the major cloud service providers, all of which experienced an impressive surge in demand. Market leader AWS closed out 2020 with revenues of $45.3 billion, up nearly 30% year-over-year and more than $13.5 billion in annual operating profits – which is 63% of Amazon's total operating profits for the year.

Roughly 50 percent of all corporate data is stored in the cloud, according to Statista. Storing data in a cloud service eliminates the need to purchase and maintain data storage infrastructure, since infrastructure resides within the data centers of the cloud IaaS provider and is owned and managed by the provider. Beyond cost savings, cloud storage provides valuable flexibility for data management. IT organizations are increasing data storage investments in the cloud for backups and data replication, data tiering and archiving, data lakes for

artificial intelligence (AI) and business intelligence (BI) projects, and to reduce their physical data center footprint. Just as with on-premises storage, in the cloud, you can purchase different levels of storage based on whether the data is hot (accessed frequently) or cold. This way, you are not overpaying for storing data which is needed only for archives or for very occasional access. You can use data management solutions to set up policies and automatically move data to the right cloud storage class based on parameters such as age, owner and cost.

The leading use case for cloud storage today is handling the petabytes of unstructured data that enterprises are amassing: file data from many different applications such as genomic sequencing, electric cars, bodycam videos, Internet of things (IoT), seismic analysis and collaboration tools. Migrating file data to the cloud is hard because it can take a long time and

entails unique requirements regarding access controls and security. Depending on the type and volume of data you wish to move to the cloud, you will need to adjust your strategies appropriately. Here are considerations as you evolve your cloud data management strategy to avoid getting burned on cost and performance:

⦾ Secondary storage tier gotchas. Enterprise IT organizations are increasingly seeing the value of the cloud as a secondary or tertiary storage tier because it frees up space on expensive on-premises storage and allows you to leverage the cloud for AI and analytics. However, it's easy to get burned when a storage vendor writes data to the cloud in a proprietary format. Data in non-native format must be read through the vendor's application before use, making it difficult for other applications to use. As well, in some cases the data must be rehydrated to the source and then moved before use. Ensure that you understand the limitations of moving your data to the cloud and if it's in a format that is acceptable to common use cases.

⦾ Managing shadow IT
It's true: shadow IT is no longer a dirty word. But opening up the cloud to your workforce without guard rails can get messy quickly. Conversely, by creating a well-defined strategy and data governance process for the cloud, you can minimize the negative effects of shadow IT while still allowing employees to experiment safely with approved apps and services.

⦾ A worsening problem of data islands
The cloud, for all its merits, has added data silos – made even more scattered by the multi-cloud movement. Clouds have different storage classes and tiers for file and object storage, all of which need to be leveraged for a cost-effective file data management strategy. These result in more silos to manage. Regardless, hybrid IT is here to stay for most midsize to large enterprises and it means that IT leaders need to determine how to get a central view and management plane for data and assets. This doesn't mean that you need to store all the data in one place, but you will need visibility to move data and workloads around as needed based on cost, performance and/or business requirements.

⦾ Hidden costs
The challenges of cloud sprawl and VM sprawl have been known for quite some time. Moving to the cloud requires constant oversight to ensure that you aren't wasting money with unused or ill-used resources. Another issue, however, is making sure that file data is managed and tiered appropriately; don't manage cold and hot data the same way or you will take it in the nose with nasty egress fees and unnecessary API costs. A large government agency was recently in the news for spending millions of dollars on egress fees as the data they moved to the cloud was in fact accessed frequently: Ouch. Understand your data, and all the areas where the cloud can bite you. Be sure to talk to your IT vendors about these risks and how to avoid them.

⦾ Skills, skills!
Yes, the talent gap remains large in technology, so IT leaders must always factor this into the equation when making dramatic changes in strategy. A recent CompTIA survey found that 74% of large firms will be hiring for IT and technology roles in 2021, with a particular focus on advanced infrastructure, AI and data science, and people skills for remote collaboration.

⦾ Unrealistic expectations for savings
Over the long haul, an organization can easily save on cloud storage versus maintaining a lot of technology inside the corporate data center. But this requires a well-defined data strategy. It's better to think about the benefits of moving from a Capex to a more predictable Opex spending model without the hidden intangible expenses that occur from traditional IT. As you optimize cloud infrastructure, you won't have to worry about expensive hardware sitting in your data center, cooling costs, regular fire drills and the hassle of maintaining and securing everything.

Thinking for the long term

There is untold value in the massive amounts of unstructured data which organizations are storing; some estimates report only 1 to 2% of this data is actually being used. Have the necessary conversations with your vendors, consultants and in-house stakeholders to clearly understand all of your data assets: where it resides, who's using it and how often, and its strategic value to the organization. By gathering this information, you will be able to make informed decisions about your data and where it should live. These decisions will evolve with business needs, so ensure that you have the means to continually analyze your assets and adjust your strategy as needed.

Cloud native storage comes of age post-Covid

Many firms have previously been resistant to using cloud for storage, largely due to performance concerns, such as latency and data fragmentation across devices that undermined read/write performance, but these questions have been resolved.

BY RUSS KENNEDY, CHIEF PRODUCT OFFICER, NASUNI

BARELY A WEEK goes by without web outages stemming from technical issues for content delivery networks like Akamai, or increasing ransomware exploits which are reckoned to have grown by 62% globally since 2019. Ransomware attacks now appear to be increasingly targeting public sector and infrastructure organisations, such as Ireland's Health Service Executive and Northern Trains in England. In these circumstances, organisations, large and small, need new and more dynamic business continuity planning and recovery testing for their established or emerging hybrid working models.

While the last 18 months have been consumed by disruption brought by the pandemic as well as underlying factors such as the long-term rise in cloud computing and federated business models. We have also seen the increasing sophistication of malicious attacks, were already forcing companies to rethink their defences and disaster recovery plans and simplify storage capacity planning, to help protect their critical data assets.

Remote: here to stay

The enforced shift to hybrid working during the pandemic has cemented business' reliance on remote working and cloud-based resources. Most UK firms are planning for employees to work from home to some extent for the foreseeable future – the Institute

of Directors (IOD) June 2021 data indicate that four in five (81%) plan to explore more flexible options – and survey data seems to indicate that employees want flexible working as part of their job arrangements going forward too.

In this world of hybrid work and cloud-based applications, companies' data assets are under growing threat. Pre-pandemic research indicated that one in three firms were reporting data loss from external attacks. Meanwhile, given the surge in malicious attacks, the UK government updated its 10 cyber security rules for business in May this year. Data and storage professionals are having to mitigate the security risks and recovery costs, despite their companies now operating with rejigged supply chains and remote workforces. Recent research suggests that data breaches are 4.5 times more likely to happen at end-user endpoints than back-end servers. Incident response: on-premises and cloud native infrastructures.

Businesses' ability to enact disaster recovery plans and safeguard their data, however, varies considerably. IT teams with on-premises file sharing infrastructures remain rooted to system failovers with duplicates of their key locations or a co-located DR facility. In addition, on-premises storage infrastructures are likely to have become more complex with the supplementary or wider use of cloud applications to help businesses survive and enable remote work. On-premises–focused organisations' scope for local DR testing and improvement of recovery plans has been held back by the pandemic-related upheaval while recovery of data on compromised servers and devices can take days, sometimes even weeks. In a revealing example, Ireland's Health Service Executive acknowledged a ransomware attack on May 14, but was still working on its recovery in late July and has stated that the clear-up could cost €600 million.

Risks in a post-pandemic economy

In a post-Covid economy that is demanding considerable flexibility from adapted supply chains and new work models, cloud-native file storage's fast recovery capabilities could give companies greater resilience and the operational flexibility they need. In contrast to on-premises IT infrastructures, cloud-native storage strategies that save multiple versions ensure data is protected in the cloud, while the file systems affected by outages or attacks can be reconstituted with uncorrupted data for each virtual appliance. Because data and storage teams can easily roll operations back to the point of any incident or attack, they can efficiently recover data in a matter of minutes.

The UK economy adapted well to reworked supply chains and hybrid working since 2020 but the relentless stream of web outages and ransomware attacks shows the risks that firms with multiple cloud applications on federated workforces will have to

CASE STUDY

Cloud native's built-in backup and disaster recovery saves critical data.

A STORAGE ADMINISTRATOR at a large enterprise was working on one of their virtualisation platforms and made a potentially catastrophic mistake.

In this case, the administrator was removing unused machines that had been used in prior testing and then removing underlying data stores. In the physical world, it's much more difficult to make a mistake of this type since it involves moving hardware, changing cables and jumping between major interfaces. But in the virtual world, however, it is possible to delete large amounts of data and whole machines with a single click. While one of virtualisation's great advantages is the ability to create new machines on demand, over time this flexibility can leave teams with "virtual machine bloat."

In this case, the administrator thought the data store on his virtualisation platform was no longer in use and right-clicked on the data store and chose "delete."
Like all good applications it popped up a warning asking him if he was sure. In this case there was no extra pop-up and he clicked "yes, I'm sure" and the data store was deleted permanently. After realizing his mistake, he recalled the vendor's disaster recovery capabilities. The product still had its default setting to take a snapshot to the cloud every hour, so the administrator could do a DR and get back to within the last hours' worth of work.

He shut down the broken filer and downloaded a fresh copy of the filer software. He then created a new data store to host it and began the installation/disaster recovery process. This takes about 15 minutes and he was back up and running quickly with all of his data up to his last hourly snapshot available to his users. The cache performed its function and made it appear as if all the data was available to the users immediately.

His users noticed an outage from the period from the data store deletion until the completed recovery: less than one hour, but otherwise they had no idea what happened. A few colleagues complained of missing files that were not there at the time of the last snapshot, but the file loss was greatly reduced.

Amid continuing Covid disruption and changing company workloads, effective DR and restoration plans are critical to the successful management of data assets. Cloud-native storage has come of age, not only because of its rapid incident response capabilities, but also its long-term benefits - simplifying organisations' file storage capacity planning, business continuity testing, and cutting storage infrastructure maintenance costs.

address. Cloud-native file storage strategies give companies simplicity of use, easier DR testing, and fast recovery times; they are turning file restoration from being the 'Achilles Heel' for IT teams into a straightforward task within more effective and dynamic cloud-enabled incident response strategies. This is especially true in an age of such regular outages and increasing hacking activity.

Cloud-native file storage also makes it simpler to add file space for new or existing offices – without I/O teams having to carry out required storage calculations and maintenance cost projections associated with on-premises storage set-ups. As a result, the cloud storage option is an important factor

in companies being able to respond more flexibly to customer needs in a fast-changing economy.

Challenges overcome

Many firms have previously been resistant to using cloud for storage, largely due to performance concerns, such as latency and data fragmentation across devices that undermined read/write performance, but these questions have been resolved.

Leading cloud-native platforms have met these challenges through a successful record of being implemented across hybrid, multi-cloud and multi-region environments and delivering consistent storage experience across many different infrastructures.

Backup software boosts data protection with cloud storage

Corporate data is never truly safe—it's always at risk of damage or loss from threats including hackers, accidents, or natural disasters. This is why businesses must incorporate an extra layer of data protection off-site in a safe location, where archived content can also be housed when it's not in use.

BY JG HEITHCOCK, GENERAL MANAGER OF RETROSPECT, A STORCENTRIC COMPANY

IF YOU USE BACKUP SOFTWARE, then an effective way to safeguard your Windows, Mac, or Linux environment off-site is using integration with third-party cloud storage providers. Specific backup software providers may be certified with Amazon S3, Google Cloud Storage, Wasabi, Dropbox, and other nationwide and/or global cloud storage providers. They may also be certified with regional cloud storage providers as well, such as DreamHost, 1&1 IONOS, and ArubaCloud.

Benefits of Public Cloud Storage
There are many benefits of public cloud storage, particularly when you are adding it to boost the power of your on-premises storage, whether to stream

media, distribute content, archive or backup data, or for disaster recovery (DR).

The advantages of cloud backup begin with low pricing. Because of its ability to offer a pay-for-use model, public cloud storage providers are a very cost-effective option. A recent Gartner report identified the behemoths Amazon and Google as the market leaders in public cloud storage. Public cloud storage can offer much lower pricing compared with flat-fee storage options.

Secure encryption is another benefit of cloud backup support for backup software. Cloud storage providers are vulnerable to data breaches, so AES-256

encryption offers the assurance that customers need to retain ownership of their data, even if their provider suffers a breach.

The right cloud backup support also allows companies to avoid cloud storage lock-in. Since the cloud storage market changes so quickly, companies need the ability to easily switch between providers to meet the needs of their current environment. Cloud backup support with multiple providers helps avoid the problem of cloud storage lock-in.

Advanced seeding options are also important, given the limiting factor of bandwidth in uploads to the cloud. To avoid a huge time commitment, use a cloud storage provider that offers seeding options for the initial backup.

You'll also want large-scale recovery support for cloud storage, which allows your company to obtain your entire backup set from your cloud storage provider.

Disk-to-Disk-to-Cloud

Since every enterprise's backup strategy should incorporate off-site data protection as well as local protection, consider this effective strategy:
- Backing up your computers locally
- Protecting your data on quick local disk storage
- Periodically transferring to cloud storage

The third step frees up client computers, as the longer transfer time can be moved to an evening or weekend. The three-step workflow is what we call "Disk-to-Disk-to-Cloud."

Off-site Storage for Critical Documents

Another backup strategy is off-site storage via the cloud for important documents.
This involves four steps:
1. Create a cloud set for your cloud storage.
2. Make a backup policy for your computers. The cloud set should be the destination.
3. Next, create a filter for "Office Documents." You can include files by extensions, by path, and refine with exclusions.
4. Last, select that filter for the backup policy, which then back up every file that matches that selector to cloud storage.

Companies can also opt to combine these strategies to suit their specific circumstances using backup software. For example, you might want to use a "Disk-to-Disk-to-Cloud" strategy, but only transfer "Office Documents" to cloud storage.

Bottom-line, backup software helps to provide extra insurance on your enterprise's sensitive data in the cloud, helping organizations avoid potential data loss, avoid fighting fires, and get back down to business.

CLOUD STORAGE

Why you need to manually back up your Office 365 data

To ensure full confidence that your documents, spreadsheets, and correspondence are kept safe, dedicated non-Microsoft backups are essential.

BY DAVID FRIEND, CO-FOUNDER AND CEO OF CLOUD STORAGE PROVIDER WASABI

OVER THE PAST SEVERAL YEARS, workplaces have seen SaaS apps become essential to their workflows. This is best epitomised in the ubiquity of Office 365 in workplaces, Microsoft's cloud-based offering which has come to supersede its previous editions of Office. Through providing cloud-enabled features like document sharing across multiple devices and real-time document collaboration, many teams find Office 365 to be an ideal standalone solution for many of their business needs.

However, Office 365 has left many with a false sense of security regarding their data. With the system coming with its own facility to store data on Microsoft's cloud, many teams now believe that old routines around backing up data aren't necessary. Unfortunately, many have come to discover that this isn't the case. This is because while Office 365 does store data on Microsoft's cloud, Microsoft does not offer any protection against deletion from the user's end. That is, if your files end up being deleted from your end - whether it be accidental, intentional, or via cybersecurity threats like ransomware - you will lose it forever. In effect, this means that data backed up via Office 365's native cloud storage isn't really "backed up" at all when it comes to the more common causes of data loss such as human error or sabotage.

Should you backup on-premises?

If you want to protect your files from problems that aren't on Microsoft's end, then, you can't rely on Office 365's own backup facility. Instead, to protect

your files against ransomware, accidents, or sabotage you'll need to adopt your own complementary backup solution.

At first, it might be enticing to backup your Office 365 files on-premises, since there's already a live copy of your data in Microsoft's cloud. However, you will then have to overcome the challenge of having to sync up your on-prem backups regularly with your live Office 365 data - as your business produces more and more data, this means a hefty investment of time and resources in configuring your on-prem storage solution.

Storing data on-premises also will leave you vulnerable to those same risks that you face by just relying on Microsoft's cloud for backups. Your on-prem storage remains vulnerable to accidents, misconfigurations, sabotage, and malware that can destroy your backups and leave you with no avenues to restore your data. Rather, you should embrace a solution that offsets all these risks.

Backing up Office 365 data in the cloud

Cloud storage is much easier to set up and far less risk-prone than backing up Office 365 data on-premise, along with coming with notable economic benefits. Through the economies of scale offered by cloud vendors, cloud storage will almost always prove cheaper than on-premise alternatives for any given storage requirement. They apply to expertise and process too, with setup and configuration for a cloud storage environment being cheap, quick, and with the vendor handling most of the technical detail.

A major boon from cloud storage is that it provides distance between you and your backups. This "air-gapping" between your daily business operations and your backups can radically reduce the risk of accidental or intentional destruction of your files and data, which alongside the fact you can tailor access permissions to your backups means you should have an unparalleled degree of confidence in the safety of your data.

Cloud storage often performs far better when it comes to enabling 24/7 access to your data as well, whilst at the same time ensuring durability against degradation or bit rot. Most providers are willing and able to store multiple copies of your data across their data centres, which means that it's highly unlikely that your backups

become unavailable due to downtime at any one data centre and that you have ample redundancy in case one copy of your data is corrupted.

Finally, cloud providers can also offer you storage and security options that aren't possible for your team to implement on-premise. One prominent example of this is data immutability, which serves to prevent anyone from altering a designated set of files: for the duration in which data immutability is applied to file sets, those files cannot be overwritten, changed, or deleted. This means that in the unlikely event that a ransomware operator or hacker were to obtain your cloud storage login credentials, they wouldn't be able to destroy your backups.

For many today, Office 365 is their productivity tool of choice and is truly ubiquitous. Despite its impressive functionality and Microsoft's live backups, however, Office 365 is not immune to many of the old concerns that prompted teams to back up their files in the first place. To ensure full confidence that your documents, spreadsheets, and correspondence are kept safe, dedicated non-Microsoft backups are essential. Implementing a separate cloud backup strategy using dedicated, modern, and secure cloud storage providers will enable you to give your team peace of mind when it comes to the safety of their data.

For many today, Office 365 is their productivity tool of choice and is truly ubiquitous. Despite its impressive functionality and Microsoft's live backups, however, Office 365 is not immune to many of the old concerns that prompted teams to back up their files in the first place

Harnessing AIOps for a proactive network

Until recently, managing network issues meant helping users face-to-face or huddling in a conference room while planning next steps. Now, most IT teams are working remotely and trying to solve issues for other workers with very little data or interaction with their broader team.

BY MATT VALENTINE, MANAGING DIRECTOR, ARUBA UK&I

HYBRID WORKING PROJECTS are proving challenging for IT teams. Everything from improved coverage planning to new environmental health and safety programs, contact-tracing analysis and access control, involve some level of guesswork without real-world data. To add to their list, modern network requirements are extremely complex due to increased network size, volume of traffic, and diversity of devices and applications. Virtually configuring and operating these networks has become time-consuming, error-prone, and difficult to manage - due to the explosion of IoT devices and distributed connectivity from the edge to the branch.

Network operators need better insights, and intelligent automation powered by AI that is aware of all aspects needed to maintain a network today. We call this combination of AI and automation, actionable AIOps.

Embracing AIOps can help over-burdened IT teams manage the issues of the day while also working on plans to support long-term hybrid working models. Let's explore how AIOps works in practice.

Troubleshooting the day-to-day. Leave it to AI

Troubleshooting problems today requires data and information that users and IoT devices can't convey on their own. If one user complains that video calls keep dropping, IT has a starting point. However, that data alone often isn't enough to solve the whole issue. It requires a more time-intensive approach to test different solutions with the user to see what happens. Or for IoT, looking at a management tool to identify potential anomalies. This is where AIOps comes in. Through effective AIOps, IT can identify and preempt issues before users are impacted. This can

be achieved where data is collected from all wireless, switching, and SD-WAN Gateway devices to create an operational baseline across the entire ecosystem, including managed work-from-home scenarios.

If the performance of the network or an application deviates drastically, IT teams can proactively take the right steps to resolve the issue before end users even notice.

AIOps also include easy-to-use, natural language processing-based search features that empower IT personnel to quickly locate the user, the network device, or site-specific issues if there is a problem.

Employing AI to give back time

The biggest issue for IT teams is that trying to identify and fix even simple issues takes time, and that can eat into resources which could be used elsewhere. Most IT teams lose track of what percentage of time is spent on troubleshooting or working with a user on an issue. With many teams stretched thin by a network tasked to do more than ever before, reducing troubleshooting efforts is mission critical.

With AIOps, teams can be sure that service levels are continuously being monitored and will flag if anything goes wrong. AI-powered insights can automatically point the IT team to actual root causes, in order to resolve common issues. The difference could mean

solving an issue in minutes versus hours, simply knowing where to start, and what to change to fix the problem.

The AIOps framework. Setting a baseline

It's equally important for AIOps to continuously learn as the environment evolves and to dynamically adjust critical baselines. While capturing the insights provided for similar issues that may arise in the future is valuable, the goal is to stay abreast of changes without setting up static thresholds or service-level expectations (SLEs).

This can also eliminate the need for trial and error based on old assumptions. Networking knowledge captured by AIOps becomes an advantage - that additional context can be critical for a swift resolution or optimisation effort. Network teams are now quickly creating new strategies and processes for connecting on-premises and edge locations. Network orchestration tools play a huge role here by automating manual processes.

AIOps supports IT teams to solve these core issues and afford overall improved efficiency. Giving back time to work on ways to get the most out of an existing infrastructure. Time to tackle future projects that further improve the network. Time to do more rewarding work that adds value to the business long term. What's not to like?

How visibility is key to preventing cloud overspend

Cloud computing has become the lifeblood of enterprises operating in the digital era. However, while cloud adoption is ostensibly pursued in the interests of greater efficiency and optimised cost, cloud implementation is notoriously beset by budget overspend.

BY MAGNUS E BJORNSSON, CEO, MEN&MICE

FUNDAMENTALLY, most businesses should want to embrace cloud transformation. The benefits are manifold, but most notably is access to leading edge technology via pay-to-use subscription models, and easy scalability. Cloud technology has also proven invaluable throughout the COVID-19 pandemic by enabling companies to maintain undisrupted operations while supporting distributed workforces.

This being said, despite the self-evident benefits of cloud computing, cloud budget overruns are pervasive. Indeed, a report by Pepperdata [1] revealed that more than one-third of businesses have cloud budget overruns of up to 40 per cent, and that one in

12 companies even exceed this number. Why is this? There is one major culprit – a lack of central visibility in cloud usage resulting in large unforeseen spending.

Increasingly complex cloud architectures

As digital transformation continues, company cloud architecture is growing ever more complex. For example, it is now common for enterprises to employ hybrid or multi-cloud architectures as a means to secure greater benefits to service through a variety of cloud vendors. This results in multiple cloud models, technologies, tools and software being incorporated into an organisation's digital infrastructure. The task of integrating these overlapping solutions with all their moving pieces into an optimised model is no easy one.

The effective managing and monitoring of this infrastructure becomes a pivotal business need as it grows more complex. Indeed, it is the failure to do so that frequently results in an overprovisioning of resources that contributes to cloud overspend and a decreased return on investment (ROI).

To make matters worse, cloud budget overruns are compounded by organisations concurrently running their traditional (and costly) datacentre operations whilst attempting to migrate this infrastructure over to their more dynamic multi-cloud environments.

Bills, bills, bills

Complexity in hybrid and multi-cloud environment is not limited to operations, however. Billing structures and charges can and will vary from vendor to vendor. For instance, there may be diversity of licensing options available, as well as different usage models, whether that be based on simply total user numbers, on a departmental basis, or revolving around resources, projects or platforms. All being said, there is no standardised cloud vendor billing model, so with different providers working on different billing cycles, the financial complexity can quickly get out of hand. This in turn obfuscates an organisation's visibility across their already complex cloud infrastructure, creating an additional challenge when identifying where resources are being wasted and attempting to optimise costs.

This lack of central visibility across the breadth of cloud environments not only increases costs, but can also lead to a number of operational conflicts. For instance, overlapping address spaces can lead

> As digital transformation continues, company cloud architecture is growing ever more complex. For example, it is now common for enterprises to employ hybrid or multi-cloud architectures as a means to secure greater benefits to service through a variety of cloud vendors

to both network integration and migration issues. It's vital then that businesses take utmost care while integrating new cloud resources in order to ensure network visibility and central management of network operations across their infrastructure.

Similarly, little visibility within the network can lead security concerns. Unnoticed stale DNS records can create vulnerabilities that bad actors can exploit. A single spoofed subdomain can severely damage business operations, either as the primary attack or the prelude for something else.

With so many moving parts across a variety of complex environments it is completely understandable that cloud overspend, revenue leakage and potential misconfigurations would occur. Gaining visibility into this environment is crucial to fixing these issues, and to achieve this, businesses need to look into platforms that can orchestrate a lot of this hard work and unify address spaces across hybrid and multi-cloud networks. By centrally managing network resources, even across diverse infrastructures, companies can get a better idea of where their money is being spent, and where they can better optimise their costs.

FURTHER READING

[1] https://www.pepperdata.com/pepperdata-new-survey-cloud-budgets
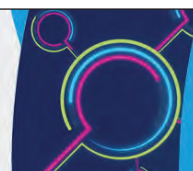
How can energy providers use AI to help customers?

Energy providers often are in the cross hairs when it comes to attacks on their quality of customer service. The problem is intensifying as prices must rise steeply to cover increasing wholesale prices. Yet, this challenge to better serve customers could be the catalyst for an AI-powered revolution.

BY JO ALLEN, CUSTOMER ENGAGEMENT EXPERT, PEGASYSTEMS

SUPPORTING CUSTOMERS is becoming a priority as energy prices are set to rise in the UK. The regulator OFGEM has announced that the energy price cap will increase on the 1st October 2021 by £139. This comes as consumer finances have been undermined by the pandemic and imminent lifting of furlough support for jobs and wages. The impact on customers' financial resiliency is great. For example, Citizen's Advice noted that around 6 million adults in the UK has fallen behind on at least one household bill because of the pandemic, and at least 2.6 million of these people are struggling to pay their energy bills.

So how can technology help here?

One clear solution would be to modernise utility companies' collections capability and there is an influx of investment in new systems, software, and staff to collect revenue. Yet, it is both malicious and impractical to wait for customers to get into debt and then do something about it once it becomes a bigger problem.

A better approach would be to help customers get ready for financial pressures as they increase over time. Helping customers navigate through their debt

is helpful, but it is far less costly for businesses if their customers do not get into debt in the first place. This is where a smart investment in intelligent decisioning technology can step in. Predictive models that use AI and machine learning technology can highlight customer patterns that lead to financial distress. By spotting the early signals, this will help smooth the evolving evolve economic conditions.

By using a customer engagement system that functions on the combined information of AI insights as well as a library of support messages. From this , personalised messages can be created that can guide customers towards better financial wellbeing. Each and every interaction can be used as an opportunity to help advise customers on their payments, whether it be advice on how they can use their smart meter to manage their consumption or apply for payment holidays and other help.

Decisioning capabilities can also be used to deliver product messages that could assist individuals and businesses, including deferring payments on loans and mortgages, and rate and fee reduction. For example, by using a Customer Decision Hub (CDH), difficult challenges such as knowing who is likely to be in financial debt can be addressed.

A CDH ensures that every customer is valuable, regardless of the channel the conversation is taking place on. The AI aspects of the hub can be exploited by allowing it to self-build hundreds of learning models that ensure every conversation has a high chance of a positive outcome by guiding the customer into the right direction. Moreover, the combination of AI with business-friendly rules means messages can meet regulatory compliance whilst adhering to product eligibility and relevancy rules.

The practicalities of using AI to enable large customer service organisations to identify and help vulnerable customers are already being put to practice in related sectors. For example, UK utility firms can learn from the example of Australia's Commonwealth Bank of Australia (CBA) and how they are improving the financial resiliency of their customers in the pandemic. The bank created a library of support messages for customers that nudged their behaviour towards better financial wellbeing. Such messages were heavily personalised and displayed on mobile banking apps and websites.

This high level of personalisation enabled by AI and machine learning is key. Like so many other companies, utility companies exhaust goodwill through irrelevant marketing messages. Customers simply 'tune out' when they believe they are being sold to. What is needed is a set of empathic behavioural nudges that are individually relevant, delivered at the right moment to be timely, consistent across all channels and contextual to their current needs. However, hyper-personalisation and empathy

can only be done at scale using AI and machine learning.

CBA uses machine learning to help identify which customers would benefit from which sort of messages and help. The primary goal was to connect customers with the various forms of financial support available to them including government grants, rebates, and payments. More than 270 different types of payments were included, and customers were matched to the right schemes and connected to over $481 million in 2020 with over 1 million extra claims being initiated. CBA used the same decisioning capability to deliver product messages that might help individuals and businesses, including deferring payments on loans and mortgages, reducing rates and fees, and accessing cash through secured and unsecured lending.

> The practicalities of using AI to enable large customer service organisations to identify and help vulnerable customers are already being put to practice in related sectors

What CBA achieved and what utility companies could replicate is helped by how so many more customers are going online to run their affairs. This can help a provider to spot the signals that customers are giving off about their potential financial problems. For example, are they browsing terms and conditions and are they looking at past statements?

So, using proven AI-powered systems, utility firms can go some way to change customers' perception of their business and be seen as a trusted source of help. However, there will be challenges to overcome. A major headache will be predicting which customers are likely to hit difficulties.

Predictive AI models that worked well pre-COVID are now redundant. Rebuilding models frequently as the economy evolves will be critical. But even more so, being able to manage the deployment and lifecycle of these models in operation will be the key to extracting value from them. A platform for data science innovation, management and operational execution will be critical.

Even with the kind solution in place, customers will still go into arrears on their energy bills. Yet by ensuring customers are making the best use of current products, are paying the right amount for services, are minimising unnecessary expenditure, and getting the right help from government and charities, a resilient customer base can be created that can weather difficulties better.

Solving the utilities bad debt crises with better data

Suppliers should go upstream and leverage their customer data to reduce debt and/or prevent this debt occurring in the first place.

BY ANITA DOUGALL, CEO & FOUNDING PARTNER, SAGACITY

THOUGH THE UK has now emerged from COVID-19 restrictions, the after-effects of the pandemic are still being felt. Families and companies alike are counting the costs of successive lockdowns, with the poverty rate among working households hitting a record high of 17.4 per cent in May, affecting their ability to pay energy bills. In fact, the utilities industry has been one of the hardest hit by the pandemic, with EDF Energy alone reporting losses of £160 million.

One of the key factors cited by EDF Energy for this was the increase of bad debt provisioning within the utilities industry. Bad debt refers to loans or outstanding credit balances owed that are no longer deemed recoverable and must be written off. The

pandemic has sent a tidal wave of bad debt towards the utilities industry, as the number of customers unable to pay their bills increased exponentially.

According to Ofgem, in Q2 2020 there were more than 1.6m electricity and gas accounts in arrears with no arrangement to repay their debts. The resulting problem for suppliers is that more customers require support now more than ever, but managing ever-growing bad debt and an increasing pool of customers falling into financial vulnerability is proving to be an almost insurmountable challenge.

It is clear that that both customers and suppliers need help, but for suppliers this starts close to home as they

should go upstream and leverage their customer data to reduce debt and/or prevent this debt occurring in the first place.

Bad data leads to bad debt

Utilities companies must start with the basics: ensuring their customer data is correct. This is particularly crucial in the wake of the pandemic, as many billpayers have undergone a change of circumstances. For example, there has been a 37 per cent rise in business closures during the pandemic. If utility companies don't have up-to-date information for their customers, they may still be billing businesses that have shut down, or families that have relocated, with no easy way to recoup cost, whilst wasting time and money in the process.

Many utility companies currently use internal data or rely on their customers or third parties to provide the data they need whether that be to replace incorrect data or populate missing. Where external data is purchased, the use of it is limited due to the complexity of the customer base and volume of data that needs to be processed and interpreted. However, significant value can be drawn from this data with the right technical, operational and industry expertise.

Tackling the problem at its source

Having cleaned the customer data and ensured it is up to date, utility providers can now use this information to determine the root cause of why they're experiencing bad debt. These will likely fall into the following categories: billpayers unaware of the debt they owe; those who are aware of bills and can afford to pay them but choose not to; and customers who cannot afford to pay.

From here, utility providers can start to fill in any blanks, by aggregating third party data to help build a fuller picture of each individual customer. For those unaware they owe money, the issue may be that customers are not receiving bills as the name or address on their account is incorrect.

Third party data can help verify addresses as customers move, even if they forget to inform their utility provider. If a customer can pay but is choosing not to, third party data can confirm what other services the customer uses and whether they pay for them e.g. a utility provider can identify if a customer is paying their credit cards, mobile phones, etc.

Finally, to determine which customers cannot afford to cover their bills, providers can use external data sources to identify criteria that indicates a problem with affordability - for example, if the billpayer receives benefits, this may also be an indicator that they require urgent support.

Many in this category may not pay, but some will pay, even when they can't afford to, pushing them further into energy / water poverty or debt. This group

continues to grow as the pandemic leaves lasting damage to households and businesses across the country, who desperately require help with their bills as their financial vulnerability worsens.

If utility providers have a segmented customer base and the correct details for billpayers, they can put this information to use to both head off bad debt and support those in need. Providers can use data analytics to determine bad debt risk and which payments they're more likely to be able to collect. From here, customer communication is key, ensuring that up-to-date phone numbers or email addresses are used to reach customers and that agents are trained on how to collect debt in appropriate ways, most suited to the customer.

Utility providers must look at how they can proactively help customers who are struggling to pay their bills. The Consumer Council for Water is calling for a cross-industry social tariff for vulnerable customers, but there are also special measures that providers can implement, such as helping customers pay bills in instalments, find a better payment method or guide them towards government support to unlock some of the £16bn of unclaimed benefits for those most financially vulnerable.

Analytics for the future

Analytics can also help providers plan for future debt crises. Companies could prioritise and chase up customers they know have the funds available to pay. Using analytics, companies can combine third party data with their own records to forecast bad debt costs. This way, suppliers will be able to determine which payments they are most likely to be able to collect before referring accounts to an external collections agency.

Finally, analytics has the power to prevent future bad debt by determining bad debt risk when accepting and onboarding new customers. Being able to predict future bad debt costs at this early stage allows utilities companies to be prepared for the future – flagging where debt might occur and being ready to take action if needed when the time comes.

The road ahead

After a difficult 18 months, utility providers have options on how they go about tackling bad debt and supporting vulnerable customers, but the responsibility must rest on their shoulders. While recouping costs is a must, utilities companies can't just rely on regulators to recoup costs. They need to use methods that don't penalise their entire customer base, and tackle the cause of the issue, not just treat the symptoms.

Analysing customer data to categorise billpayers contributing to bad debt can help achieve this, as well as identify and assist vulnerable customers who need help now more than ever.

Why? What? How? A guide to the exciting new technologies soon to revolutionise the warehouse

It really is a pivotal time for the logistics industry, according to Linde Material Handling GmbH

FOLLOWING THE RISE of e-commerce and continued fall in bricks and mortar retail, shopping habits have changed drastically. With more consumers deciding to spend their money online and making the most of deliveries straight to their front door, retailers have been rushing to keep up with customer expectations and rapid delivery times.

As a result, retailers are increasingly only looking to partner with warehousing and distribution partners with the capabilities to meet those demands.

For many warehouses dealing with consumer products, this means two things in the future. They will need to store far more goods and have the processes in place to get them dispatched quicker than ever. And that, right there, is what's driving the trends and technologies that are shaping the warehouse of the future.

Changing landscape of the logistics industry

Changing customer expectations about delivery times have created a situation where there is greater urgency to find ways to make logistical processes more efficient. With Amazon's famous next-day delivery setting the bar for the rest of the sector, other retailers are forced to follow suit or be left behind.

This has also created a shift whereby many retailers are no longer transporting in bulk to bricks and mortar stores, but instead sending goods right to our front doors. This requires a lot of manpower, so these new, large e-commerce warehouses are absorbing a huge amount of traditional warehousing staff. Meanwhile, Brexit is reducing the UK labour pool and Covid has impacted the reliability of human labour. For many warehouses, these tight labour markets are complicating things even further.

Consumer demands

The last year or two have been tough for the logistics sector – with a widespread fall in investment in new technologies. However, in 2021 the market has begun to pick up substantially.

Against this backdrop of changing end-consumer expectations and labour challenges, we've seen that retailers are now incredibly interested in investing in new technologies that can help bolster the efficiency of their supply chain.

And it's not just consumer expectations on delivery timeframes that's having an impact. As more consumers look to make greener choices, we've also seen more retailers committed to reducing their carbon footprints as they look to become more environmentally friendly.

Today's conscious consumer doesn't just look to the retailer, they also interrogate that retailer's suppliers and their working practices, so this is impacting the whole supply chain. From greener fuel and lithium-ion batteries to employee satisfaction, everything is under scrutiny. The warehouse of the future will need to adopt greener technology to meet the expectations of retailers and consumers in a more environmentally conscious market.

Cutting-edge technologies

Automation technology is about to transform the face of many warehouses across the world. As more and more retailers have discovered, wherever you have repetitive tasks where a person doesn't add significant

value, automation can make life so much easier. Automated guided vehicles (AGVs), make warehouse operations more streamlined by fulfilling simple transport from one point to the other at the mere press of a button, without the need for any sophisticated software.

As companies demand more goods to person picking, the warehouse of the future will be filled with autonomous mobile robots (AMR's) to a greater extend. Instead of someone going around the warehouse to pick the goods, these clever little units will travel around the warehouse where they will take it to the person to collect it at a picking station. So, the product keeps coming to the person and they don't need to move.

Digitisation is also changing the world of intralogistics when it comes to keeping tabs on the various vehicles in the modern warehouse. Modern logistics devices continuously collect data, which is analysed and can then be used to optimise complex warehouse and transport processes. Networking and advanced sensors even enable the forklift trucks to act autonomously. This will result in fleets becoming intelligent, and in the warehouse of the future, this focus on networking and real-time data access will become extremely important.

Looking ahead

Whilst significant new entrants like Amazon are shaking up the logistics sector, it's important to note that markets where there is less focus on delivering to individuals' front doors like supermarkets or business to business, will be less affected by automation. Despite that, we expect all markets to be affected by digitisation to some extent.

For those warehouses operating within consumer retail goods, the changing face of the warehouse will see more automated trucks and connected fleet management. Effective capacity management is the foundation of a functional modern warehouse too – after all, when there are millions of consumers now demanding rapid deliveries, you want to avoid any surplus or slow-moving inventory which can take up valuable space.

According to Mike Hawkins, Director of Logistics Solutions at Linde Material Handling, efficiency will be central to the warehouse of the future. "No matter what you do, you want to be as efficient as possible. For retailers operating on a big enough level, investing in this new technology might be a key to success."

"Looking ahead, the reality is that technology will never replace humans completely – so the majority of warehouses will consist of a mix between human labour and automated vehicles. Despite this, in the next three years there might be a retailer that has a warehouse run solely by automated technology. Keep your eyes peeled!"

Reprioritising the digital employee experience

There's no doubt about it – the digital employee experience has got complex.

BY MATT STURMAN, SENIOR TECHNICAL CONSULTANT, APPLEARN

YOU ONLY NEED to think about the myriad of software applications that the typical employee is now using to complete their day-to-day work: supporting tasks, processes and communication. And while the acceleration in embracing technology over the last 18months has been incredible, the digital employee experience needs some attention.

Consider this: each platform or piece of technology that an employee uses operates entirely differently, with disparate help and support functions – whether that's a chatbot, in-app resource centre or online hub. It's a lot to navigate and often leads to user frustration, with users heading to search engines to find the information they're looking for.

As we move beyond the pandemic, addressing the employee experience stack will be key. This means looking closer at how employees are interacting with software and using this insight to inform decision making. Accessing user analytics and analysing the metrics that matter is a critical component of this journey.

The metrics that matter

When identifying the metrics that matter, it's important to consider useful insights rather than more traditional usage insights – often referred to as actionable intelligence. This will ensure that any metrics you monitor can form the backbone of key decision making. According to a 2021 report from Everest

Group, analytics broadly operate at three different levels:

- **Tactical:** Metrics that demonstrate how users are interacting with certain applications or how processes are performing. These could include error rates or process completion rates.
- **Strategic:** Metrics that align the performance of technology with IT and business goals, such as efficiency or productivity gains.
- **Financial:** Metrics that demonstrate tangible benefits from the investments made, perhaps cost reduction or Return on Investment (RoI).

Addressing the employee experience requires a focus at the tactical level. This doesn't mean the other levels should not be considered – in fact, a best-in-class approach will monitor and analyse all three. Consider tools that will provide you with this view across your technology stack.

Discovery

Focusing on metrics such as error and process completion rates will enable you to identify areas of friction and frustration for users. This might be areas where workflows are challenging, or digital adoption is particularly low. Where possible, you should look to segment these analytics. For instance, by user role, business unit or geographies, to better understand how different user groups are interacting with processes and tasks.

The most mature approach to tactical analytics is a pre-emptive one – spotting potential user pain points and resolving issues early, often before they even become a problem.

Benchmark and monitor, monitor, monitor

Once you have identified a relevant set of metrics, benchmarking the current employee experience should start a cyclical process of diagnose, analyse, monitor and improve.

Following this approach will enable you to make meaningful interventions to improve the employee experience at every stage – whether that's optimising processes, adding additional or more relevant layers of support, or looking for opportunities to consolidate your enterprise technology.

While starting with these tactical elements of analytics will be crucial to better understanding and improving the employee experience, interventions made at this level will almost certainly support and drive overall business objectives. The goal must always be to enable employees to do their job better, and in doing this, make them happier and more productive.

It's then that you will see an impact on the bottom line, whether that's productivity gains, reducing support ticket costs or RoI.

Breaking down the barriers to data science

FLORIAN DOUETTEAU, CEO OF AI AND MACHINE LEARNING PLATFORM DATAIKU, discusses how code-free environments are paving the way for new innovation business-wide.

WITH THE INCREASING ADOPTION of data science, machine learning, and AI platforms, what often goes unreported is the update of broader business use of these platforms. It's a misconception that they are just for data scientists and analytics teams. In fact, some of the transformative analytical-driven business results that come from these platforms are driven by marketing teams or finance departments.

There are many approaches to helping companies manage and make use of their data so that business users can access it just as easily as data scientists. Perhaps the biggest and most successful move data platform providers have made is providing code-free tools that average non-coding employees are comfortable with. People in all positions across organisations are leveraging data (via data exploration, visualisation, and more) to answer business questions in a way that doesn't need to involve code.

Some organisations call these citizen data scientists, but the reality is that they are simply data and business-savvy people who are not formally trained data scientists, but who recognise the power and potential in breaking down data silos and democratising data access across teams.

It's great news for the global data science platform market, but how can we ensure that we don't drop the ball on this one, and how can we continue to grow the number of business people working with data every day, especially in more traditional (non-digital native) companies that don't necessarily have the same resources to hire data talent as the Fortune 500? The answer lies both in understanding how technology can help, and implementing a truly inclusive AI strategy.

A Common Ground for Data Experts and Explorers Smart data ingestion, processing dates and times, clearing complex text fields, combining datasets - even creating new machine learning models - these are all examples of tasks that can be done code free on many platforms.

Does it mean that no one will learn to code anymore? Of course not, but it does mean that the work of non-data scientists can be incorporated in data science projects in meaningful ways.

It's the beginning of a fundamental shift in mindset around data tooling, and with code-free tooling evolving rapidly, we'll continue to see a bigger breadth
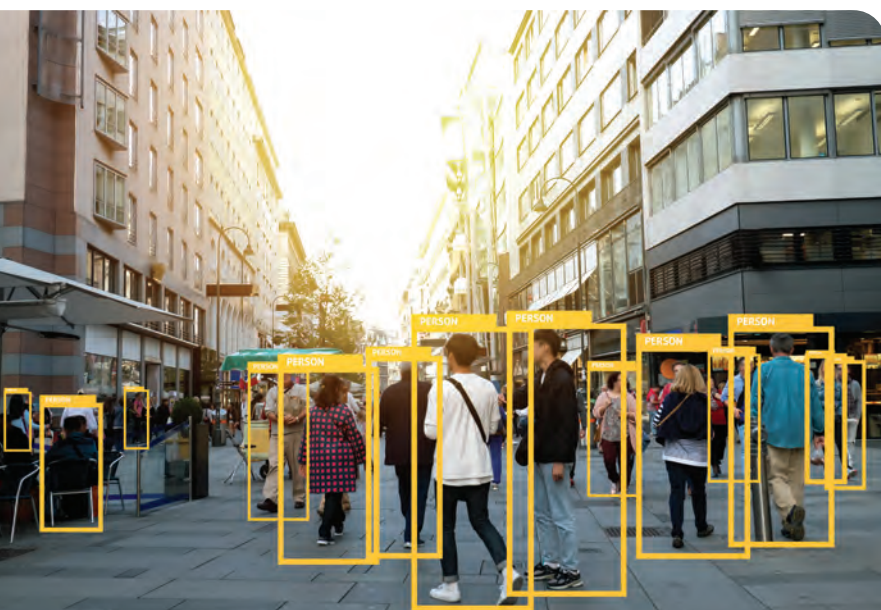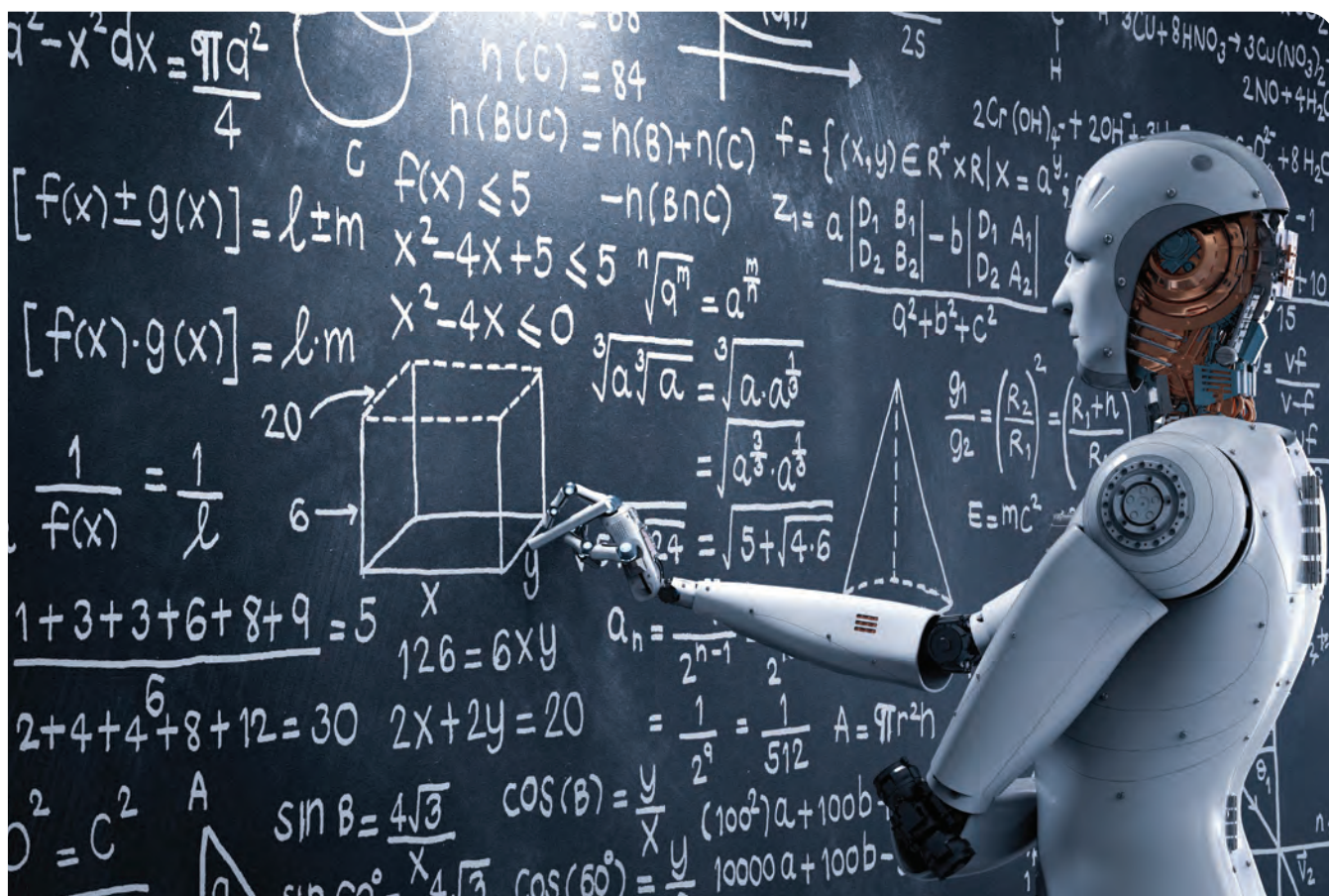
of people that have access to data to work with it on a day-to-day basis.

AutoML and Augmented Analytics

Low code or code-free also means that data scientists can focus on building cool things, and not spending hours of maintenance and days of work just to ensure everything is kept running. Most data science teams will have a real mix of people: some will want to use a more code-free approach, and others will want to dive into code. Today's platforms should offer enough flexibility to let people whip up a quick model, or get very involved 'under the hood.'

AutoML, which has long since been touted as the 'future of AI' is helping to provide this flexibility. In fact, a few years ago Gartner estimated that by 2025, 50% of data scientist activities will be automated by AI, easing the acute talent shortage."

The rapid acceleration of AutoML has spurred the application of automation to the whole data-to-insights pipeline, from cleaning the data to tuning algorithms through feature selection and feature creation to operationalisation. At this larger scale, paired with an increasing volume of data, AutoML is producing more insights in less time. At a very high level, AutoML is about using machine learning techniques to automatically do machine learning. Yet AutoML can have a broader scope. Its development has spurred the application of automation to the whole data-to-

insights pipeline, from cleaning the data to tuning algorithms through feature selection and feature creation, even operationalisation.

It's also expanding the capabilities of the citizen data scientists, and allowing entire companies to design and implement machine learning models while easily scaling them out in production without failure or interruptions, with complete transparency.

Inclusive AI

One of the most important parts of data democratisation in an organisation is ensuring an inclusive AI strategy is in place.

Inclusive AI means not restricting the use of data or AI systems to specific teams or roles, but rather equipping and empowering everyone at the company to make day-to-day decisions, as well as larger process changes, with data at the core. The more people are involved in AI processes, more often than not, the better the outcome. It also means integrated documentation and knowledge sharing for increased communication around bias, responsibility, interpretability, and model fairness.

Ultimately, crafting an AI strategy that is inclusive allows for the democratisation of data use across entire companies, lines of business, and profiles – technical or non-technical. This is the key to unlocking everyday AI.

Understanding the importance of security for your IT infrastructure

Security needs to be considered in every aspect of an organisation's infrastructure and regularly reviewed as threats and technology evolve.

BY ROB PRICE, PRACTICE DIRECTOR, DIGITAL INFRASTRUCTURE AND JAMES HAMPSON, SECURITY SERVICES PRACTICE DIRECTOR LOGICALIS UK & I

Rob Price

James Hampson

AS A RESULT of the global pandemic, digitisation is now a must for organisations wishing to remain competitive, with research by Gartner revealing 63% of leading organisations increased funding for digital transformation. One of the main drivers behind this was the move to hybrid-working, with around 30% moving to remote working over the last year.

With distributed workforces becoming part of the new workplace, companies are connecting the unconnected at a fierce pace, with some estimates suggesting that over 1 million new devices are connected to the internet every hour. As increasing numbers of devices are connected to networks, data volumes are expanding, which, if collected, analysed and acted upon, represents an opportunity for organisations to gain business advantage. Whilst digitisation represents an opportunity for businesses, it also creates opportunities for cybercriminals to

exploit vulnerabilities. Barely a week goes by without a high-profile cyber-attack hitting the mainstream media. We have recently seen cyberattacks on the Colonial Pipeline in the eastern United States, at JBS - the world's largest meat processing company, and the Ireland's Public Health Service Cybercrime is clearly reaching epidemic proportions, and it is incumbent upon the IT industry providing the maximum protection possible for organisations.

Given businesses are now massively reliant on digitisation to remain competitive, coupled with an ever-increasing attack surface and the associated vulnerabilities, security is now very firmly a boardroom agenda item.

Zero-trust Security
Many organisations rely on the internet as part of their network, and cloud providers are part of their

datacentre. It has become increasingly difficult for companies to identify a perimeter to which security controls can be applied in this environment. These challenges have given rise to the idea of zero-trust security, where users devices and applications are continually asked to verify that they are who they say they are.

However, for organisations to use identity in this way, they need to ensure there are controls in place to monitor it effectively. A simple username and password model is no longer adequate. Credentials are the primary means by which a bad actor hacks into an organisation, with 61 per cent of breaches attributed to leveraged credentials and 81% of the total number of breaches due to stolen or weak passwords. Multi-Factor Authentication (MFA) is one way in which organisations can address these issues. Using MFA, organisations can use two or more "factors" to identify a user, device or application. A conventional password may be one of these factors, and this will then be supplemented by a second factor like biometrics, such as a fingerprint, retina scan or facial recognition, making it harder for cybercriminals to breach an organisation's environment.

Security Is Not An Option

So, given these complexities, how can organisations address these concerns?
Organisations must consider security as a must rather than a nice to have, and it must be a component of every project rather than an add-on. If we take a new car as an example, you won't buy a new car and then pop round the corner to have the seatbelts, airbags and locks fitted, and yet for a long time, this bolt-on approach has been the norm for IT security. Part of the reason for this, as already stated, is that security is no longer an option. Still, on top of this, it makes little sense to deploy multiple security solutions that operate independently from one another, sharing little or no information.

To use my previous example, if you are unlucky enough to be involved in an accident in your new car, the seatbelts will pre-tension, the relevant airbags will fire, and the doors will unlock. This is because these systems are fully integrated into the vehicle and interacting with one another to protect the occupants to the highest degree possible.

Back in the world of IT, there is an increasing trend towards vendor consolidation. Having fewer security vendors in your environment and choosing vendors willing to cooperate with one another is a growing trend. In fact, a 2020 Cisco Cybersecurity report stated that in 2018 54% of customers had fewer than 20 security vendors in their environment; by 2020, this had increased to 86%.

There are several trends in the industry which present great opportunities, but at the same time represent significant security challenges:

1. "The Internet is my network"
Given the rapid rise of technologies like SD-WAN, coupled with a significant increase in remote and mobile working, organisations are seeing many customers using the internet as a primary bearer. While organisations can protect "in-flight" data using encryption, having multiple sites or users directly connected to the internet presents an opportunity for cybercriminals to access corporate environments. To mitigate these threats, organisations should consider solutions such as "SASE" (Secure Access Services Edge), which provide a set of proxy security services between them and the internet.

2. "The cloud is my datacentre"
Most organisations are using cloud services in some way. Whether it be IaaS Services or complete SaaS platforms, organisations are using data and applications that are no longer just housed in private data centres. Regardless of the mix of infrastructure, whether on-prem, off-prem or a hybrid-mix, organisations need to ensure security technologies are deployed, such as web firewall, MFA and Cloud Access Security Brokerage (CASB) to protect end-user data and applications.

3. "Identity is my perimeter"
Given the above factors of highly mobile users, the internet as a primary bearer and cloud-based services hosted in multiple locations, it is virtually impossible to define a conventional perimeter. Employing a zero-trust model with robust multi-factor authentication allows organisations to use identity as a perimeter. If organisations can reliably establish the identity of a user, device or application, then it is less likely that a cyber-criminal will gain access.

Prevention, Containment and Remediation

Organisations need to understand that no security solution is 100% effective. Despite the best efforts of any business, there will always be breaches as new technologies arise and increasing numbers of devices and applications are connected to new networks. Whilst it is crucial for companies to concentrate on prevention, containment and remediation must also be critical components within a security framework.

Containment is vital during a security incident to mitigate its effects as far as possible. Time to detection is also a significant factor, and remediation is equally essential to get organisations back up and running as quickly as possible after an attack has taken place. Security needs to be considered in every aspect of an organisation's infrastructure and regularly reviewed as threats and technology evolve. It's difficult for a business to keep abreast of these developments while running day-to-day operations. But by working with a technology partner with specialist expertise, experience and security solutions, organisations can ensure they can access industry best practices and implement security by design rather than fault.

The rise in collaboration technology over the last 18 months and the three key drivers for change

Since COVID-19 challenged industry norms and forced enterprises to relocate operations, collaboration tools became the backbone of successful hybrid working.

BY SIMON HAIGHTON-WILLIAMS, CEO OF ADAPTAVIST

COVID-19 underpins everything now happening in the working world. The requirements from leaders of large enterprises are not what they were 18 months ago. For many, a new priority is enterprise-ready software that integrates the way people work. There's also an increased demand for strategies in the DevOps field to improve the development of software, helping operations establish better routes from ideation to the final product.

As we look back on what this time has taught the software industry, it's clear that efficiency and productivity can still be achieved across locations. To maintain these gains, companies need to continue to adapt. We see three current drivers for efficiency: the increasing need to integrate with third-party tools across teams and organisations; the strong demand to automate workflows and the increase in non-technical teams using tools.

> Automation is huge at the moment and organisations are actively looking at cloud software or Software as a Service (SaaS) for the future. SaaS is inevitable for enterprises and companies to adopt, so figuring out how operations can move to SaaS and how to integrate existing platforms with new ones and third-party tools is going to become a trend over the next few years

Companies want to grow their tools

In the last year, there has been growth in the amount of non-technical teams using third-party tools, which has meant that both the technical and non-technical users in a company can work from the same applications and systems. As more teams interact with these tools, the tools themselves become more beneficial for both the users and the wider company. Our State of the Atlassian Ecosystem report found that IT, engineering, operations and customer support teams, to name a few, have all been using these tools more over the last year, enabling them to implement new business processes for success. Our research also found that 43% of HR teams, as an example, are now using these tools, which is a big number for non-technical users. This increase across teams demonstrates a radical shift in the way enterprises, and now companies, operate thanks to third-party tools.

Automation is huge at the moment and organisations are actively looking at cloud software or Software as a Service (SaaS) for the future. SaaS is inevitable for enterprises and companies to adopt, so figuring out how operations can move to SaaS and how to integrate existing platforms with new ones and third-party tools is going to become a trend over the next few years.

Manual workflows aren't an option

Enterprises are making headway on the DevOps side of their operations and it's because automating workflows is critical for them to address. Software developers can simply not afford to be inundated with bug fixes, slow turnaround times and poor-quality products. Such inefficient processes can quickly create a lack of morale within the wider team as it doesn't make use of their best qualities.

From talking with people across the industry, it's clear that DevOps has been well received and welcomed by enterprises. It won't be long before these operations accelerate delivery and ensure quality, continuous improvement through the implementation of their DevOps strategy. Having an end-to-end pipeline changes the way people think across an organisation in all aspects of development and operations, so it's certainly not a strategy that companies would want to be left behind on.

Integration will ensure future resilience

Our research found that integrating third-party tools is the biggest concern for 48% of companies. As a result of COVID-19, tools have become an essential part of how teams work. Typical collaboration tools, such as Microsoft Teams, have blown up over the last 18 months and require integration for longevity.

While some companies are still unclear of the benefits that integration provides, with some 100 SaaS applications in the mix at the average enterprise, it ought to be more widely considered. As we transition to working in multiple locations, having connectivity between disparate systems and allowing business-critical data to flow freely between them is essential. While this is often underestimated, a lack of integration will cause complications for companies because of mismatched data stored across platforms. However, momentum on integration is increasing year over year, and while implementing new tools was a trend already in existence, these tools are becoming mission-critical for enterprises and companies alike. If your company isn't already adopting strategies for DevOps and prioritising integration, it should be considering it now to ensure resilience for the future.

How to succeed as an IT leader in the digital age?

What does it mean to be successful as an IT leader? As technology has evolved, so have the skills needed to lead. As this article will explain in more detail, a generative organisational culture has never been more important.

BY PETER VOLLMER, DISTINGUISHED TECHNOLOGIST, MICRO FOCUS, CTO OFFICE

Times of disruption and change
ACCORDING to Carlota Perez, in her book, Technological Revolutions and Financial Capital, every 50-60 years we face a paradigm shift that affects the social, business, and economic order.

It starts with an installation period. New technologies and financial capital start to build momentum, which, after a few years, leads to a turning point where companies either adapt or decline. Then follows the deployment period. Technology giants take over the old economy or manifest. According to this philosophy, we are currently at the end of the turning point or already in the deployment period depending on the technology.

These are critical points in time for businesses. Paradigm shifts up end what is required and expected to be successful. Companies and leaders who don't understand this invariably lose relevance in the upcoming age.

Westrum's Organisational Culture Model

Where workers were once seen as a "cogwheel in a machine" - easily interchangeable, doing repeating, easily learnable work steps - in the Digital Age, collaboration and an individual's contribution and cohesion to the larger unit is vital. Successful teams act more like an adapting organism, using the collective brain power to handle ever more complex solutions and changing demands in less predictable environments.

To create and maintain a highly motivated, skilled, and engaged workforce that can master these challenges, we demands a new leadership style and a culture that supports faster learning and information flow. According to research by Dr Ronald Westrum, there are three different types of organisational cultures; pathological, bureaucratic and generative.

Each of these cultures has a different impact on informational flow. The generative culture is performance-oriented culture, where responsibilities are shared and collaboration is encouraged – theoretically, this culture is the most conducive to leadership success in the current digital age.

The model suggests that culture is therefore a primary factor for the success or failure of an organisation. It defines how fast an organisation can sense market changes and how quickly it can react to them. It requires a culture that is continuously improving the information flow within and across the company's value streams. In other words, business agility can only thrive on a generative culture, which is why this style of leadership of so essential.

Behaviours to support a generative culture

The "New Leadership Playbook for the Digital Age" report describes different leadership behaviours. The analysis is another way to describe the move from a Tayloristic world into the digital age and the change in the leadership paradigm.

Behaviours that hinder the generative culture are what we refer to as 'eroding' and include behaviours such as top-down management, micromanagement, avoiding transparency and a one-size-fits-all approach. Conversely, what we refer to as 'enduring' and 'emerging' behaviours are the attributes that are required to succeed as a leader in the digital age. These include behaviours such as taking risks and leading change for enduring behaviours. While nurturing passion, showing humility and demonstrating empathy are examples of emerging behaviours.

Personal mastery as the foundation of leadership Albert Einstein famously said, "Setting an example is not the main means of influencing others, it is the only means." Given the politically and socially charged times we're currently living in, the ramifications of this quote could not be more appropriate across businesses and organisations from both the public and private sectors. Personal mastery is the foundation of leadership excellence and leadership excellence is the foundation of a successful organisational transformation.

Acquiring new work skills isn't enough; if you're not growing as a human being, your performance will suffer. That is why we must start with personal mastery. Peter Senge defines personal mastery as "living our lives in the service of our highest aspirations". This can be achieved by being the best possible and authentic version of ourselves by constant learning and development and continually clarifying and deepening our personal vision and mission.

In order to stay relevant in the current digital age, it's crucial that IT leaders understand the concept of the different organisational cultures and the importance of fostering a generative one. As well as the impact of different leadership styles on this culture, individual employee performance and the overall success of an organisation.

Introduction - Future Views
By DCA CEO Steve Hone

IN THIS EDITION we are taking a break from the DCA Special Interest and Focus Groups. We have taken this opportunity to share the thoughts of several our partners and their views on the Future might hold for us in 2022.

Thank you to Noveus Energy, EkkoSense and Schneider Electric for their contributions. Many thanks also, to Advisory Board Members Mark Acton and Venessa Moffat for their comments.

We now find ourselves at the end of another challenging year and I know I am keen to move forward to next year and an improved situation. Best efforts with digital technology have meant we have all been able to keep in touch via zoom, teams or similar but nothing has pleased me more than being able to attend 'in person' events again in the last few weeks.

Datacloud UK & Ireland Event in September was a great start point, this was a well-attended event, with a great agenda/format and large number of DCA Partners speaking on panels. For the 11th year running The DCA once again were proud supporters of the DCS Awards that took place at the end of

October, so congratulations to all those shortlisted and I was delighted to be able to present the awards on the night especially to DCA Corporate Partners – Teledata, Schneider Electric and Chatsworth Products who among others were all worthy winners.

The DCA ventured over to Ireland in November with a stand at Data Centres Ireland, again the event was well supported as always, Hugh Robinson staged an excellent event despite the social distancing restrictions in place.

Finally, thank you to Caroline Hitchins of Datacentre.me for hosting a great networking event in London, it was great to see so many faces from the sector out and about again at this year's data centre Christmas kick-off party.

The DCA are now working to ensure normal service is resumed. For 2022 we have a series of 10 x 10 networking events throughout the year, the Data Centre Transformation Conference in late spring, along with a golf day and race day later in the year. Look out for the imminent DCA Marketing & PR Guide that will provide all the details of key events planned in 2022 or contact us directly: **info@dca-global.org**

2022 Predictions: Digitising the design and build of data centres

Steven Carlini, Vice President, Innovation and Data Centre, Schneider Electric

DATA CENTRES have become the very heart of the digital economy, and critical to our ever more digitised way of life. As we adapt to a new and hybrid world, greater innovation will be necessary to help overcome many of the remaining challenges, including the need for increased sustainability, more efficient use of energy, and for our industry to meet accelerated demands for capacity. Let's take a closer look at five trends that are influencing the direction of data centres.

Digital design tools speed development
I expect to see greater innovation in the digitisation of data centre design and build. One of the top challenges customers are experiencing is the need to meet demands for new data centre capacity. To help address this challenge, new software tools are emerging that speed up the design and construction of data centres. Schneider Electric's partner ETAP produces software (essentially a digital twins tool) that allows designers to model the electrical powertrain for availability, efficiency, and sustainability. Another company, in which Schneider Electric has a stake, is RIB, which develops construction management

software.

Traditional computer-aided design (CAD) platforms have long allowed users to design the layout of a facility, however, the use of ETAP's software allows detailed modelling of the powertrain while RIB's enables time and cost modelling. Although CAD tools have been familiar for many years, the ability to model the powertrain is new. End-users can now choose or substitute components and subsystems based on their environmental impact or energy efficiency - evaluating the effects on technical performance and pricing via digital twins before committing to physical prototypes.

The 6G effect
Fifth generation networks have been expected to make an impact for some time, but the fast millimetre wave 5G variant has been slow to materialise. 5G is, however, beginning to make an impact in open spaces with few physical barriers such as stadiums, airports, and shipyards. The problem remains that a killer application to drive the need for mass adoption has yet to materialise.

An exciting prospect is 6G networks, which could offer life and experience changing functionality. 6G operates at THz frequencies and has access speeds of 1Tbps, which will deliver near 'air latency'. Whereas high band 5G hits speeds around 500Mbps, with air latency aimed at 8-12ms. Potential use cases for 6G include embedded technology for controlling artificial limbs (prosthetics) through wireless Brain-Computer Interactions (BCI), which is an incredible prospect! In the 6G world, people could interact with their environment and other people using devices that could be held, worn, or implanted.

6G networks also have the potential to eliminate traditional base station and antenna networks because their high frequencies need a ubiquitous mesh network where everything around you has an antenna function. In theory everything that powers up will have a built in antenna function and become part of this new 'antenna free' network. While the network architecture may change with 6G, the computing capacity will need to grow, so placement at the edge will become even more crucial.

Energy concerns at the edge

Adoption of edge infrastructure will also continue to grow. However, energy efficiency will become a critical factor, with customers demanding that edge deployments match the capabilities of larger data centres in terms of resilience, efficiency, and sustainability. Edge deployments may be smaller than traditional facilities, but the scale and volume at which the infrastructure is likely to be deployed demands its environmental impact be minimised.

Building a sustainable edge at scale requires greater attention when selecting components, during the design and deployment stages, and use of comprehensive management systems to drive operational efficiency. Cooling will remain an essential part of the efficiency requirements, but the challenges presented by edge deployments, especially those in unmanned environments, will require innovative approaches in terms of technology and topology. Air cooling is often unsuitable for edge deployments, which are frequently located in urbanised and harsh locations where dust and other contaminants abound. Blowing such material around an unmanned or remote edge data centre is far from ideal, and even if filters were attached, the task of frequent replacement and servicing remains a key challenge – especially where cost and circularity are concerned.

With sealed and unmanned edge data centres, therefore, liquid cooling will be required, although it is not yet clear what sort of topology will be best suited. As such, new liquid cooled architectures may emerge for the edge at scale. Whether that involves direct-to-chip liquid cooling or chassis-based immersive cooling is yet to be seen.

Standardised metrics for sustainability

The circular economy - the ability to reduce, reuse, and recycle technologies deployed at the edge - will be an important consideration in 2022 and beyond. However, another area growing in importance is the need for standardised sustainability metrics. Today, there are a plethora of metrics from which to choose, with data centre operators each reporting their own preferred measurements. However, I believe there is a need to measure sustainable progress in a consistent and organised way.

According to the Uptime Institute, IT and Power consumption, and Power Usage Effectiveness (PUE) remain the top sustainability metrics tracked across the industry. While PUE has long been an excellent marker of efficiency, we must also agree on metrics for the other categories of environmental sustainability – greenhouse gas emissions, water use, waste, and biodiversity.

Going forward, I believe sustainability metrics within the industry must evolve and become more standardised. This effort can leverage business processes, like GAAP balance sheets and income statements, to provide a ledger where each company can state the results using established rules and units of measurement. An approach such as this ensures comprehensive reporting that is universally understood and provides a baseline to measure success. Further, it makes it possible to compare sustainability results with other companies.

At Schneider Electric, we know that not all companies are at the same stage of their sustainability journey, which is why we recommend a framework for

Beginning, Advanced, and Leading. Beginning companies will report on energy use, Greenhouse Gas Emissions (GHG), and water utilisation. The 11 metrics for this level are a mix of measured values like GHG emissions in mtCO2e and ratios like Carbon usage effectiveness (CUE) in mtCO2e/kWh. 'Advanced' metrics bring in the 'waste' category and 'Leading' metrics will include a category for land and biodiversity.

Data centre functions become services

Data Centre as a Service (DCaaS) offerings are beginning to gain popularity. The trend is enabled by standardising power, cooling, IT and storage in data centres to offer the same user experience and data access from everywhere. Companies like Microsoft and Amazon have already started offering such services with their Azure and Outposts initiatives, extending versions of their cloud architecture into the edge environment where customers can pay a monthly service fee for their capacity.

Many traditional IT companies such as Dell and HPE have positioned themselves as IT advisors to help companies design and run business application or workloads in the cloud (consulting services, engineering, integration and management), rather than as IT hardware and software suppliers, so one might predict that DCaaS will continue to gain traction.

Overall, I believe data centre capacity will continue to grow at both the core and edge driven by digital acceleration and enabled by high capacity networking 4/5/6G and WiFi 6. Model based software will be leveraged to bring efficient, resilient, and sustainable data centre capacity online faster, which is great timing, as we are at the precipice of edge being deployed at scale.

Four power supply cornerstones to consider in 2022

By Noveus Energy

AS WE STEP INTO 2022, what can data centres expect concerning power supplies. Here, I look at four cornerstones – connectivity, renewables, metering, and purchasing – and ask what's in store for 2022.

1. Connectivity is further questioned

Data centres use a lot of energy. A single data centre can consume as much power as a small city, with the world's biggest centre's requiring more than 100 megawatts of power (that's enough to power 80,000 homes), according to thinktank Energy Innovation [1]. It's estimated that the world's data centres collectively consume more energy than Germany [1].

Because data centres are so energy-hungry, there have been concerns within the industry regarding the demand they place on power systems nationally [3]. There is a high probability we may see further barriers put in the way of data centres trying to connect to grids across the UK and Europe – unless they can demonstrate flexibility by reducing consumption when requested and supply back to the grid through on-site generation and storage.

While this may seem an imposition, there are opportunities to generate revenues through local distribution networks and the national grid, which data centres are well placed to do and, in our opinion, should be investigated at the very least.

However, industry-led voices are putting the case for data centre connectivity. A study published by research company BloombergNEF (BNEF), in partnership with Eaton and Statkraft, found that data centres are a largely untapped resource to support the grid and not just a demand on power systems [4], in that they can support the grid with back-up generation in times of need.

With our digital lifestyles requiring increased data processing power and reliability, there is also a strong argument that digital infrastructure has proven itself as a vital national resource, argues Steve Hone, co-founder of the UK's Data Centre Alliance: "Rather than putting hurdles in the way of data centres connecting to national grids, connectivity should be a national priority, supporting our increasingly digital lifestyles."

2. Renewables remain the focus

At the end of last year, COP26 shone a light on climate change, net-zero initiatives, and renewable energy

sources. Yet today, electrical power for most of the world's data centres still comes from non-renewable sources such as coal, gas, and oil.

The Global e-Sustainability Initiative highlights that global data traffic accounts for more than two per cent of global climate emissions, nearly equivalent to the entire global airline industry [5]. In 2022, a central challenge for data centres will continue to focus on reducing such emissions and achieving net zero targets.

Yet, it's clear that data centres worldwide have already reduced energy consumption by optimising and becoming more efficient. A recent report in the Journal of Science backs up the energy-reducing role already played by centres worldwide – the study found that while data centre workloads increased six-fold from 2010 and 2020, the overall energy consumption has not increased by the same degree [6].

So, what else can data centres do in 2022? Answers will undoubtedly be found in renewable corporate power purchasing agreements (CPAs) or hybrid power purchase agreements (HPPA).

Such agreements are a win-win. The renewables project gets a route to market for its energy and can maximise the overall value of a site's output via initiatives such as battery storage. The procuring corporation secures a greener energy supply and/ or credits to offset its emissions. While hybrid PPAs provide an alternative, allowing for an element of both CPPAs and grid power, and are becoming increasingly attractive as the duration of contract is more like 3-5 years compared to 10-15 for CPPAs.

In 2022, we expect a greater scrutiny when it comes to green energy and green offsets. The market will increasingly ask: how green and ethical is the green energy or offset I am purchasing? There will be more of a focus on how to add actual renewable energy to the grid, rather than simply purchasing green offset credits (for energy that already exists).

3. Sub-metering becomes a must
As more and more data processing power is required, hyper-scale data centres have emerged and become more prevalent.

Hyper-scale centres are very large-scale critical sites processing vast volumes of data, with one sizeable extra high-voltage electricity supply into the building then distributed to tenants. However, hyper-scale tenants will likely want to negotiate, purchase, and manage their energy contracts and supplies directly with suppliers in the framework of their net zero plans and targets.

At Noveus Energy, we're seeing more hyper-scale data centres looking for sub-metering arrangements, enabling their tenants to purchase energy directly, and

> Fiscal sub-metering of data centres is a very specialist area which requires detailed knowledge and practical know how. With increased focus on this subject, there could be a skills gap in the future limiting the application of direct metered solutions

expect to see more in 2022. This has been supported by the Electricity Settlements Process, which means power can now be sub-metered, going directly to tenants who would have their own purchasing power and an installed, recognised and agreed fiscal meter.

For existing hyper-scale data centres there are several ways to approach a retro fit for existing centres. Most will require special dispensation from Elexon, but there are other solutions which don't – and these are less time consuming and less costly to implement.

If you're a new hyper-scale data centre looking to accommodate the growing needs of technology companies, direct metering should be part of the initial design criteria. It is easier and cheaper to have made that decision in advance, as opposed to retrospectively remodelling the electrical infrastructure with approval from Elexon.

Fiscal sub-metering of data centres is a very specialist area which requires detailed knowledge and practical know how. With increased focus on this subject, there could be a skills gap in the future limiting the application of direct metered solutions.

4. Purchasing should be approached dynamically
A number of datacentres in the UK purchase green energy through their supply contract via either a Renewable Energy Guarantee of Origin (REGO) or EU Guarantee of Origin (GOO) certificate. But could buying green become more difficult in 2022?

The transparency of green energy tariffs is being reviewed by government to ensure consumers are clear on the carbon content when choosing their energy services and products. In addition, the EU has stopped recognising Guarantee of Origin (GOO) certificates issued in the UK – with the UK government in-turn stating they will review this position and may follow suit, and not recognise any certificates issued in the EU.

The impact of either or both measures would be to reduce the amount of green energy readily available

to procure in the UK through energy suppliers, which would almost certainly drive prices upwards.

With soaring energy costs and extreme market volatility during 2021, our mantra of using a dynamic approach to energy purchasing is more relevant now than ever. What we mean by this is how and when you purchase, which is constantly reviewed and adjusted with a dynamic approach.

Such an approach helps you to understand the market, highlight risks and adjust your purchases in step with market changes and the market's volatility, enabling you to buy at the right time and lower your costs. In today's market, a dynamic approach can deliver savings of up to 10% and in our opinion should be an essential part of your risk management strategy.

It is essential you work with a team who understand the market, constantly review risks and can adjust how and when you purchase on a continual basis.

At Noveus Energy we specialise in the data centre market, and we support our data centre clients to adopt an integrated view of energy power supplies – from connectivity and renewables through to metering and purchasing.

If you would like an informal discussion about our approach or want to talk through anything else discussed in this article, please feel free to get in touch at:
https://dca-global.org/companies/profile/2135/noveus-energy

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Giving data centre operations teams more control in 2022

By Dr. Stu Redshaw, Chief Technical Innovation Officer, EkkoSense

2022 SHOULD PROVE to be a key year for those organisations that have made clear commitments towards achieving net zero. And while the UK Government has signed up to a 2050 net zero target, many leading brands have been much more ambitious – setting themselves a goal for their operations to reach net zero by as soon as 2030.

This is going to place huge pressures on organisations. Already proposed Treasury rules suggest that financial institutions and companies with shares listed on the London Stock Exchange will need to come up with net-zero transition plans that detail their greenhouse gas emissions targets and the steps they will be taking to achieve them. As the full impact of corporate net zero commitments starts to bite, there's going to be sustained pressure on the high energy users within organisations to start securing serious energy savings.

And with data centres already established as one of larger corporate consumers of energy, it's clear that

2022 will see data centre IT operations teams focused on doing everything they can to deliver quick carbon reduction wins. That's why it's vital that bodies such as the Data Centre Alliance, ASHRAE and the EU with its Code of Conduct do everything they can to help organisations optimise their data centre energy usage – particularly given some of the key challenges the industry currently faces.

Key issues that need addressing for 2022
However there are some issues that need to be addressed before data centre teams can really get started on a more structured approach to carbon reduction - specifically around current efficiency momentum, understanding where they are starting from in terms of energy usage, and – critically – in data centre resourcing.

Energy price fluctuations and the potential for overloading national electrical grids also open up the possibility of load shedding as a potential short-term solution in 2022. Will governments look towards major

energy consumers such as data centres to absorb any reductions in available power by throttling back or running on local power?

Uptime Institute highlighted the issue of momentum in its 2021 global data centre survey, citing the flat-lining of average annualised PUE (Power Usage Effectiveness). According to the report, while new builds might deliver PUEs of 1.3 or even better, older data centres seem to have stalled in terms of PUE reduction, having already received gains from replacing aging equipment and improving airflow management. It appears many are now uncertain what to do next to achieve further PUE improvements.

It's also difficult for data centre teams to deliver a precise carbon reduction on their operations if they don't know exactly how much energy they're using in the first place. Our own research at EkkoSense suggests that only 5% of M&E teams currently monitor and report actively on an individual rack-by-rack basis, and even less collect real-time cooling duty information. This suggests that very few teams really know how their rooms are performing from a cooling, capacity and power perspective. So, it's perhaps no surprise that the default position for many organisations is still to keep throwing more cooling at a problem should any issues arise. This clearly adds to the data centre's overall carbon footprint, and often does little to resolve potential optimisation concerns.

Additionally if data centre teams are being tasked with unlocking carbon savings, it's essential that they have the right people in place to drive this net zero transformation across their operations. But with demand for digital services showing no sign of slowing down, 2022 will continue to see a shortage of skilled professionals across data centres. Indeed, Uptime's recent global survey reported that almost half of those polled were having difficulty in finding qualified candidates for open jobs. These recruitment concerns are also being amplified by 'the great resignation', with a recent Randstad recruitment survey suggesting that 24% of employees plan to change their job within the next three to six months.

Over the next year we expect organisations look for further innovative ways to support their data centre operations through this skills shortage. We're certainly seeing a number of universities now setting up dedicated courses to support the data centre sector, and it would be great if these students could establish themselves in our industry before our skills gap grows any wider.

Providing this new generation of engineers with tools to enable them to work smarter will also be essential. Central to this will be the ability to decouple skilled staff from specific locations, with the latest cloud-based optimisation solutions helping teams to optimise cooling capacity and minimise energy usage - regardless of location.

The impact of the pandemic – particularly the difficulties involved in getting people into a critical facility, plus the emergence of remote 'dark' Edge sites - means that people are increasingly looking at both enhancing remote monitoring, as well as identifying management capabilities where there is no routine human presence onsite. The great resignation will only accelerate this shift during 2022.

And while most CIOs believe that AI and automation will help in terms of managing data centre staffing levels, Upsite's research suggests that 50% feel that these benefits will not be realised in the next five years. Certainly, when it comes to optimisation, many still have concerns around trusting AI to make operational decisions. While it's true that automated controls can enact smart actions immediately post optimisation, they're much less able to accommodate the continual, inevitable changes that always happen in data centres. We've seen 400 kW sites suddenly introduce a further 75 kW of additional DC power usage within days of optimisation, so you simply can't rely on rooms ever staying the same.

Rather than treat machine learning and AI as a universal solution to data centre concerns, we expect to see data centre teams in 2022 focusing on those areas – such as cooling optimisation and airflow management - where these technologies can be applied and deliver significant results. But rather than rely on unwieldy automation solutions, we see a light touch DCIM approach becoming a smarter choice in 2022 and beyond.

For this we envisage cooling, power and space data being collected at a highly granular level – ideally with each individual rack featuring multiple sensor points. Data centre teams will benefit from accessible 3D visualisations that are easy to interpret, while AI algorithms will draw on potentially billions of machine learning data points to provide actionable insights. The key difference for operations teams will be that they are provided with actionable recommendations that they can validate before pursuing.

It's this combination of granular real-time data, a clear understanding of the relationship or zones of influence that are established and maintained between specific cooling assets and the racks they're cooling, and AI-powered recommendations that will put the control back in the hands of data centre teams. Optimisation done this way via a new style of light-touch DCIM will give operations teams the insights they need to make the kind of smart optimisation choices that can actually reduce cooling energy usage across sites.

Our experience suggests that following this kind of approach can help keep data centre teams on track in their journey to achieve average 30% reductions in their cooling energy savings. And in the post-COP26 world of 2022, that could be a real bonus for data centres as they move quickly to identity and secure the carbon savings their organisations need to deliver on their net zero commitments.

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Prediction - Where will be the most popular region for data centre development over the coming year and why?

Comments from Mark Acton and Venessa Moffat, DCA Advisory Board Members

The data centre sector has experienced strong momentum in 2021, which will continue into the coming year.

The main drivers behind this growth are the following:
- Significant additional levels of funding available as a result of investors moving away from more traditional asset classes to data centres, which can show significantly improved returns.
- The next new normal in form of remote work, re-architecting to support greater volumes of digital services.
- Digitisation of existing business processes, and digital transformation of sectors such as construction.
- Growing use of Over-the-Top (OTT) services by traditional telecoms providers, a method of delivering film and television directly via the internet.
- Development of data-generating and data-hungry technologies, sand recognition of the increasing capability and value of data analytics such as available from IoT, Edge, and smart city initiatives.
- The continuous adoption of cloud services and increasing hyperscale infrastructures.

All of these trends are driving change across the globe, and of course 5G will be an enabler for network growth as well. Additionally, huge investment in ambitious new subsea cables are bring opportunities to build and operate large data centres in locations that have previously not had this capability. This is offering digital infrastructure to significant populations which are currently underserved.

The landing points for those cables will provide the connectivity and bandwidth required by larger data centres to support the capacity and edge infrastructure needed to accommodate the increase

in digital services, data processing, storage and data transmission - all with the low latency now expected by populations in all parts of the world.

Other factors in choosing locations for data centres include the following:
- Safety and security
- Political stability.
- Reliability of grid energy.
- Low likelihood of natural disasters such as earthquake, flood hurricane etc...
- Environmental sustainability factors such as renewable energy sources.
- Diverse high bandwidth network connectivity.
- Internet download speed / current telco infrastructure.
- Total cost of ownership (inc. real estate and energy)
- Favourable local taxation and regulation environment
- Proximity to end-users (for Edge).
- Availability of grid energy (Ireland, Netherlands, Singapore).
- Proximity to skilled labour.
- Data sovereignty – control over citizen data.

Taking all the above into account, we think it will be unlikely that the highest growth will be in tier 1 cities, such as London, Amsterdam, Frankfurt and Paris in Europe.   With the addition of more edge infrastructure, we'll be looking at more tier 2 and tier 3 cities for higher growth and investment. The exciting regions to keep an eye on will be various parts of Africa where the subsea cables land. With renewable energy supplies becoming more of a genuine option, we might start to see some innovative designs come along with the levels of investment now available. Lastly the Nordics will continue to be a good option and will experience steady growth over the coming year.