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Editor's View

By Phil Alsop Editor

Heating or tweeting?

IN THE UK AT LEAST, the main slogan used to emphasise the current major cost of living crisis, caused by some mixture of the pandemic, the Russia/Ukraine conflict and, whisper it quietly, just maybe a bit of Brexit, is that 'People are having to choose between heating and eating'.

Recent conversations I've had with folks in the IT industry, and the data centre industry in particular, have suggested that, as autumn and winter come around, there is the very real prospect of selective power cuts in a wide selection of European countries. The suggestion is that, as Russian gas is more or less off the table, and other energy sources, whether of the fossil fuel or renewable variety, are not sufficiently developed to pick up the demand, there could well come a time when governments have to choose who, where and when gets the power they need.

At this point, the choice outlined in my headline could become a reality. Assuming our digital factories, and other critical industries, are given the power that they need to continue functioning, then it could just be that ordinary citizens will be the ones to suffer. The ultimate 'paradox' being that, if the electricity is not on at home, then your ability to connect to the digital world, which is being kept open, is severely compromised. Perhaps then we will all return to our offices, with their guaranteed power supplies?!

Of course, no one knows for sure what might happen over the next few months. However, it

would be nice to think that our respective European governments have given the 'doomsday' scenario some careful thought and maybe even come up with a plan. After all, asking citizens to forgo their private power supplies to allow the IT giants, who it seems we all love to hate, to continue operating, might not be an obvious vote winner.

I don't have any magic solution myself, I'm just making the observation that, as we already know in the IT/data centre space, power is a crucial part of digital infrastructure. Without it, or with a limited supply, some difficult choices will have to be made.

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Angel BUSINESS COMMUNICATIONS

Editor
Philip Alsop +44 (0)7786 084559 philip.alsop@angelbc.com
Sales & Marketing Manager
Shezhad Munshi +44 (0)1923690215 shehzad.munshi@angelbc.com
Sales Executive
Jessica Harrison +44 (0)2476 718970 jessica.harrison@angelbc.com
Director of Logistics
Sharon Cowley +44 (0)1923 690200 sharon.cowley@angelbc.com
Design & Production Manager
Mitch Gaynor +44 (0)1923 690214 mitch.gaynor@angelbc.com
Publisher
Jackie Cannon +44 (0)1923 690215 jackie.cannon@angelbc.com

Circulation & Subscriptions
+44 (0)1923 690214 circ@angelbc.com

Directors
Stephen Whitehurst: Chairman
Scott Adams: Chief Technical Officer
Sukhi Bhadal: Chief Executive Officer

Published by:
Angel Business Communications Ltd, 6 Bow Court, Burnsall Road, Coventry CV5 6SP
T: +44 (0)2476 718970 E: info@angelbc.com

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Majority of CIOs want to replace current technology

Research commissioned by Lenovo reveals CIOs are more involved than ever before in areas outside their traditional technology purview, such as business model transformation, corporate strategy, and sustainability.

A NEW GLOBAL RESEARCH study from Lenovo reveals how the CIO role has evolved, shedding light on growing areas of responsibility and increasing influence in the C-Suite, as well as removing barriers to business growth.

Today, technology is the nervous system that connects corporate strategy, finance, innovation, operations, and talent. CIOs are increasingly tasked with connecting with key stakeholders across the organisation to ensure alignment and drive execution. With IT enmeshed in every facet of a business, CIOs believe that their organisations must continue to invest in digital transformation to remain relevant.

Key findings from Lenovo's global survey of more than 500 CIOs include:

- Nearly all CIOs surveyed believe their roles have evolved and expanded in the past few years, and that they are being asked to make business decisions that go far beyond technology.
- 9-in-10 CIOs say that their role and responsibilities have expanded beyond technology, including non-traditional areas such as data analytics and business reporting (56%), sustainability/ESG (45%), DE&I (42%), HR/talent acquisition (39%), and sales/marketing (32%).
- 82% say the CIO role has become more challenging compared with just two years ago as they are confronting a vast array of unique challenges, from the increasing use of AI and automation to talent acquisition in a global, remote workforce.
- CIOs find it most difficult to solve challenges related to data privacy/security (66%), cybersecurity/ransomware (6 6%), keeping up with technological change (65%), managing fragmented IT vendor ecosystems (61%) and adopting/deploying new technology (60%).
- The majority of CIOs believe their role in the organisation has increased in influence.
- More than 3-in-4 CIOs say they have a greater impact on their company's overall fortunes than other C-Suite positions.
- 88% agree that "my role as CIO is the most critical component of my company or organisation's continued operation."
- As the CIO role expands and evolves, respondents say that their technology vendors play an invaluable role in their company's overall success.
- Business would feel an impact in no more than a few weeks if they halted spending on digital transformation initiatives, according to 61% of respondents. This speaks to technology's role as a critical component of the business, not just a source of cost efficiencies.

Looking ahead, CIOs expect to turn to their vendors to help them solve a myriad problems in the next five years, including increasing their organisational agility (60%) and providing security of their company's systems and operations (52%), as well as to simplify the configuration, deployment and maintenance of technology (50%), and optimize costs (43%).

8-in-10 CIOs agree their tech vendors are "so effectively integrated that it increases [their] overall productivity." Considering their new challenges and evolving responsibilities, CIOs suggest their current tech stack has much room for improvement. Given the chance to reboot from scratch, most CIOs (57%) say they would replace half or more of their company's current technology. Compared to the previous year, 63% of companies are using more Device-as-a-Service in their tech stack. As business models change, nearly all CIOs (92%) would definitely or probably consider adding new aaS offerings over the next two years.

"Modern CIOs are the 'mission control' for their organisations, their role has transformed drastically in just the span of the past 24 months," said Ken Wong, President, Lenovo Solutions and Services Group. "From navigating complex tech ecosystems to keep up with the speed of digital transformation, to upskilling employees and managing a global shortage of IT talent, today's CIO is responsible for the entire technology value chain and beyond. Lenovo's research demonstrates CIOs are up for the challenge. And they are looking to partner with their vendors to bring their organisations along and succeed."

Research firm International Data Corp. estimates that by 2023, 60% of CIOs at companies world-wide will be primarily measured for their ability to cocreate new business models and revenue streams, chiefly through enterprise-wide collaboration.

IT investment is the key to reaping the benefits of hybrid working

THE SHIFT to hybrid and flexible working patterns has revolutionised the way small and medium sized businesses and employees think about productivity, company culture, and how to organise their operations to best support their needs.

RESEARCH FROM GoTo, the flexible-work support and collaboration company, reveals that 70% of employees are unwilling to accept a job without the option to work flexibly, and companies are continuing to step up their investments to remain competitive.

The findings are published in GoTo's latest report, Flex Appeal: The Work-From-Anywhere Future, which looks into the current flexible work environment and how it is impacting small and medium sized business decision-making. They are drawn from a survey of 1,000 key IT decision-makers across the UK, Ireland, USA, Canada, Germany, Italy, India and Australia, conducted by Frost & Sullivan.

The report shows that IT department workloads increased 72% in 2021 versus 2020, with the main reasons being more challenges related to flexible working (49%), more tasks to perform (44%), increased pressure (41%), and software underperforming/ wrong tools (31%).

With many small and medium sized businesses pushing to increase their IT budgets significantly in 2022, now is the time for IT teams to reevaluate the tools they need to keep pace with the new realities of working from anywhere, while balancing an increased and complex workload.

Hybrid work is the way to go, but it is not without complexities:
The survey shows that hybrid and flexible work models can lead to more productivity and positive impacts on company culture. Still, it can also result in complexities for IT, especially when SMBs lack the right tools. 76% of respondents found that the workload of IT workers has increased due to flexible work models, with 43% agreeing that IT jobs have become more difficult. After two years of increased focus on tools to quickly make remote work possible, businesses are now evaluating service duplications within these tools and areas they can consolidate. The study found that 95% of companies plan to consolidate their tools in 2022, with many already under evaluation.

IT teams have more responsibilities and more scrutiny than ever before:
The study also shows that leaders are prioritising their IT needs more than ever to ensure their business operates effectively. Senior leadership involvement in software purchasing has increased 75% since the start of the pandemic.

In 2021 there was a 73% increase in IT budgets and another 73% increase in 2022 to make hybrid systems run smoothly. Leadership must continue to devote time and energy to support IT organisations to ensure their company can successfully run from anywhere.

"Time and time again, we see that businesses struggle to work from anywhere without the right tools to support their people. In particular, small and medium-sized businesses have been lacking a simple and achievable solution for the hybrid and flexible world of work we now live in," said Paddy Srinivasan, Chief Product & Technology Officer at GoTo.

"Our dedication towards bringing enterprise-grade technology, unified communications and support solutions into one affordable application is a direct response to the needs of our

SMB customers. We aim to partner with them to create a truly sustainable, resilient, and future-proof work from anywhere strategy through great technology."

Additional findings
Employees demand hybrid work: Staff turnover is significantly lower in a hybrid model (22%) than in completely remote work models (43%) and work from office models (44%).

Hybrid has a positive impact on company culture: 77% view hybrid/ remote work as having a very positive impact on company culture.

In-office requirements are not needed: The majority (78%) of hybrid companies have guidelines on how many days in the office are required (an average of 2.7 days per week) which nets out to about the same as those without mandatory days in the office (2.5 days per week).

Flexibility is key: 20% of leaders with a remote work policy would prefer to move to a hybrid model. Of the leaders with a work from the office policy, 25% would prefer a hybrid or fully remote model.

Business leaders are re-evaluating IT suppliers because of increased energy prices

Data centre provider ServerChoice has released new research, highlighting the widespread impact of the cost of energy increase and how it is leading businesses to re-evaluate their IT suppliers.

THE RESEARCH, which surveyed over 1,000 UK business leaders found that 77% of businesses are experiencing price increases from their suppliers, with 84% worried about how the rise will impact their bottom line. Despite this concern, over a third (36%) of business leaders have not begun contingency planning to alleviate the pressures of the growing cost of energy.

However, of those who have begun contingency planning, 35% are currently re-evaluating their providers in an effort to help offset the growing cost of energy. Those most likely to be evaluated are utility providers, with 63% stating this, followed by IT suppliers, with 32% stating this.

This market exploration comes at a time when businesses are growing increasingly dependent on data storage, with 75% envisaging a need to increase their capacity over the next five years.

Adam Bradshaw, Commercial Director at ServerChoice, said, "For data centres, where the cost of energy continues to be the largest financial expenditure for the business, providers will have to think laterally about how to offer competitively priced services to help underpin the demand for data storage."

The research also found that the largest deciding factor when determining a new supplier is competitive pricing, with 91% of business leaders stating it would be fundamental in their selection process. 63% stated service offering would also be a highly influential concern and a further 40% of leaders stated flexible contracts were amongst their top priorities.

Adam added, "The coming months look set to be a period of upheaval. Providers that are always seeking new ways to improve energy efficiency will be able to offer the most competitive pricing as the cost of energy increases across the board.

"Our research also found that a strong majority of decision-makers greatly prioritise valuable service offerings. Data centres that offer tailored data storage packages suited to individual businesses' requirements, whether that includes hybrid infrastructure options, assistance when moving provider or even negotiable contract periods, will be best positioned to aid the decision-makers looking for new suppliers."

Enterprises 'guilty' of device wastage

SOTI global research finds enterprises are lured into adopting the latest hardware with up to 69% of IT leaders believing that devices are replaced prematurely.

ENTERPRISES across the world are disposing of electronic devices, including rugged devices such as handhelds, scanners and barcode readers, prematurely despite placing bigger emphasis on reaching sustainability goals, global research from SOTI has discovered.

Nearly 7 in 10 (69%) of IT leaders of international corporations believe devices are being disposed of unnecessarily, with laptops and tablets the most common prematurely disposed of electronics. This is despite 59% of IT leaders having clear targets for reducing e-waste, and 55% working towards corporate social responsibility (CSR) key performance indicators (KPIs) around sustainable device management. Additionally, 54% have dedicated Enterprise Mobility Management (EMM) strategies to maximize their usage of devices, but clearly are failing to reap the full benefits of EMM solutions in extending their mobile device lifespans.

These findings have been detailed in SOTI's inaugural sustainability report, Reduce, Reuse, Rethink: From Discard Mentality to Tech Sustainability. The report also highlights that more than half of IT leaders (52%) believe tablets and laptops are unnecessarily replaced according to their 'expected lifespan', while 44% believe mobile phones and printers are also replaced for the same reason.

Despite having sustainability targets in place, and 60% of IT leaders agreeing that device management is an important environmental issue, 62% believe that having the latest mobile technology hardware at their disposal makes their organization more attractive for workers. These results uncover an acute need of enterprises to identify viable models of operation that would enable them to marry up these seemingly contrasting aspirations.

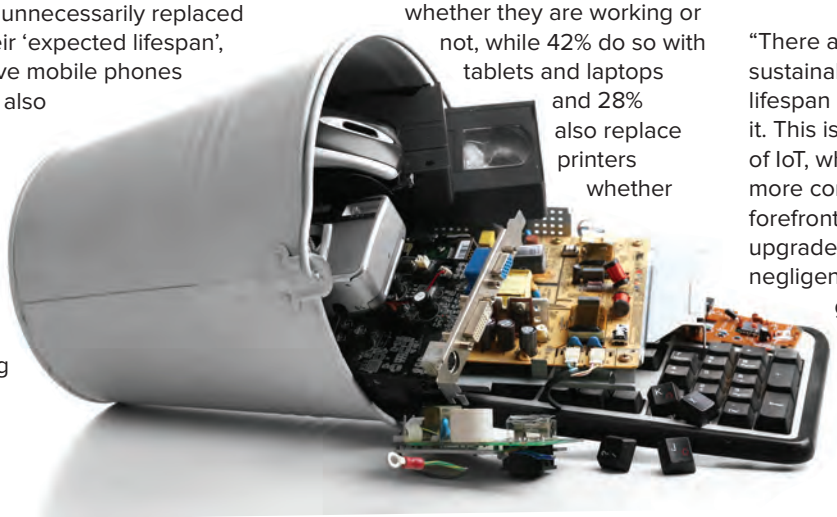
Contributing Factors to E-Waste

Worryingly, there are many factors contributing to the unnecessary disposal of devices.

Of the IT leaders surveyed, 39% agree they replace mobile phones when a newer model comes out, while 45% replace tablets and laptops for the same reason and 25% replace printers. And if requested to do so by users, 38% will replace mobile phones, 44% will replace tablets and laptops and 27% will replace printers too.

Further exasperating the negative sustainable impact of e-waste, 32% of IT leaders globally replace mobile phones when the warranty expires, 36% replace laptops and tablets and 29% dispose of printers for the same reason.

In addition, 39% of IT leaders say their organization replaces mobile phones whether they are working or not, while 42% do so with tablets and laptops and 28% also replace printers whether they are functional or otherwise, too.



The Financial Implications

Not only are sustainability targets being impacted, but enterprises are also wasting money by disposing of electronic devices prematurely.

While the financial resources for the replacement of devices are considerable, very little of companies' budgets are dedicated to extending the lifespan of devices.

For example, organizations commonly tend to relate the end of a battery's life to the life of the device itself, when in many cases with rugged devices such as handhelds, scanners and barcode readers, batteries are changeable, and the hardware can live on. Almost half (44%) of devices used by enterprises have replaceable batteries, yet only 33% of IT leaders' annual budget is earmarked for battery replacement.

Stefan Spendrup, VP of Sales in Northern and Western Europe at SOTI, said: "Devices aren't thrown away accidentally. There is always a decision made, and it shouldn't be as simple as seeing a newer version on the market, seeing the battery die or just 'expecting' it to need replacing soon."

"There are more cost-effective, sustainable ways to monitor a device's lifespan and to subsequently elongate it. This is even more critical in an era of IoT, where organizations feel even more compelled to stay at the very forefront of new hardware launches or upgrades. Carrying on the attitude of negligent device replacement is only going to continue to impact the world's sustainability efforts and potential. Diagnosis and repair is a far more effective way to ensure proper device management."

Research and digital transformation trade-offs

Organisations addressing complexity with AI and SRE solutions, balancing modernisation with security, and repatriating applications.

F5 has published its 2022 State of Application Strategy Report. Now in its eighth iteration, this year's report shows the challenges organisations face as they transform IT infrastructures to deliver and secure digital services that have become inseparable from everyday activities, such as completing job tasks or consulting a doctor.

With highly distributed architectures and a broader threat landscape resulting from an ongoing digitisation of previously physical experiences, organisations are turning to a variety of solutions to help manage complexity and address widening IT skills gaps.

However, survey results also indicate pitfalls ahead that, if ignored, will prevent organisations from becoming more responsive and agile.

"Digital transformation efforts have experienced a marked acceleration over the past two years, and we see no indications of a slowdown," said Kara Sprague, EVP and GM, App Delivery, F5. "Our research shows that the average organisation manages hundreds of applications across data centres, multiple clouds, and edge deployments – as well as more than 20 different app security and delivery technologies. With these growing and more distributed portfolios, organisations require consistent security, end-to-end visibility, and greater automation in their app deployments to tame debilitating complexity and continuously add value for customers, streamline operations, seize new opportunities, and respond to emerging threats in real time.

Respondents ranked visibility across different environments as the top challenge for those deploying applications in multiple clouds, followed closely by consistent security. To help, 90% of organisations across all industries are planning to implement AI to better serve customers and surface valuable insights. Yet, effective AI requires better data transparency, integration, and governance than is currently available.

Similarly, the survey identifies site reliability engineering (SRE) as a key piece of the puzzle, with 77% pursuing SRE approaches for their applications and systems, but enterprise architecture must evolve in parallel to support distributed, application-centric models and further advance organisations' digital transformation efforts.
Other key findings include:

- **Modernisation is spreading to back-office processes**
  More than two-thirds of organisations realise that creating superior digital interactions for customers also requires modernising less visible business processes and back-office functions.
- **IT and OT are converging**
  In a related finding, respondents rate the convergence of IT and operational technology (OT) systems as the most exciting development in the next few years. Integrating OT systems that manage industrial and enterprise operations with data-centric IT systems will help close the automation loop and make digital businesses more adaptive so they can better anticipate and respond to shifting customer interests and market conditions.
- **Nearly everyone lacks critical insights**
  An overwhelming number of organisations (95%) have plans to mine operational data for insights they hope to use to improve the customer experience and drive business growth. However, 98% of respondents indicate that they are currently unable to extract needed insights from their existing systems. Even with an expanded use of AI, many organisations still lack the personnel and capabilities to successfully identify relevant data and capitalise on it.
- **Complexity is becoming untenable**
  With 93% of respondents using cloud-based as-a-Service offerings and 84% planning to move workloads to the edge, associated challenges range from overlapping security policies and fragmented data to the deployment of point solutions that ultimately add complexity, increase fragility, or inhibit performance.
- **Security is evolving to risk management**
  Even as complexity has increased the number of potential failure points, performance remains paramount, with more than three-quarters (76%) of respondents admitting that – given a choice – they'd turn off security measures to improve performance. Managing a spectrum of risks with real-world objectives demonstrates businesses are taking a modified approach to risk management, contributing to identity-based security surpassing traditional app security and delivery technologies in terms of prevalence.
- **Repatriation is on the rise**

today's organisations manage everything from a growing collection of container-native and mobile applications to legacy monoliths that are fundamental to business operations. Significantly, over two-thirds of organisations (67%) are currently repatriating applications – that is, moving them back to a data centre environment from the cloud – or planning to in the next 12 months. This is up from only 27% the prior year.

CX investment pays dividends

Twilio has released its third annual State of Customer Engagement Report, which reflects findings from a survey of 3,450 business leaders and 4,500 consumers across 12 countries.

THE RESEARCH demonstrates that the vast majority of UK businesses (72%) increased investment in digital customer engagement in 2021, and many are reaping the rewards. In fact, those that did invest in customer engagement technology increased revenues by 58%.

The rewards for businesses don't stop at direct financial benefits. Many businesses reported that these technologies also positively impact customer retention and trust: two in five UK businesses (40%) said that investing would increase loyalty, while 42% said it would increase trust.

UK businesses lack digital talent to execute on critically important CX improvements

According to the research, 39% of global businesses cited "lack of in-house talent" as a roadblock to digital customer engagement strategy. In the UK, nearly half of respondents (47%) said that they lack the in-house talent to run digital customer engagement programmes, which is a barrier to resilience in the long run. This is significantly higher than in the US, where one third (33%) said they had a talent gap.

The pandemic has proven that effective digitisation is fundamental for long-term business resilience. Digitisation was not only paramount to empower businesses to continue serving customers when in-person interaction was not possible; it also offered customers greater flexibility in the longer term, which has shaped consumer behaviour and preferences for good. Yet the tech talent shortage has impacted organisations' ability to digitise rapidly and effectively, and this is true in the area of customer communications and engagement as much as any other.

It's crucial that this issue is addressed now, as customer engagement is going to continue to move over to a more digital playing field. By 2025, businesses expect that digital customer engagement will increase 47% from pre-pandemic levels globally.

Customer engagement impacts business bottom line

Yet at the same time, strong customer engagement has never been more important. In fact, consumer opinions demonstrate that a failure to engage effectively with your customers could significantly affect the bottom line. Nearly nine in ten UK consumers (89%) said that they would stop doing business with a company after a frustrating customer experience. One fifth (21%) said they'd cut ties if they could not connect to someone from customer support, and 16% if they knew they could get better customer experience from a different company.

Concurrently, organisations who have successfully invested in their customer engagement strategy have reaped the benefits. UK businesses who did so saw revenue increased by 58%, but other markets saw even greater returns: France saw a 70% rise, the US 79%, Colombia 95%, Brazil 95%, and Mexico 91%.

"This research demonstrates what we have known for a long time: that good customer engagement matters," said Paul Adams, vice president, EMEA at Twilio. "While insufficient in-house talent can be an issue for implementation of customer experience strategies, the research shows that overcoming it has a truly positive impact on a business' bottom line.

"The lack of tech talent in the UK is well documented, but there are ways in which companies can mitigate this, for example using partner networks or easy-to-implement APIs that can help stretched tech teams build solutions more quickly. Overcoming the tech skills gap is a long term play, but one that should undoubtedly be prioritised at all levels to ensure long-term digitally-driven company resilience and business success."

Other key findings from the report include:

- Globally, utilities, professional services and retail industries saw the greatest digital acceleration as a result of the pandemic. Utilities and energy companies reported that it sped up their organisations' digital transformation strategies by 7.9 years, 7.6 years for professional and technical services and 7 years for retail and ecommerce businesses.
- Split globally by industry, construction companies reported saw the greatest ROI from digital customer engagement strategies with an 88% revenue boost, while telecoms saw an 83% lift and tech 82%.

Research shows 90% of workers support hybrid work

A majority describe digital collaboration as useful — but relatively few describe it as engaging, impactful or crucial

THE GLOBAL PANDEMIC has forced a permanent change in the nature of work, which has made collaborating with digital technologies ubiquitous for workers, whether in-person, remote or hybrid. However, many companies still experience challenges with their digital collaboration tools, and they need to put a priority on making collaboration smoother, more useful, more interactive and less confusing to enable higher levels of productivity and efficiency.

According to a global report sponsored by Lucid Software, a leading provider of visual collaboration software, more than half of respondents describe digital collaboration as useful, but rarely "engaging," "impactful" or "crucial," which indicates that the technology used now is far from helping teams reach their full potential. The report highlights the challenges for managing today's distributed workforce and offers insights into how organizations can adapt and address the needs of differing collaboration styles.

"The global pandemic has caused two years of uncertainty on how the return to office will shape up, including how the mix of remote, in-person and hybrid workers will impact the workplace. This ongoing uncertainty is forcing organizations to carefully consider how well digital collaboration is working for their employees," said Nathan Rawlins, CMO of Lucid Software. "Amidst the uncertainty, workers have adapted. Our data shows that while there is positive momentum around digital collaboration, there are also challenges and different collaboration styles among the respondents. As the workplace continues to evolve, companies will benefit greatly from addressing the needs of these workstyles."

Digital Collaboration Momentum

The report reveals that workers have become more comfortable with virtual meetings, with 90% expecting it to be the norm for the foreseeable future. Furthermore, 87% have become comfortable with digital collaboration since the pandemic started. Respondents also recognize the essential role digital collaboration now plays in teamwork and team culture: 80% say that collaborating virtually with their team is imperative to effectively do their job, and 79% say that their company uses virtual meetings to collaborate cross-functionally.

The ubiquity of collaboration tools for the hybrid workplace has also increased communication and participation from workers who might otherwise not contribute. Among respondents, 67% report that in virtual meetings they see people sharing ideas who wouldn't normally speak up, and 78% say that the chat function improves their ability to participate.

Challenges and Emerging Collaboration Styles

While workers are adapting to this hyper-digital workplace, there are still shortcomings to the current state of collaboration:

- 65% cite at least one problem with current digital collaboration technologies and want them to be more user-friendly.
- 72% admit to multitasking while in a virtual meeting.
- 45% say the lack of a clear direction or agenda is a challenge.
- 47% wish for better ways to keep track of key points and action items during meetings.

The research also discovered that about half of workers have preferred collaboration styles — and that businesses need better processes and solutions to empower a diverse range of styles.

Expressive: These workers yearn for more engaging, visual ways of collaboration, such as interactive charts, drawings and graphics. For example, they are more likely than their peers to say that the use of reactions, GIFs and emojis help them express themselves while collaborating with their team virtually (69% vs. 58%).
Introspective: These workers tend to be more naturally introverted and gravitate toward a more thoughtful, deliberate approach to collaboration. For example, they are more likely to say virtual meetings are mostly people talking and sharing vs. getting things done (65% vs. 59%).
Relational: These workers thrive through meaningful, human connections with co-workers and prefer technology that enables direct, human-to-human teamwork. For example, they are more likely to say collaborating during virtual meetings drains their energy because they are not as engaged (56% vs. 44%).

Although features such as GIFs, emojis and chat can boost self-expression, they are still limited — 56% of those surveyed say that virtual meetings are dominated by the loudest, most active voices. Nearly as many (53%) think meetings often fail to capture everyone's perspective due to too many people being involved. These workers will require help reaching their full potential in what will be the Next Normal — a transformation of the workplace to a more fluid, hybrid environment, where digital solutions are the catalyst to creativity and collaboration.

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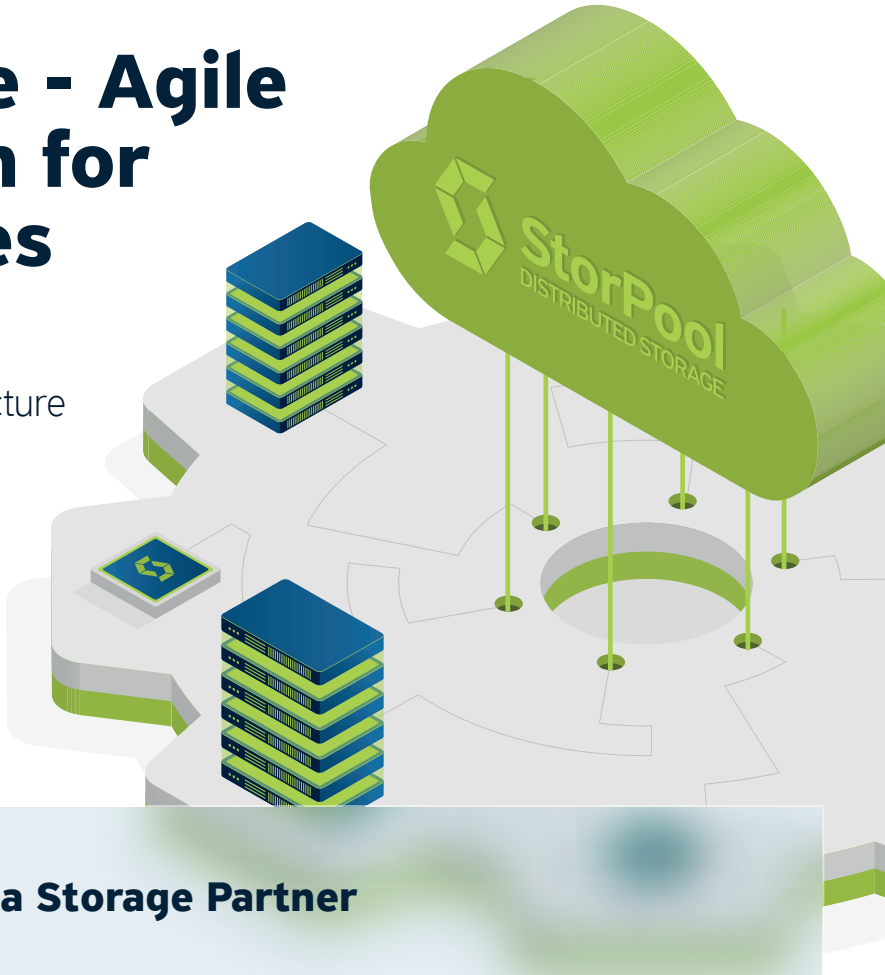

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Cloud enables AI to raise CX to new heights

Frost & Sullivan's 2022 IT Decision-Maker Survey reveals that among the most crucial corporate goals, the top 3 focus on customers. With rising costs sweeping the world, it is surprising to see cost-related goals fall in prominence.

FROST & SULLIVAN'S 2022 IT Decision-Maker Survey reveals that among the most crucial corporate goals, the top 3 focus on customers. With rising costs sweeping the world, it is surprising to see cost-related goals fall in prominence. Enriching customer experience (CX), improving brand equity, and promoting digital commerce are cited as the top 3 objectives for 2022, moving the contact center, often seen as a cost center, to the front and center of business growth. Another big surprise is the rise of attracting and retaining talent from the bottom corporate goal to number 4. In an industry where agent turnover has long been an issue, companies now have an opportunity to turn the tide by adopting the latest contact center technologies that support and empower agents.

The contact center is now a multifaceted hub of CX management that fulfills a broad range of business functions, including customer service, technical support, marketing, and sales. In addition, most companies offer myriad channels to support customers anywhere, anytime. This support includes voice, live chat, email, social media messaging, and self-service tools. According to Frost & Sullivan's Nancy Jamison, industry director, "To be a winner in this increasingly complex industry means being able to provide an extensive array of integrated solutions on a modern platform that takes advantage of the cloud and AI technologies."

Let's explore why customers and employees are top of mind in 2022, and how IT decision-makers plan to achieve these goals this year.

Reaping the benefits of innovation without capital investments

Figure 1 shows that as companies recover from the COVID-19 pandemic, the top challenges that IT professionals face in 2022 include supporting remote employees, providing stable and reliable networks, and dealing with security concerns. The latest evolution of cloud technology allows companies to move contact centers to the cloud more agilely to tackle the issues listed above and, at the same time, provide flexibility and scalability in uncertain times, including access to innovative features that the latest AI technologies deliver.

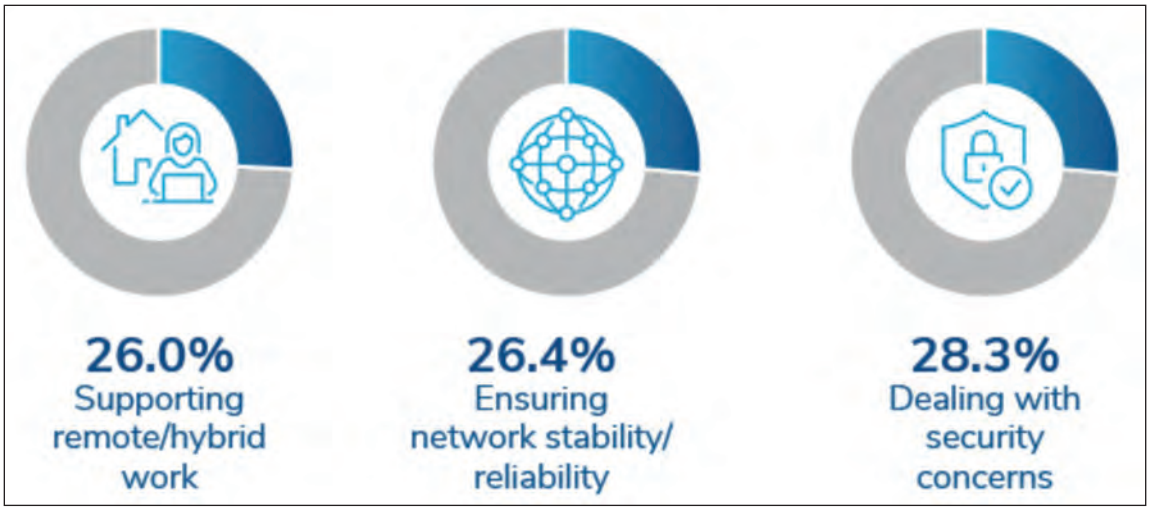


Figure 1

AI technologies have had a significant impact on the breadth and richness of contact center portfolios, deepening analytics capabilities, broadening self-service options, enabling process automation, and bringing intelligence to performance and workforce management. These robust portfolios help companies reach their CX objectives, notwithstanding the growing volume of demands from customers.

AI – Beyond the World of Chatbots

AI technology is driving investments in self-service tools, with 78% of the companies surveyed expecting to support this channel by the end of 2022 (see figure 2).

Although many companies are focused on implementing chatbots simply to deflect calls, AI offers a far more effective way to elevate self-service tools by continually learning, training, and building on the insights needed to automate even more tasks. These insights, driven by rich data, make self-service a powerful channel. Smarter self-service channels address today's customers' needs and allow agents to focus on complex tasks and deliver a better CX. AI can also support agents and reverse the age-old challenge of attrition. Year after year, attaining and retaining talent have been at the bottom of business goals. Our 2022 survey reveals that disruptions speed-up technology adoption, and with a dire shortage of talent over the past year, companies finally recognize they need to make employee satisfaction a top priority.

More than 40% of the companies surveyed plan to invest in solutions that allow employees to make their own or better decisions, provide scheduling preference capabilities, and improve employee training and development. AI infused into workforce management and training tools can deliver on these intentions to assist agents in improving their performance, which simultaneously makes their jobs easier and more rewarding. AI-assist technologies represent a game-changer for agent and customer retention by collecting valuable, actionable information from the self-service journey.

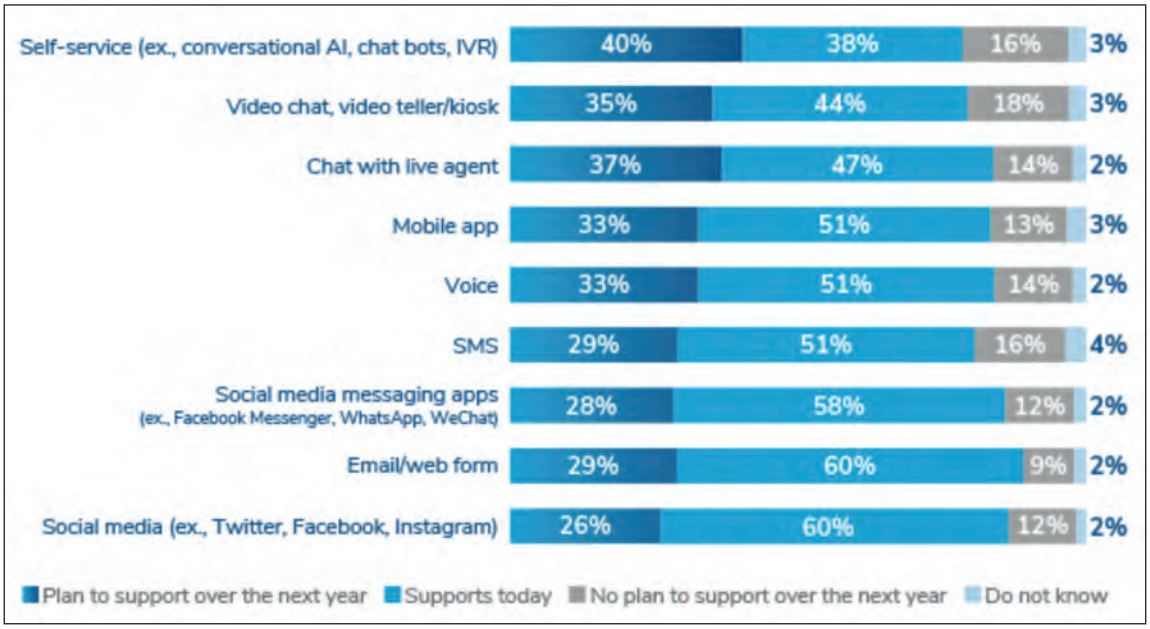


Figure 2

Strong growth for cloud infrastructure spending

According to the International Data Corporation (IDC) Worldwide Quarterly Enterprise Infrastructure Tracker: Buyer and Cloud Deployment, spending on compute and storage infrastructure products for cloud infrastructure, including dedicated and shared environments, increased 13.5% year over year in the fourth quarter of 2021 (4Q21) to $21.1 billion.

THIS MARKED the second consecutive quarter of year-over-year growth as supply chain constraints have depleted vendor inventories over the past several quarters. As backlogs continue to grow, pent-up demand bodes well for future growth as long as the economy stays healthy, and supply catches up to demand.

For the full year 2021, cloud infrastructure spending totaled $73.9 billion, up 8.8% over 2020.

Investments in non-cloud infrastructure increased 1.5% year over year in 4Q21 to $17.2 billion, marking the fourth consecutive quarter of growth. For the full year, non-cloud infrastructure spending increased 4.2% over 2020, reaching a total of $59.6 billion. Spending on shared cloud infrastructure reached $14.4 billion in the fourth quarter, increasing 13.9% compared to a year ago, and grew to $51.4 billion for 2021, an increase of 7.5%. IDC expects to see continuously strong demand for shared cloud infrastructure with spending expected to surpass non-cloud infrastructure spending in 2022. Spending on dedicated cloud infrastructure increased 12.5% year over year in 4Q21 to $6.7 billion and grew 11.8% to $22.5 billion for the full year 2021. Of the total dedicated cloud infrastructure, 47.5% in 4Q21 and 46.1% in 2021 were deployed on customer premises.

For the 2022, IDC is forecasting cloud infrastructure spending to grow 21.7% compared to 2021 to $90.0 billion, while non-cloud infrastructure is expected to decline slightly, down 0.3% to $59.4 billion. Shared cloud infrastructure spending is expected to grow 25.5% year over year to $64.5 billion for the full year. Spending on dedicated cloud infrastructure is expected to grow 13.1% to $25.4 billion in 2022.

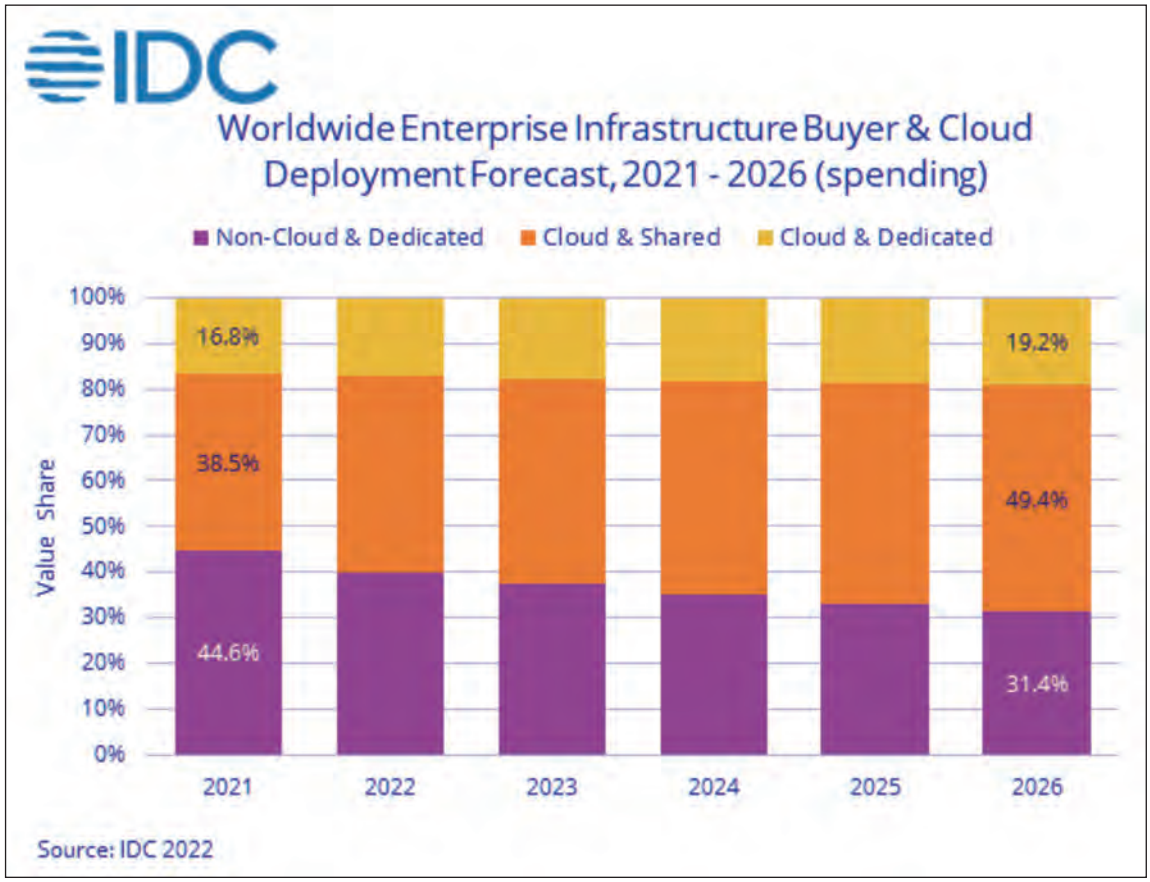
As part of the Tracker, IDC tracks various categories of service providers and how much compute and storage infrastructure these service providers purchase, including both cloud and non-cloud infrastructure. The service provider category includes cloud service providers, digital service providers, communications service providers, and managed service providers. In 4Q21, service providers as a group spent $21.2 billion on compute and storage infrastructure, up 11.6% from 4Q20.

This spending accounted for 55.4% of total compute and storage infrastructure spending. For 2021, spending by service providers reached $75.1 billion on 8.5% year over year growth, accounting for 56.2% of total compute and storage infrastructure spending. IDC expects compute and storage spending by service providers to reach $89.1 billion in 2022, growing at 18.7% year over year.

At the regional level, year-over-year spending on cloud infrastructure in 4Q21 increased in most regions. Asia/Pacific (excluding Japan and China) (APeJC) grew the most at 59.5% year over year. Canada, Central and Eastern Europe, Japan, Middle East and Africa, and China (PRC) all saw double-digit growth in spending. The United States grew 5.6%. Western Europe and Latin America declined for the quarter. For 2021, APeJC grew the most at 43.7% year over year. Canada, Central and Eastern Europe, Middle East and Africa, and China all saw double-digit growth in spending. Japan grew in the high single digits, while Western Europe grew in the low single digits. The United States grew 1.5%.

Latin America declined for the year. For 2022, cloud infrastructure spending for most regions is expected to grow with the highest growth expected in the United States at 27.8%. Central and Eastern Europe is the only region expected to decline in 2022 with spending forecast to be down 21.7% year over year. Long term, IDC expects spending on compute and storage cloud infrastructure to have a compound annual growth rate (CAGR) of 12.6% over the 2021-2026 forecast period, reaching $133.7 billion in 2026 and accounting for 68.6% of total compute and storage infrastructure spend. Shared cloud infrastructure will account for 72.0% of the total cloud amount, growing at a 13.4% CAGR.

Spending on dedicated cloud infrastructure will grow at a CAGR of 10.7%. Spending on non-cloud infrastructure will flatten out at a CAGR of 0.5%, reaching $61.2 billion in 2026. Spending by service providers on compute and storage infrastructure is expected to grow at a 11.7% CAGR, reaching $130.6 billion in 2026.



The importance of data in the Metaverse

Ever since the unveiling of the metaverse by Facebook, now Meta, the industry has been in a buzzword frenzy. This new virtual era is raising a lot of questions, like, for instance, whether to alter existing business plans and customer models as well as how businesses are handling this new, potentially profitable avenue. Businesses also want to know how they can leverage the metaverse to thrive in times of uncertainty. At this stage of this game-changing reality, there are more questions than answers.

BY OR LENCHNER, CEO, BRIGHT DATA, PUBLIC WEB DATA – A WORLD OF BENEFITS

BEFORE WE INVESTIGATE the viability of virtual environments, we need to understand the impact of the internet on businesses, and how this has changed in the information age. Even though the transformational aspect of the internet has been steadily growing throughout the years, it's the public data generated across the World Wide Web that has changed how organisations of all sizes, including large businesses and small startups, plan and execute their decision-making. This publicly available data can make the difference between winning a market share and losing to a competitor.

It can also make the difference between developing a revolutionary product that addresses specific consumer sentiments, raised in real time, and losing those consumers' attention. Moreover, public web data is also what enables the pricing of a product or service in such a way that it attracts more customers than your competitors.

These benefits are the reasons behind the increased need for public web data. This is also supported by the fact that information on the internet is growing every single day, placing us right in the midst of a data explosion. In fact, it is forecasted that the amount of data generated will grow from 64 zettabytes in 2020 to more than 180 zettabytes by 2025. And who's using this amount of data? Public businesses in sectors such as e-commerce, finance, travel, and more are utilising the near-live actionable insights that this data provides on a constant basis.

However, with the internet age transforming into a world where virtual environments are set to dominate, many are wondering how the use and importance of data will transfer to the metaverse. The question now is whether this shift requires decision-makers' immediate attention or is it something to plan for in the distant future.

A closer look at the metaverse – and the expected role of data

Let's get back to basics and identify what the metaverse is. The platform itself is a representation of an immersive 3D virtual world where users can interact with different spaces. Just like the real world, being inside the metaverse allows its users to move around different virtual spaces, using their respective digital avatar layer or "skin" and probably generating a lot of data, much of it in the public domain. For example, instead of having your regular work call through your phone or a web conferencing software, you can use your digital avatar to take a walk with your boss while chatting.

Now, the bigger question for many businesses and technology industry vendors alike is how to tap into the metaverse to improve their business operations, quality of service, and growth. Some of the brightest tech minds and multinational corporations are already attempting to figure this out.

However, it may be that the answer is staring us straight in the face: data. New research carried out by Vanson Bourne on behalf of Bright Data

highlighted the continued importance of data in virtual environments such as the metaverse. The recent survey generated insights from 400 IT and technology industry leaders across the US and UK and showed that more than half of respondents (54%) believe that data will be vital in sustaining the metaverse. The research went further to indicate that the metaverse will sit at the heart of businesses, with seven out of ten (70%) C-suite executives surveyed planning to integrate metaverse strategies into their business operations, highlighting a high degree of adoption. It's becoming evidently clear that collecting data inside the metaverse is a priority for businesses and will be key to those wanting to improve their business decision-making accuracy.

Taking retail and e-commerce to a whole new level

Make no mistake, most data across this 3D desert will be generated by virtual reality (VR) and augmented reality (AR) technologies, which means that there will be vast quantities of it. In addition, all of this data will be unstructured, making it even more complex to decide which type needs to be collected. While it's too early to put an exact framework around it, we do know that methods of public data collection, or intelligent-gathering tools, will need to be incorporated to truly make sense of it all.

One sector that can immediately tap into this is retail. As mentioned previously, data has driven the e-commerce space in recent years. The metaverse is expected to take sectors such as these to a whole new level, changing the way they have always operated. This will also vastly change how consumers use brands and will fundamentally disrupt where, how, and more importantly, what they buy.

Now, the retail and e-commerce sectors are no strangers to rapid change and using digital tools to improve the overall purchasing experience. It was during the Covid-19 pandemic that these sectors had to rethink their operations and processes, highlighting how they can adapt to meet users' increased needs.

Research around the Black Friday shopping season in 2021 found that those consumers who only previously shopped in person (14%) said that they would do more online shopping that year around the holiday season. This showed a clear demand for online shopping following a strong 2020 in which the majority of consumers moved online for their holiday shopping. This included those aged 65 and over, with 39% completing the majority of purchases online, as opposed to only 15% in 2019. Although digital natives are likely to be the first to embrace sectors such as this in the metaverse, it is clear that as with online shopping, users will migrate towards it over time.

Looking forward

Although the metaverse and its associated benefits mean that this is an exciting time for businesses across a variety of sectors, there are also practicalities that they must overcome. For one, they must acknowledge that there is a need for the right innovative DaaS (Data as a Service) tools and skilled personnel to collect and make sense of the data at hand. We spoke about the possible masses of public data waiting to be accessed by organisations, but the one thing that will become evident over the years is the speed and efficiency at which this data will need to be processed. To gain instantaneous, near-live data, businesses will require the right public web data collection tools. They will also need to employ and upskill the latest data software and engineering talent to ensure they are getting what they need.

Moreover, with Web 3.0 and the metaverse, we're now at a point where both the data industry as well as relevant governmental industry bodies can openly acknowledge past mistakes in dealing with the implementation of privacy and ethics. It's up to companies such as ours to study the new future reality very carefully and begin to design smart solutions with those principles at the core. New regulations, protocols, processes,

Adapting to new tools, new data regulations, and requirements won't be easy, but they will play a crucial role in determining the success of the metaverse

and procedures will have to be introduced and explained to all organisations, including businesses and customers.

Measures will have to be taken to ensure the compliance factor of the overall data ecosystem, much of how we're treating data across the internet currently. Otherwise, we risk harming this newly formed digital environment for good. This is backed up by the same Vanson Bourne research which shows:

- 89% of businesses understand that before the introduction of the metaverse, therein lies a need to upskill and hire new staff and data-skilled employees to prepare for the reality.
- 60% of respondents identified data and security as a significant barrier standing in the way of their integration with the metaverse.
- 47% of the sample noted that there is no set of ethics or safeguards yet in place to be able to predict if it will be able to meet compliance standards.

We're now at the precipice of an industry, something truly revolutionary, that is poised to alter our entire way of living. From businesses changing entire models to consumers possessing digital assets, virtual environments are here to stay. Even though the road from concept to reality is a complex and long one, it's important to start acknowledging now the challenges of bringing the metaverse to life, especially when it comes to data.

All these metaverses will be composed of multiple layers of data, with multiple dimensions, sizes, and types that need to be addressed and possibly accessed by a variety of organisations, businesses, and companies and for the benefit of its users. Adapting to new tools, new data regulations, and requirements won't be easy, but they will play a crucial role in determining the success of the metaverse. A calculated, early-on approach is required. This is the future, and we're making strides in ensuring that we're pioneering the way forward for data platforms inside the metaverse.

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5G: What next?

In the realm of popular opinion, 5G had a rough start to life. As with many new technologies, claims of future potential were met with initial scepticism and ill-informed fear-mongering. But the potential of the technology is now coming to light as it turns into real-world applications, and wariness is waning as major brands champion its power.

BY PATRICK HIRSCHER,, ZYXEL'S EMEA LTE/5G MARKET DEVELOPMENT MANAGER

IN SHORT, 5G is no longer just a future technology, it's a technology for now. But what comes next in the technology's life cycle, and how can businesses and networks alike help push the transition from 4G to 5G to access its full transformative potential?

The 5G upgrade

The possibilities are vast; in business, industry, and everyday society, 5G has the potential to be a truly game-changing technology. In the mobile era, 4G has been king, but we are now talking about a near-exponential upgrade in performance: 5G network speeds are roughly 100 times faster, and the number of devices supported per square kilometre jumps from 4,000 to around one million.

Clearly, from a general consumer's point of view, 5G can bring considerable benefits to our modern data-hungry lifestyles, alleviating the pressure on household bandwidths and facilitating our ever-increasing network consumption. However, the real benefits of 5G can be found in business and industry and are only just starting to be realised. With increased adoption will come ever increasing benefits across the economy.

The adoption cycle

As with any new technology, initial benefits can be relatively modest and rely on a more widespread and connected approach before the theoretical possibilities championed by manufacturers begin to take shape. As we reach that inflection point with 5G, we are beginning to see these theoretical benefits become actualised, which in turn is prompting further uptake and greater innovation.

The automotive industry will benefit greatly from widespread 5G adoption, well before we reach a world where autonomous vehicles are commonplace. The modern vehicle is already a connected device, with location services, maintenance tracking and performance management among other services built in

The good news is that there are clear signs of 5G adoption picking up pace across Europe. In the UK, for example, the government has announced a £28.3 million investment into "innovative new uses of 5G", with supply chain logistics, tourism and TV production among the sectors being targeted. The plan will also see a major focus on the automotive industry, with driverless taxis and smart parking management implemented as part of a trial at the MK Stadium in Milton Keynes.

Driven forwards by 5G

The automotive industry will benefit greatly from widespread 5G adoption, well before we reach a world where autonomous vehicles are commonplace. The modern vehicle is already a connected device, with location services, maintenance tracking and performance management among other services built in and linked up. As 4G is upgraded to 5G, the vehicles on the road become more reliable, smarter and better connected.

Real-time tracking devices - the driving equivalent of a little black box - can detect if a vehicle has had an accident, report it, and alert the driver of repair needs or communicate any defects directly to the manufacturer. In fleet management, this ability to track and monitor thousands of vehicles accurately in real-time is crucial.

Industry 4.0

5G has also started delivering huge benefits for industry, with its faster speeds, lower latency and greater bandwidth projected to generate an extra £5.2 billion for the manufacturing sector alone. The automated factory line requires precision timing and seamless connectivity, with even a small lag in connection causing a huge potential problem. However, with 5G's implementation, the inflexible, analogue production line can become a thing of the past.

As well as the smart factory automation that will improve production lines, 5G is allowing manufacturers to connect their indoor networks with their warehouses and outdoor spaces. This provides an invaluable link between production, fulfilment and delivery logistics and enables complete synchronisation of operations.

In addition, factories typically struggle with the differing and competing needs of their office and factory networks, with each using their own wired and wireless WLANs. 5G's network slicing solves these issues, creating a holistic network that is safer, more productive, efficient and sustainable, while requiring less maintenance downtime.

The importance of integration

As with other networking products, there is a huge range of solutions available for various needs, from outdoor entertainment venues or vast factory complexes, to individual office buildings or even single devices. Furthermore, these 5G products can now even be located, set up and managed centrally through cloud-based monitoring platforms, which add even more layers of security and improve ease of integration, which is especially important for business and industry use cases.

The boom in remote work has caused a rapid proliferation of business networking needs; now the office is everywhere, and workers need business-level connectivity wherever they are. 5G solutions managed centrally in the cloud allow decision-makers and IT teams to provide cutting-edge network connectivity across vast sites, such as factory complexes, and across geographically distributed devices, whether catering to work-at-home employees or a fleet of connected trucks. 5G technology might be already here, but the benefits it can create are only just beginning to appear.

Edge infrastructure models – solving the architectural challenges of 5G and Edge Computing

It's no secret that edge computing and 5G are intrinsically linked. 5G networks can be up to 500% faster than 4G and support a 100x increase in traffic capacity, but edge computing is central to realising this promise, providing compute and storage power that eliminates backhaul latency issues inherent to a reliance on a central data centre.

BY JON ABBOT, EMEA TELECOM STRATEGIC CLIENTS DIRECTOR FOR VERTIV

HOWEVER, despite this clear need, there are significant challenges to deploying these sites quickly and economically. Operators need hundreds – in some cases thousands – of new edge sites to fully realise the potential of their 5G networks, but the differing geography, climate, compute load, power demands, and myriad of local and regional regulations and guidelines present specific architectural and engineering challenges for each site.

A new set of infrastructure models To help solve these pressing issues, Vertiv has introduced a new set of edge infrastructure models designed to streamline and standardise the design and deployment of various edge sites including those supporting 5G networks.

Using in-depth insight from industry practitioners across industry sectors, including telecom operators, Vertiv has defined four distinct models:

1. Device Edge
In this model, compute is at the end-device. It is either built into the device itself (for example a smart video camera with artificial intelligence capabilities) or is an "add-on edge", stand-alone form factor that directly attaches to the device. When the compute is built in, the IT hardware is fully enclosed within the device, so it does not need to be designed to endure harsh environments. When the compute is attached to the outside of a camera it must be ruggedised, but if it is built into the camera, ruggedisation is not necessary.

2. Micro Edge
A small, standalone solution that ranges in size from one or two servers up to four racks. It is often deployed at an enterprise's own site but can also be situated at a telco site if required. The Micro Edge can be deployed in both conditioned and unconditioned environments. In conditioned environments such as IT closet, the Micro Edge doesn't need advanced cooling and filtration as external factors like temperature and air quality are stable. In contrast, in unconditioned environments such as a factory shop floor, the Micro Edge requires specialised cooling and filtration to account for the harsher external factors.

3. Distributed Edge Data Centre
Perhaps the most commonly referenced approach to edge infrastructure, this model refers to a small, sub-20 rack data centre that is situated at the enterprise's site, telco network facilities or a regional site – for example in modern factories or large commercial properties.

4. Regional Edge Data Centre
A data centre facility located outside of core data centre hubs. As this is typically a facility that is purpose-built to host compute infrastructure, it shares many features of hyperscale data centres; conditioned and controlled, high security and high reliability.

Putting the models into practice

So, there is plenty to consider. But when it comes to identifying the appropriate edge infrastructure model, any decision will ultimately depend on the use case being deployed.

For example, the lower the required latency, the closer the edge infrastructure must be to the end device. It's for this reason that what we call "Life Critical" use cases (those that directly impact human health and safety and which demand speed and reliability) often need to be hosted at the Device Edge.

Data Intensive use cases like high-definition content delivery require the edge to be close to the source of data to prevent high bandwidth costs - on-premise deployments are desirable. In this case, a Micro Edge provides a good balance of short data transmission distance (thus limiting bandwidth costs) and greater compute capabilities than a Device Edge.

The latency requirements of Machine-to-Machine Latency Sensitive applications, which include smart grid technologies, are met by the Device Edge. However, there will be a move to the Micro Edge as enterprise edge adoption becomes more widespread, particularly for machine-to-machine devices that are too small or low cost to justify a Device Edge.

Making the right choices

Physical infrastructure is key in any edge computing strategy. The power, cooling and enclosure equipment, as well as the compute it supports, provides the foundation on which applications can run and enables countless edge use cases.

Making the right physical infrastructure choice is even more important at the edge given that many deployments are in locations where additional support and protection is required.

Navigating edge infrastructure is also made more challenging with the broad and varied definitions of edge. Fortunately, there is an ecosystem of suppliers, system integrators and other channel partners with experience and expertise in edge deployments to provide support, so the future for 5G and edge infrastructure looks bright.

Enabling successful 5G rollouts through effective orchestration

With 3 billion 5G mobile subscriptions expected by 2026, the race is truly on for operators and providers across the world to provide adaptable, dependable mobile networks.

BY BROOKE FRISCHEMEIER, SR DIRECTOR OF PRODUCT MANAGEMENT AT ROBIN.IO

CLOUD NATIVE TECHNOLOGY is becoming increasingly important for providers and operators, allowing them to be responsive to market fluctuations and their competitors, as they look to efficiently roll-out and iterate services. As the amount of 5G services continues to increase, so too does the requirement for unified and optimized operations.

To this end, operators face the need to deliver a greater number of new services with increased speed and throughput than ever before, but with lower latency and a greater demand for Quality of Service (QoS). Those who adopt fully orchestrated cloud-native platforms will be best placed to succeed, with deeper market penetration and advanced lifecycle operations on offer. Utilizing Kubernetes platforms, along with unified operations models and fully shared resource pools, is the best way to reduce time to market, with flexible and profitable 5G solutions.

Supporting 5G services with innovative edge computing

5G networks are already beginning to revolutionize how we live our lives, offering real-time connections on an unprecedented scale. However, the spectrum of 5G services now on offer requires significant amounts of bandwidth whilst needing to be delivered at much lower latency than seen previously. As Internet of Things (IoT) devices are broadly embedded across a wide variety of industries – from energy to agriculture – companies need reliable, self-adapting connectivity in order to harness the abundant potential of connected operations.

As applications such as Virtual and Augmented Reality (VR/AR), Autonomous X, Ultra-High-Definition (UHD) and Industry 4.0 become increasingly prevalent in our lives, the cloud-computing capabilities offered at the edge of the network can hold the key that enables operators to deliver real-

time services. Multi-access Edge Computing (MEC) hosts virtual environments closer to the devices that require connectivity, removing the need to backhaul data to central sites which reduces the time it takes to process and analyze that data. Through these virtual environments created by MEC, operators they provide and access a service that runs locally, offering high throughput with minimum latency.
Reducing lifecycle tasks from hours to seconds
More and more operators are adopting cloud native, Kubernetes orchestration tools in edge environments to automate and optimize the use of infrastructure. Migrating from Virtual Machines (VMs) to containers can help improve efficiency and agility, while reducing costs.

With containers, applications are broken down into their constituent parts or functions, called micro-services. By doing this, one only needs to scale out the micro-serviced container dedicated to a specific function or task. This drastically reduces the resources needed and the time it takes to auto-scale, and when you look at the complexity of entire services, tasks can be reduced from hours to seconds.

Kubernetes has innovative self-healing capabilities when a discrepancy is detected between the declared optimal state and any suboptimal state. Furthermore, Kubernetes can also be set to auto-scale the microservices that can be based on a number of Key Performance Indicators (KPIs), to further reduce service reaction times. For example, Central Processing Unit (CPU) usage degradation, or loss of connectivity can be used as a trigger for one automated response.

Choosing the right platform to suit your purpose
The competitive edge Kubernetes offers to operators is paramount, with 85% of IT professionals agreeing that the platform is 'extremely important', 'very important' or 'important' to cloud-native application strategies. But as more vendors turn to these platforms to scale massive 5G services, it is becoming increasingly apparent that "how you automate is just as important as what you automate". Kubernetes has played a significant role enabling the mass rapid move to the cloud over the past few years, but it is not a simple cure-all for any repetitive or scale-out task. There is more to making 5G services a success at a scale, than just choosing Kubernetes itself.

There are often large disparities in time to outcome, resource utilisation, solution costs, and opportunities in variations between Kubernetes cloud platforms and orchestration solutions. Operators choosing these platforms must do so methodically, thinking not only about the features available, but how they impact performance, flexibility and scale. Considering how they can be used to reduce time to outcome for service integration and production lifecycles must also play a key part when choosing what is best for your operation, throughout the lifecycle of its service. The right selection can help to bring about increased optimization and efficiency.
So, what do you look for? Lifecycles must be policy driven to eliminate hunting and hard coding, in order to make your service impacting events fully automated. This must include compute/storage/resource locality and the environmental variables that control migration of applications from core to edge to far-edge. Automation tools must incorporate workflows from the entire solutions stack including bare metal servers, Kubernetes clusters, supporting applications, services and physical devices.
User interfaces need to look like your solution requirements, not a scripting nightmare. Deep technical expertise should never be a mandate in order to operate the solution. Observability must incorporate the full solutions stack, multi-tenancy and roles-based access with built in analytics. Solutions must also support both Virtual Machines (VMs) and containers on a single platform - not a multi-headed beast - to reduce resource silos and eliminate operations silos.

Kubernetes has the potential to reduce the time needed for scale-out tasks from weeks to minutes, with a reduction of CapEx and OpEx costs by 50% and 40% respectively. Interoperability across a vibrant vendor ecosystem ensures that chosen Kubernetes infrastructure will work with all kinds of applications and services, preventing any pitfalls as they are processed to the cloud. Handling stateful workloads to enable cloudification
Stateful workloads, such as edge applications, databases and subscriber information are vital for optimized cloudification and must be handled with care. When handled well, agility and efficiency can vastly improve, but Kubernetes microservices add a level of complexity, meaning snapshotting and cloning storage volumes alone is insufficient. For zero-touch-automation, a solution needs to snapshot, backup and clone not only the data, but all of the applications' constructs such as metadata, configuration, secrets and SLA policies. Doing so enables teams to rollback, recover or migrate an entire Kubernetes application. No hunting, no hardcoding and no restarting from scratch should be required from the user. The storage only way of performing data protection and recovery things goes against the agility and efficiency expected from Kubernetes, lessening its capabilities.

Orchestrating a cloud-native future for 5G
Choosing fully orchestrated, cloud native-platforms will be key to any successful 5G deployment, allowing operators to explore a more competitive and vibrant supplier ecosystem whilst enabling a wide variety of services and applications. Utilizing advanced orchestration tools provided through platforms like Kubernetes can reduce overhead through streamlined lifecycle automation. It's no surprise Kubernetes has been dubbed the secret weapon for unlocking cloud-native potential, with unified operations models and resource pools that lead to improved user experiences and, for businesses, deeper market penetration.

The future of urban networks

The relationship between edge-cloud and 5G

BY ALEX RODITIS & JAMES ARIAS, CO-FOUNDERS OF WEAVER LABS

Alex Roditis

James Arias

ACCORDING to a recent PwC report, the roll out of 5G will bring value in many industries and not just by being faster than 4G or having a wider reach than Wi-Fi6 but because it will provide "bandwidth by at least a factor of 100, which will allow data created by smart vehicles (think Teslas, buses, trucks), municipal surveillance cameras, traffic signals and sensors, emergency vehicle communications, and hundreds of other data sources to reach the cloud". When 5G is used in combination with other technologies such as AI or edge computing, "it will enable business and society to realise the full benefits of these other technological advances".

An example of such a combination and the benefits it can deliver comes from a real-life case that saw our team partner with Vivacity Labs and Transport for Greater Manchester to build a private 5G network to help with the development of a connected infrastructure to help manage transport more efficiently.

If we consider this as a starting point, we can then eliminate options such as using wired connectivity to connect sensors to an Internet connection. A wired connection may work well but it's also costly to build, it can't be used for anything else and it limits the public sector's capability to innovate and trial any other future solution.

A private 5G network would have the advantage of being flexible in fulfilling not just the present requirements but also connectivity for other future applications.

In addition, a smart city network like the one we are building should be:

- Strictly separated from the consumer traffic to make sure it's available when the sensors need it.
- Affordable and easy to maintain, presenting similar deployment and maintenance costs as that of a WiFi network.
- Able to serve more than one application, with separation of services, allowing a commercial route for public sector owned infrastructure and creating a sustainable business model for local authorities investing in infrastructure.

So where does edge cloud come into play?

After assessing different possible connectivity scenarios, you can see that a strict set of requirements have to be included and then you can recognise that edge-cloud technology is the best option to help deliver the benefits you want: cost efficiency and flexibility.

A cloud-based network running on commercial off-the shelf computing hardware – which also allows for the running of 5G software out of one server, minimising hardware costs - is certainly a cost-effective network. Adding to that the fact that it allows for more nodes to be added and be connected, allowing for the network to expand as needed. Deloitte estimates that by 2050 70% of the population will live in a city and with this growth, issues such as traffic congestion and air quality will become more prominent.

Applying advanced technologies such as AI, data analytics, and edge computing is proving to be a successful solution to create a sustainable urban network. In fact, we have seen how, although the challenges may stay the same, the infrastructure can be 5G, WiFi, or any IoT technology.

Networks should be able to scale fast and be cheap to attend the needs of the applications bringing innovation constantly into the market.

A key principle applies here: to be able to integrate and aggregate infrastructure so that networks can be consumed easily and scale fast.

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Private 5G, a key influencer for Industry 4.0 roadmap

The success of Industry 4.0 rests on a robust infrastructure and a clever network strategy. A private 5G network can provide manufacturers with a highly reliable carrier network, and data shows that organizations are already placing their bets on it.

BY GOPIKRISHNAN KONNANATH – SVP AND SERVICE OFFERING HEAD, ORACLE AND BLOCKCHAIN SERVICES, ENGINEERING SERVICES, INFOSYS

AN ECONOMIST SURVEY found that 94% of firms are planning or implementing connectivity upgrades, and 24% are piloting private 5G networks. But ensuring a future-proof, secure, and reliable strategy is critical for a successful private 5G transformation. Until recently, the connectivity layer of the enterprise production network was largely wired with the industrial network elements. This was partly because of non-demanding use cases and the non-availability of a better wireless alternative. Industry 4.0 opened the door for new use cases driven by its principles of digital transformation, converged IT/OT, smart manufacturing, and connected/autonomous machines. Incidentally, the quest for alternate wireless technology for enterprise also ended with the answer of private 5G.

Private 5G boasts of up to 20 gig bandwidth, sub 10 milliseconds latency, and higher speed than any existing connectivity mechanism and supports unshared network without security concerns. Thus, it is the holy grail for Industry 4.0 use cases. The market signals are also positive. Many countries like USA, Germany, Japan, and UK have announced private 5G spectrum for enterprises. The projected global market for private 5G is ~16 BUSD by 2028 with a healthy CAGR of 38.8%.

Enabling Digital transformation now and beyond Industry 4.0 use cases expect very specific digital capabilities from the connectivity layer which private 5G offers.

Seamless vertical handover: Autonomous technologies like Autonomous Guided Vehicles (AGV), Remote Guided Vehicles (RGV) and telerobots require seamless connectivity with smooth handover across the mobility area which 5G provides.

Application-aware network: The end-to-end slicing capability of 5G allows the network to support different applications like IoT, robotics, or connected vehicles by understanding the profile of each application and providing what they each demand. Edge analytics and closed-loop: 5G is fully cloud-native and can be deployed at the edge. Further, small form factor edge computing can be attached to the private 5G which enables faster real-time exchange of data between a machine and an edge infrastructure enabling many smart factory use cases.

Future-proofing: The future of Industry 4.0 lies in extreme customer experience and advanced operations such as immersive operations or digital twins, through AI/ML technologies. Private 5G enables these through its hyper bandwidth per session.

Thus, enterprises should plan a future roadmap for private 5G networks to enable Industry 4.0 strategically.

Newer hurdles to be solved by efficient ecosystem integration

While the long-term impact of private 5G on Industry 4.0 is clear, there are some hurdles on the way as well.

- **Multiple components**
  An end-to-end view of the enterprise domain, use cases, and network, involving choices like frequency spectrum, 5G network components, deployment architecture, infrastructure, and more are essential for the success of private 5G.
- **Evolving Technology**
  5G is still evolving and is not yet fully implemented by the OEMs. So, choosing the right

strategic products as per enterprise domain use cases and its digital roadmap becomes critical.

- **More Software governed**
  5G is a cloud-native wireless technology with several other software and automation elements like CI/CD, Zero Touch Provisioning (ZTP) and Low Touch Operations (LTO) that needs to be thought through well.
- **Towards API-driven for better integration**
  Until now, production network deployment did not require much focus on the northbound integrations. But the business case for private 5G is lying heavily on digital and industry 4.0 use cases. Hence, it's essential to design a standard API driven architecture flexible for use case integrations as well as the integration with the IT/OT systems and IoT.
- **Need for insightful and deeper visibility**
  One must prioritise AI/ML/automation-driven fault, performance, and assurance mechanisms to bring in predictability and self-correction in case of faults.

Apart from all the above, end-to-end Security is also a major concern. Hardened software, end-to-end security tested pre-integrations and assurance tools that monitor the runtime environments efficiently can address security. Device suppliers, network OEMs, standard bodies, and software vendors must solve the security challenge holistically.

The ecosystem integrator plays a kingpin role in providing end-to-end services from consultancy for technology choices to operations.

Conclusion

Private 5G will be pivotal to the Industry 4.0 roadmap in the coming years. Therefore, enterprises must have a holistic approach to 5G adoption and align it to the organization's strategy and business priorities. The market and consumer expectations will continue to be demanding, and it would become necessary to have an aggressive yet realistic approach in defining the 5G roadmap. Certain first-of-its-kind hurdles can be solved through the right technology choices and well-designed ecosystem integration. It would require ecosystem integrators who would be the glue in bringing the transformation together.

An edge explosion?

ANDY CONNOR, EMEA CHANNEL DIRECTOR, SUBZERO ENGINEERING, outlines this edge explosion and examines the crucial role of the modular, micro data center in delivering digital transformation.

THE IDEA of delivering IT resources close to the point of use is not a new one. However, where once the required data center and IT infrastructure resources were relatively inflexible, slow and expensive to build out and run, today's digital solutions provide the necessary mix of scalability, agility, flexibility, speed and cost-effectiveness to make the edge a transformational reality.

The Linux Foundation's recent 'State of the Edge 2021' market report suggests that, between 2019 and 2028, approximately $800 billion will be spent on new and replacement IT server equipment and edge computing facilities. At the same time, the global IT power footprint for infrastructure edge deployments is forecast to increase from 1 GW to over 40 GW. Valuates Reports predicts that the global edge computing market alone will reach $55,930 million by 2028, from $8,237 million last year.

The growth of edge

Edge growth will be witnessed across almost every industry sector, including transport and logistics, manufacturing, energy and utilities, healthcare, smart cities and retail. This growth can be divided into two subcategories: edge devices – all manner of (IoT-enabled) sensors and handheld devices which will leverage artificial intelligence and machine learning to generate, process and act upon

data locally; and edge infrastructure – the networks (including 5G) and data center infrastructure required to support the 'local' applications and to house the servers which will collect, process and store the likely zettabytes of data and images these applications generate via the devices.

Industry 4.0 promises to revolutionize the manufacturing industry, with more and more intelligence and automation being implemented to optimize product design and testing as well as actual production processes. Edge sensors, devices and infrastructure can be installed retrospectively to upgrade existing manufacturing facilities – indeed many organizations have already embarked on this process. Native edge applications which incorporate advanced digital operations, such as autonomous, mobile robots, will be a major feature of new greenfield factories, constructed, for example, to produce the autonomous vehicles and alternative, sustainable energy infrastructures of the future.

Edge and affected industries

Autonomous vehicles are, perhaps, the best example of just how prevalent edge computing will become. Not only will all manner of IoT sensors and devices be deployed in the manufacturing supply chain, as well as during vehicle production; there will also be the need for edge data center infrastructure to be created within the factories, to ensure near real-time communications between the computers, the networks and the data storage. The autonomous vehicles themselves will incorporate a wide range of edge sensors and devices, ranging from those required for driving, control and safety functions, alongside what might be termed as 'passenger interaction' technology – everything from entertainment to safety instructions, route and time details.

There will need to be a massive build out of edge infrastructure across the road network. This will serve three main functions: traffic safety at the very local level, ensuring there are no crashes or accidents with other road users or pedestrians; traffic management across specific zones, most notably in busy urban environments; and regional or national strategic data collection, processing and reporting, to enable analysis of traffic trends and patterns, with a view to making improvements. More widely, autonomous vehicles, transport systems and traffic management are a key component of the rapidly developing Smart City concept. Road pricing and travel ticketing tariffs both rely on edge devices and infrastructure to respond to varying demand. Security and surveillance are key digital services within metropolitan areas and will increasingly rely on edge-enabled real-time reporting to flag up potential issues more quickly and more accurately than human beings scanning multiple security screens.

And the same is true in the retail sector – although, as many shops are located in city locations, one could argue that smart retailing is almost a sub-sector of the smart city. Point of sale (PoS) payment systems have existed for many years, relying on both edge devices and, increasingly, relatively local edge data centers, to ensure the transaction speed and reliability, as well as efficient stock management. Customer loyalty programs are another example of edge technology already at work.

Smart transport, smart cities, smart retail. To this list can be added smart homes, smart healthcare, smart energy, almost every activity can benefit from the addition of some kind of intelligence and/or automation. Our daily domestic and working lives, which increasingly intersect thanks to the digital transformation accelerated by the pandemic, will feature literally hundreds of edge interactions.
Infrastructure – the edge explosion bottleneck?
Talking about edge applications is a great deal easier than implementing them. If autonomous vehicles, smart cities and smart retail are to become an everyday, reliable reality, then there needs to be a major build-out of the edge infrastructure required to make them happen. Look beneath the surface of almost any edge application and the data center is the crucial foundation upon which to build. Right now, large, centralized data center facilities are the norm. But this is beginning to change with the realization that the local, real-time requirements of so many edge applications require a small, local, fast, agile, flexible and, importantly, scalable data center to match. What's needed is a micro data center that is as dynamic as the customer's edge application.

Customers should have the flexibility to utilize their choice of best-in-class data center components, including the IT stack, the uninterruptible power supply (UPS), cooling architecture, racks, cabling, or fire suppression system. So by taking an infrastructure-agnostic approach, customers have the ability to define their edge, and use resilient, standardized, and scalable infrastructure in a way that's truly beneficial to their business.
Furthermore, by adopting a modular architecture users can scale as demands require it, and without the need to deploy additional containerized systems. This approach alone offers significant benefits, including a 20-30% cost-saving, compared with conventional 'pre-integrated', micro data center designs.

For too long now, our industry has been shaped by vendors that have forced customers to base decisions on systems which are constrained by the solutions they offer. Now is the time to disrupt the market, eliminate this misalignment, and enable customers to define their edge as they go.
By providing customers with the physical data center infrastructure they need, no matter their requirements, you can help them plan for tomorrow. Disruptive edge applications require disruptive, proven micro data center solutions.

Five steps to creating effective data governance in healthcare

Data is changing healthcare. From improving patient outcomes to streamlining operations and inventory efficiency, data and analytics present a major opportunity to tackle modern challenges in a post-pandemic world.

BY MATT TURNER, ALATION

MANY HEALTHCARE PROVIDERS, from NHS and private hospitals to large medical research organisations, are embracing digital transformation and using data to enhance operations using lessons learned from the pandemic.

However, as healthcare providers and organisations continue to look to data-driven digital solutions such as apps, virtual warehouses, automated stock replenishment, and the application of AI and machine learning, their need for effective data governance practices will also grow in order to keep private data secure. From engaging in research to providing emergency care, healthcare organisations must ensure that they can efficiently and effectively use data. Here are my five steps for creating effective data governance in healthcare:

Determine goals and objectives

Whether it's a pharmaceutical company looking to breakthrough in its latest piece of research or the NHS Digital strategy looking to review the

digitalisation of England's hospitals, healthcare organisations have many different data use cases. At the outset, any healthcare organisation enabling a data transformation must decide how data governance fits into their overall strategy and define objectives accordingly.

Defining objectives helps teams create a transparent data governance framework that supports key areas such as improving patient outcomes, mitigating supply chain disruption or creating a more mature cybersecurity strategy.

- **Identify, categorise and prioritise sensitive patient information**
  Patient data is arguably the highest risk data that a healthcare organisation manages. To stay compliant with data regulations and provide the best standard of patient care, identifying and categorising patient data should be a top data governance priority. From clinical data to lab data and even payment processing data, knowing where data lives and how it is classified will determine how it is governed, and ensure it is properly protected according to GDPR regulations.

- **Assess and assign privileges and permissions**
  Privileges and permissions define who can access what data, and what they may do with it. As a best practice, data access should be governed according to the principle of least privilege. This means limiting access to information as much as possible without getting in the way of someone's ability to do their job.

The healthcare sector has a growing number of interoperability standards that dictate how information is stored and shared between devices. Before you assign privileges it's important to:

- Define types of data that different areas need to access
- Define who within a functional area needs to access the data
- Outline how they can access the data, including details about devices, geographic locations, and time of day

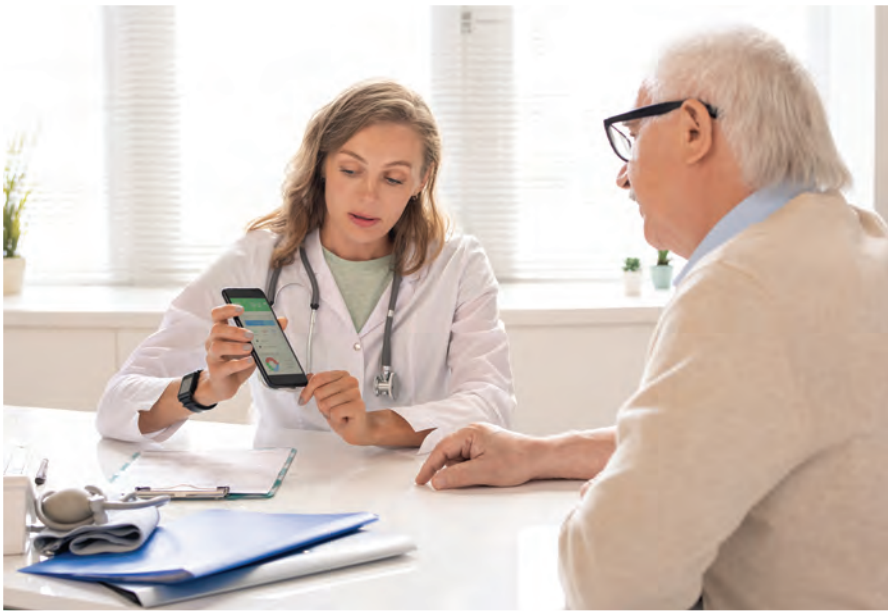
For example, a phlebotomist needs to know the patient's name and date of birth. However, they may not need access to the patient's entire medical history. Too much access increases the risk that data can be changed or stolen.

- **Remove low quality, unused, or stale data**
  In healthcare especially, data integrity is incredibly important. Low quality, unused, or "stale" data can negatively impact research by skewing findings. From a physician's perspective, bad data can lead to care issues. For example, outdated patient prescription information can impact a doctor's diagnosis and treatment plan. Keeping data fresh helps to achieve both care and operational goals.

Patient data is arguably the highest risk data that a healthcare organisation manages. To stay compliant with data regulations and provide the best standard of patient care, identifying and categorising patient data should be a top data governance priority

- **Assign key roles and train employees**
  Finally, it's important to have the right people with the right training in charge of data governance. To do this, you should create teams based on role, including practitioners, IT team members, and finance.

Accountability is important. Every functional area that manages sensitive information needs to ensure that the data managers, data owners, and data analysts understand their responsibilities. Data owners are in charge of their data, and they must know who has access and who should have access. The healthcare sector is increasingly digitalising, and while simultaneously creating and storing vast amounts of data. To get the best use out of that data, as well as to ensure compliance with data protection laws, it is crucial for healthcare organisations, be they private hospitals, or the wider NHS, to implement and maintain good data governance practices.



How AI can reduce stress in the workplace

Supporting mental health and stress in the workplace has never been more important. Especially as businesses start to realise the real impact of COVID-19 on their employees.

BY ATTRIBUTED TO GREG OUILLON, CTO EMEA AT NEW RELIC

ACCORDING to the CIDP Health & Wellbeing Report mental ill health remains the most common cause of long-term absence in the workplace. With the UK Government stating that poor mental health is costing employers between £33 billion and £42 billion a year, and the UK economy between £74 billion and £99 billion per year, businesses need to focus on a solution that protects their employees and their bottom-line.

But stress-related illnesses and absences are continuing to increase and employees who were already on the verge of overload before the pandemic are now finally reaching their limits. Now is the time to take action, embrace technology and elevate 18 months of stress that pushed the world to its edge.

It's here that specifically AI can play a disruptive role. Artificial Intelligence (AI) and Machine Learning (ML) are now so advanced in their development that they can effectively support the mental health of workers and make the rebuilding of business activities after the pandemic even more efficient. How do businesses begin to solve this issue and create a culture that puts mental health first? It starts with rooting out the problem....

Get to the root of the problem A staggering 79% of British people have commonly experienced work-related stress in the last 18 months. As a result, employers have turned to tech and specifically AI and ML to reduce the stress and fatigue on their workforce, essentially by providing AI-based self-service to provide direct care and mental health support services to employees.

But business leaders can't just deal with the end result, they need to address the root cause and understand why and how employees are being exposed to severe levels of strain and stress. If they don't, they are in danger of creating a cycle that, in the worst-case scenario, will lead to burn-out, illness or resignation.

To solve this critical business issue and avoid the personal and professional fallout of mental health, AI solutions are crucial.

AI – Analysing data to save time, and reduce stress

Artificial intelligence is particularly good at one thing: processing gigantic amounts of data within a very short time, detecting specific signals and deriving recommendations for action from it. This is particularly fit to tackle some key g areas of fatigue, stress and strain within the business and streamlining processes to free up employee time and relieve stress.

For example, dermatologic pictures, X-rays, or CT scans are often the only way to detect and confirm what a patient is suffering from and how he/she needs to be treated. However, with a shortage in specialists, restrictions of COVID-19 and fast rising demand, this puts the burden on medical teams already stretched to their limit and the risk of errors are increasingly high.

Introducing AI into this scenario, it can process hundreds of thousands of images accurately and faster than a human could, having learnt to diagnose risk from millions of pictures, more than a doctor would ever see in a lifetime. By removing the pressure on medical staff to conduct preliminary evaluations using A, they can focus on analysing high risk cases and deriving a final diagnosis and concrete treatment. It saves highly valuable time and stress on the individual and medical function. Allowing doctors to treat significantly more people and increase the efficiency and quality of their work. While at the same time protecting their own mental health, and the capacity of their team.

Stress is everywhere

Stress and fatigue are, however, not exclusive to healthcare and the emergency services. In every profession, in every walk of life, employees are forced to deal with higher levels of stress. For instance, in manufacturing, where engineers and operators must ensure that large and complex infrastructures keep operating 24/7. From power grids to transportation networks or large digital architectures, the possibility of an outage puts people and revenue at risk.

Unsurprisingly, the monitoring and supervision of IT and software architectures in companies have added considerable pressure to IT teams. You only have to look at the number of recent high-profile outages and the fact that internet outages are up nearly 10% in the first two weeks of 2022 alone, to have a small idea on the pressure placed on the IT function. Operating 24/7 or on-call and having to deal with urgent and complex situations with very limited support, DevOps and Infrastructure teams simply can't enjoy luxuries such as work life balance. And high levels of stress naturally will take their toll. To support these teams and protect the wellbeing of the individuals, businesses should invest in reliable system monitoring based on software telemetry and an intelligent observability platform that can act like a silent guardian. By using this technology to monitor all systems 24 hours a day, it removes the fatigue related to alert noise and the burden of possibly overlooking critical incidents, placing the power in the team's hands.

While Observability or AI cannot replace the expertise and knowledge of engineers, it can, and does, allow IT to take quick action, when the platform detects an anomaly. Streamlining the process and ensuring that resources and team wellbeing can be prioritised, without compromising on the business or user experience.

Reducing false alarms, reducing stress

The key factor here is that Observability and AI reduce false alarms and more accurately recognise critical situations, removing noise and detecting weak signals. In utilising the vast amount of available telemetry data, AIOps systems can automatically detect and notify anomalies without the need for manual engineer insight or process. By providing automated Root Cause Analysis and context for issues, AI also dramatically reduces the time to understand and resolve incidents. It frees up the DevOps team from significant toil and stress and lets them focus only on the high value activities, on their own wellbeing and, importantly, the areas of the business that will drive revenue.

Mental health comes first

Regardless of the industry, with the help of AI solutions, employees and businesses must put mental health first. This is possible by using technology to understand and get a real view of their stresses and pressure points and put in measures to drive the efficiency of the team and themselves.

In this way, AI and Telemetry data not only reduce the workload of employees, but also enable their personal development in the long term and reduce the impact of stress. Ensuring that the workforce is happy, healthy, and motivated to drive the business forward. After the last 18 months of stress, uncertainty, and change, it is time to put our mental health first and embrace technology that will embed this ethos into each and every business, now and into the future.

Artificial intelligence is particularly good at one thing: processing gigantic amounts of data within a very short time, detecting specific signals and deriving recommendations for action from it

The solution to the sustainability problem lies in the IT department

With sustainability having moved from a 'good-to-have' to a 'must-have' amongst company leadership, CIOs cannot afford to shy away from implementing carbon reduction strategies throughout IT operations.

BY YASSINE ZAIED, CHIEF STRATEGY OFFICER, NEXTHINK

HAVING EXISTED as a background concern for businesses over the last few years, in 2021 sustainability raced to the top of the priority list for many organisations. There are multiple factors responsible for the intense spotlight on sustainability, a key one being COP26, the United Nations (UN) Conference for Climate Change held in Glasgow at the end of last year. During the summit, the UK Government announced that all large companies registered in the UK are required to disclose their plans for achieving net-zero greenhouse gas emissions by 2023. Combined with 60% of British businesses having signed up to the UN's Race to Zero campaign, the pressure is on for leaders to dramatically reduce emissions.

Furthermore, businesses' positions in the competitive employment market are also increasingly being impacted by their sustainability initiatives. Research from Targus in December 2021 found that over half (54%) of UK employees don't want to work for a company that doesn't

prioritise sustainability, with GenZ and millennials the most sensitive to this issue. With the Great Resignation remaining in full swing, and the tech sector in particular suffering from job vacancies, businesses can't afford to ignore this priority area for jobseekers.

IT: The new frontier for green businesses

Technology companies are the biggest and most innovative companies globally, with tech businesses dominating the top 10 global rankings. As such, IT operations have become more crucial and valuable to many companies than more traditional products and services, with this department constituting a huge portion of annual budgets. In turn, IT systems are an equally significant source of business emissions: in 2020, digital technology accounted for 4% of global carbon emissions, which is double that of the aviation industry.

However, IT systems still remain a blind spot for businesses' sustainability strategy. Whilst they are aware that they must reduce carbon footprint in this area, CIOs and leaders are unclear as to how to do so without harming employee and user experience. Rooted in a lack of knowledge, decision-makers fear that implementing sustainability initiatives will be unpopular amongst employees and will get in the way of their work in the digital workplace.

Facing the fear

In order to overcome this fear, businesses must gain deep insight into their employees' digital experiences. This will enable businesses to understand not only how to limit environmental impact most effectively, but how to do so in a way that will not block productivity or negatively impact experience.

IT teams must gain visibility into employee's digital workplaces , from device and application usage data to hardware start-up time to employee sentiment of workplace tools. IT teams initially lost sight of these analytics during the sudden shift for remote working, however with hybrid and remote working the clear path for the future, it's crucial IT teams gain visibility into remote workspaces.

Furthermore, leveraging technologies to gain deep insights can enable IT leaders to directly visualise and detect the source of settings, behaviour, hardware or infrastructure which contribute to energy and CO_2 wastage. By deploying remote actions to eliminate sources of unnecessary emissions, environmental impact can be immediately improved without disrupting the individual employee.

For example, Nexthink research found that computers that take longer than 5 minutes to start, will produce, at a minimum, 450 tons of CO_2 emissions per year—or the equivalent of 50,636 gallons of gasoline. Whilst the initial and instinctive reaction may be to replace these old pieces of

hardware with newer models, further analysis found that the majority of computers with slow start-up times (98%) could be fixed with a simple RAM upgrade and some configuration changes. Not only does this save money, this approach is less disruptive to employees and prevents the unnecessary and energy-consuming manufacturing of new hardware.

Remote capabilities also enable IT teams to deploy educational campaigns and resources to the workforce. By gaining insight into where employees are most environmentally harmful in their digital operations, IT can automatically send out remote, targeted informative pop-ups to encourage green behaviours, such as reminding employees to shut down laptops rather than leaving them running on stand-by mode.

Confidence is key

It is clear that in order for businesses to be able to make smart sustainability decisions that are effective and seamless for the employee, it is imperative that IT teams have deep insight into data from the digital workplace.

With sustainability having moved from a 'good-to-have' to a 'must-have' amongst company leadership, CIOs cannot afford to shy away from implementing carbon reduction strategies throughout IT operations. In order to adopt these initiatives on a large-scale, IT leaders have to feel confident that they are working with, rather than against, the employee's productivity. This is only possible by genuinely understanding in real-time how members of the workforce are experiencing the good and bad of the digital workplace.

A defining moment: the next 12 months will be critical for businesses on their journey to full-stack observability

New research from Cisco AppDynamics shows that the journey to full-stack observability is well underway.

BY JAMES HARVEY, EXECUTIVE CTO EMEAR AT CISCO APPDYNAMICS

WITH PEOPLE using a wider range of applications than ever before, consumers' eyes have been opened to the incredible digital experiences that are now on offer. Across every sector, from retail to technology, online users have come to demand the 'total application experience', and they now expect businesses to provide a high-performing, reliable digital service that is simple, secure, and helpful. At a time when customers are spoilt for choice with online services, they now have little tolerance for anything less than the best digital experiences.

An observability awakening

However, delivering experiences of this quality has proven an increasingly challenging endeavour. As many organisations have embarked on journeys of rapid digital transformation, they have found themselves faced with spiralling IT complexity and an inability to closely monitor performance across their IT stack. Businesses are now looking to build on their existing monitoring capabilities and equip themselves with new solutions that can allow them to meet customer demands.

The latest report from AppDynamics, The Journey to Observability, reveals that concerns around IT complexity have been a leading force in businesses' growing appetite for full-stack observability, with a majority of technologists (54%) describing it as a key driver of this shift in attitudes. This data shows that IT leaders are increasingly looking for innovative ways to improve visibility across their organisation and deliver exceptional digital experiences to customers.

Whereas 12 months ago, the general feeling amongst technologists was one of uncertainty and some trepidation about the size and complexity of the challenge ahead, there is now an overriding sense of positivity and confidence surrounding full-stack observability solutions. Full-stack observability is now a leading priority for their business, with 86% of technologists reporting that demand for observability tools within their organisation has increased over the last 12 months.

Early strides towards full-stack observability lay the groundwork for 2022

Already, some business leaders are starting to feel the impact of having their technologists focused on key strategic priorities, such as digital transformation and enhanced customer experience, rather than the constant firefighting of the past two years. These include improved productivity within the IT department, enhanced collaboration across the business and reduced operational costs due to teams having to spend less time reacting to performance issues. With enhanced visibility across their IT stack, it is becoming easier for technologists to get to the root cause of performance problems and fix issues before they adversely affect the user experience.

However, in order to realise the full benefits of this transition, businesses will have to advance beyond the initial phases of full-stack observability adoption that many still find themselves in. Although 81% of technologists have now defined a full-stack observability strategy, only 48% have taken first steps and just 24% are in execution mode. In progressing through this multi-stage journey, businesses need to be aware of the implementation challenges they might encounter and understand how to overcome them. Some of the most prevalent issues include implementation challenges (40%), integration issues and concerns (42%) and concerns about increasing complexity as they scale (30%).

Overcoming these challenges will depend on a combination of factors, including a clear implementation and integration roadmap, senior leadership commitment and identifying the right technology vendor. Therefore, success hinges on the support of the wider business to respond to this imperative with the urgency it demands.

2022: It's 'go time' for businesses.

This next year will be critical for businesses, as inaction may result in them being left behind. Enterprises that do not make significant strides towards full-stack observability in the next 12 months will face a competitive disadvantage compared to their peers. 20% of UK technologists noted that a loss of revenue and customers arising from technology performance issues was one of the biggest organisational consequences of failing to progress full-stack observability.

As a result, business stakeholders are now strongly backing the transition to full-stack observability and freeing up the resources for technologists to accelerate their implementation programs.

Technologists are right to approach 2022 with confidence. They've already made remarkable progress. They've identified areas of focus, and, most of all, they now have the full backing of business leaders, with a clear understanding of their trajectory over the next 12 months.

Open clouds power innovation, agility, and efficiency

Cloud computing gets headlines every day, with predictions about the percent of workloads moving to large public cloud providers. While there is some momentum in the IT industry to move to public cloud environments, this choice is not automatic.

BY MICHAEL MCNERNEY, VP MARKETING & NETWORK SECURITY AT SUPERMICRO

SEVERAL DECISIONS must be looked at closely before moving critical workloads to a public cloud provider. Different computing environments serve different needs of IT organisations, and one environment is not ideal for every enterprise. Large public cloud providers certainly offer a range of services and enable specific workloads to scale to very large computing or storage needs. With a range of services provided, the large public cloud providers can offer a range of capabilities for many different workloads and requirements. However, there are many cases where a remote public cloud provider may not be able to satisfy the needs of an IT department. An on-prem data centre (even if operated as an internal cloud) would be ideal in these cases. It can be architected and deployed to serve the users better, whether in-house or external.

Open Standards

While the instruction set for most clouds is fairly standardised (but not completely), there are restrictions that public cloud providers impose on users. For example, there are limited choices for operating systems, accelerated computing hardware, and other parts of a hardware infrastructure or software environment that may not match up with what an enterprise needs for maximum performance or optimised workflows. Thus, a public cloud could be considered proprietary, as IT organisations must use the hardware and software given to them, while an open cloud allows for complete customisation. A cloud built on open standards allows IT administrators to create a cloud computing environment to customise software and even physically modify

(within warranty limits) servers and storage systems to suit their needs, which is impossible when using a public cloud provider. The components that need to be considered when creating an efficient high performing cloud include:

Hardware

While there are several choices in terms of the CPUs for compute servers, the dominant CPU in use today uses the x64 instruction set. A leader in this category is 2nd Generation Intel Xeon Scalable Processors. However, the new 3rd Gen Intel Xeon processors eclipse the previous generation's performance. Thus, the question becomes that if the software is modified to take advantage of the new capabilities, how certain is the IT department that these new servers are online and available at a reasonable price? This standardisation allows for a wide range of applications to run without modification.

However, since there are several CPUs that fit this high-level requirement for a specific instruction set, the different options can make a sizeable native performance difference. Although virtualisation and containerisation technologies can abstract the underlying differences, the optimal matching of a CPU to the application will increase performances and potentially decreases energy consumption.

Software

The software stack required for a smooth-running cloud environment can be complicated and highly specific for individual mixes of workloads. The underlying libraries and management software requirements are almost guaranteed to be different from company-to-company. Without a wide range of choices that can easily be installed and configured on the underlying hardware, a cloud may not serve the needs of the users or system administrators. In addition, not all middleware and supporting software will run optimally on all CPUs. Choices abound for all layers in the software stack, and an open computing environment is a key to creating an efficient cloud computing system.

Networking

Many of today's most innovative applications require clusters of servers, sometimes working in coordination with each other to solve a complex problem, for instance, in large scale HPC simulations.

Different servers are used to perform more simple tasks in other scenarios, with each server being given a certain amount of work to do, completely independent from other servers. The networking between servers needs to be matched to the application requirements, both in latencies and bandwidth. An open based cloud service needs to be designed and implemented with the networking requirements defined. Depending on the workloads and applications being used, different networking solutions may need to be used, and the application should not be locked into an environment that is not optimal.

Business results

An open cloud environment has numerous benefits for organisations and enterprises that wish to control their IT infrastructure. Higher efficiency of the IT infrastructure is a primary benefit, both in terms of using less energy when workloads can be more closely matched to the computing and storage hardware. In addition, more work gets performed at a lower cost when the right sized infrastructure is closely matched to the needs of the enterprise. Another benefit that open clouds bring is that an internal cloud, for example, can be adapted quickly due to changing workloads. This is advantageous whether there is a need to scale up or down due to business cycles. New and more technological hardware can be integrated quickly, and the workloads that need the increased performance can be easily assigned to the new servers or storage systems.

Systems have many tuning parameters that allow different applications to run faster than if the tuning parameters are not set correctly. Having direct control over these parameters leads to better utilisation of the infrastructure components. New systems that contain multiple sockets with multiple cores, combined with the latest GPUs, can be optimised to deliver results much faster than previous generations of systems.

As new technologies are introduced and made available, on-prem or open cloud data centres can quickly integrate the latest technologies, even before official product announcements. This gives IT administrators the ability to test new hardware with real world applications to meet demanding SLAs from their user communities. Decisions can then easily be made whether to invest in new hardware as part of ongoing refresh cycles. New hardware purchased for an internal data centre has a known cost, which is part of a known budgeting process. This knowledge can be factored into a budget, and the TCO can be calculated compared with a public or proprietary cloud where cost amounts can be unexpected.

The Return-on-Investment, or ROI, increases as new workloads are assigned to new technologies, and keeping the systems busy. An open cloud approach based on open standards allows for a best-of-breed combination of hardware and software, increasing the ROI of the IT infrastructure. Clouds come in many forms and delivery mechanisms. While there is much discussion about which form of a cloud to use, the higher-level concern should be whether to implement a cloud based on open standards or use a proprietary one. The cloud computing market, estimated to be $364B in 2022 according to a recent Gartner analyst report, is evolving. Different enterprises will need to determine what is important to them, not just today but moving forward as well.

The secure marriage of two acronyms: SASE and CASB

Regardless of the number of potential – and actual – influencers in the world of IT, in reality Gartner, especially in the world of cyber security, has more impact than any other party.

BY STEVE BROADHEAD FROM BROADBAND-TESTING

A CLASSIC EXAMPLE is with respect to SASE (Secure Access Service Edge) – pronounced "sassy" – which Gartner introduced in 2019 as a blueprint for an intensified, integrated secure network platform based around a cloud service delivery mechanism. It had traditional security solution providers scrabbling around to try and reshape their offerings to match Gartner's definition, while other companies – notably Cato Networks who we are featuring here – effectively were SASE vendors from the ground up. As a result of world events since its introduction, the case for a SASE-style security infrastructure has only got stronger and stronger. Witness what is happening with the world right now and where and when government-led cyber crime might enter the building.

Throughout these years, another Gartner concept, CASB (Cloud Access Security Broker) has been popularised as a means of providing a solution for security solutions designed to address the challenges created by shifting workloads to the cloud. Some have seen this as a solution in its own right – but it is not. At best, CASB could be described as a subset of what true SASE provides. What it hinges upon is the new potential wave of threats that are created when adding cloud-based networking to the IT infrastructure. Traditional security solutions were designed for On-premise/private deployments. So, storing applications and data in the cloud provides, not just a new potential back door option for attackers, but a whole wall of sliding patio doors and French windows to unlock (assuming you remembered to lock them all in the first place). So, logically, if you move to a hybrid environment, CASB provides the bridge for companies to adapt to those potential new threats from the cloud, while also reducing the in-house workload and inherent complexity that such a model brings with it.

While – as ever – definitions vary from vendor to vendor, there are some fundamental elements to a CASB solution generally identified as: threat protection, data security, compliance and visibility. In each case, it is designed to deal with the cloud element of said security component; for example, compliance becomes a whole different ball game when cloudy data sovereignty is added into the equation. And how do you see what is going on in the cloud with tools that were designed specifically to manage OnPrem/private network traffic? Basic data access mechanisms change, the attack surface increases... the cloud brings a whole new weather front of security storm forecasts to the IT table. In other words, CASB has validity. However, it is only a part of the total network solution and overall strategy. Speaking with Cato Networks recently about its recent incorporation of CASB into its increasingly mature SASE platform, it really starts to make sense. Here's the point: you have a security infrastructure that is based on a portfolio of products that you have spent a lot of money and time on integrating (with partial success usually the best effort scenario here). And, in terms of money spent, we are talking CapEx, OpEx, training, re-training (when staff leave), rejigging that portfolio when some products are "end of lifed" or simply fall short (or the vendor disappears or is acquired by an unwanted 3rd party...). And that's just securing what is within your control/remit. Add in the cloud and that brings in all the potential problems described earlier. So, you add in a CASB solution to handle these new problem areas and that leads to the next problem to resolve, namely, how do you get that CASB solution talking to your partially successful existing security portfolio investment?

A quick demo with Cato's current platform showed just how you go about managing that hybrid scenario – bring it all together under one system, one management console and view everything as one. Yes, you can see the source of the data and apps, including the cloud, and you don't have to swap between systems and consoles, spend days and months ingesting separate data feeds from a gazillion different syslogs using yet more expensive 3rd party products, by which time the network has been hacked several times anyway...

At this point we need to bring in a fourth security acronym – that of ZTNA or Zero Trust Network Access. Over the past few years, no term has been more overused – or debated – within IT security than zero trust. In theory, at least, it is kind of all or nothing, like a fundamental firewall – i.e., allow all or deny all. In the real user world, obviously that is somewhat overly-restrictive – kind of like babysitting toddlers, who have the ultimate "deny all" mechanism in the form of the word: "shan't". As with SASE and CASB, some vendors appear to be making more sense of ZTNA than others, and aforementioned Cato Networks' SASE solution has fallen on its secure sword in this instance too, in the form of what it defines as "device context". This

new addition to its SASE offering is straightforward and logical and a natural panacea to blind zero trust, in that it sees that every user is different and has a different associated risk profile. This, thereby allows SecOps to set policies that factor in a user's full context for data and application access (the zero-trust element) and additionally – and this is the clever bit – the actual capabilities within an application.

The first thing to point out here is that user devices are often seen as the easiest "back doors" to enter in a cyber-attack scenario. After all, why would a non-techy user even want to understand the mechanics of cyber security, let alone implement some kind of defence mechanism? Not only does it impact on their day-to-day workings but also on their lunch break, unless they use that time to read to – as yet - unpublished "Back Door Device Access For Dummies"? However, it is both the obvious point

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to secure from a ZTNA perspective and the point at which application access needs to be properly defined and controlled. Access based purely on user ID is a 90s concept – has no one heard of identity spoofing; or device spoofing? Or – and this is a classic – devices that are not configured to IT defined standards. Hello back door...

This refocusing on what is effectively risk-based application access control is a far more realistic approach to locking down network access. After all, if we don't allow for flexibility within a modern IT infrastructure, in order to maximise the access and application opportunities that now exist, then we might as well simply revert to the old-school mainframe methodology. Secure? Yes. Limited? Very. Cato's view is that defined policies will allow companies to embrace the full user context, so adding control not simply to application access, but what capabilities and features within those applications can further be accessed. This is where the vendor in question is clearly taking a forward step. In general, policy control in networking has been around – and largely ignored – for decades, but taking it to intra-application level makes a lot more sense than the basic allow-deny strategy. And, naturally, the concept extends to wherever those users wander – internal, Internet, cloud...

So, how does it work in practice? What Cato is doing is embedding continuous device context assessment throughout its software stack, meaning it will continuously assess the posture of a user's device, including automatically taking remedial action if that device becomes non-compliant. As part of this overall assessment, the platform already analyses the fundamentals such as identity, the network, data and related activity, so it's a broad and adaptable solution, not a stuck in time one-trick pony. It means that the user controls are not tied to a specific device; for example, when using their own device, they might have very different permissions than if they are using a company-provided endpoint device – think smart phones as an example.

This adds extra flexibility to the work from office/anywhere and/or home scenario too, especially since it also covers geo-location. So, if the user is trying to access the network from an untrusted location, it can simply block access.

From a productivity perspective, it means that the secure versus allowing the user to do their job conundrum is being addressed in two ways: from a ZTNA perspective it means a user can be restricted to specific, trusted resources. But, looking from a broader perspective, such as CASB, the ability to use device context at an application level, means that they can be working from anywhere, on any application located anywhere, and the controls still apply. And it's totally scalable. Put simply, it's a security solution for the modern world.

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NetSecOps – removing the roadblocks of traditional network and security operations

From a technical perspective, network and security have always been regarded as two separate entities within an organisation. That's why network infrastructure and operations (NetOps) and security infrastructure and operations (SecOps) teams have operated independently for decades now. While NetOps teams focused on network management and maintenance, SecOps teams focus on network and endpoint security.

BY RONAN DAVID, CHIEF OF STRATEGY AT EFFICIENTIP

THE DEVELOPMENT of integrated cloud architectures and the push for complete digital transformation across industries is constantly driving network and security operations to overlap. In fact, many of the complexities experienced by today's NetOps and SecOps teams can be addressed by integrating workflows and establishing a collaborated NetSecOps division. Every organisation, regardless of size, industry or infrastructure, needs a network security solution in place to protect it from cyber threats and attackers that are always trying to find and exploit vulnerabilities.

NetSecOps is a streamlined process for both network and security operations, which efficiently integrates the workflow for both teams through shared resources for efficient network infrastructure design, incident response, and threat monitoring. Traditionally, NetOps teams are responsible for network orchestration and troubleshooting, with an aim to make the network more accessible and efficient for the users. On the other hand, SecOps teams are specifically focused on monitoring network traffic for malicious activities, providing incident response to security alerts, analysing advanced threat actors, and maintaining the overall security infrastructure of the corporate network. Having network and security operations completely segregated can lead to significant management complexities in the current digital ecosystem, such as communication delay, wasted resources,

longer network downtime, and unidentified vulnerabilities. Security teams and network teams are often focused on opposing mandates. A unified NetSecOps approach allows network engineers to configure network infrastructures in a way that security handling and threat monitoring becomes efficient, while security professionals patch vulnerabilities to improve network performance. However, NetSecOps is still a very new concept, and its implementation is easier said than done. Before starting the transition journey to collaborated network and security operations, organisations first have to clearly comprehend the potential benefits and challenges of this unified approach.

The benefits of a successful NetSecOps collaboration

The biggest benefit of a successful NetSecOps collaboration is improved security. Research by EfficientIP shows that 57.9% of the organisations that successfully implemented NetSecOps collaboration experienced faster resolution of security issues, while over 51% experienced reduced security risks. NetSecOps teams work with shared resources and tools, thus the chances of security incidents due to network misconfiguration are greatly reduced. For example, when both teams work through a shared IP Address Management Platform, any changes made to the subnet configuration by the network administrators are automatically sent to the firewall management platform used by security teams. In addition to solving security issues, NetSecOps collaboration also allows organisations to achieve faster resolution of user experience and network performance issues. This is because security and network teams in a collaborative setting are more likely to use streamlined solutions performing similar activities, rather than having standalone solutions for different functions.

Collaborative teams can also ensure better policy compliance, as both network engineers and security professionals work with the same set of shared policies. Another key benefit is operational efficiency, with 46.4% of organisations experiencing more efficient operations due to NetSecOps. With successful collaboration, operations become more effective with fewer obstructions.

For example, sharing network data in NetSecOps allows both teams to gain a common view of digital infrastructures and services, thus improving productivity among network and security teams. Streamlined resource allocation, unified solutions and tools, and shared access points allow NetSecOps teams to overcome redundancies and downtimes, and increase overall operational efficiency and security.

Overall, the unified NetSecOps approach takes away the redundancy of siloed network and security operations and enables full visibility into the organisational network in terms of network configuration, security threats, performance, and incident response.

The challenges of achieving successful NetSecOps collaboration

While the benefits of NetSecOps are lucrative for any industry, the critical challenges of implementation can hinder the success of this collaboration. EfficientIP's research revealed that only 39% of organisations successfully achieved NetSecOps collaboration.

The biggest challenge of successful collaboration is the core nature of both teams. Network and security teams are used to operating completely different tasks. Both teams also have very different ways of carrying out operations. Most security operations are focused on constant monitoring and urgent solutions. Threat actors can emerge from any source, and when a breach occurs it needs to be resolved immediately to contain the damage. So, security teams generally need to operate with a sense of urgency.

However, network engineers tend to take a long-term approach. Their core responsibility is to improve the network performance, which requires a gradual thought process centered around problem-solving. Cross-skills gaps are another critical issue. Both teams do not operate with the same mindset. Network teams are generally not experienced in

cybersecurity terminologies, while security teams are not used to thinking about network performance or user experience. So, a successful collaboration of both units will require sufficient training and realignment of working practices.

The biggest challenge however is data. In our research, 27.6% of the organisations identified data quality and authority issues as the biggest challenge. Successful collaboration requires both teams to be supported with a single source of truth. In most organisations, both teams have access to different sets of data for similar functions, which creates significant confusion in terms of determining which data is correct. Data integration also becomes a major issue, as not all network data are relevant to the security operations and vice versa. To overcome these challenges of NetSecOps collaboration, organisations need to equip both teams with efficient technical resources that creates a shared foundation. DNS, DHCP, and IP address (DDI) are three of the most critical assets that are integral to both network and security operations. Thus, using DDI management solutions as a foundation can help to establish a sustainable and successful NetSecOps collaboration.

DDI management is the key to successful NetSecOps collaboration

Network teams have always used DDI tools for operational efficiency and infrastructure optimisation. But security teams can also find benefits in DDI solutions, as DNS and IP data can help with critical security investigations. Using DDI as a base for initiating NetSecOps collaboration, organisations can establish a resourceful communication channel between both teams and build from there.

DDI tools allow security teams to dig in and figure out where things are in the infrastructure a lot faster, and as network teams are proficient in using DDI solutions, they can share DDI data with the security teams for faster resolution to security assessments and shorter IT services roll-out.

This will also allow network teams to achieve a good understanding of cybersecurity operations and the core concepts used by security teams. Once both teams are able to establish better communication and synchronise their activities, effective collaboration will naturally flow. From there, business leaders need to gradually introduce more cross-departmental automation, so that the collaboration grows, and network defence and performance start sychronising together.

With the right support, effective solutions, and DDI management tools at the base, network and security teams will soon naturally start collaborating more efficiently, thus leading to a successful NetSecOps collaboration.


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The DCA – Powering Data Centres

By DCA CEO Steve Hone

THE DCA are taking a break from the features related to Special Interest Groups this month to focus on the topic of Powering Data Centres. We have some comments on Power Provision and Management from the following: What lies ahead for Data Centres from Nicholas Laag, Managing Partner & CEO at Prime Data Centres, Navigating the Current Energy Market from Bobby Collinson, MD Noveus Energy and finally Global Events impacting Energy from David Loveday, Director of Operations & Trading and Richard White, Solutions Strategy Manager both representing LG Energy Group.
The DCA have been considering introducing a new Focus Group or Special Interest Group that will focus on the related challenges facing data centres. Forming this is very much dependent upon the level of interest we receive.

Please contact The DCA if this group would be of interest to you (contact details are below).

The purpose of the group is yet to be fully defined, but its broad objectives could focus on:

- Data Centre Power Requirements
- Methods of Power Provision to Data Centres
- Power Management & Distribution within Data Centres
- Legislation & Policy
- Energy Security
- Renewables
- Sustainability Strategy
- Driving towards Net Zero / Carbon Reduction

Some of the above feed into existing Special Interest Groups. There is already a good level of cross group collaboration and this is openly supported and encouraged. The DCA currently facilitates nine Special Interest or Working Groups and DCA members are welcome to join any of the groups and contribute, to find out more here: https://dca-global.org/groups

If you or your organisation are interested in being part of the Data Centre Powering Data Centres Focus Group please contact Steve Hone: steveh@dca-global.org or call 0845 873 4587.

Global Events Impacting Energy

By David Loveday, Director of Operations & Trading and Richard White, Solutions Strategy Manager - LG Energy Group

THE UK ELECTRICITY SYSTEM is once again undergoing a significant period of change as the government moves to achieve its net zero target by 2050. More recently, the tragic events which have occurred in the Ukraine have served to show two things: that the UK is not an island when it comes to meeting our energy requirements, and that global events can significantly impact the price we pay for our electricity.

From 2010 to 2015, the UK government committed to a series of reforms of the electricity market, known collectively as Electricity Market Reform, or EMR. The aim of these reforms was to solve the energy trilemma of ensuring that the UK's future electricity supply was secure, low-carbon and affordable. Whilst it is beyond question that we have seen the carbon intensity of UK electricity fall, success in the other two areas is somewhat less clear.

The electricity system operator has modelled a number of credible future energy scenarios to meet its target of net zero emissions by 2050, the majority of which require a degree of positive engagement from consumers. The system as built today is designed to ensure that there is sufficient supply to meet demand, but moving forward it is highly likely that demand coupled with storage will be flexed to meet available supply. This will present opportunities for those who can flex their demand or are able to store energy to be released back to grid at times of system tightness. The importance of flexible demand will become more apparent as the amount of intermittent renewable generation connected to the system at all levels increases further still. It is clear that as we pivot away from unabated fossil fuel consumption for areas such as transport and heating, that the demand for clean electricity to power the increasing numbers of electric vehicles (EVs), heat pumps and electrolysis plants is only going to increase.

The increase in demand for clean electricity will be met through the building of additional wind and solar projects, an increase in the number of electricity interconnectors to low carbon energy

sources in other countries and new large- and small-scale nuclear power stations.

In terms of data centre electricity consumption, there are numerous articles which have been published by the International Energy Agency (IEA), informing readers of the headline figures of energy usage by data centres, such as: consuming 73-terawatt hours of energy in 2019, but with analysts expecting further significant increases with crypto-mining.

Over recent years, and likely accelerated by the pandemic, the uptake in television streaming services has increased, and television on demand has again seen the demand for data and therefore data centres increase. According to the German statistics office, there are approximately 7.2 million data centres across the globe, the majority located in the Unites States. What is interesting to note is that although the number of internet users, and therefore internet traffic, has increased exponentially, the energy demand from data centres has not risen as significantly due to improved energy efficiency. The majority of these energy savings have been achieved by both more efficient hardware, and efficiency in the buildings where data centres are housed in terms of cooling and humidity management. The sector has seen a move away from small inefficient data centres to large hyperscale facilities.

Many data centres are striving to be carbon neutral. Facebook, for instance, now states that 100% of its electricity comes from renewable sources, whereas the European Community has set the goal for data centres to be carbon neutral by 2030 as part of its digital strategy. In order to achieve this, data centres will need to deploy best practice in areas such as cooling, better heat reuse and geographical location, such that renewable sources can be used to power the data whilst minimising cooling and heating demands.

As with most areas in energy and energy management, it is important to be able to measure energy consumption. The data centre industry uses a metric called Power Utilisation Effectiveness (PUE); this is calculated by dividing the total facility energy usage by the amount of energy used to power the IT systems. The closer the figure is to one (1), the more efficient the energy usage in the data centre. There is a best practice guide provided by the EU, which is updated annually and can be found at the web address: Data Centres Code of Conduct | E3P (europa.eu).

It is clear that the UK has set out in legislation its ambitions to de-carbonise the energy we use in order to reach net-zero by 2050. Some of this will be achieved by off-setting, but a large portion will be achieved by the deployment of renewable energy sources, battery storage and energy efficiency measures. The role of the National Grid future energy scenario plans is to ensure that there will be

sufficient energy to meet the UK's electricity needs. At the same time, the growth in data requirements will see energy demand from data centres increase, though through increasing energy efficiency it will not be a one for one relationship.

In November 2020 the Government issued a document "The Ten Point Plan for a Green Industrial Revolution" The ten point plan for a green industrial revolution - GOV.UK (www.gov.uk). In this document it details how and where government money will be spent to create jobs but also to decarbonise industry, buildings and transport. Within it there are the plans for expansion in offshore renewables, as well as increased amounts of large- and small-scale nuclear power plants. By 2030, the UK is looking to produce 40GWs of electricity from offshore wind, which is greater than the summer peak demand on some days.

As heating and cooling (HVAC) is the second largest consumers of energy in a data centre after hardware, we can expect further innovation in this area in terms of efficiency and optimisation. We could see other uses for the heat being rejected from the data centres, either to enhance cooling or to heat other parts of the building. Changes in technology, such as batteries used in Uninterruptable Power Supplies (UPS), could potentially see a change in data centre temperature set points, to a higher temperature and therefore result in a reduction of cooling load. Colocation of data centres with large solar PV farms and large batteries to act as energy reservoirs (and so convert daytime electricity generation into 24-hour supply) would allow minimal grid dependence and, therefore, protect data centres form market fluctuations.

Find out more about LG Energy:

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Managing the Power feature v2 for submission

By Bob Collinson, Managing Director, Noveus Energy

Navigating the Current Energy Market

The current state of the energy market and significant advances in renewables justifiably dominate the headlines and should be areas to focus on for data centres considering ongoing and future power provision.

In this article Noveus Energy's Managing Director, Bob Collinson, first takes a quick look at navigating the current market amid recent geopolitical changes, and secondly provides an overview of existing renewable energy sources in a fast-moving marketplace.

Navigating the energy market

It's no secret that the energy market has shown extreme volatility of late, with the war in Ukraine exacerbating the situation and leading to higher costs that look set to remain.

For example, amongst heightened political opposition and tensions, the Russian Nordstream 2 gas pipeline faced an uncertain sign-off but has since been shelved by the EU and Germany's government. It's now right to ask what the future might look like without a dependency on Russian gas: what will the implications be for energy infrastructure, supply, price pressures, and future trade?

At Noveus Energy, we're already finding the answers to these questions, as we believe a good understanding of what's driving the energy market can only inform current and future purchasing decisions and help to inform a robust risk management strategy. We assess the implications of any shift in the market and take a weekly snapshot published as our Radar Report, which provides an overview of the current situation, headlines across all energy markets and accompanying insights, and a market outlook.

A dynamic solution to energy purchasing

Data centres require huge amounts of energy, so where your power comes from as well as how much it costs will be major concerns.

As a business leader, you're likely looking for both strategic clarity and cost certainty. And there are ways to achieve both things through a dynamic energy purchasing strategy, which data centres are well placed to implement and, in my opinion, should be investigated at the very least. A dynamic approach delivers a lower commodity cost by maximising the benefit of market volatility and limiting the risk of buying when prices are artificially high.

It requires an in-depth understanding of the market, daily analysis, and ongoing adjustments to deliver a lower price than the average market, reflecting your financial and operational objectives. These can include budget considerations, expected market fluxes and demand forecasts, plus any energy you may be self-generating on-site.

At Noveus Energy, when we say our approach to managing energy is dynamic, it is constantly reviewed and adjusted. The result: more significant opportunities to maximize market changes and control and reduce costs.

Put it this way: Most of us would expect our financial advisers to continually review the market and adjust our position on an ongoing basis. However, despite greater volatility, this rarely happens in the energy market. In normal market conditions and with a dynamic approach, you can save up to 10% on energy procurement. However, in today's volatile environment, you could make considerably more savings, but you must be absolutely fleet of foot – daily, weekly – as the market is changing all the time.

Choosing the right renewable energy sources

For data centres, staying on top of ways to reduce emissions and achieve net-zero targets is a central challenge, with global data traffic accounting for more than two per cent of global climate emissions, nearly equivalent to the entire global airline industry, according to the Global e-Sustainability Initiative. There is good news. Significantly, government net-zero policy will drive out coal (and eventually gas) in exchange for renewable generation. In my view, the drive towards renewable energy will only increase, as both businesses and consumers demand zero-carbon power from suppliers alike.

But what are your options, and do you have enough clear-cut information to make informed decisions? You may even be asking what's the difference between REGO and GoO, and how do I know that energy is truly 'green'?

How can data centres purchase renewable energy?

Many data centres in the UK purchase green energy through their supply contract via either a UK-issued Renewable Energy Guarantee of Origin (REGO) certificate or an EU Guarantee of Origin (GoO)

certificate. There are various options, depending on the fuel source:

- **Standard renewable energy**
  Anything that can be REGO certified, including less noticeable options like landfill waste energy.
- **Natural renewable energy**
  Any natural energy source, such as wind, solar, and hydro.
- **Technology-specific renewable energy**
  When energy is supplied from one specified source, such as a wind farm.
- **Corporate/sleeved PPA (CPPA)**
  An agreement between an organization and one generator/supplier to provide energy.
- **Hybrid PPA**
  An alternative option that allows for both a corporate PPA and grid power supply.

The options outlined above are a win-win for all involved. The procuring corporation secures a greener energy supply and/or credits to offset its emissions. The renewables project gets a route to market for its energy and can maximize the overall value of a site's output via initiatives such as battery storage. 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 a contract is more like 3-5 years compared to 10-15 for CPPAs.

What will happen to the availability and price of renewables?

In the coming years, we can undoubtedly expect greater scrutiny regarding renewable energy and offset certificates. There will be a focus on adding actual renewable energy to the grid, rather than simply purchasing green offset credits (for energy that already exists). The market will increasingly ask: how green and ethical is the green energy or offset I am purchasing?

In addition, in 2021 the EU stopped recognising REGO certificates issued in the UK. In a counter move, the UK government has since stated it will stop recognising EU GoO certificates by October 2022 or April 2023, at which time offsets will no longer exist against EU certificates.

The UK government's decision will have a major impact on renewable energy in the UK, creating a scarcity of supply by reducing the amount readily available to procure, which should be a factor of concern as it will only drive prices upwards.

In conclusion

The current state of the energy market should be a cause of concern for data centres, where a high proportion of costs is spent on power.

While it's no secret the energy market has shown extreme volatility of late, there are still many opportunities. With a dynamic approach to energy purchasing, you can make considerable savings/partially mitigate the steep increases. Now is also a time when tenants will be insisting on renewable power, and when reducing emissions and achieving net-zero targets are central challenges. There are many renewable energy options available to you but be aware that this is a fast-moving market and both the cost and availability will come under pressure in the next 12-24 months.

If you would like an informal discussion about what these opportunities might look like for your business, please get in touch with Bob Collinson at Noveus Energy.

What lies ahead for data centers and sustainability? A complicated yet critical path

By Nicholas Laag, Managing Partner and CEO

AS GLOBAL COMPUTING CAPACITY continues to increase, energy consumption in data centers follows suit. While data centers have made energy efficiency a major goal, with swelling demand and incoming regulations, the sustainability challenge has only begun. So what does the future hold for data centers and sustainability? How can leaders work towards not only increasing efficiency, but playing a more active part in the fight against climate change?

With so many emerging technologies and platforms to track and monitor energy usage and carbon emissions, one would think that the data center industry is way ahead of the game, which is true to some extent. But with an explosive amount of growth, new builds and surge in demand — the path ahead is complicated yet critical for the future.

The Great Power Surge Meets Emerging Tech

As one of the most energy-intensive spaces ever created, the problem of energy consumption is not new to data centers. Neither is the problem of increasing energy consumption. Between 2010 and 2018, data center computing went up by around 550 percent. However, even with this massive spike in demand — not to mention the proliferation of mobile device usage during this period — national data center energy usage held steady at around two percent. This huge discrepancy is due to the hard work data centers put toward creating more economical technology around elements like servers, storage, network hardware and cooling. As impressive as these industry efforts have been, the biggest challenges are yet to come. Estimates hold that total data energy usage over the next 10 years will triple, and in the next 20 years will account for 10 times the amount of global greenhouse gas emissions as today. The rise in future demand will be advanced by two primary factors. The first driver is a steady increase in existing types of network transmissions like video streaming, video conferencing, online gaming, social networking and blockchain mining. Internet traffic in North America has increased by almost 25% year-over-year since 2017, and there are not any signs of slowing. The second driver is the future emergence of new types of network usage enabled by developments like 5G and IoT, where uncertain growth in network usage increases may be exponential.

Future Growth: Adjusting For Oversight

Along with increased demand, the future will also bring close monitoring of data center energy usage and stricter oversight concerning their limits. European Union data centers have introduced a green data center pact and expect governmental sustainability regulations in the near future. Governments in places like Australia and New Zealand are expected to do the same. Areas like Amsterdam and Singapore are already in the midst of an indefinite moratorium on any new data center construction that has been in place since 2019.

In the United States, last year's Energy Act promises a country-wide study on data center energy and water use with the aim of evaluating and addressing data center energy usage. The question isn't whether more transparency and new regulations are on the horizon; it's when — and more importantly, what. Restrictions could come at the municipal, state or national level. They could involve overage taxes, compliance limits or set efficiency standards. The restrictions could also include servers, storage, network devices, cloud infrastructure or even construction in general.

The challenge for the next generation of data centers emerges as a layered one. On the first level, best practices in regard to data center system efficiency were able to offset a huge growth in demand, but those capabilities are reaching a point of diminishing returns and won't be able to keep up with future growth with the same ability to limit energy usage. Although aspects like standardized best practices around hot/cold aisle containment and blanking plates create excellent efficiency now, counting on that trend to continue for the next five to ten years is highly questionable. On

the second layer, the plan behind any long-term future developments cannot assume that power availability will be procured the same way it is now, where any land is available to construct a facility of any Power Usage Effectiveness (PUE). Instead, data center design, construction, and operation energy consumption will be tracked closely for efficiency regulations that will likely be far stricter than the industry is currently familiar with.

Conservation Holds the Key to the Future

There are hurdles ahead, but there is plenty of hope for the future. Data centers have overcome massive obstacles before, and the industry can do it again. Together, we can achieve greatness by doing what we do best: focusing on constant technical innovation. While many avenues of innovation require attention when striving for a sustainable future, finding new ways to conserve energy is paramount. Yes, a shift toward renewable energy sources is key, but it's not enough on its own. The same goes for efforts toward reducing water usage, reusing heat and refurbishing IT equipment. These efforts need to be led by the largest and most important area for data centers to focus on: improving energy efficiency whenever possible. For example, look at Google's efforts toward shifting data center load to times when renewable energy supply is greater, which has the chance to revolutionize the way we think about power usage.

Updating and consolidating servers to be more energy-efficient, better managing data center airflow, seeking out more effective cooling solutions, adjusting and improving HVAC systems, implementing carbon tracking solutions, introducing Artificial Intelligence (AI) aimed at energy optimization, improving energy storage technologies — these are the arenas where major gains in conservation and climate change can be made. It's also these areas where organizations like the DCA can play a part in propelling the industry forward. By creating a space for industry professionals to share ideas and best practices in the interest of raising the industry standard toward energy efficiency, DCA can provide a valuable platform by which to raise the efficiency tide that in turn lifts all data centers. By focusing on energy efficiency and sharing knowledge, the data center industry can not just aim for carbon neutrality, but carbon negativity.

The data center industry has a rich history of technological development in the name of a more efficient, more sustainable future. With energy consumption set to grow at an unprecedented rate and stricter, much-needed carbon footprint regulations on the horizon, our most critical years still lie ahead. The industry needs to continue that proud legacy by redoubling down on our efforts to improve energy efficiency. In order to address the future, the answers may just lie in the past.

Integrating data centers with low carbon energy assets

THE INFORMATION and communications technology (ICT) sector is one of the fastest-growing sectors in the world. It is apparent that the large amount of information and digital services we consume via the Internet also demands physical resources in the form of large, concentrated information technology (IT) infrastructure. We see this especially in the growth of data centers and their energy and resource consumption. Data centers consumed approximately 270 terawatt hours (TWh) of electricity globally in 2019, or about 1% of total global power consumption, according to the International Energy Agency (IEA).

This is expected to rise as 5G, artificial intelligence (AI), and other enabling technologies unlock a host of new applications. Facing this development in a time where renewable energy is still scarce requires data centers to explore and utilize power supply concepts that support the energy system of the future.

The Sustainable Digital Infrastructure Alliance (SDIA) and its members advocate supporting the integration of data centers with energy assets, be they decentralized renewable energy assets or centralized Combined Heat and Compute (CHC) assets. Such integration would enable distributed, resilient, and environmentally friendly digital infrastructure, and facilitate the decarbonization of our energy system.

This paper outlines, at a high level, the concepts that could be employed to deliver the twin transition of decarbonization of our energy systems and the digitalization of our economy. This paper aims to highlight where our focus should turn next in creating a truly sustainable digital economy by 2030. We call on policy-makers and industry stakeholders to acknowledge energy asset integration and similar concepts as a feasible solution to energy-, climate-, digital sovereignty-, and resiliency-related challenges, and support their development and rollout with respective adjustments in policy frameworks and funding from the public and private sector.

Access the full whitepaper - click here.

SDIA

Founded in 2019 and co-based in Germany and the Netherlands, the SDIA is a nonprofit network of more than 90 members and partners working to catalyze the transition toward a sustainable digital economy.

The Alliance also brings together stakeholders from across industries and fields, both public and private, in an effort to realize its Roadmap to Sustainable Digital Infrastructure by 2030.

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