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DIGITALISATION WORLD

Modern enterprise IT - from the edge to the core to the cloud

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Delivering intelligent automation to retail

By DataRobot

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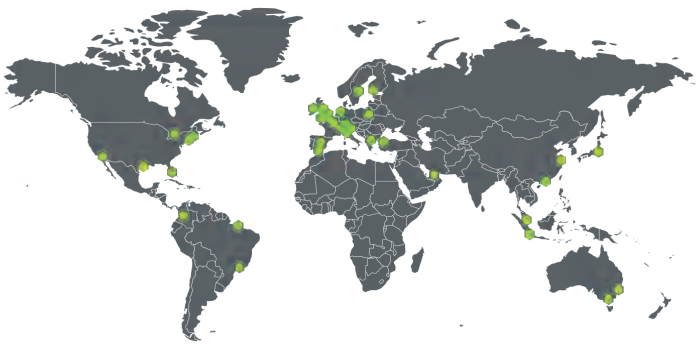

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Editor's View

By Phil Alsop

Security – a new normal?

THERE USED TO BE two schools of thought when it came to security. The 'optimists' believed that it was possible to make an organisation so secure that it was impervious to attack – whether from inside or outside threats.

The gloomsters believed that, for any business, it was only a matter of time before a security breach, and therefore it was as important to concentrate as much on business continuity and disaster recovery (BC/DR) as on preventing security attacks in the first place.

I would like to suggest that the seemingly hourly reports of security breaches we see at the present time, with ransomware being a particularly prevalent and pernicious strain, means that the gloomsters have 'won' the argument. A pyrrhic victory for sure, but nevertheless, if it serves to concentrate minds on how to survive a major security breach, then there's a crumb or two of comfort in this change in outlook.

Having started life in the storage industry in the dim and distant past, I've always been made acutely aware of the importance of not just data backup, but also the recovery part as well. As with so many things insurance related, every organisation has to carry out a detailed risk analysis, with the financial sums being of critical importance. Too often, it seems that these sums concentrate rather too heavily on the capital cost of implementing any comprehensive BC/DR, rather than the, admittedly unquantifiable, consequences of a data breach/ransomware attack.

What price reputation? Especially in the mad world in which we live, whereby famous individuals from all walks of life appear to enhance their public profile by indulging in behaviours which are dishonest, if not potentially criminal? The cost of lost sales is also somewhat vague, depending on how long the business is offline and, of course, depending on how many customers do go elsewhere, because of the reputational damage.

As we accelerate into the digital age, there are no easy answers, but I would urge all businesses to devote plenty of time to some really serious thinking about their ability to survive, or not, from some kind of a cybersecurity attack. It really does seem to be a question of when, not if.

DIGITALISATION WORLD

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Digital leaders expect long-term workplace changes to continue with network improvements

EQUINIX report reveals changing working patterns spark surge in digital infrastructure investment.

Equinix, Inc. has published the findings of its annual global study of the views of IT decision-makers on the biggest technology trends affecting businesses worldwide and the impact of the COVID-19 pandemic on digital infrastructure plans.

Surveying 2,600 IT decision-makers from diverse enterprises across 26 countries in the Americas, Asia-Pacific and EMEA regions, the study reveals:

- 51% of global businesses have rearchitected their IT infrastructure to meet new remote and hybrid working demands, with tech budgets increasing to accelerate digital transformation.
- 64% of digital leaders believe there will be long-term changes to where and how people work within their organization.
- More than half (57%) of companies globally still intend to expand into new regions, countries or metros, despite the disruption experienced as a result of COVID-19.

Digital Transformation In The Post-Pandemic Future

Digitization and business investment in digital infrastructure have increased as a result of COVID-19. 47% of the digital leaders surveyed around the world said they have accelerated digital transformation plans because of the pandemic, while 42% said their budgets have been increased to satisfy the rapid growth in digital demands.

There has also been a major overhaul of IT strategies to meet the challenges emerging from the pandemic. Six in 10 said they have revised their IT strategy as a result of COVID-19, while 58% said they want to invest in technology to be more agile post-COVID.

Asked about their biggest priorities for their organization's digital strategy, 80% of respondents reported digitizing their IT infrastructure was a top priority, with 57% saying they see interconnection as a key facilitator of digital transformation – up 9% on last year's results.

Concerns That The Pandemic Will Have Put The Brakes On Companies' Expansion Plans Lessened

- 57% of businesses still have plans to expand into new regions, countries or metros, according to the digital leaders surveyed.
- Of that 57%, nearly two-thirds (63%) plan to achieve this virtually, rather than by investing in physical IT infrastructure in-market.

Utilizing Interconnection For Success

- 58% of IT leaders said they believe interconnection – the direct and private exchange of data between organizations – will help them to navigate the challenges they face due to COVID-19.
- Those stating interconnection was key to their organization's survival increased to 50%, up from 45% last year.

Claire Macland, Senior Vice President, Global Marketing at Equinix, said: "Digital leaders around the world were clearly already working to accelerate their organizations' digital transformation. This effort has been supercharged by COVID-19, as this study clearly relays. "Many companies are now investing more in their digital infrastructure to enable them to embrace a hybrid working model and thrive in the new world of work we all find ourselves in.

Despite headwinds in many sectors, many organizations are continuing to expand physically and virtually into new markets and regions around the world. "This increasing focus on digitization and expansion is one of the reasons why Equinix has continued to invest in its own growth. We completed 16 new expansions in 2020 – our most active build year ever – and expect to continue to evolve Platform Equinix to support our customers as they continue on their digital transformation journey."

The Global Interconnection Index (GXI) Volume 4, a market study recently published by Equinix, forecasts that overall interconnection bandwidth—the measure of private connectivity for the transfer of data between organizations – will achieve a 45% compound annual growth rate (CAGR) from 2019 to 2023, globally. The expected growth is driven by digital transformation, and specifically by greater demands from enterprises extending their digital infrastructure from centralized locations to distributed edge locations.

Businesses invest in workplace changes

REMOTE IT support, cloud-based solutions and cybersecurity infrastructure among top IT investment priorities across all sectors.

Dynabook Europe GmbH reveals the results of its new research report, 'The Hybrid Shift: Managing an increasingly remote workforce', which shows that 65% of European IT decision makers have access to increased IT budgets this year both to accommodate more widespread remote and hybrid working, as well as to support business continuity.

The research, commissioned by Dynabook in partnership with Walnut Unlimited, surveyed more than 1,000 senior IT decision makers at medium to large enterprises across a range of industry sectors within the UK, France, Germany, Spain and the Netherlands to reveal IT spending, new working patterns and device priorities for the next 12 months.

While all regions surveyed indicated an increase in IT spend, Spain noted the most change, with 71% of organisations demonstrating a rise in technology investments in the next year, closely followed by 70% of businesses in the Netherlands. Over three quarters (76%) of financial services organisations revealed increased budgets, while 73% of manufacturing businesses said the same. Enterprises operating in the retail sector were the least likely to up IT budgets, although over half (54%) still indicated increased IT expenditure.

Remote working here to stay

Changing work patterns and locations are a clear driver for this growth in IT spend. The study found that over two thirds (67%) of employees are expected to either work from home or from no fixed location following the pandemic, which has increased from 53% before COVID-19.

When asked about ensuring the productivity of their growing remote workforce, over half (51%) of organisations surveyed indicated they will prioritise providing remote support/ assistance for staff. When compared to similar research conducted by Dynabook in 2018, this has increased from 29%.

Secure communication and collaboration tools were also regarded as important for employee productivity – 41% of IT decision makers noted both as key for supporting good employee performance, while 37% indicated IT training as an important factor here.

Shifting business priorities

The research also found that European businesses are continuing to accelerate digital transformation and equip themselves with a robust IT infrastructure to support a new remote and hybrid workforce.

Cloud solutions and remote IT assistance were highlighted as top priorities for organisations across all markets and sectors, as 50% of respondents ranked both technologies top respectively. UK businesses were found to be prioritising remote IT support the most, with nearly two thirds (63%) naming this as a key focus.

Cybersecurity infrastructure (48%) is also expected to be a key technology investment priority in the next year, followed by IT training for staff (40%) and equipping employees with devices coming in fifth (37%).

When comparing the importance placed on these technologies to pre-pandemic times, 77% of organisations now regarded security software as more important, while 73% said collaboration tools are now more significant.

At the same time, 70% indicated cloud platforms as more valuable, and 62% regard device accessories with heightened importance going into the new normal.

Devices in demand

The research also highlighted an increased value placed on laptops – the unsung heroes of the pandemic – as nearly three quarters (74%) of businesses now regard purchasing decisions around such devices as more important than before COVID-19.

The UK saw the highest disparity between laptops and desktops usage, with 90% of UK companies using laptops and only a third (33%) using desktops

for remote working. Desktops popularity remains higher in other parts of Europe – Spain (52%), France (47%), Netherlands (46%).

What's more, two thirds (66%) of organisations are now planning to integrate more laptops into their remote working infrastructure over the next 12 months, demonstrating that the reliance on notebooks will remain strong for the rest of 2021.

When it comes to key device features, European businesses appear to be taking heed of warnings of increased cyber-attacks, with 81% of businesses considering security to be an important feature when purchasing a laptop.

Other key priority features include connectivity (80%), performance (76%), battery life (72%) and portability (70%). That said, 28% consider performance to be the most important feature, compared to 20% for security.

"The last year has seen unprecedented change in the way we work, and it's clear from our research that European businesses are still racing to ensure their IT infrastructure meets the demands of an increased remote and hybrid workforce," said Damian Jaume, President, Dynabook Europe GmbH.

"Armed with increased budgets, it's evident that the role of the device has grown in importance as organisations realise the vital role hardware plays – alongside the right software – in keeping employees secure, connected and productive in this new world."

Research reveals hybrid work pain points

ACCORDING to new research conducted by Wrike, employee engagement (56%), burnout (53%), and reduced productivity (52%) are top concerns for IT leaders in 2021 and beyond, as they continue to enable remote workers and plan for new, hybrid workplace environments.

Last year's shift to remote work compounded an already complex and distributed work environment, one cluttered with an array of heterogeneous applications and communication channels. The negative impact of this digital workplace chaos on employee efficiency and productivity is set to increase further, as the world enters the new era of hybrid work.

As a result, nearly 60% of IT executives surveyed are prioritizing investments in solutions and strategies that power collaboration across the enterprise. In particular, they'll focus on providing greater visibility into ownership across the organization (45%), enabling more secure collaboration (51%), and powering seamless external collaboration (46%).

"The pandemic put CIOs in the hot seat last year, forcing IT departments to accelerate digital strategies that would quickly support remote work and keep organizations running," says Andrew Filev, Senior Vice President and Wrike General Manager, Citrix.

"This first 'COVID-19 wave' of tech investment had 55% of respondents focused on basic, secure communications between remote teams. While those tools are important, they don't alleviate the complexities of collaborating in a work-from-home model, which leads to burnout and major inefficiencies.

"That's why we're now seeing 58% of IT leaders – up from 17% one year ago – prioritizing powerful collaborative work management solutions in 2021 to help dispersed teams share and drive work in a systematic and cohesive manner."

Going deeper into the report findings, data collected from Pulse's executive knowledge community shows that IT

leaders believe there are three key planning, process, and execution use cases that would benefit most from cohesive/enterprise-wide collaborative work management solutions: OKRs and company objectives, requests and approvals, and agile planning and execution.

Fifty-eight percent of IT leaders confirmed that project management solutions tied with internal communications capabilities will be the number one tool they invest in this year to enable high-performing teams to execute with speed, precision, and agility.

Hybrid cloud needs to evolve

CLOUDBOLT SOFTWARE has published findings based on a global survey of IT leaders from a range of industries. CloudBolt's inaugural Industry Insights report, "The Truth About Hybrid Cloud and Digital Transformation," conducted in partnership with Pulse, a social research platform trusted by 30,000 verified CxOs and global tech leaders, showed widespread agreement on several key issues related to digital transformation (DX).

Survey respondents included directors, VPs, and other executive titles among IT professionals across the Americas, EMEA, and APAC. In the survey, 94% of respondents agreed that hybrid cloud is critical to digital transformation.

Specifically, they cited three top initiatives most critical for DX through hybrid cloud: enabling self-service IT, accelerating automation initiatives, and optimizing cloud spend.

In these areas, the majority of IT leaders also agree that there are specific challenges that currently exist in today's approaches:

- More than half (56%) believe that their self-service IT is too difficult, requiring expertise in clouds and infrastructure tools
- 76% still rely on some form of custom coding when it comes to integrating different tools to advance their IT automation initiatives
- 78% say they lack the visibility necessary to optimize cloud deployment, while 54% say they lack automated ways to optimize cloud costs

The good news is IT leaders have a clear understanding of what they need to move forward when it comes to self-service IT, automation acceleration, and cloud cost management:

- 71% want self-service IT to be a true "easy button," without the need for end-users to understand underlying cloud-native tools and technologies
- 62% want integration approaches that don't require deep domain knowledge or special expertise typically found in custom coding projects
- With cloud cost management, 56% want the ability to continuously notify stakeholders of cost overruns and automated methods for optimization

The findings released recently mark the launch of an ongoing research series dedicated to providing timely, actionable, and essential hybrid cloud technology trends and insights. While the focus of this study was digital transformation, future installments, to be delivered two to three times annually, will drill down into issues surrounding DevOps, cloud operations, security, and governance. The goal is to provide IT leaders with continuous insight into broader industry trends, allowing them to benchmark their own progress as well as identify solutions to challenges faced by their peers.

Security and networking teams holding back digital transformation

NETSKOPE RESEARCH reveals that - despite shared goals - 'combative' and 'dysfunctional' relationships are jeopardising projects estimated to cost $6.8tn globally between 2020 and 2023.

Netskope has revealed startling new research showing a major breakdown in collaboration between two of the central components of the IT team - networking and security. While 45% of European security and networking teams sit within the same larger group and report to the same boss, 43% of European IT professionals state that 'the security and networking teams don't really work together much'. Even more damning, 44% of network and security professionals described the relationship between the two teams as 'combative' (13%), 'dysfunctional' (10%), 'frosty' (10%) or 'irrelevant' (10%).

These insights should be viewed with alarm given that 51% of research participants agreed that a lack of collaboration between specialist teams stops their organisation from realising the benefits of digital transformation (rising to 54% among CIOs).

Industry analyst IDC recently valued the upcoming global spend by enterprises on Digital Transformation projects between 2020-2023 at $6.8 trillion, indicating the scale of the potential wastage that could be caused by these poor working relationships.

There were more heartening insights discovered during the research. European network and security professionals identify similar priorities driving their team's activity in 2021, flagging the same top three priorities of 'Supporting increased productivity for the organisation as a whole', 'Increasing visibility and control' and 'Expansion of infrastructure to support business growth'.

Digital Transformation projects are being pursued by both teams (85% of research participants are either working on a DT project currently or have just completed one). 56% of these projects involve both networking and security transformation, and 56% have a sponsor within both networking and security teams.

The headline lack of collaboration appears illogical at a day-to-day level, as well as amid strategic transformation projects. 82% of both the security professionals and the networking professionals state that security is part of the network team's responsibility, specifically answering that 'security is built into the network architecture'.

When looking at the last year's growth of remote working, 42% of security professionals and 37% of networking state that security has been their biggest challenge.

Planning is the key to cloud success

ALTHOUGH most organisations (80%) recognise cloud computing as being vital to their financial security, more than half (57%) have encountered unexpected costs. These findings come from part three of the four-part Cloud Impact Study from Aptum, the global hybrid multi-cloud managed service provider. The report, titled A Bright Forecast on Cloud, explores the financial benefits of cloud computing and how organizations can optimise cloud spend.

According to the report findings, most IT professionals (80%) see success in utilising cloud services to unlock greater business profitability. The agility of cloud deployments allows organisations to quickly scale their services to support demand, release new products or services to market, and subsequently improve profit margins and increase efficiencies. In fact, increased efficiency is a common driver behind cloud computing for 72% of respondents. The overall efficiency and flexibility of cloud allows organisations to only pay for what they use, increasing overall profitability, which is cited by 39% of respondents as a motivator behind cloud adoption.

However, as organisations migrate workloads to different cloud platforms, visibility and control into cloud environments becomes difficult to achieve, often leading to unforeseen costs – a key challenge for 81% of respondents. Without necessary insights to evaluate performance and enforce remedial measures for issues, the efficiency of cloud becomes hard to manage. This is the case for over half of respondents (57%) who say cloud has resulted in unanticipated costs, and over a third of respondents (35%) who admit they are wasting IT spend due to the inefficient use of cloud platforms.

"The greater operational efficiency and flexibility that cloud promises can grant organisations opportunities to unlock new performance capabilities and help cut costs," Leigh Plumley, Chief Revenue Officer at Aptum, explains. "But most businesses don't have the in-house expertise to effectively specialise and manage a range of environments and stay current with the rate of change in technologies."

Plumley continues: "A cloud partner can help organisations harness the power of cloud to deliver greater efficiencies. Partners like Aptum will provide a holistic approach encompassing best-practice architecture, security, resilience and cloud-connectivity. For businesses to understand the true total cost of ownership and deliver maximum value from their cloud investments, it's essential to consider all these components of cloud architectures."

The data suggests that cloud deployments without expert guidance from a Managed Service Partner (MSP) can increase associated costs if cloud optimisation is not a fundamental principle from the start. Taking a holistic approach to cloud infrastructures, where visibility and control are embedded from design, can ensure costs are optimised and the service runs at maximum efficiency.

Europe ahead of US on cyber-business alignment

TREND MICRO has revealed that European business and IT leaders are more likely than their North American peers to view cybersecurity as part of the business mission — but that there's still plenty of room for improved alignment.

The Trend Micro-sponsored research was conducted by the Enterprise Strategy Group. It found that 73% of European respondents today view cybersecurity partially or entirely as a business area, versus just 58% in North America. In addition, 80% of European organisations indicated that most (47%) or some (32%) of their board members are knowledgeable about cybersecurity.

What's more, things are improving, with 82% claiming that the board is somewhat or much more engaged with security than it was two years ago.
This is good news as, when board members are more educated and engaged, they ask tougher questions, dig into issues, and make the leap from cybersecurity to business issues, the report noted.

However, there's still a long way to go: less than half of European respondents rated their C-level executives' commitment to cybersecurity (49%) or their organization's intention to build cybersecurity into business processes and IT initiatives (45%) as adequate or fair. Over half (56%) rated their company-wide commitment to cyber-hygiene as adequate, fair, or poor.

By minimising their commitment to cybersecurity, boards can inadvertently increase risk and make the deployment of security controls more complex and costly than they need to be. This comes at a time when 77% of European respondents believe cyber-risk is increasing, primarily due to escalating threat levels.
European organizations are also more mature than their North American counterparts in areas like GRC (29% versus 15%) and third-party risk management (22% versus 13%). However, they are not investing in application security (3%), security engineering/SDLC (6%), or endpoint security (5%) despite the renewed focus on these areas since the start of the pandemic.

"The GDPR has forced closer collaboration between cybersecurity and the business among European organisations, as this study clearly shows. But while this is laudable, it's disappointing to see areas like application and endpoint security still being neglected," said Camilla Currin, Cybersecurity Consultant at Trend Micro. "These will be crucial for organisations to drive the kind of secure digital transformation projects on which post-pandemic growth must be built. The first stage is getting the board to understand the strategic criticality of cyber to business success."

The report makes the following recommendations to improve cyber-business alignment:
·Create a Business Information Security Officer (BISO) role to drive security into business processes, critical assets, sensitive data, and employee roles
·Change the reporting structure so that the CISO reports directly to the CEO, for greater exposure and alignment
·Formalise and document a top-down cybersecurity programme highlighted by KPIs and established metrics, to help CISOs better communicate with business executives

Businesses to focus on employee experience

EMEA business leaders are out of touch with what employees want in the hybrid workplace experience, and 66% of organisations plan to adopt a different operating model than they had before the COVID-19 pandemic, according to according to a new survey from Unisys Corporation (NYSE: UIS).

A majority (61%) of these organisations say these new models are designed to ensure employee safety and to achieve more productivity (47%). Almost two thirds (64%) say the key driver for them is to create a better overall employee experience. The findings are included in a new IDC white paper, sponsored by Unisys, titled "Digital Workplace Insights™: Seeking Digital and Experience Parity to Support the Hybrid Workforce."

Further key EMEA highlights from the survey include:

- While work location and schedule that is conducive to family life is important for 66% of employees in EMEA, only 49% of business leaders see this as important.
- 51% of employees said that empowering teams and individuals is crucial, but here the discrepancy was even higher with only 31% of businesses acknowledging this. This gap is significantly lower in North America (63% of employees and 51% of businesses).
- On the other hand, 55% of business leaders say that access to the most up-to-date technology for the task at hand is key to an ideal employee experience. This is only important to 43% of employees.

Concerns about remote working differ significantly

Similarly, business leaders show much more concern around the practicalities of remote working than employees:

- For 38% of business leaders, difficulties communicating and working with other team members is a concern. Only 24% of employees agree.
- 38% are concerned about the lack of management oversight and visibility as a result of home working, compared to only 7% of employees.
- While 38% are worried about potential difficulties accessing data, only 11% of employees believe this is a challenge.
- Using unfamiliar or new work-from-home technologies is seen as a challenge by 41% of business leaders, but only by 10% of employees.

Overall, employees are far more positive about the new remote working model, with 33% not seeing any or just a few noticeable challenges that come with remote working.

"One of the outcomes of 2020 has been the rapid technology, process and policy adjustments that most organisations have made to support hybrid ways of working," said Holly Muscolino, research vice president, content strategies and the future of work at IDC.

"Across the globe, almost 40% of the workforce was forced to shift to remote ways of working almost overnight, while the remaining 60% continued to adapt and find new, safer ways to do their jobs.

Now we know that, for most, there will be no return to the business models of 2019. Remote employees will continue to comprise almost one-quarter of the global workforce, albeit with some variability across industries. The hybrid workforce – remote, on-site, in the field and transitioning between locations – is here to stay, and the temporary changes organisations put into place throughout 2020 must become permanent going forward," said Muscolino.

Productivity remains high despite untapped technological potential

Despite their concerns, two thirds (66%) of business leaders in EMEA say that remote work is just as productive – or even more productive – than working from a company location.

To capitalise on this, 42% of businesses plan to make targeted investments to generate growth and are prioritising innovation to thrive in a post-COVID era. Here, 5G (48%), IoT (46%), AI (52%) and modern security platforms (40%) are seen as providing the greatest benefits to organisations' work environments in the next five years.

"The real challenge for IT is providing experience parity for all employees, working in various and hybrid locations", says Kevin Turner, EMEA Digital Workplace Strategy Lead, Unisys. "This means enabling all workers to find individual ways of working that drive productivity and innovation anytime, anywhere and on any device.

"AI, automation, analytics and proactive problem resolution are part of a broader set of technologies and processes required to provide this. This survey shows how varied the perceptions are on a modern, Digital Workplace. It also shows that many businesses think ahead by creating a workplace which will not only be more productive, but also be better for their employees."

Cloud services market totals $312 billion

The worldwide public cloud services market, including Infrastructure as a Service (IaaS), System Infrastructure Software as a Service (SISaaS), Platform as a Service (PaaS), and Software as a Service (SaaS), grew 24.1% year over year in 2020 with revenues totaling $312 billion, according to the International Data Corporation (IDC) Worldwide Semiannual Public Cloud Services Tracker.

SPENDING CONTINUED to consolidate in 2020 with the combined revenue of the top 5 public cloud service providers (Amazon Web Services, Microsoft, Salesforce.com, Google, and Oracle) capturing 38% of the worldwide total and growing 32% year over year. Thanks to an expanding portfolio of SaaS and SISaaS offerings, Microsoft now shares the top position with Amazon Web Services in the whole public cloud services market with both companies holding 12.8% revenue share for the year.

"Access to shared infrastructure, data, and application resources in public clouds played a critical role in helping organizations and individuals navigate the disruptions of the past year," said Rick Villars, group vice president, Worldwide Research at IDC. "In the coming years, enterprises' ability to govern a growing portfolio of cloud services will be the foundation for introducing greater automation into business and IT processes while also becoming more digitally resilient."

While the overall public cloud services market grew 24.1% in 2020, consistent with the past four years, the IaaS and PaaS segments have consistently grown at much faster rates. This highlights the increasing reliance of enterprises on a cloud foundation built on cloud infrastructure, software defined data, compute and governance solutions as a Service, and cloud-native platforms for application deployment for enterprise IT internal applications.

IDC expects spending on foundational cloud services (especially IaaS and PaaS) to continue growing at a higher rate than the overall cloud market as resilience, flexibility, and agility guide IT platform decisions.

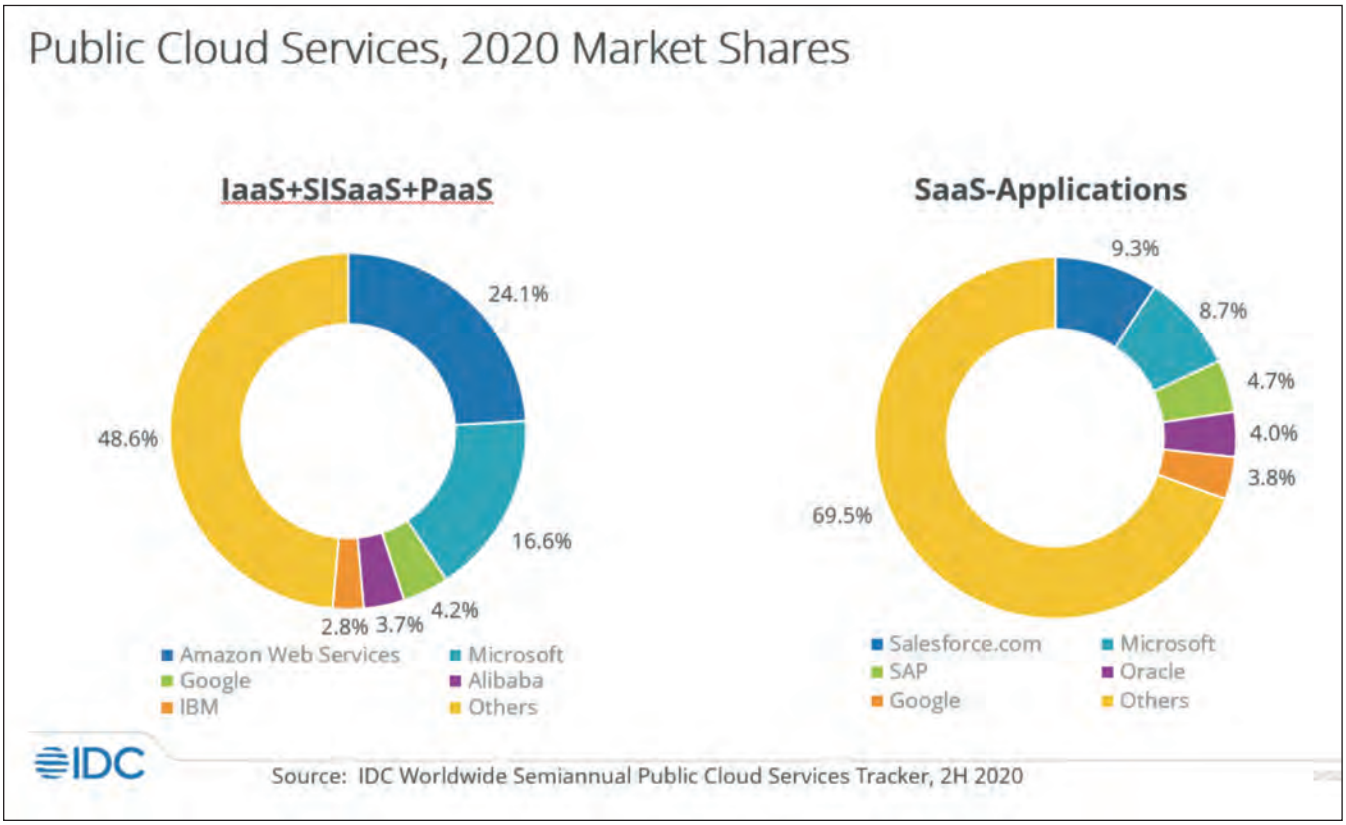
"Cloud service providers are rapidly expanding their portfolio of infrastructure and platform services to address confidential computing, performance intensive computing, and hybrid deployment scenarios," said Dave McCarthy, vice president, Cloud and Edge Infrastructure Services. "Extending these foundational cloud services to customer premises and communications networks enables a broader set of use cases than previously possible."

"The high pace of growth in PaaS, IaaS, and SISaaS,

Worldwide Public Cloud Services Revenue and Year-over-Year Growth, Calendar Year 2020 (revenues in US$ billions)

Segment	2020 Revenue	Market Share	2019 Revenue	Market Share	Year-over-Year Growth
IaaS	$67.2	21.5%	$50.2	19.9%	33.9%
SaaS – System Infrastructure Software	$49.2	15.7%	$40.2	16.0%	22.4%
PaaS	$47.6	15.2%	$36.1	14.4%	31.8%
SaaS – Applications	$148.4	47.5%	$125.2	49.7%	18.6%
Total	$312.4	100%	$251.7	100%	24.1%

Source: IDC Worldwide Semiannual Public Cloud Services Tracker, 2H20



which combined account for about half of the public cloud services market, reflects the demand for solutions that accelerate and automate the development and delivery of modern applications" said Lara Greden, research director, Platform as a Service. "As organizations adopt DevOps approaches and align according to value streams, we are seeing PaaS, IaaS, and SISaaS solutions become increasingly adopted and, at the same time, grow in the range of services and thus value they provide. Innovations in edge and IoT use cases are also contributing to the faster rates of growth in these markets."

"SaaS applications is the largest and most mature segment of public cloud with 2020 revenues of $148 billion. Organizations across industries hastened the replacement of legacy business applications with a new breed of SaaS applications that is data-driven, intuitive, composable, and ideally suited for more distributed cloud architectures. Organizations looking for industry-specific applications can choose from a growing assortment of vertical applications.

The SaaS apps market is dominated by a longtail of providers that account for 65% of the total market," said Frank Della Rosa, research director, SaaS and Cloud Software.

Looking at the segment results, a combined view of IaaS, SISaaS, and PaaS spending is relevant because it represents the foundational set of services that end customers and SaaS companies consume when running, modernizing, building, and governing applications on shared public clouds. In the combined IaaS, SISaaS and PaaS market, the top 5 companies (Amazon Web Services, Microsoft, Google, Alibaba, and IBM) captured over 51% of global revenues. But there continues to be a healthy long tail, representing nearly half the market total.

These are companies with targeted use case-specific PaaS services or cross-cloud compute, data, or network governance services. The long tail is even more pronounced in SaaS, where customers growing focus on specific outcomes ensures that over two thirds of the spending is captured outside the top 5.

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Global spending on Blockchain to reach nearly $19 billion in 2024

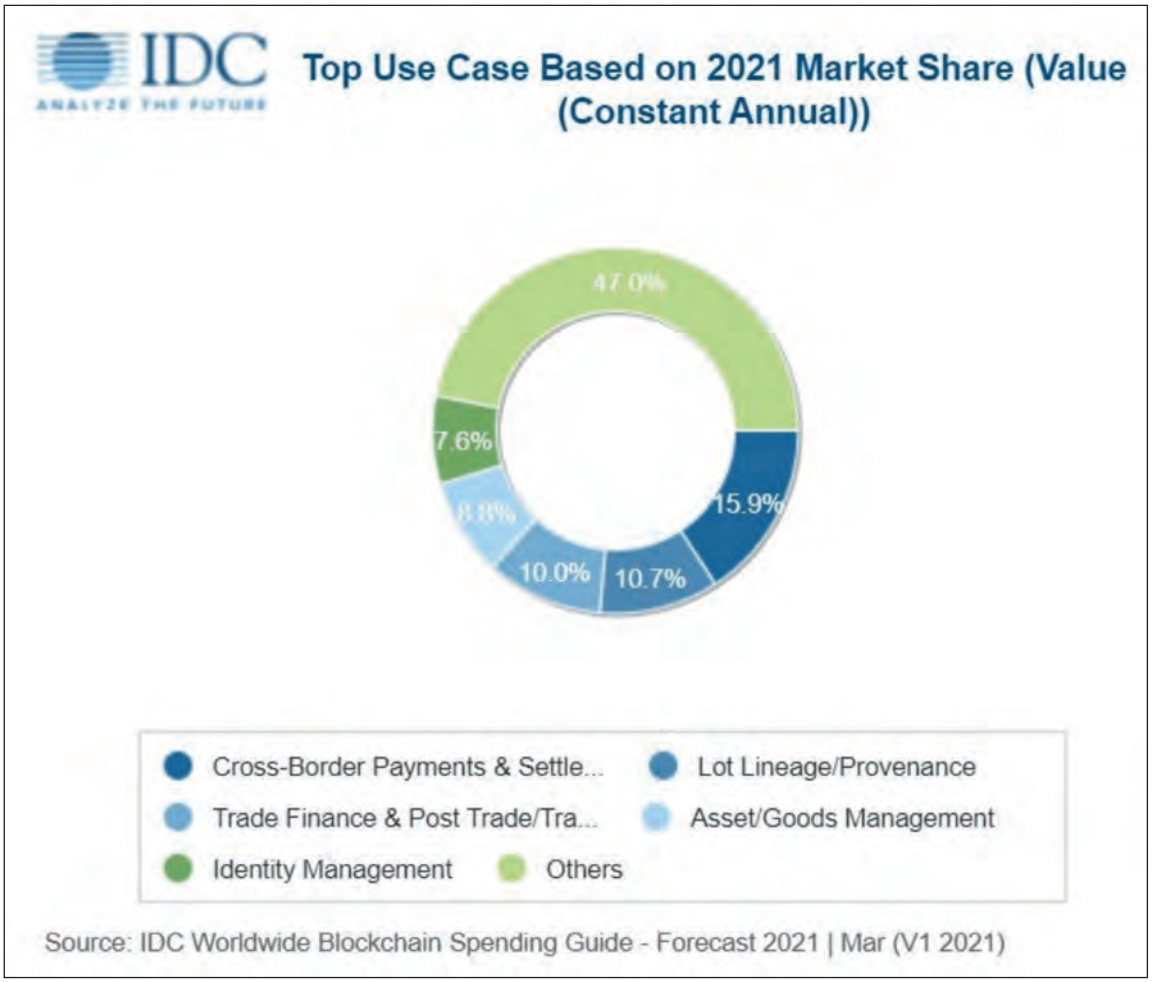
Organizations are forecast to spend nearly $6.6 billion on blockchain solutions this year, an increase of more than 50% compared to 2020. According to a new update to the International Data Corporation (IDC) Worldwide Blockchain Spending Guide, blockchain spending will continue to see strong growth throughout the 2020-2024 forecast period with a five-year compound annual growth rate (CAGR) of 48.0%.

"THIS IS AN IMPORTANT TIME in the blockchain market as enterprises across markets and industries continue to increase their investment in the technology. The pandemic highlighted the need for more resilient, more transparent supply chains, healthcare delivery, financial services, and so much more, and enterprises around the world have been investing in blockchain to provide that resiliency and transparency," said James Wester, research director, Worldwide Blockchain Strategies.

"What is also very important right now is that we are seeing real interest and investment by corporations, financial institutions, and even governments in areas they previously viewed with some uncertainty such as cryptocurrencies, digital assets, central bank digital currencies, decentralized finance, and stablecoins. This investment will have major implications in a very short time on everything from retail to financial services to capital markets."

The leading use case for blockchain in 2021 and throughout the forecast is Cross-Border Payments & Settlements, which uses distributed ledger technology to track, trace, and manage payments and settlements. The second largest blockchain use case is Lot Lineage/ Provenance, which is used to verify the origin and authenticity of a product as it moves throughout the value chain. Other leading use cases include Trade Finance & Post Trade/Transaction Settlements, Asset/ Goods Management, and Identity Management.

From an industry perspective, banking leads the way in blockchain spending, accounting for nearly 30% of the worldwide total in 2021. Banking will remain the top industry for blockchain spending throughout the forecast although its share of spending will diminish slightly by 2024. The primary use cases for blockchain within the banking industry are Cross-Border Payments & Settlements and Trade Finance & Post Trade/Transaction Settlements. The next



largest industries for blockchain spending are process manufacturing and discrete manufacturing, which together account for more than 20% of all spending worldwide. The leading use case in both industries is Lot Lineage/Provenance. Following the manufacturing industries are professional services, retail, and insurance, which rely on blockchain to trace the movement of payments and products. The industries that will see the fastest growth in blockchain spending over the forecast period are professional services (56.0% CAGR), state/local government (53.3% CAGR), and healthcare (52.7% CAGR).

"While the effects of the pandemic had organizations diverting budget or pausing projects to focus on more essential endeavors, this was not the case with blockchain," said Stacey Soohoo, research manager, Customer Insights & Analysis. "Along with the on-going pressures of digital transformation, COVID-19 made it clearer than ever that in order to have resilient business operations, changes in behavior, demand, and supply have forced companies to adopt a digital-led and blockchain-driven business model to survive lockdowns, supply disruptions, and future crises. Within the current environment, the use of blockchain is coming up especially within banking, manufacturing, professional services, and retail. Specifically, focus has been in tracking items from manufacturer to distribution to the end consumer and related payments and settlements that come with goods movements and management.

The market is now reaching a point where successful pilots and deployments have proven the need, but other key factors such as a willingness to collaborate are needed to instill blockchain technology across the entire value chain, with every single participant needing and wanting to be a part of the network." From a technology perspective, IT services and business services (combined) will account for more than two thirds of all blockchain spending throughout the forecast with IT services receiving slightly more investment over the forecast period. Blockchain platform software will be the largest category of spending outside of the services segment and the fastest growing technology category overall with a five-year CAGR of 52.9%.

Spending on blockchain solutions in the United States will be nearly $2.6 billion this year, making it the largest geographic market, followed by Western Europe ($1.6 billion) and China ($777 million). All nine regions covered in the Spending Guide will see exceptional spending growth over the forecast period led by China with five-year CAGR of 54.6% and Central and Eastern Europe (50.0% CAGR).

IDC boosts forecast for the worldwide services market

Worldwide IT and business services revenue declined 1.16% year over year (in constant currency) in 2020, according to the International Data Corporation (IDC) Worldwide Semiannual Services Tracker. In nominal dollar denominated revenue based on today's exchange rate, the decline was 1.53%, due to FX.

DESPITE BEARING the full brunt of the pandemic, services revenue managed to stay above $1 trillion last year and the overall contraction in 2020 proved to be milder than forecast in September 2020.

IDC now expects the services market to have a strong rebound in 2021. The current forecast projects year-over-year growth in both 2021 and 2022 to be around 4%. This is a notable improvement over the September 2020 forecast, which projected the market to grow close to 2% in 2021 and 3.2% in 2022. The improved outlook is buoyed by better-than-expected revenue in 2020, especially in Q3 and Q4, a brighter economic outlook and growing business confidence, and the pandemic's long-lasting impact on IT and business services spending – the new normal.

The demand-side shock was indeed severe in 2020. Most top vendors saw revenue growth slow or decline last year, particularly in Q2 and Q3. However, in aggregate, the 2020 market contraction was softer than expected and overall better than the decline in global GDP.

With recent economic forecasts pointing to a faster and more robust recovery, services spending is expected to improve in developed markets. Additionally, services spending in some regions or countries, especially Europe, the Middle East, and Africa (EMEA) and Asia/Pacific, is being driven by large government digital initiatives coupled with businesses' growing trust and confidence in their governments' handling of the pandemic and economy.
Finally, most vendors believe that the crisis has tipped organizations and consumers over to the digital world – a net positive in the long run. In this forecast, IDC believes that the magnitude and timing of this transition have been slightly larger and sooner than anticipated.

In the Americas, the services market is forecast to grow by more than 2.5% in 2021, a notable improvement from the 1.4% growth forecast in September 2020. Much of the improvement is attributed to growth in the North America services market.

In the U.S. market, 2020 revenue was better than expected and the near-term GDP growth projection has improved. As a result, the U.S. market is forecast to grow by more than 2.4% this year with U.S. business consulting growth adjusted significantly upwards to reflect faster than expected economic recovery. Similarly, managed services contracted less severely last year, driven by continued cloud adoption. This produced some adjustments in the near-term and

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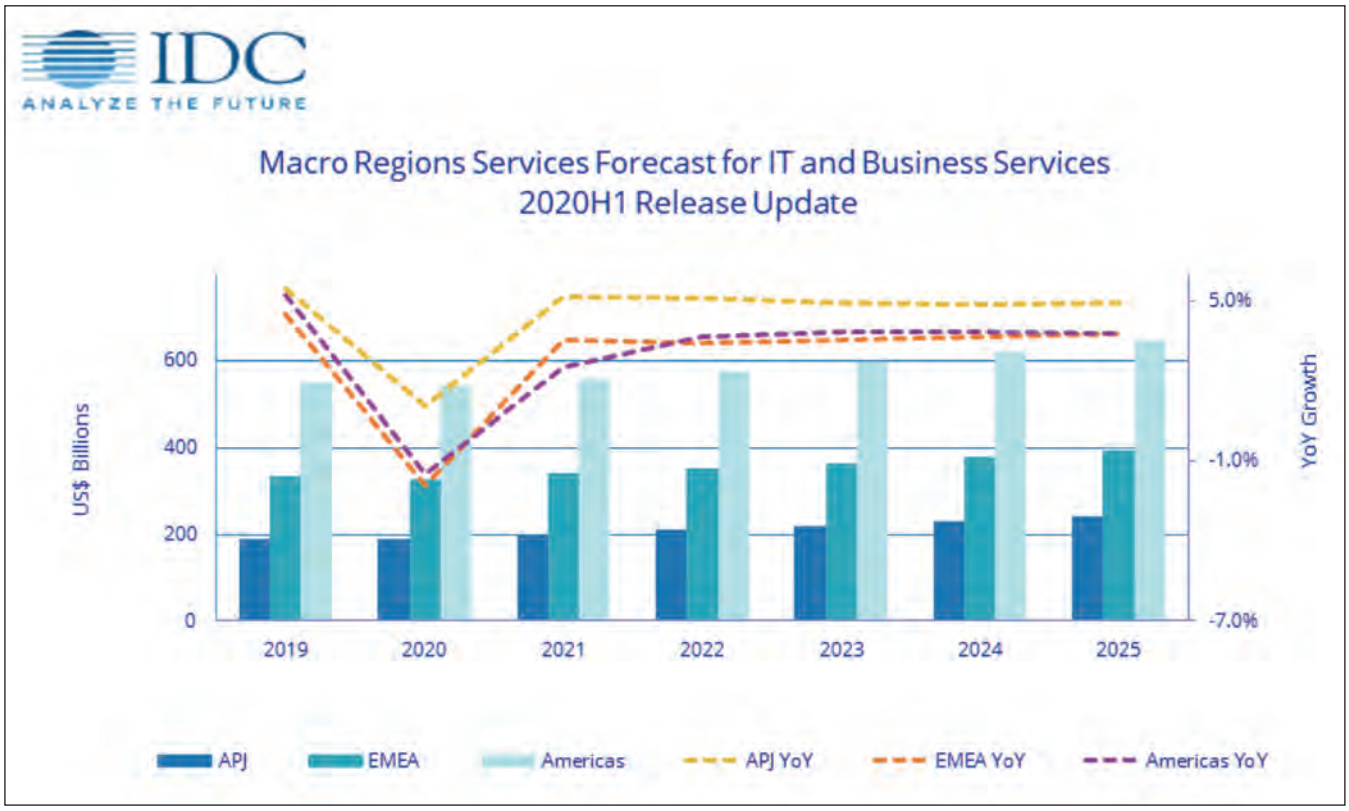


mid-term growth outlook, as well as the forecast for managed cloud services (private/hybrid cloud).

In Canada, the forecast was buoyed by an improved economic outlook, the rapid shift to digital transformation, as well as the government stimulus. In Latin America, overall growth did not change significantly from the previous forecast. IDC's outlook for 2021 remains pessimistic as the region's economic recovery is likely to be in 2022. However, Latin America overall remains a high growth region for business and IT services.

In Europe, actual 2020 revenues were better than expected. Due to government stimulus and vaccination progress, Europe's recent GDP forecasts point to a faster, stronger, and more unified recovery, unlike the post-2008 years. This will boost business confidence and, compounded by the need for digital transformation, enable growth to bounce back to 3+% across markets in both Western and Central & Eastern Europe (CEE). CEE will see faster growth, but the overall market size remains much smaller. Like the U.S., Europe's managed cloud services penetration rate has also been adjusted upward to reflect the region's fast cloud adoption.

The Middle East and Africa's (MEA) near-term growth rate has also been adjusted upward in the new forecast. The larger markets in the region expect slightly improved economic growth, more government initiatives, and more incentives for digital transformation (i.e., hybrid cloud) from the private sector. However, smaller economies are likely to see a slower recovery, resulting in a more cautious outlook for their short-term growth prospects.

In Asia/Pacific, overall growth remains higher than the other global regions. The near- to mid-term growth prospects have been adjusted slightly upward, reflecting the improved economic outlook for the more mature markets. For example, the near-term and mid-term growth forecast for Japan and Australia is more optimistic due to a stronger than expected 2021 recovery.

China's 2021 and 2022 growth rates were increased by around 250 and 120 basepoints, respectively, largely driven by pent-up demand from last year and large government funded digital initiatives as part of the large stimulus spending package.
As for the emerging markets in the region, while they will still enjoy faster growth, the long-term growth prospects are still shy of pre-pandemic levels. The September forecast largely captured the market dynamics in these countries and the outlook remains largely unchanged.

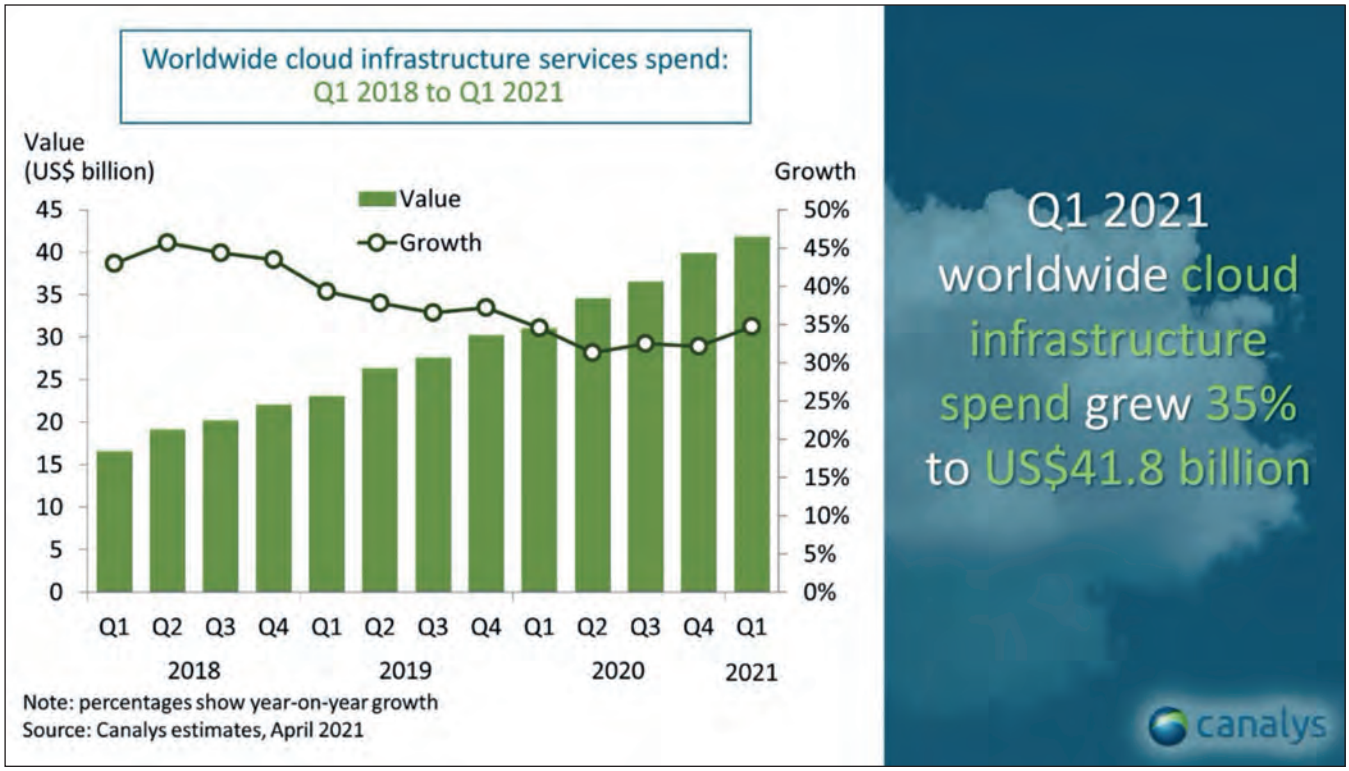
"While 2020 has been a challenging year for services vendors both from a supply and demand side, the overall services market remained resilient and major vendors are reporting stronger bookings and pipelines," said Xiao-Fei Zhang, program director, Global Services Markets and Trends. "Looking forward, while the recovery will be uneven between mature and emerging markets, and the threat of inflation still lurks, a strong recovery this and next year is still expected."

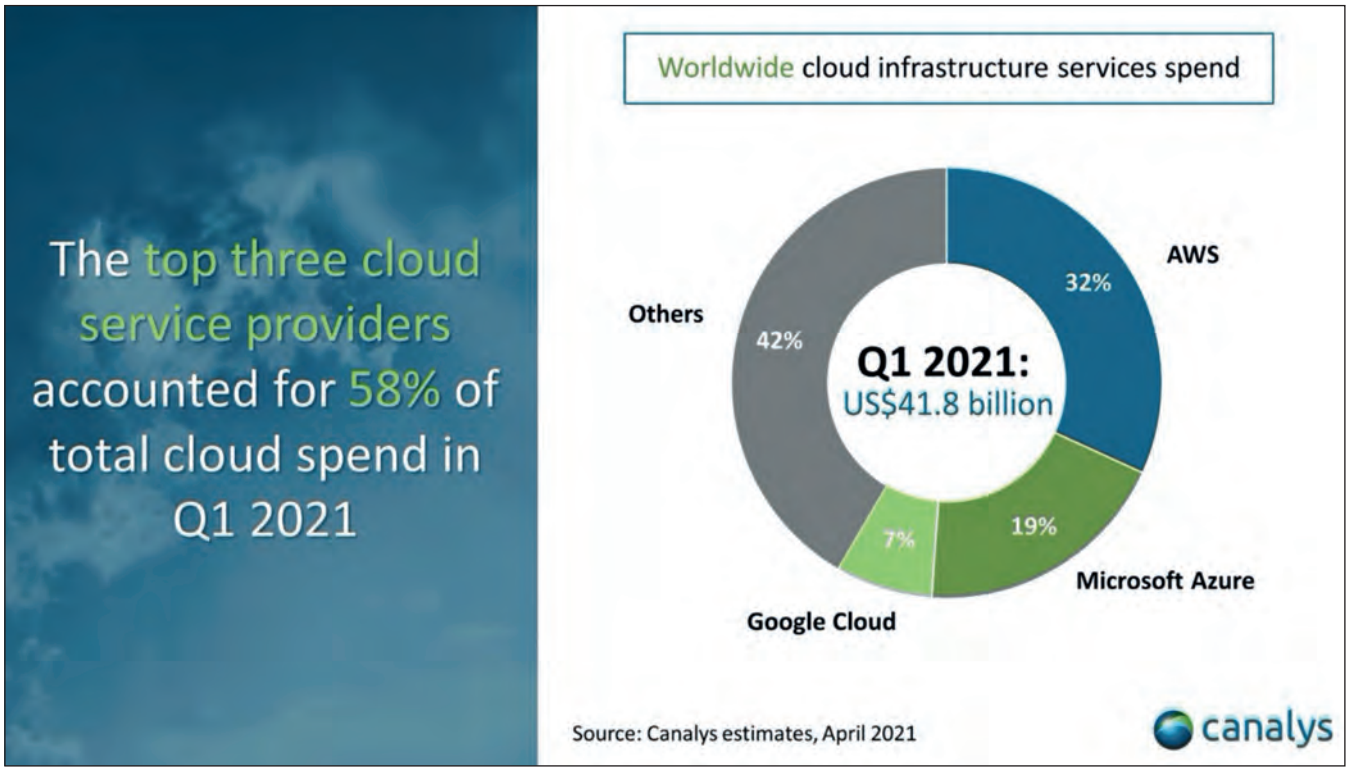
Global cloud services market reaches US$42 billion in Q1 2021

Cloud infrastructure services spending grew 35% to US$41.8 billion in the first quarter of 2021. The trend of using cloud services for data analytics and machine learning, data center consolidation, application migration, cloud native development and service delivery continued at pace.

OVERALL, customer spending exceeded US$40 billion a quarter for the first time in Q1, with total expenditure nearly US$11 billion higher than in Q1 2020 and nearly US$2 billion more than in Q4 2020, according to Canalys data. The acceleration of digital transformation over the last 12 months, with organizations adapting to new working practices, customer engagement, and business process and supply chain dynamics, has elevated demand for these services. This, combined with the rebound in some economies, in line with government stimuli, the roll-out of mass COVID-19 vaccination programs and subsequent easing of restrictions, has increased customer confidence in committing to multi-year contracts.

Amazon Web Services (AWS) was the leading cloud service provider in Q1 2021, growing 32% on an annual basis to account for 32% of total spend. In the last quarter it announced new CloudFront edge locations in Croatia and Indonesia and extended its Wavelength Zones for 5G networks to Japan





and across the United States. It launched its new EX2 X2gd instances based on the AWS-designed Graviton2 CPU for memory-intensive workloads and improved price-performance.

Microsoft Azure grew 50% for the third consecutive quarter, taking 19% market share in Q1 2021. Growth was boosted by cloud consumption and longer-term customer commitments enabled by investments in Azure Arc for hybrid-IT control plane management, Azure Synapse for data analytics, and AI as a platform. It introduced new industry clouds propositions for financial services, manufacturing and non-profit organizations, adding to healthcare and retail. Google Cloud maintained its momentum, benefiting from its Google One approach driving cross-sell and integration opportunities across its portfolio.

Overall, it grew 56% in the latest quarter to account for a 7% market share. Cloud-native development and accelerated cloud migration among its customers has been boosted by its focus on industry-specific solutions, machine learning, analytics and data management. It announced a new cloud region in Israel.

"Cloud emerged as a winner across all sectors over the last year, basically since the start of the COVID-19 pandemic and the implementation of lockdowns. Organizations depended on digital services and being online to maintain operations and adapt to the unfolding situation," said Canalys Research Analyst Blake Murray. "Though 2020 saw large-scale cloud infrastructure spending, most enterprise workloads have not yet transitioned to the cloud. Migration and cloud spend will continue as customer confidence rises during 2021. Large projects that were postponed last year will resurface, while new use cases will expand the addressable market." Investment at the edge, including 5G, is a key area, especially for the development of ultra-low latency applications and use cases, such as autonomous vehicles, industrial robotics and augmented or virtual reality.

Competition among the leading cloud service providers to capitalize on these opportunities will continue to intensify. "Geographic expansion for data sovereignty and to improve latency, either via full-region deployment or a local city point of presence, is one area of focus for the cloud service providers," said Canalys Chief Analyst Matthew Ball. "But differentiation through custom hardware development for optimized compute instances, industry-specific clouds, hybrid-IT management, analytics, databases and AI-driven services is increasing. But it is not just a contest between the cloud service providers, but also a race with the on-premises infrastructure vendors, such as Dell Technologies, HPE and Lenovo, which have established competitive as-a-service offerings. The challenge will be demonstrating a differentiated value proposition for each."

Canalys defines cloud infrastructure services as services that provide infrastructure as a service and platform as a service, either on dedicated hosted private infrastructure or shared infrastructure. This excludes software as a service expenditure directly, but includes revenue generated from the infrastructure services being consumed to host and operate them.

Delivering intelligent automation to the retail sector

There's no doubt that every industry sector is under tremendous pressure to improve processes, speed to market and productivity and this is especially the case the in the retail sector.

BY ANDREW PELLEGRINO, DIRECTOR OF INTELLIGENT AUTOMATION AT DATAROBOT

MANY RETAIL ORGANISATIONS have already taken a data-driven, automation-oriented approach to address a range of business issues but they are also poised to take advantage of artificial intelligence (AI) and machine learning models to help solve more complex business problems.

For some, Robotic Process Automation (RPA) has been producing benefits for over a decade, helping to automate manual, time-consuming processes and eliminating the need for humans to perform repetitive, transactional tasks like gathering and sorting data. However the real challenge is how to unleash RPA so that it can overcome key stumbling blocks to aid digital transformation strategies. Valuable data is often unstructured, embedded in documents and emails, and cannot be processed by a simple RPA solution alone. RPA can only automate simple tasks. It

needs processes to follow finite predefined rules with structured data.

The answer to this conundrum lies in the convergence of AI and ML with RPA to create Intelligent Automation (IA), which enables AI/ML to automate the prediction decision-making and RPA to proceed with the manual next steps within the process, without human intervention. In other words, adding AI/ML enables the RPA to 'think' through more complex problems. It's this ability to connect the head with the hands that offers the potential to increase the range of knowledge work that may have previously been considered to be either too complex to automate or required human intervention to make predictions.

This is achieved by firstly training models on historical data to make predictions. This involves collecting and preparing the data - often the most time-consuming step in machine learning - and concluding with a training data set that is labeled and ready for modeling. Models are then built using algorithms to address different types of data problems, i.e. classification, regression, binary.

Secondly, once the model is built and deployed into production, the next phase of machine learning can begin where unseen data is scored against the built models. This is the step where RPA can ask the machine learning model what to do next, with the model providing a prediction decision for RPA to continue without human intervention.

For those in the retail sector, combining AI/ML with RPA can add real value across the entire ecosystem. It can help the industry to create a scalable digital workforce that has the capacity to execute processes that don't require human intervention and deliver a return on investment in less than 12 months. Releasing human labour from mundane tasks for higher-level, human-led decision making can, for example, contribute to far greater accuracy in demand forecasting predictions.

Improving efficiency throughout this process can be achieved by using historical data to predict demand for each SKU/Store and leveraging RPA to order the correct amount of supplies needed in the ERP to

improve less under-forecasting (improved product availability) and less over-forecasting (reducing excess stock). This is a great example of RPA and machine learning working together to drive better outcomes.

Providing greater visibility of data in real-time is also being used by retail companies to predict the probability of returns for items purchased through all channels. This helps minimise risk of excessive inventory (reducing inventory holding cost and working capital in the supply chain) as well as reduce trans-shipment cost. By predicting how much stock will be returned, less stock will need to be procured from suppliers, retail companies can operate more effective return policies and incentivise customers to not over-order goods.

Intelligent Automation is being harnessed to optimise promotional campaigns to identify the best SKUs and best promotion strategies (e.g. rebate, discount, BOGO, etc.) to achieve target revenue or volume. Using an historical understanding of the relationship

Introducing more automation in retail warehousing will also enable data to be linked back into manufacturing, and other data lakes, to provide greater visibility of trends, faster and delivering scale manufacturing, and more agile supply chains which are major requirements, especially at this time

between price, promotion and demand, retail companies can plan for different promotion strategies and execute the delivery of those plans with RPA. This will increase sales revenues, gross margins, product sell-through on promoted items, and vendor support. The ability to standardise data, use larger data sets, remove biases, and train algorithms more efficiently to identify, for example, which customers are likely to complain in the next 30 days, can provide nightly predictions based on customer behaviour to identify the most at-risk customers, thereby reducing customer churn and increasing profit margins.

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Identifying the most effective product to offer each customer can influence their buying decisions and historical data (purchases, web searches, etc.) can be used to predict the propensity for customers to respond to different offers. Delivering personalised offers to customers and collaborating with category managers to optimise the best offers and offer types will create an increased response rate and decrease the overall marketing cycle times. This will encourage customers to shop for new categories and increase category penetration for retail.

Intelligent Automation is also enabling the retail industry to manage and integrate legacy systems and achieve the benefits of digital transformation without updating software, developing APIs, or building a new system, within weeks, rather than months or in some cases years.

Data can be collected from multiple sources and must be cleansed and prepped before modelling is initiated. However instead of being locked in an ivory tower, Intelligent Automation is democratising AI and RPA, providing people with direct access to data science so they can make use of the information themselves. There's no need to wait to gain access to the same information from a group that is siloed somewhere else.

Enabling the retail industry to take advantage of these AI, ML and RPA tools and techniques to support AI-driven decision making and deliver ROI in a short period of time is increasingly becoming a practical reality. Organisations are already solving data-driven machine learning use cases such as daily demand forecasting, customer loyalty state, predict next best offer, and vendor invoice fraud and that's just the beginning.

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A picture is worth a thousand terabytes: **Image generators in life sciences**

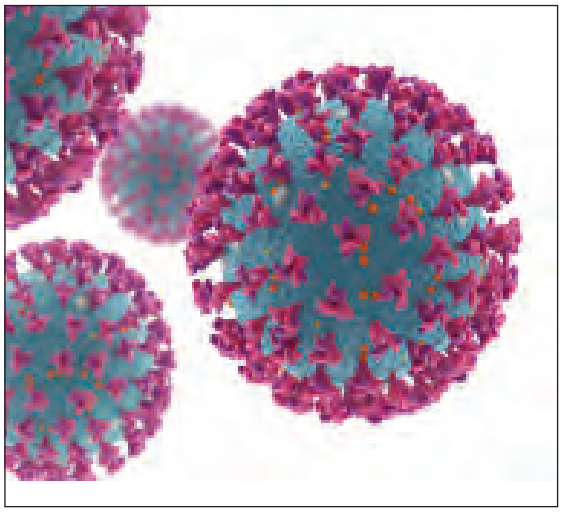
New data types drive the need for storage that delivers capacity and performance.

BY ADAM MARKO, DIRECTOR OF LIFE SCIENCE SOLUTIONS AT PANASAS

Big Data in the Life Sciences

Next-generation imaging technologies are producing a wealth of rich data to advance Life Sciences research. Artificial intelligence and machine learning can help researchers quickly derive insights from such data. However, many organizations do not have the compute and storage infrastructure to handle the combination of enormous imaging data volumes and demanding analysis workloads.

The reason: Installed infrastructures were designed to handle the requirements of next-generation sequencing (NGS), which was released into the market over a decade ago. While infrastructure deployments supporting NGS were large and certainly expensive, they did not necessarily require the most advanced computing technologies. Despite some successes in leveraging GPUs, CPU extensions, and FPGAs, these technologies never gained much traction in NGS analysis. Traditional genomics pipeline needs were met with commodity CPUs and mid-range performance file systems.



While the challenges associated with sequence analysis are well understood and addressable, new technologies and advancements in existing instruments promise to upend the way research IT builds its storage infrastructure.

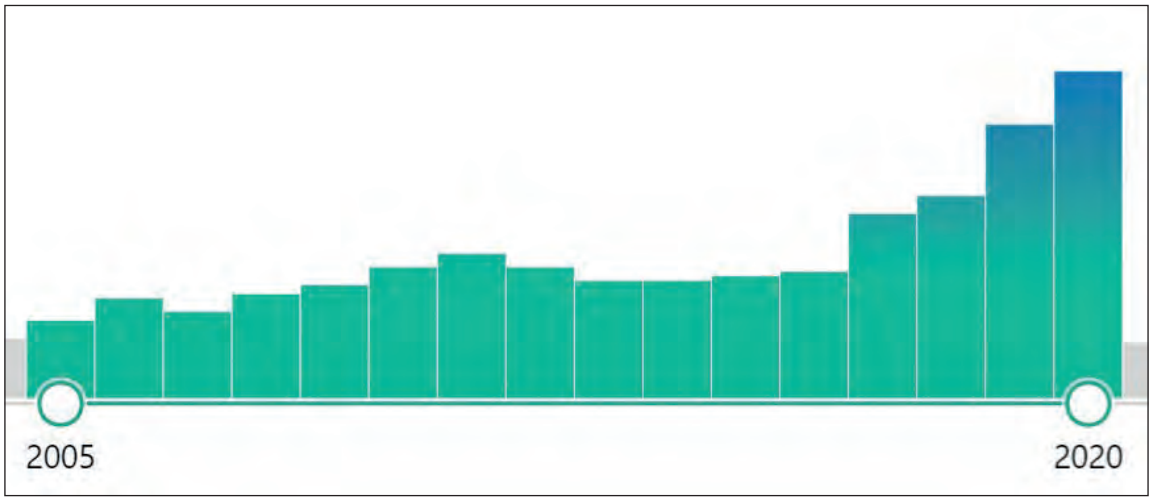
Imaging Technologies Contributing to Life Science Data Growth

Though many imaging technologies have existed for years or even decades, a few are experiencing rapid growth and development, with an associated increase in storage demands. Specifically, technologies like Cryogenic Electron Microscopy (CryoEM) and Lattice Light Sheet Microscopy are having major impacts on research and human health. Such technologies are challenging how storage is implemented and used in a number of ways.

Cryogenic Electron Microscopy (CryoEM)

CryoEM is a technique that uses electron microscopy to image cryogenically frozen molecules. Unlike a common older molecular determination technique, X-ray crystallography, the primary advantage of CryoEM is the ability to use molecular samples that are not crystallized. Many molecules cannot be crystallized, or have their structures changed by the crystallization process. Historically, though CryoEM can be used for molecules in a more native state, the imaging resolution was too poor to gain scientific insights at the level of X-ray structures. Recent advancements in CryoEM, however, are now increasing the scientific interest and applicability of the technique.

While CryoEM has been in use since the 1980s, improvements in detector technology and software have led to massive growth in the past five years. With these changes, the resolution has improved immensely and increased the utility of the results.



Growth of CryoEM publications over the past 15 years. Note the rapid increase in number of publications in the past 6 years, coinciding with improvements in CryoEM technology. Image Source: PubMed

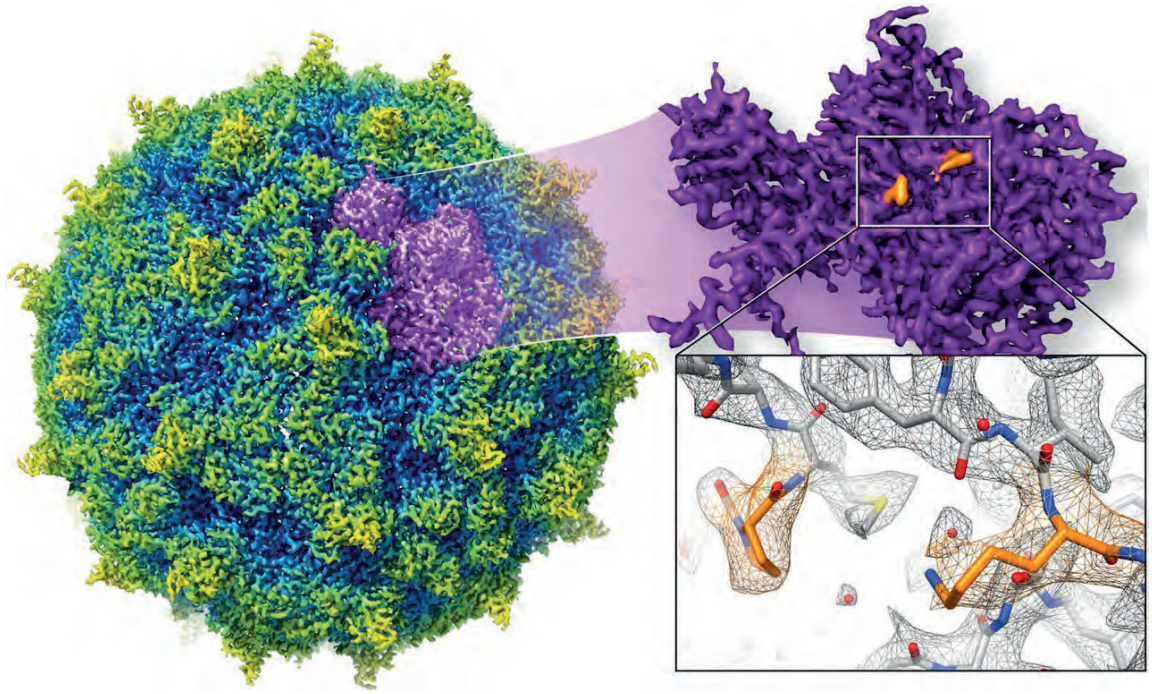
However, this improvement has come with associated larger data sizes and increased storage and processing demands.

Current microscopes can generate TBs of data per day, and that amount continues to grow. Furthermore, many organizations are deploying multiple devices, so it is not unreasonable to expect multiple petabytes of data generated per year at a single organization from just CryoEM.

Organizations that are deploying CryoEM instruments face the challenge of rapidly advancing technology, as well as adding more devices. From a compute and storage standpoint, a parallel file system that can grow with the infrastructure is required both for capacity and analysis. Additionally, software for CryoEM analysis is multithreaded and can take advantage of both increasing core counts and well as GPUs. Intelligently compiling the software for scale with multicore CPUs, and GPUs for acceleration, is key to running the analysis as fast as data is generated.

Lattice Light Sheet Microscopy (LLS)

Lattice Light Sheet Microscopy, developed by Nobel Prize Winner Eric Betzig, is a relatively new technique, having been developed only in the past five years. It allows long timescale imaging of dynamic biological processes in 3D. It is unique among microscopy techniques in that there is little damage to the sample, meaning living organisms can be imaged in real time. With other technologies, the sample is damaged, and long videos cannot be recorded.
LLS works by using thin sheets of light to illuminate the sample, which can be living tissue, cells, or organisms. The technique is less damaging to live samples and enables the longer acquisition time (hours instead of seconds or minutes). The use of the sheet of light enables faster data acquisition as compared to more traditional methods such



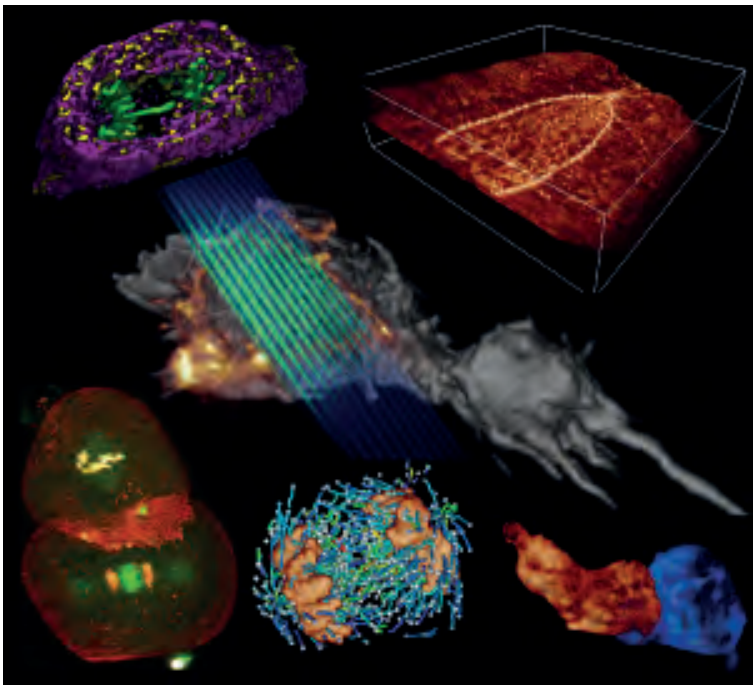
Rhinovirus atomic structure as determined by CryoEM. Structures of this resolution are now produced by CryoEM at a greater rate than ever before. Image Source: PNAS

Demands on infrastructure will grow with scientific output. Research IT staff will need to spend more time supporting researchers and deploying experimental technologies than ever before. Storage, central to image analysis workflows, must be stable and reliable in addition to high-performance

as confocal microscopy. By operating at a higher acquisition rate, researchers can visualize previously unseen biological processes in three dimensions. Like CryoEM, LLS generates TBs of data per day from each instrument. Currently, data output is comparable to or exceeds that of CryoEM, and it can be expected to grow as the technology improves, and more organizations deploy microscopes. Lattice Light Sheet requires GPUs and high-performance storage to analyze the datasets in a timely manner. Like the other techniques mentioned, the improvement in scientific resolution, in this case, length of time and data acquisition rate, contributes to the massive data output sizes.

Infrastructure Considerations for Future Image Analysis

The infrastructure designs currently implemented for NGS will not meet image analysis needs and mixed workload pipelines. Storage is central to image analysis workflows, and it must have the capacity to meet the data volumes, and the performance to meet changing workloads. Previously, large amounts of medium performance storage and CPU-only nodes connected at 1G or 10G supplied adequate performance for genomics pipelines. With the growth of image generating devices, storage and compute requirements are far more demanding. Multicore nodes, as well as GPU nodes, are required. Existing 10G networking will not meet the bandwidth needed to get these larger datasets to GPUs or multicore servers. Ideally, an image analysis-ready infrastructure will need high-capacity, high-performance storage, and GPU nodes connected to storage at 25G or better.



6 Lattice light-sheet examples. As light planes move through the specimen, 3D images are generated. Image Source: CBMF Harvard Medical School

Demands on infrastructure will grow with scientific output. Research IT staff will need to spend more time supporting researchers and deploying experimental technologies than ever before. Storage, central to image analysis workflows, must be stable and reliable in addition to high-performance. Furthermore, research IT staff will increasingly have less time to fight fires or get involved in complicated configurations of systems, because their skills will be needed to support researchers in a greater capacity. The growing sophistication of research pipelines will require increased contributions from IT staff, and IT will transition from their infrastructure support role to a partner in accelerating discovery.

Artificial Intelligence and Machine Learning in Image Analysis

Another factor driving infrastructure demands is the growing use of artificial intelligence (AI) and machine learning (ML) for image analysis.

The rate at which images are generated far exceeds the ability for humans to analyze manually. Great potential exists for AI/ML to accelerate research in image analysis. However, two main challenges exist. Image files, especially legacy data, are spread across disparate storage platforms with limited or no file management in place. Naming conventions and standardized directory structures rarely exist within organizations, and almost never exist externally.

Some research areas, such as CryoEM, are only now generating enough quality datasets to use for training models. Previously, there simply was not sufficient data to enable algorithm development. The growth in datasets has produced some early wins (e.g., in the particle picking step of the processing pipeline) that

have resulted in software performing similar human manual analysis.

Unfortunately, until major progress can be made solving the data management challenges surrounding Life Sciences image files, large-scale breakthroughs will be few and far between. Organizations that immediately start managing their data as they generate it will be much better positioned to take advantage of AI/ML. As this data is created, it is important to have an AI/ML-ready infrastructure is in place to handle the analysis.

What's needed is a highperformance infrastructure with a parallel file system that can saturate GPUs to efficiently and quickly run image-related Life Sciences AI/ML workflows.

COVID-19 and CryoEM

It is easy to get caught up in the technical details of emerging technologies. Often, the research that accompanies these techniques can appear to be esoteric with no practical application. However, as an example, CryoEM has had major success in helping the global effort against COVID-19. In March of 2020, researchers were able to use CryoEM to visualize the structure of the 2019nCoV trimeric spike glycoprotein. The structure was rapidly determined in a biologically-relevant state at 3.5 Angstroms of resolution, which is comparable to X-ray crystallography techniques. This protein structure of the virus is a key target for vaccines, drugs, antibodies, diagnostics, and for contributing to our understanding of infection. Now that this structure has been determined, it can be used to guide therapeutic efforts going forward, as referenced in an article titled Cryo-EM structure of the 2019nCoV spike in the prefusion conformation in the March 2020 issue of Science.

The Way Forward for Image Analysis

The IT infrastructure designs used for the past ten years to meet NGS needs will not meet the current and future analysis requirements of image analysis in the Life Sciences. Organizations that were used to genomics-only workloads will soon be challenged with analysis related to more recently adopted imaging technologies and the resulting increases in data sizes and volumes.

These mixed workloads will stress storage infrastructure in unforeseen ways. As organizations plan for the changing landscape of research pipelines, they must ensure a data storage foundation that delivers high performance in a reliable, scalable and adaptable way. In doing so, IT staff can free themselves from the administrative burden of storage systems and move towards becoming a partner in scientific discovery.

Business must stop treating the cloud as a data graveyard

The cloud can provide extensive storage cost efficiency and a powerful compute environment – depending on your specific data needs at any given time.

BY KRISHNA SUBRAMANIAN, PRESIDENT & COO, KOMPRISE

90 PER CENT of the world's data was created in the last two years alone. Having doubled in this period, analysts IDC predict that the data created over the coming three years will be more than the data created over the past thirty. In fact, over 59 zettabytes of data were created, captured, copied and consumed last year alone. Very few businesses planned for such an explosion in data (and particularly the unstructured type) and rather than IT budgets being doubled to match, they have largely stayed flat.

From a storage perspective, while many organisations are maximising the benefits of transforming to the cloud, there remain multitudes who use it purely as a cheap and deep storage locker where data goes to die. With 80 per cent of the world's data remaining unstructured, many also plan to keep up to ten copies of the data they create in the hope that they can turn it into information they can monetise.

There is now an urgent need to fundamentally re-think how enterprise IT organisations approach data storage and back up. Similarly, to what we saw with cloud application migrations, thinking you can just lift and shift your growing volumes of unstructured data to a cheap storage locker will result in greater costs and end user frustration. Alongside not treating the cloud as a data graveyard, it's going to be imperative that enterprise IT organisations stop the endless cycle of buying more storage, backing up data before analysis and treating all data the same.

With these flawed approaches, organisations are missing huge business opportunities to leverage the compute power of the cloud and realising the full value and potential of their data. Many IT leads need to ask themselves why they are keeping large amounts of data if they will never extract value from it.

The data cost crunch

There's an important OpEx / CapEx implication here. Most companies overspend on their cloud budgets every year because they're not actively managing their data to ensure cost efficiency. Because many don't have sufficient datacentre space to store all their data, there's a frequent temptation to just 'push it to the cloud' while the cloud is cheap.

While it's true that the cloud provides economies

of scale, companies are often paying by the hour, so every hour they're keeping data in there is a daily operational cost – with much of it that that's unlikely to be used and 'delete-able'. A vast array of data crunching and data analytics services are available now, so it's important to look at the cloud as potentially a giant supercomputer that can be used 'on demand'. Organisations that see it simply as a cheap storage locker are missing a huge business opportunity in terms of computing power and ability to leverage their data.

By considering whether they are keeping data in the right place in the cloud, companies can move from an OpEx situation to a CapEx one. An example would include using more premium cloud services when performing number crunching tasks and pushing it back into a cheap or deeper tier when it needs to be archived. This type of active management is crucially important in the cloud, because many approach cloud services from a low cost perspective and are shocked when they receive their ultimate invoices based on time and data quantities.

We're all data hoarders

Aside from the extraction of value there's also an urgency to manage data effectively from a wider backup perspective. By nature, we're all data hoarders. Few businesses nowadays can afford to lose data when a virus hits, so many keep around five to ten copies of each piece of data. Backing up everything in this way incurs huge costs and is highly inefficient, resulting in backups taking longer than necessary and slowing down productivity.

Aside from the extraction of value there's also an urgency to manage data effectively from a wider backup perspective. By nature, we're all data hoarders. Few businesses nowadays can afford to lose data when a virus hits, so many keep around five to ten copies of each piece of data. Backing up everything in this way incurs huge costs and is highly inefficient, resulting in backups taking longer than necessary and slowing down productivity

The issue is becoming an increasing challenge for businesses, with IT departments typically having no clear idea of what data is important, how frequently it is being used or what can be archived permanently. Without this information on the data they own, businesses IT departments often just continue buying further storage with minimal visibility over how to prioritise the data they're sending to it. In the worst cases, disposable data can often be sent to the expensive but fast flash arrays, where the important and business critical data should sit.

There are several challenges facing organisations in their data management today. These include massive data growth within flat budgets, accessing the right data in the right place at the right time and the costly and complex challenges of managing legacy data. But these challenges can be addressed with the right approach – and examining certain key considerations towards maximising the benefits of cloud storage.

Real cloud storage value

The real value of the cloud is in its elastic compute and analytics services. If you can't use your data to operate on it in tiers, then the value of that data will be diminished. The first step therefore is to get help to gain insight into the data you have. Working with a service that works with all of the appropriate storage and cloud vendors and uses open rather than proprietary standards will help at this point.

Services like these will help you re-purpose your data, rather than just storing and protecting it. This will also help you extract more value from your expensive flash storage investment. While organising data in a similar way to file storage was once expensive, new object storage (locker type model) functionality also bridges the worlds of data storage at much lower cost.

Avoid vendor software lock in of your cloud data

Some business complain that their data is locked into a particular vendor and that they're then forced to remain with that vendor, even within the cloud. There's an assumption that going with a single vendor using all their native tools, provides a 'better' and more seamless experience and a single point of contact when things go wrong. But these businesses often end up getting locked in by assuming they're getting superior functionality from a single homogenous stack .

The reality is that you don't have to take this route because it's possible to work through standards across all of these vendors, using the best native functionality of every vendor without lock in. Here, you can sit withing a heterogeneous environment. Many enterprises already plan to use multiple cloud vendors

as part of their business strategy. This is wise because it eases the process of moving their data across vendors, while still being able to leverage their native capabilities.

Ultimately, limiting the future portability and use of your data can create expensive licensing alongside unnecessary limitations on evolving your cloud choices over time. If your data is kept accessible through a standard language, you don't have lock in. When you look at anything that's moving data, you should ask, "How is it storing the data in the new location?" and "is it just storing pieces of the data". Paying attention to how data is moved and stored is important. To avoid being locked into a particular vendor, ask whether you can access your data without needing third party software.

Reducing cloud costs

30 per cent of IT/cloud spend nowadays is on storage – and we estimate that it's possible to cut 70 per cent of these costs. With some businesses throwing more money at storage as they run out and backup processes start taking longer, many don't realise this ability to reduce costs as part of the process. It's easier to manage data and accommodate the bottom line than many organisations think.

Consider the functionality you are getting and the corresponding trade offs, because nothing is perfect and businesses frequently end up paying for way more functionality than they need in the short to medium term. You should also consider how flexible and future proof your data solution is, because it will continue to grow at a similar pace. So future proofing yourself means preparing for the fact that you will be migrating that data at some point – and that's becoming increasingly essential.

Show your true cloud native colours

The cloud can provide extensive storage cost efficiency and a powerful compute environment – depending on your specific data needs at any given time. Cloud native is really about getting the most out of this new environment. Following a huge movement around cloud native applications and development, storage is evolving with it.

If 30 per cent of IT budgets are being spent on storage in a lift and shift approach there's huge value in preparing and extracting value from your data's 'home'. The new breed of storage administrator will be thinking cleverly about where to put their company's data that's exploding everywhere. Soon, these data 'stewards' will be thinking more analytically about the value of their companies' data, and the role will become highly valued commercially.

For now, gaining control of your data positions you well to leverage the compute power of the cloud – gaining easy access to the data you need at the right place and time and using only what's needed.

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How to store (petabytes of) machine-generated data

The amount of data worldwide grows by several billion terabytes every year because more and more machines and devices are generating data. But where will we put it all? Even in this age of IoT, hard drives remain indispensable.

BY RAINER W. KAESE, SENIOR MANAGER BUSINESS DEVELOPMENT, STORAGE PRODUCTS DIVISION, TOSHIBA ELECTRONICS EUROPE GMBH

DATA VOLUMES have multiplied in recent decades, but the real data explosion is yet to come. Whereas, in the past, data was mainly created by people, such as photos, videos and documents, with the advent of the IoT age, machines, devices and sensors are now becoming the biggest data producers. There are already far more of them than people and they generate data much faster than us. A single autonomous car, for example, creates several terabytes per day. Then there is the particle accelerator at CERN that generates a petabyte per second, although “only” around 10 petabytes per month are retained for later analysis.

In addition to autonomous driving and research, video surveillance and industry are the key contributors to this data flood. The market research company IDC assumes that the global data volume will grow from 45 zettabytes last year to 175 zettabytes in 2025 . This means that, within six years, three times as much data will be generated as existed in total in 2019, namely 130 zettabytes – that is 130 billion terabytes.

Much of this data will be evaluated at the point of creating, for example, in the sensors feeding an autonomous vehicle or production facility (known as edge computing). Here, fast results and reactions in real-time are essential, so the time required for data transmission and central analysis is unacceptable. However, on-site storage space and computing power are limited, so sooner or later, most data ends up in a data centre. It can then be post-processed and merged with data from other sources, analysed further and archived.

This poses enormous challenges for the storage infrastructures of companies and research institutions. They must be able to absorb a constant influx of large amounts of data and store it reliably. This is only possible with scale-out architectures that provide storage capacities of several dozen petabytes and can be continuously expanded. And they need reliable suppliers of storage hardware who can satisfy this continuous and growing storage demand. After all, we cannot afford for the data to end up flowing into a void. The public cloud is often touted as a suitable solution. Still, the reality is that the bandwidth for the data volumes being discussed is insufficient and the costs are not economically viable.

For organisations that store IoT data, storage becomes, in a sense, a commodity. It is not consumed in the true sense of the word but, like other consumer goods, it is purchased regularly and requires continuing investment. A blueprint of how storage infrastructures and storage procurement models can look in the IoT age is provided by research institutions such as CERN that already process and store vast amounts of data.

The European research centre for particle physics is continuously adding new storage expansion units to its data centre, each of which contains several hundred hard drives of the most recent generation. In total, their 100,000 hard disks have attained a total storage capacity of 350 petabytes**[2]**.

The price decides the storage medium

The CERN example demonstrates that there is no way around hard disks when it comes to storing such enormous amounts of data. HDDs remain the cheapest medium that meets the dual requirements of storage space and easy access. By comparison, tape is very inexpensive but is not suitable as an offline medium and is only appropriate for archiving data. Flash memory, on the other hand, is currently still eight to ten times more expensive per unit capacity than hard disks.

Although the prices for SSDs are falling, they are doing so at a similar rate to HDDs. Moreover, HDDs are very well suited to meet the performance requirements of high-capacity storage environments. A single HDD may be inferior to a single SSD, but the combination of several fast-spinning HDDs achieve very high IOPS values that can reliably supply analytics applications with the data they require.

In the end, price alone is the decisive criterion – especially since the data volumes to be stored in the IoT world can only be compressed minimally to save valuable storage space. If at all possible, compression typically takes place within the endpoint or at the edge to reduce the amount of data to be transmitted. Thus, it arrives in compressed form at the data centre and must be stored without further compression. Furthermore, deduplication offers little potential savings because, unlike on typical corporate file shares or backups, there is hardly any identical data.

Because of the flood of data in IoT and the resultant large quantity of drives required, the reliability of the hard disks used is of great importance. This is less to do with possible data losses, as these can be handled using appropriate backup mechanisms, and more to do with maintenance of the hardware.

With an Annualised Failure Rate (AFR) of 0.7 per cent, instead of the 0.35 per cent achieved by CERN with Toshiba hard disks, a storage solution using 100,000 hard disks would require that 350 drives are replaced annually – on average almost one drive replacement more per day.

Hard drives will remain irreplaceable for years to come

In the coming years, little will change with the main burden of IoT data storage borne by hard disks. Flash production capacities will simply remain too low for SSDs to outstrip HDDs. To cover the current storage demand with SSDs alone, flash production would have to increase significantly. Bearing in mind that the construction costs for a single flash fabrication facility run to several billion Euros, this is an undertaking that is challenging to finance. Moreover, it would only result in higher flash output after around two years that would only cover the demand of 2020 and not that of 2022.

The production of hard disks, on the other hand, can be increased much more easily because less cleanroom production is needed than in semiconductor production. Additionally, the development of hard disks is progressing continuously, and new technologies such as HAMR (Heat-Assisted Magnetic Recording) and MAMR (Microwave-Assisted Magnetic Recording) are continuing to deliver capacity increases.

Experts assume that HDDs' storage capacity will continue to increase at a rate of around 2 terabytes per year for a few more years at constant cost. Thus, IDC predicts that by the end of 2025, more than 80 per cent of the capacity required in the enterprise sector for core and edge data centres will continue to be obtained in the form of HDDs and less than 20 per cent on SSDs and other flash media[1].

Further reading

[1] IDC "Data Age 2025" Whitepaper, Update from May 2020
[2] Case Study von Toshiba: www.toshiba-storage.com/trends-technology/case-study-how-toshiba-hdds-have-helped-cern-keep-track-of-their-generated-data/

Will the rise of Kubernetes pose challenges for data protection?

The popularity of containers first emerged with Docker in 2013, although the system as we know it was established in the 1970s. Container orchestration tools, such as Kubertenes, are revolutionising the deployment and development of applications for businesses.

BY FLORIAN MALECKI, INTERNATIONAL PRODUCT MARKETING SENIOR DIRECTOR, STORAGECRAFT

KUBERTENES allow developers to concentrate on delivering value and creating software. It would not be an exaggeration to say that containers are triggering a transformation in the software development industry.A container is an application that groups entire libraries, dependencies, and configuration files into a single package.

The bundling makes it simpler to spin up new container instances and move containers with ease from one computing environment to another.

There are significant advantages of using containers for businesses. For example, containers are used commonly when migrating from a physical machine to a virtual machine that is cloud based, and they can do this with ease. Containers are also typically used when developers want to move an application from a testing environment (such as their laptop for instance) to a live production environment.

The additional benefits of containers is that they are not slowed down by different operating systems, which is highly convenient in various scenarios. They are also not deterred by different software versions, which is convenient for modern day businesses, that typically operate on several softwares. Containers are both portable and flexible, making them a seamless fit for many cloud-based applications. Computing and storage are increasingly moving to the cloud, and therefore containers will become a crucial piece of technology for every contemporary organisation. However, while container orchestration tools like Kubernetes are convenient due to their scalability and portability, they can fall short when it comes to data protection. If businesses are willing to embrace containers into their operations, they must also be willing to adapt to the growing issues around data protection.

Why is data protection for Kubernetes potentially problematic? To begin with, a Kubertenes architecture is exceptionally fluid and dynamic. Just as quickly as containers are spun up, they can be torn down depending on the developers' specifications, and overall goals. That means that, essentially, containers are temporary and have a relatively short lifespan. This has various implications for data protection. In short, it means that data protection will become an increasingly important issue as more businesses begin to adopt containers. Unexpected things can happen to data during migration and deployment and is becoming apparent to the growing number of organisations now using containers in their testing environment before deploying new applications.

Containers are both portable and flexible, making them a seamless fit for many cloud-based applications. Computing and storage are increasingly moving to the cloud, and therefore containers will become a crucial piece of technology for every contemporary organisation

As organisations increase their use of containers, more and more data will be created that will need to be backed up and stored. As mentioned earlier, because containers tend to be used for testing and development, the lifespan of the containers themselves is usually shorter than the data they create. Still, for compliance and other reasons, that data needs to be stored and protected long after a particular container is destroyed or decommissioned. The primary takeaway here is that backing up data is absolutely essential for businesses – and will only become more critical in the months and years ahead.

Why backup and security can no longer live in silos

The past year significantly changed the way organisations protect and store their data.

BY JOE NOONAN, GENERAL MANAGER OF UNITRENDS AND SPANNING

BACKUPS must now protect data centers, endpoints, multiple clouds and SaaS – and this data is growing 33 times faster than those who manage it. While ransomware is certainly not new, cybercriminals took advantage of the remote work environment of 2020 to launch even more sophisticated attacks. In 2020 alone, ransom payments jumped 31 percent to $233,817 and 51% of businesses reported being impacted by ransomware, account takeover attacks, or phishing schemes. Cybercriminals are continuously adapting their methodologies to increase their success rates – for example, attackers may delay encrypting their victims' systems and will use that time to steal admin credentials that they can later use to distribute the ransomware payloads throughout the compromised environment.

Though the financial realities of the pandemic have stretched budgets for many organisations, it's crucial that businesses allocate resources for backup solutions as part of their overall cybersecurity strategy. Many companies had already begun thinking of their backup and security strategies as interconnected, and the continued evolution of the cybercrime landscape has made this shift in thinking a necessity.

As the data environment continues to grow in complexity for organisations of all sizes, it's crucial that businesses equip themselves with integrated solutions that span both traditional security and backup functions to help prevent, anticipate and mitigate account compromise and data loss. Organizations should look for unified BCDR solutions that use artificial intelligence (AI) and machine-learning to detect suspicious patterns and alert administrators to ransomware before it spreads. Solutions with anti-phishing defence capabilities provide another layer of protection from credential compromise, ensuring that phishing attacks are stopped before an account takeover attack takes place.

A truly unified solution that provides a single view of the entire data landscape is critical, as moving between multiple systems wastes time and increases room for error. Technicians can spend up to 33% of their day monitoring, managing and troubleshooting backups, so automated solutions that proactively fix common problems in the backup environment are key to increasing productivity and securing the environment. Since many organisations may be wary of large capital expenditures due to the impact of the pandemic, a subscription-based model allows for organisations to allocate resources for data protection as an operating expense.

By prioritizing a unified BCDR solution, companies of all sizes can build comprehensive uptime strategies no matter where their data lives and adequately protect their data from ever-evolving cybersecurity threats.

Leading CX strategies with thoughtfulness

Customer service has quickly become a key differentiator as a result of changing consumer behaviours during the pandemic. Personalisation from brands is in the spotlight and many organisations are adopting personalised customer experience (CX) strategies in order to deliver relevant messages to audiences.

BY BRIAN ATKINSON, GM & VP AT FIVE9

CONSUMERS want to feel important. Organisations that provide great experiences through human connections and putting their customers first from the beginning to end of communications will not only succeed but be praised. Brands are reimagining CX models by providing personalisation that leads with empathy and inspires brand loyalty, all while proving their understanding that everyone has different needs.

Delivering great CX is challenging – but possible. Every moving part must be moving smoothly in sync to create a seamless, uplifting experience that looks effortless to customers. To do this, brands need to have the right people, processes, and technology in place.

Reimagining CX

The way we experience everyday life has changed dramatically due to the pandemic and the way in which we interact with brands changed too – the use of digital channels is growing exponentially, and more and more stores are closing their doors permanently. It is no surprise that consumer demand has evolved with these changes. Therefore, it's imperative that brands stay ahead of customer expectations and go above and beyond in order to win new customers while retaining existing ones.

As contact centres have become the new front door to businesses, there is now little room for error. Brands need to make the most of every interaction with customers – knowing who they are, meeting them on their channel of choice, empowering them to self-serve when they can, enabling them to pick up where they last left off on a different channel and, ultimately, resolving their issues quickly and to their satisfaction. Brands also need to utilise the right means of communication so they can deliver the service and support their customers need at any given point.

The key to delivering exceptional CX is for brands to know their customers and cater to their norms of communication whether that be by phone, email, live chat or even through social media channels. Organisations that want to reimagine their CX

strategies need to invest in building ecommerce highways to access these thriving digital communities of their customer base.

Why CX is really HX (Human Experience)

CX is about how organisations make the customer feel throughout their entire journey with the brand. What may be right for one customer, might not be for another, and it's the understanding that it's not a one size fits all for everyone which will set brands apart from the rest. Catering to any and all customers is what organisations should strive for to provide the best experiences and build brand loyalty. As customer bases grow or adopt new messaging trends, brands must ensure they remain agile and adaptable to move at speed with changing consumer demands.

Customer loyalty is the hardest thing to win and the easiest thing to lose. Therefore, ensuring each and every customer has a great experience is crucial. To do this, brands need to be providing targeted communications to drive customer engagement and begin interactions on a high. We've seen this evolving already, with many brands offering 'opt-out' services at potentially sensitive times of the year. Brands don't need to blow a huge budget to deliver great personalisation, it can be as simple as offering these types of opt-out emails for particular times of the year, and consumers have been quick to praise these offerings.

The COVID-19 experience brought out the importance of empathy and human connections between brands and customers. Messages of comfort and positive support assured consumers (and employees) that they were cared for during times of uncertainty

Consistently providing exceptional customer service isn't easy, but worth it. Great CX consists of seamless, easy interactions with fast, accurate resolutions – but better experiences are also more human experiences. The software that brands use should empower connections between a brand and its customers to deliver a more empathetic interaction, with the ability to focus on and relate to customers. People respond to how brands make them feel. The more positive the experience is – making them feel loved, admired, and respected – the more they value the brand, spend money on the brand, and tell their friends about the brand.

Learn and grow

The COVID-19 experience brought out the importance of empathy and human connections between brands and customers. Messages of comfort and positive support assured consumers (and employees) that they were cared for during times of uncertainty. As conditions settled and brands and customers adjusted to new needs and new ways of doing business, a post-COVID era came into view. Brands need to move forward based on what they have learnt through this experience, and those that understand how to get close to their customers will be able to respond agilely to their needs.

Now more than ever, when customers engage with brands, they expect extraordinary customer service that makes them feel known, respected, and valued. Brands who strive to deliver value-enhanced engagements in the contact centre will reap the rewards.

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Struggling with data overload in the wake of the pandemic

Healthcare sector must focus on efficiency, visibility and security or risk significant digital transformation slow down

AS HEALTHCARE ORGANIZATIONS scrambled to cope with huge surges in patient numbers in the wake of the pandemic, the past year has seen a major step change in the adoption of technology and digital services. But with World Health Day, any progress they have made in their digital transformation risks being washed away by the deluge of resulting data.

According to research by Aruba, a HPE company, as of last year the healthcare sector was among the furthest ahead in terms of its adoption of advanced technologies and the sense of urgency it felt around this. Around three quarters of healthcare IT leaders had started to implement trials or applications in areas such as artificial intelligence (AI) (74%), Internet of Things (IoT) (76%) and machine learning (71%).

But it was also one of the sectors struggling most with the data this new technology is producing. A third (33%) of IT leaders in healthcare said there was too much data for their systems to handle, and that they could not process the data they collected quickly enough to act (32%).

To get a handle on all this data and underpin long-term digital transformation in healthcare, a new eBook by Aruba, 'Taking healthcare to the Edge', lays out three key areas of focus for healthcare organizations – providing a clear roadmap to setting up the right network for future success.

Step 1: Processing data efficiency

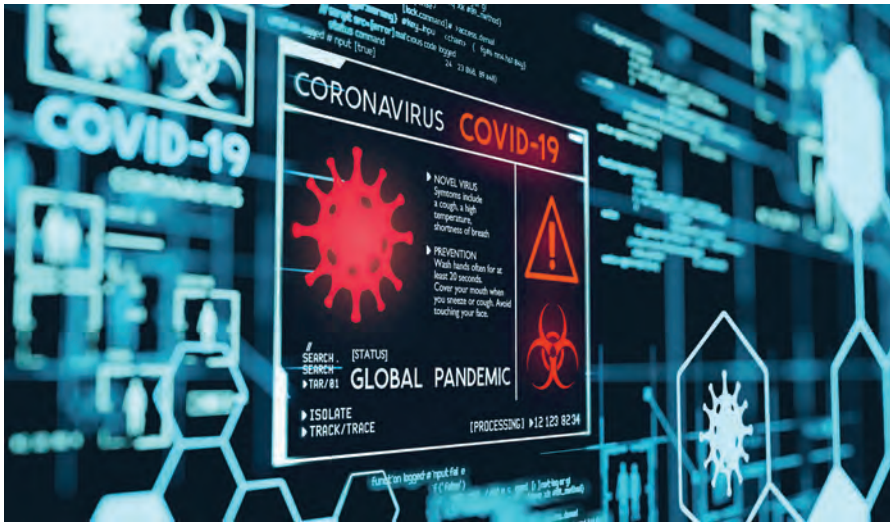
In order to process data efficiently healthcare organizations must follow it to the Edge of the network, capturing it in real-time at its source versus transferring it back to a centralized hub. Our research showed that 86% of health IT leaders identified the need to implement integrated systems to handle data at the Edge of the network as urgent, 71% are already using or trialing Edge technologies and 74% are delivering new outcomes as a result. These include equipping healthcare providers with improved tools and applications, ensuring continuous availability of patient data at the point of care and using IoT sensors to continuously monitor patient data in real-time and generate early-warning notifications at bedside.

Step 2: Analyzing data intelligently

Capturing all that data is one thing, but being able to act on it is something else entirely. That is why there is a growing role for AI to help convert disparate data point into insights for diagnosis, patient care and pharmaceutical development – but also support IT teams with network troubleshooting and issues resolution to avoid any costly downtime or damage the user experience. Even before the pandemic around three quarters (74%) of IT leaders in healthcare were either trialing or running AI applications on their network to deliver powerful insight.

Step 3: Storing data securely

Against a backdrop of rising IoT use in hospitals and homes, healthcare organizations are having to police growing levels of device and app connectivity. And this is a big worry for healthcare IT leaders, with 61% saying that connecting IoT devices at the Edge would make their business more vulnerable. Aruba believes it is critical for healthcare organizations to put the right solutions in place to make sure highly sensitive healthcare data is protected and that they maintain the necessary consumer trust



for the system to continue on its path of radical transformation.

A Zero Trust approach to security is part of the answer here, but network visibility and device identification also become key – providing a single-pane-of-glass view of increasingly fragmented networks and giving IT teams the ability to grant differentiated levels of data access according to device or user group.

"During the pandemic, healthcare organizations accelerated their use of digital tools and solutions out of necessity. Approaches that had previously only been trialed or never attempted were deployed for lack of alternative," explains Morten Illum, VP EMEA of Aruba. "With choices set to open up thanks to the vaccine and a return to 'normal', healthcare providers will find themselves at a point of inflection. They have a tremendous opportunity to make changes now to provide fundamentally superior digital services in the future. But either they find a way to get a handle on the information flow in and out their systems, or they risk a rapid reversal of momentum.

"That is why it is critical that the sector evolves its network capabilities to ensure it has the infrastructure and solutions in place to support the next-generation technologies and experiences that will define their organization's digital transformation in 2021 and beyond."

Capturing all that data is one thing, but being able to act on it is something else entirely. That is why there is a growing role for AI to help convert disparate data point into insights for diagnosis, patient care and pharmaceutical development – but also support IT teams with network troubleshooting and issues resolution to avoid any costly downtime or damage the user experience

Emergent Alliance tracking effects of COVID-19 among population

With a government-imposed roadmap in place to end the UK's fourth lockdown, it isn't without data and insights that local authorities can confidently navigate the plan on behalf of their residents. Across the nation, data and insights must be used to examine region-specific implications to ensure this will in fact be, our last lockdown.

BY ANDREW BROWN, GENERAL MANAGER IBM TECHNOLOGY SALES UKI

AS VACCINE DOSES continue to rise and virus cases fall, this is the moment where it is more vital than ever for local authorities to monitor their communities by analysing changes in population density, demographics, rate of infections and the behaviour and sentiment of the population. This data-driven approach is imperative to easing rules responsibly and has recently been made achievable.

In working to make this possible, not-for-profit community, Emergent Alliance, has collaborated with IBM, Rolls-Royce, Meltwater, and Echosec Systems to create a selection of dashboards for predictive risk assessment. The tools use IBM Cloud Pak for Data to better understand the attitudes and behaviours among the general population regarding the ongoing pandemic and, going an extra step, the Emergent Alliance is also using that data to keep local authorities, the public and economic experts informed on the facts behind COVID-19 thus helping to futureproof our economy's recovery and work towards our long-anticipated freedom.

We examine below how the Emergent Alliance, as part of the Regional Risk Pulse Index project, has dedicated itself to supporting innovation and resilience as organisations move towards a post COVID-19 future, and how it has been able to support the NHS with expertise, data, and resources to inform decision making based on the attitudes and behaviours of the general population.

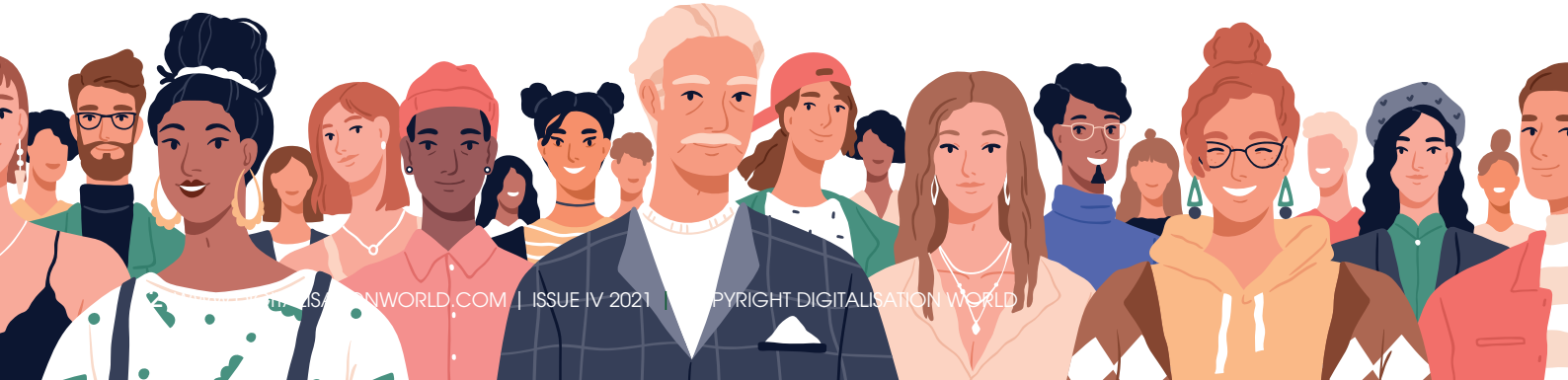
Collecting the right data and insights

In a world where organisations and authorities are suffering from inconceivable amounts of data, one of the biggest limitations to this, is that without the right analysis and technologies, this information can become useless. Crucially, at a time where data is key, using poorly collected and analysed data can ultimately lead to poor decision making; something the UK cannot risk as we look to emerge out of COVID restrictions.

With humans producing 2.5 quintillion bytes of data every day, data is being generated at an astonishing rate. Whilst in theory, the use of data and insights is useful in understanding current attitudes and behaviours to better inform decision making, it must first be collected from reliable sources and analysed with the correct tools before it can serve any purpose.

Through the Emergent Alliance, which incorporates several advanced AI solutions in its tools, members are able to build an end-to-end analytics pipeline, to help their data scientists rapidly catalogue and analyse data from multiple sources and display insights in intuitive dynamic dashboards.

In this case, data is curated from numerous trusted sources including social media content supplied by Meltwater and Echosec Systems, stringency Index published by University of Oxford, which quantifies the government measures, OEDC data on economic



impact and travel data from WFP (World food programme).

The data collected and analysed will help to inform decision makers on current attitudes and behaviours in relation to COVID-19, ultimately helping to make the world's data more accessible and the insights delivered useful for sectors including, healthcare, government, business, and the general public, with the focus currently on supporting the NHS.

Virtual Assistant easing strain on health services

Since the onset of COVID-19, healthcare services have been inundated with customer calls, queries and concerns, inevitably putting increased pressure and strain on the NHS. Consequently, limiting the public's access to information and medical services though long virtual queues. At a time where the NHS is already working tirelessly to treat as many patients as possible, solutions to ease pressure on call centres and information services were vital.

In supporting the NHS, the project team built a COVID-19 virtual assistant using Watson Assistant to enable users to ask questions such as, "What regions are currently hotspots in the UK?" and "What is the risk of infection in Nottingham?" and get answers to queries such as "Where can I travel?" to provide clarity on where travel restrictions are in place.

The implementation of a virtual assistant aims to help with COVID-19-related questions, making a substantial difference to local authorities and easing the strain on health services. Ultimately, by driving initiatives that use technology and talent to address the societal challenges we're presented with today, we're able to help ease these pressures and allow for the reallocation of resources to more critical areas, in addressing the pandemic.

Technologies helping to analyse mental wellbeing

As we experience every day, technology is ubiquitous and infiltrates our working and personal lives whether we like it or not. Despite its challenges, technology has been our ultimate blessing throughout the pandemic. When our usual face-to-face interactions have been restricted, many of us have relied on social platforms and collaboration software to help maintain a sense of closeness and connection to friends, family and vital services.

Technology in the form of IBM Watson is helping the alliance work with Nottingham and Nottinghamshire Integrated Care System (ICS) to provide extra insights about how the pandemic is influencing mental wellbeing. It can be used to monitor social media channels and provide insights to the NHS, also seeing how the virus and the vaccination is being talked about and to see how the population feels about this from a sentiment perspective.

This will allow Nottingham and Nottinghamshire Integrated Care System (ICS) and the local authority to portray the right message with their announcements, driving the conversation and using their platforms as influential users, to relay the information in the best way possible to the local community, providing fact-based information and giving people piece of mind during these stressful times.

Technologies producing practical tools and insights

As emerging technologies have proven their worth over the past year, it has become clear the importance of driving initiatives that implement these technologies and talent in addressing societal challenges.

One last step our team took, was to build an app aimed at helping economic experts in government, local authorities and businesses. The app simulates the impact of shocks to specific industrial sectors (transport, hospitality, and travel) and how they propagate to the whole economy. Equally, they can see how financial stimulus being injected into the economy by governments or other public authorities can help with economic recovery for a particular sector.

As we look to progress down the roadmap and out of lockdown, the new Regional Risk Pulse Index project will help local authorities determine the level of risk to its community's health by incorporating information about population density, age of the local population, predicted COVID-19 infections, stringency index, as well as the change of behaviour and sentiment in the population.

They will now be able to see if the stringency measures put in place have made a difference to how people behave and to the economic impact; as now more than ever, decision making needs to be guided by reliable data rather than gut feeling.

How technology has enabled healthcare to thrive through the pandemic

To say that technology is having an impact on healthcare is a cliché, if not a gross understatement.

BY EWA KIECZKA, BUSINESS LINE MANAGER AT FUTURE PROCESSING HEALTHCARE

MEDICINE AND MEDICAL CARE is being transformed by digital technology on a revolutionary scale which impacts both the performance of healthcare professionals and the quality of life for patients. More than that, it is safe to say that nowadays technology is playing a key role in modern medicine.

In this article I will take you through how extraordinary technology has transformed the health space and aided healthcare providers navigate the pressures of the pandemic.

Undeniable benefits of technology

Firstly, let's name technology's most significant benefits, on the outset: the introduction of Electronic Health Records. For years the poor quality of handwritten, paper medical records has not only been the subject of jokes and physicians' bad handwriting parodies but has contributed to serious medical errors. Digitisation has led to the standardisation of digital records, enabling the ease of storage and access by healthcare professionals. Not to mention the great savings, which shifting from paper to electronic health records has brought about.

Cloud technology is not only cheaper to store data but it is available to anyone from anywhere in the world. There are now more and more opportunities to store and access. The amount of data generated in healthcare is massive – according to statista.com in 2020 it reached 2,314 exabytes of new data. It grows exponentially as almost everyone owns a smartphone equipped with powerful sensors.

It's not only patients, but doctors and nurses alike who use a multitude of apps to collect data. Plus, there are the wearables monitoring the user's sleep patterns, cardiovascular activity, respiratory, lung and skin health, just to name a few. Not to mention the medical Internet of Things – smart medical devices communicating with each other – providing healthcare staff with invaluable insights, improving the quality and efficiency of treatment and the patients' health.

And this is where we arrive at the world of Big Data, hosting a multitude of significant benefits for healthcare. When it comes to new drug discovery, big data significantly reduces the time and cost of the process. How about research on rare diseases? Having access to accumulated data and appropriate models for analysis scientists can come up with diagnoses and new treatments more quickly and efficiently. Big data

helps healthcare organisations optimise their workflow to reduce the operational costs.

Using the analogy of Industry 4.0, healthcare is on the brink of its 4.0 version.

Digital transformation in healthcare

Slow as it has always been to adopt technology, these days healthcare is undergoing digital transformation at an ever increasing rate. Just a few examples of emerging technologies worth noting include blockchain, telemedicine/mobile apps and Artificial Intelligence.

Blockchain

With the massive amount of healthcare data generated and stored in the cloud come benefits but also issues related to privacy and patient data security. On the one hand, robust healthcare data analytics enables the discovery of new drugs and treatments more quickly and efficiently. However, to obtain datasets necessary for machine learning to train algorithms is not a simple task.

Blockchain could be a solution to provide a new model of healthcare data exchange. The data will not belong to a particular institution but to the blockchain itself and patients will have more control over how their data is used and shared. What the healthcare world needs is a single global database to be used for research and clinical trials and Blockchain could be the answer.

Telemedicine and mobile apps

The current Covid-19 pandemic has accelerated the adoption of telehealth services exponentially to a point where telemedicine is here to stay. In fact, it is expected to become a $13 billion industry by 2023. It provides solutions to some challenges healthcare is facing; like a rapidly aging society with chronically ill patients unable to travel, patients who benefit from tele or virtual visits to physicians, or being monitored via remote devices. Patients from rural areas benefit from the convenience of specialist access, obtaining their diagnosis more quickly and conveniently.

Thanks to mobile apps patients get more involved; they can schedule their own appointments, stay in touch with their GP's, have their health monitored with or without a wearable device, get medical information or marketing delivered, and make regular use of fitness and wellness apps.

Mobile healthcare is becoming more and more promising as the number of healthcare apps available just on Google Play in the second quarter of 2020 has reached 46,360 which constitutes a 7.1 percent increase over the previous quarter. What's more, Google has recently announced that it is "running a user feedback program to test features that give users the ability to collect health information from their provider patient portals". Consequently, we can expect to see a new app allowing patients to gain more control over their own medical records.

Artificial Intelligence (AI)

The main areas of AI implementation in healthcare include: diagnostics, development of new treatments and drugs, personalised medicine and patient monitoring. There are now software development companies that have developed AI solutions that aid the diagnostic process of the most aggressive cancer - glioblastoma. The system analyses the MRI examinations performed and takes just one minute to perform the task.

Another example of AI use, saving patients from a highly invasive procedure of coronary angiography and speeding up the diagnostic process is Cardio 4D. This is a system that enables virtual reproduction of flow conditions in the arteries and provides new information - flow parameters. This is used to increase the imaging and prognosis efficiency in patients with atherosclerosis.

Looking to the future

It's no secret that we have all been patiently observing the trends on the market brought about by the pandemic with many lockdowns, social distancing and well as restrictions on travel and services. The healthcare industry was hit with immense demand to deliver during this time and technology has been a huge enabler for us.

A year on, and we are still battling against the virus amongst other things. Technology advancements have been astounding and this path of transformation is only set to continue. I suggest we watch this space.

Why workplace data analytics should be a priority for healthcare leaders

As the recovery from one of the biggest global crises of the century continues apace, there has been no doubt that the healthcare profession has been stretched beyond its limits – and is needed now more than ever before.

BY JON PICKERING, CEO OF WORKPLACE DATA ANALYTICS FIRM TIGER

FRONTLINE STAFF spanning UK wards, Trusts, and care homes have been overwhelmed by the vast number of patients who have come through their doors requiring immediate, often lifesaving, treatment after contracting Covid-19.
TODAY'S NATIONAL CASE FIGURES have now surpassed the 4.3 million mark. In that time, hospitals have been built and healthcare managers have tapped into all manner of resources to assist the immense demand. Retired professionals are still now stepping up to assist with vaccinations and ongoing care efforts, and employees are upskilling in other areas of healthcare to alleviate sustained pressures.

For Trust leaders too, they're working night and day to manage everything behind the scenes – whether that means ensuring enough hospital beds are free, peak demand is being met by adequate staff redeployment, or infection rates are consistently analysed so they're ahead of the curve and well-prepared for the next phase. In short, it hasn't stopped for this sector.

And while data might not be at the top of every employee's list when they first think about the UK's healthcare provision throughout the pandemic, it's

Armed with insight, Trust leaders have been able to react swiftly to an ever-changing environment and take action accordingly

been incredibly vital for the industry as a whole. The NHS, care homes, and other providers haven't been able to operate without it, when it has come down to making the critical decisions as to what support is needed, and where.

Armed with insight, Trust leaders have been able to react swiftly to an ever-changing environment and take action accordingly. This level of unified communications and collaboration (UC&C) data at their fingertips has saved them hours and mountains of paperwork in the process too. After all, just imagine the task at hand if they had to do this all manually? It would've been truly impossible.

How insight can outline employee patterns and encourage swift action

Unlocking and understanding their UC&C insight has better equipped the sector's leaders to identify patterns and stop them at the source if needed. Knowing exactly how many switchboard and contact centre phone calls are being taken each day – and which were the busiest times – has helped leaders to make decisions on if they need to deploy more staff to manage peak demand, or train inexperienced employees to reduce bottlenecks and decrease patient waiting times. It's these moments, when departments are at their busiest, that staff need additional support – all of which can be actioned because managers are effectively analysing their workplace data and identifying trends.

Operationally too, missed calls data could prompt decision-makers to ask the question of 'why?' Does the equipment need updating? Are colleagues trained up enough on how to handle complex calls? Is the switchboard being overrun and therefore should more staff be deployed? All these queries can be identified by savvy analytics and subsequently acted upon sooner rather than later. Wellbeing is also a huge concern within the healthcare sector – especially with professionals admitting to experiencing more stress and anxiety throughout Covid-19 because of the enhanced pressures.

Equipping managers to feel confident to tap into their in-house intelligence and understand how a colleague is utilising their organisation's communications tools, means they can begin to pinpoint when employees are dropping out of calls, if they're using video options, and how engaged they are in meetings. And if any questions are raised as a result of analysing this data, it arms leaders with the opportunity to speak to these individuals openly and explore whether or not they require further assistance – and how that might look. Spotting trends quickly can often be the difference between employees feeling supported and motivated rather than disengaged and unproductive.

Workplace data analytics supports entire teams away from the frontline

Another important point to stress concerns those professionals who are working on their own out in the field. Every day they're entering unsafe areas and attending to infected patients in their homes. Without these individuals providing in-depth reports following their visits, managers wouldn't have all the information they need to determine whether or not these people might be at risk and require further help. In essence, just because they're off-site, doesn't mean they don't require support.

Overall, to provide a more productive employee environment and an improved patient experience, managers must be provided with the tools to extract the granular, real-time detail they require, to react swiftly and positively so that workforces are better prepared for the next crisis.

Get all this right and leaders can also redeploy unused channels which support peaks in demand and restructure networks to maximise UC&C technology investment. And what does this all ultimately lead to? A bigger picture to understand staffing levels, wellbeing, workloads and more. For these reasons, there is no doubt that insight will continue to play an integral role throughout – and beyond – the pandemic recovery.

Implementing digital food menus in hospitals

The Independent Review of Hospital Food led by Prue Leith recommended that digital meal ordering solutions should be implemented in hospitals by 2022. Utilising technology in patient meal ordering would, in turn, allow staff hours to be used more efficiently, reduce food and paper waste and crucially increase patient satisfaction.

BY TOM WRIGHT AT NDL

IN THE REVIEW, Leith mentions the difficulties that on-ward catering presents: 'patients are not well… and often lack appetite'; 'their medical conditions [and] cultural preferences…necessitate multiple food options'; and 'hospitals are busy, noisy places, seldom conducive to pleasurable mealtimes'. 'The reassuring fact', she mentions 'is that both caterers and nursing staff want to serve patients with food that is delicious and appreciated, and many feel ashamed and humiliated if they are unable to do so.' [1]

Already a step ahead, University Hospitals of Morecambe Bay NHS Foundation Trusts (UHMBFT), achieved successful change through implementing a digitalised patient meal ordering service in 2017. Noticing key flaws in the original system and wanting to improve the way it handles patient meals within its hospitals, Ward Manager Lisa Winn was the driving force behind this change, approaching the IT team with a vision to move food-ordering closer to the actual mealtime. The Trust served close to a million meals across its 32 wards annually, and previously distributed printed paper menus to the wards for Clinical Assistants to collect meal orders from their patients. Completed cards would be collected, delivered to the hospital kitchen, and manually counted and tallied. Specialist orders would also be flagged manually for a separate chef to prepare. The overall process would take an average of 2 hours per meal.

In the interim, patients may have been discharged or transferred wards and been replaced by new admissions. Food that they had ordered a day prior would subsequently go to waste. Meanwhile, patients who had been transferred were often left without a

meal. The outdated paper system would often get lost in transit or delivered late, further contributing to dissatisfied, unfed patients. Alongside being an unsatisfactory experience for the vulnerable patients, the overall process resulted in over £1,000 worth of food waste each week.

Identifying that the service could be improved through digitalising the process, the Trust opted to build a native mobile app that can be used on any mobile device with or without signal, with information captured and shared in real-time interdepartmentally. Working with software company NDL, they used an existing 'MX' mobile app template from its suite of digital transformation tools which are available to the NDL community. Having already used the 'MX' app template across other projects, the Trust knew how easy and adaptable the process was, amending the downloadable software to suit their exact needs. NDL's low code tool allowed them to build an app that incorporating the whole meal-ordering process, inviting the catering and IT team to build something specific and beneficial for all involved. The teams collaborated to share their existing knowledge of the patient meals process, alongside their recommendations for this bespoke solution.

Healthcare Assistants now take patient meal orders on a digital tablet much closer to their mealtime. The digital process allows real-time updates on the patients, hugely improving communication between wards, kitchens, patients, and clinicians, who can update with dietary requirements, portion sizes and allergies as necessary.

The program, named The Patient Meal Choices App, integrates with the Electronic Patient Record (EPR) and Bed Management system, automatically checks-in the patient upon arrival, and allows the patient's location to be tracked throughout their hospital stay. Meals can now be cancelled or adjusted as their circumstances require, following their hospital journey. Once an order is placed, the kitchen is automatically updated with a new tally added on its display screens, allowing catering staff to see the live status of meal orders. Deemed a success following a year-long trial on a ward of 31 beds, the app has been rolled out across the Trust. Serving 450 beds at Lancaster Royal Infirmary and 300 beds at Furness General Hospital, it supports the smooth delivery of 250,000 meals annually.

Following the roll-out, UHMBFT has reduced its food waste by almost half, down to £550 per week, with an estimated total of £26,000 saved annually. Further adding to the environmental benefits of the digitalization process, roughly 400 pieces of paper per day that had previously been used by each ward for meal ordering is now replaced by a single electronic screen. A further £190,000 a year has been saved in printing costs. Additionally, reducing this admin-heavy task means nurses time can be better spent elsewhere. Patient meal satisfaction has significantly increased due to a reduction in the time between the ordering and delivery of food. Finally, without the hassle of delivering, chasing and writing the paper forms, clinicians time is used more efficiently, with an hour saved each day.

With the initial trials and roll-out complete, work has begun on the second phase. Included in this is the incorporation of meal apps, in which dieticians are able to track a patient's food and calorie intake. This can be used to aid in their recovery process. Additional features include monitoring which food is wasted, and which is most popular, which will allow for improved and strategic menu planning and thus further reducing food waste and increasing financial savings.

Marc Hadwin, Head of Digital Servcies at UHMBFT, said, "With the aim to improve patient care, overall efficiency and reduce food and paper waste, developing the app template from NDL Software's App Showcase was a straightforward process. Incorporating input from the various teams that are now using the app daily, adopting this technology has resulted in improved patient and staff experience. "Following the recently published review into hospital food, it's encouraging to hear that others will be implementing similar processes and benefiting from the vast improvements experienced here. It's certainly an exciting time to see where further efficiencies can be achieved through technology."

Tom Wright, Head of Digital Engagement at NDL said: "Hospitals are constantly under pressure from all angles, with patient care as the core goal. The Patient Meal Choices App is a leading example of how technology can lend itself to running hospitals more efficiently, and overall improve patient satisfaction. Quick, easy and cost-effective to develop, it demonstrates a really positive role for technology in the care of those in need. "Following the recent government guidance on digital meal ordering, UHMBFT sets a standard and allows us to reflect on the positive results at several stages ahead, both from a patient care and environmental perspective. We are pleased to see that already more trusts are looking to implement similar systems". NDL works with a community of NHS Trusts that share best practice and innovation so that similar challenges across the country can be overcome more easily.

For more information, please contact:
info@ndl.co.uk or visit **www.ndl.co.uk**

To view the case study, visit:
www.ndl.co.uk/NEWS-EVENTS/Case-Studies/Case-Studies/University-Hospitals-of-Morecambe-Bay-NHS-FT-MX-Pa

[1] Independent Review of Hospital Food, 2020. P7

How digital innovation provides a scalable solution to administrative burdens

The global pandemic has greatly accelerated the rate of digital innovation within the public sector.

TIMES OF CRISIS amplify the need for scalable solutions for data management – when the ability to gather and share information with speed and accuracy is crucial for quick and effective decision making. Not only does the manual rekeying of data duplicate work between departments; it also creates a greater level of risk for errors and security breaches as the data is repeatedly handled.

Digital transformation has been firmly cemented within NHS Trusts and other public organisations as a means of achieving greater efficiency when resources are stretched and under extraordinary pressure. The journey to digital transformation has already been underway within most organisations years before the pandemic. For many, a long-term digitalisation strategy is now being considered on a much larger scale.

Since the pandemic, the adoption of transformational technology has dramatically escalated. Public services including the NHS are relying on digital workforces to support teams and reduce the administrative burden, freeing up valuable time for highly trained professionals.

The benefits that can be achieved as a result of investing in digital innovation are significant, not least when looking at how to best optimize business processes, ease the administrative burden of repetitive tasks or simplifying how information is collected.

RPA and intelligent automation

Robotic Process Automation (RPA) is a software solution which automates processes such as the synchronising or migration of data between different systems, or the checking of information held on multiple systems. Robots act as a digital workforce operating 24 hours a day, enabling a speed and accuracy that would be unachievable by humans.

It aims to minimize these repetitive administrative tasks through developing and managing automations that drive any system, but at increased speed and greater accuracy than people can. This means humans are free to focus on human tasks which require their capacity for empathy, subjectivity and creativity, resulting in a quicker return on investment. Implementing RPA software helps organisations work smarter, be more productive, saves public money and reduces unnecessary paper waste.

RPA platforms that are compatible with AI software are powering intelligent automation - an emerging area of technology that greatly broadens the scope for optimising business processes by including rich and unstructured data within automation. This forward-thinking process, in which intelligent automation fuses artificial intelligence with RPA, provides structure so that information can either be passed to another robot as part of the wider automated process, or directing the data for the attention of a human to support their decision making. It helps information to be understood and processed so that more meaning can be interpreted from a wider variety of data sources. In the healthcare setting example, the technology can be used to improve diagnosis and treatment.

Teams adopting this technology across the public sector are empowered to deliver the best service and care for their citizens by ensuring the process being automated is the most efficient it can be. Tasks that require human intuition are left to the team to handle, whilst data-entry and administrative tasks are performed using software or bots.

The prospect of robots in public services is worrying to some people at first. However, the best intelligent automation software is designed to work efficiently with teams of humans, not to replace them, and is best suited to process-based tasks that follow a set of defined rules, where it is great at providing accuracy, consistency, logical processing, and high productivity. For processes that involve judgement, what better technology is there than the human brain?

The NHS and other public sector organisations can capture and share information digitally through apps, eForms and cognitive service technologies, however it's essential that this information is integrated across the many back-office systems in play. By bridging the gap between front and back-office processes, RPA and intelligent automation deliver the next stage in digital transformation.

Successes of RPA and intelligent automation

There are many examples that demonstrate the power for RPA technology to really make a difference. For example, Swindon County Council developed an RPA solution to process the surge in applications for free school meals at the start of the pandemic. With more families in its jurisdiction entering the benefit system, applications rose more than 2,000% in March 2020 compared to 2019 figures. Processing this volume of applications manually within the council's team of four was simply not viable.

Instead, the team developed a digital solution to remove manual processes where appropriate – overall achieving a 98% efficiency increase. A digital bot now takes on the tasks of identifying new applications, checking their eligibility status against the required systems, performing validation checks, identifying any exceptions and logging them into the database for passing to a human worker. Application turnaround time has been reduced by 66%, ensuring that children have access to vital nutrition, and providing reassurance to worried parents and carers.

NDL is a UK SME software company developing transformational technologies with social purpose. Its suite of digital and RPA solutions has been specifically designed for the NHS and public sector. It is also working on a project for a finance team that highlights an even more ambitious potential for RPA technology. PDF invoices are scanned by an AI cognitive function that can identify and extract relevant unstructured data, then convert it into a structured format and pass it on to a robot. Early results have shown it provides a level of accuracy much higher than the optical character recognition systems that have been used in some settings.

Tom Wright, Head of Digital Engagement at NDL said: "We want to help public sector bodies to do more with less. Ongoing reductions in budgets and stretched resources accelerated by the pandemic have increased pressure on front-line services. Our tools help to build very specific solutions that they can wrap around individual ways of working.

"Our robots relieve the pressure on staff by only requiring them to input information once, ensuring that it is available across many different systems. By removing administrative burdens, our software means that a clinician can spend more time with their patients, or a civil servant can engage more with the public and on the tasks that computers can't do."

Initiatives are currently being developed within the NDL user community. Consisting of over 100 organisations that have been exploring applications of automation and front-end technologies, they are ready to share, collaborate and help each other where they can, all aiding towards a truly collaborative platform for NDL to shape the next piece of innovation software.

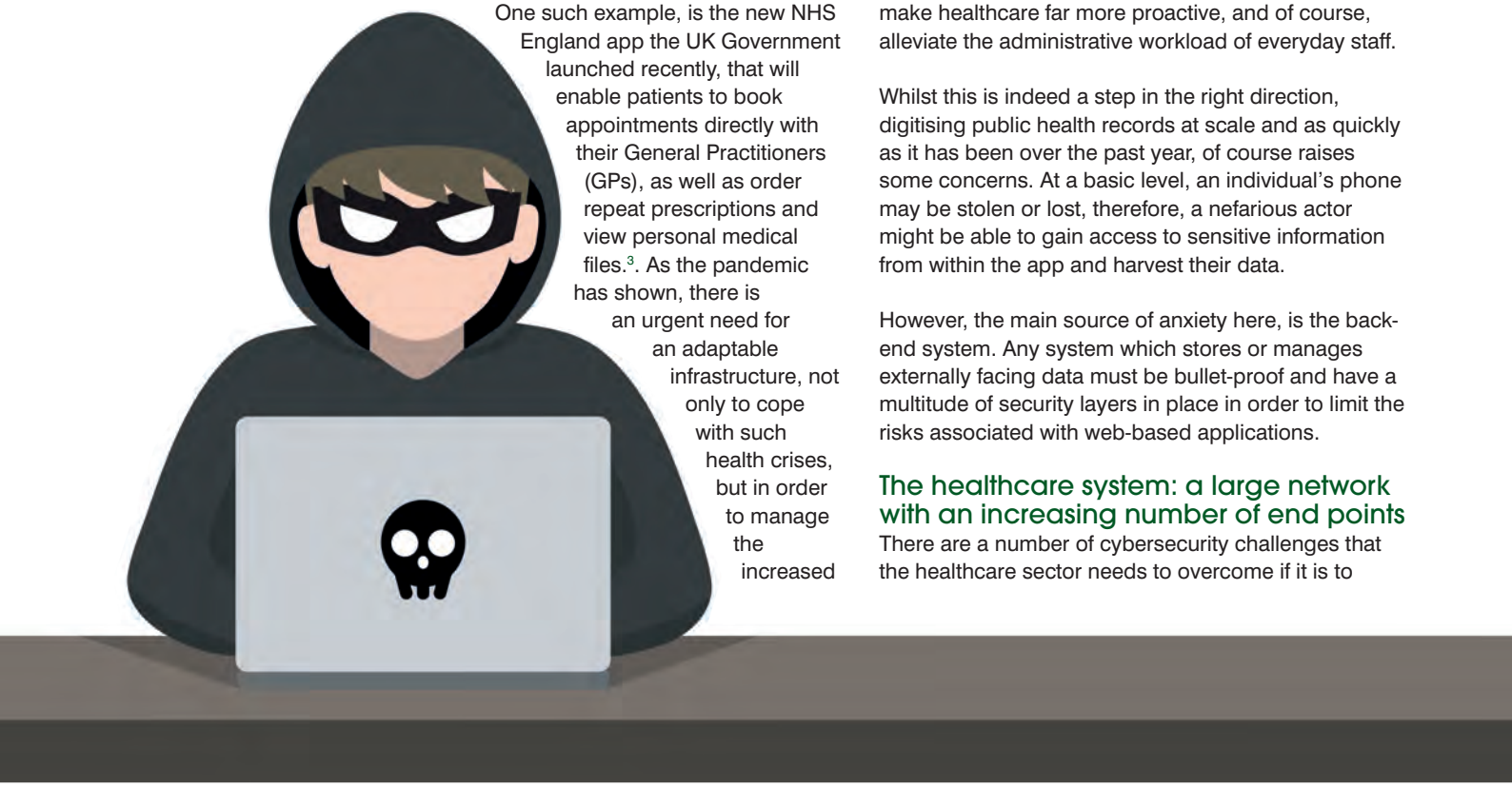
The new age of healthcare and its cyberthreats

The NHS Long Term Plan was published back in early 2019, which set out ambitious aims for over the next decade, underpinning the importance of technology and the key role it will play in the future of the NHS.[1]

BY KEVIN CURRAN, IEEE SENIOR MEMBER AND PROFESSOR OF CYBERSECURITY AT ULSTER UNIVERSITY

IN JULY, NHSX was born, with the Department of Health and Social Care, NHS England, and NHS Improvement taking the lead for driving digital transformation across the UK healthcare system. Since then, the pandemic has accelerated transformation plans by tenfold. As is often the case, technology is drawn upon to answer some of the more complex and urgent challenges – more so than ever this year.

One such example, is the new NHS England app the UK Government launched recently, that will enable patients to book appointments directly with their General Practitioners (GPs), as well as order repeat prescriptions and view personal medical files.[3]. As the pandemic has shown, there is an urgent need for an adaptable infrastructure, not only to cope with such health crises, but in order to manage the increased demand of our health services. Essentially, the healthcare sector requires far more scalability if it is to continue delivering the quality of care for a continuously growing population.



The benefits of technology are plain to see, with the internet of things (IoT) being able to influence several areas including clinical operations, medication management, in-patient monitoring, and overall workflow management. It presents an opportunity to make healthcare far more proactive, and of course, alleviate the administrative workload of everyday staff.

Whilst this is indeed a step in the right direction, digitising public health records at scale and as quickly as it has been over the past year, of course raises some concerns. At a basic level, an individual's phone may be stolen or lost, therefore, a nefarious actor might be able to gain access to sensitive information from within the app and harvest their data.

However, the main source of anxiety here, is the back-end system. Any system which stores or manages externally facing data must be bullet-proof and have a multitude of security layers in place in order to limit the risks associated with web-based applications.

The healthcare system: a large network with an increasing number of end points

There are a number of cybersecurity challenges that the healthcare sector needs to overcome if it is to

continue with its digital transformation plan, especially as the pandemic unfolds. The first issue of course, being the sheer size and diversity of its ecosystem. Consider the vast number and indeed variety of devices which are all have access to its network and are connected to a central server. All of its computers, MRI scanners, heart-rate monitors, or perhaps even staffs' own personal devices.

This presents a major security issue, given the number of devices connected to the network at any one time. There will be countless internet connected endpoints throughout each hospital or GP branch. Without complete network visibility, each endpoint presents a potential threat, and could easily be manipulated by nefarious actors.

Addressing the cybersecurity skills gap

Staff's daily behaviours and general lack of security awareness remain the greatest weakness in any system and IT departments are fully aware of this cybersecurity skills gap. To this day, employees continue to open suspicious weblinks within emails, exposing organisations to a whole range phishing scams and other threats. The healthcare system should be treated no differently to any other organisation, and if the sector is to continue with its digital transformation initiative, boosting overall cybersecurity skills and awareness will need to be the first priority.

Given the rise in ransomware attacks on healthcare organisations, continued digitalisation will only leave the healthcare system more exposed. Employees must be reminded of their own responsibility; especially as public data is migrated to the cloud or other systems. If staff are still using weak or default passwords, not regularly updating any software on their devices and clicking suspicious links, health services will be affected.

Data transformation of course has many benefits, but it is not without its risks. Whilst the move to an online an app may improve efficiency with booking an appointment and monthly patient check ins, public records will reside on a public facing server. Having records inhouse, limits the range and type of access, and are generally far more difficult for remote hackers.

Establishing an effective cybersecurity strategy

There are techniques that healthcare organisations can use to reduce the risk of future data breaches and ensure there is more transparency for the public. One way is to make it 'opt in', so patients have the choice to decide whether their medical information is moved to a public facing service so that they can access it. However, those who do not opt in or download the app should by default, have their records hosted in a non-public facing cloud service. This way, if a data breach does occur, those who never used the app or not wanted to, will not have had their details released. Naturally, developing a secure and robust web application is incredibly hard. Developers are of course aware of secure coding, but they need to understand how to encrypt databases, or prevent SQL injection attacks, and consider any third-party library vulnerabilities.[4] These teams must implement multi-factor authentication, and ensure all passwords are hashed and that no resources are enumerable in the public Application Programming Interface (API). Developers must know how to configure cloud services and use HTTP Strict Transport Security (HSTS) or Intrusion Detection Systems (IDSs) to restrict ports and ensure minimal access privileges. Constantly checking for any vulnerabilities or flaws, systems administrators must ensure every known flaw or loophole is effectively patched.

Staff's daily behaviours and general lack of security awareness remain the greatest weakness in any system and IT departments are fully aware of this cybersecurity skills gap

Another option is to use a form of searchable symmetric encryption which supports computations over data in encrypted form. In a cloud environment, cryptography is typically utilised for two purposes – security while data is at rest and security while data is in transit. However, this does not necessarily guarantee the security of data during processing, as data is processed in unencrypted form. Attackers prefer to target data in use, as opposed to when data is encrypted during storage or transit.

There can be no doubt that the teams involved in the health sectors transformation will strive to deliver a most secure service as possible, however, the cybersecurity strategy will need to be extensive. Whilst regular penetration testing can offer some relief, not all threats can actually be identified. Given the size of the healthcare system and the sheer quantity of public data entangled within its network, IT teams will need to be prepared for anything, proactively searching for any vulnerabilities at all times, and consistently scanning for any potential threats.

Further reading

1 https://www.longtermplan.nhs.uk

3 Cellan-Jones, R. (2018) NHS app: Will it cut down on wasted appointments? BBC News, 2 July 2017, https://www.bbc.co.uk/news/technology-44676493

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Meeting the demand for digital transformation

As digitization accelerates, how can the industry increase support for IT and engineering professionals amid a growing skills shortage?

BY MARC GARNER, VP, SECURE POWER DIVISION, SCHNEIDER ELECTRIC UK&I

TODAY the pressure placed on frontline workers in the face of the third UK lockdown has been unprecedented. According to an article published by the NHS in October 2020, mental health problems are one of the main reasons for staff absences, with data showing that anxiety, stress and other related illnesses accounted for 28.3 percent of all sickness leave in May 2020.

New UK government laws to try and reduce the impact of the Coronavirus pandemic, ease stress on the NHS, and protect both the UK public and healthcare professionals from the disease have been implemented nationally. And while lockdowns have required many businesses to close and staff to work remotely, in the new normal, technology has quickly become the go-to means of supporting the economy.

Digital demands are growing

Amid growing demands for accelerated digital transformation, continuity for business and mission-critical applications have become key concerns for IT professionals. So much so that in 2020, data centre employees were named key workers, fundamentally elevating the status of the industry and increasing the criticality of its role within the digital economy. According to IDC, Digital Transformation (DX) investment is growing at a compound annual growth rate (CAGR) of 15.5 percent from 2020 to 2023, and is expected to approach $6.8 trillion (£4.8T). Indeed as more organisations become dependent on digital infrastructure the pace of digitization shows no sign of slowing.

The pressure to ensure uptime, therefore, has placed greater stress not only on the networks, power and IT infrastructure underpinning the sectors reliant on them – those that include healthcare, education, and business - but on the professionals who support them. Such stress has been prevalent within tech for years and according to a survey by Regus in 2015, 49 percent of IT workers said they were closer to burnout at that time than during the five years previous.

Fast-forward to 2020 and a survey by Blind revealed that 57 percent of respondents answered ‘yes’ when asked if they were suffering from burnout, while a 2020 survey from Harvey Nash Group also found over one in three tech professionals say their mental health had deteriorated during the Covid-19 pandemic. Looking forward, CBRE predicts a 400MW surge in capacity that offers strong positive outlook for the data centre sector. Yet other pressures are placing great strain on industry professionals who are tasked with keeping the lights on at all times - not least of which are the out-dated infrastructure systems and networks picking up the increased demand.

The need to prevent downtime According to the Uptime Institute’s 10th annual-data centre survey, “outages are occurring with disturbing frequency and are becoming more damaging and expensive.” In fact, one third of survey participants admitted to experiencing a major outage in the last 12 months and one in six claimed it had cost them more than $1m (£730K). According to the 2017 Centrica Resilience

Report 39 percent of businesses also experienced unscheduled downtime as a result of an energy-related failure. Interestingly 75 percent of Uptime respondents also cited that downtime could have been prevented with better management, processes or configuration, meaning a proactive or well rounded approach to maintenance might have ensured peace of mind and mitigated any unforeseen issues.

Clearly resilience and business continuity have been key sector priorities for some time, but how do we begin to address such growing needs when the sector itself is experiencing an endemic skills shortage? And while experienced engineers and consultants continue to work tirelessly, is there a way we can use tech to help reduce stress or avoid downtime remotely?

Addressing the skills gap

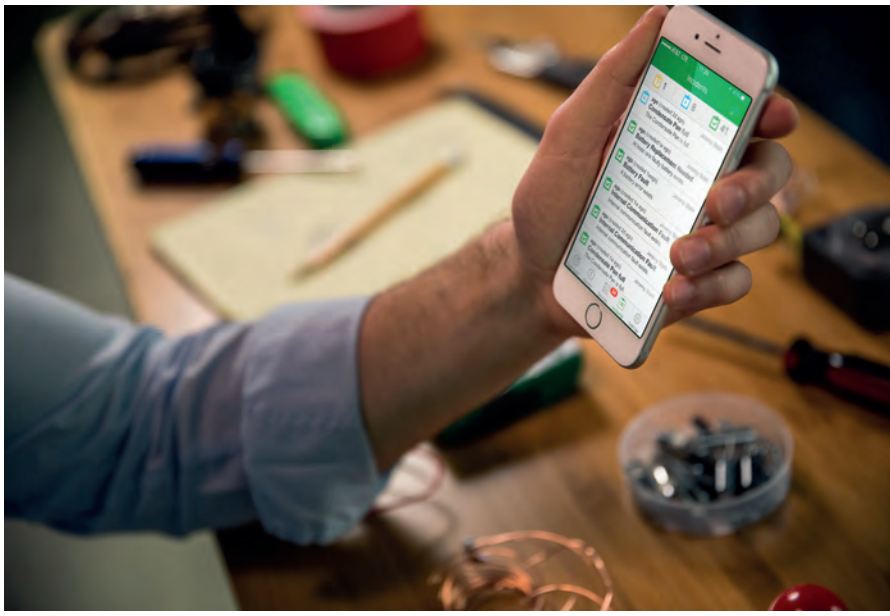
According to the UK Government's Review of the shortage occupation list 2020, an insufficient supply of adequate skills and experience, and an ageing workforce are two key reasons for skills shortages in the IT and engineering sectors. Moreover, 30 percent of full-time, working age employees in this group were over 50, compared with 32 percent across other occupations. Needless to say that when it comes to digital infrastructure, experience within the sector is paramount, but are businesses doing enough to attract new skills into the industry? Methods that some employers have found to be 'effective' include increasing salaries, expanding training in their existing workforce and within their trainee and apprenticeship programmes.

Indeed many members of the electrical, IT and channel communities have already taken advantage of new government incentives around kick-starting and apprenticeships, hoping to attract and employ new members of staff into IT and engineering. Yet some have also begun to transform their organisations with new diversified service models that support end user demands.

Partner expertise is paramount

What's become apparent is that having access to an expert digital ecosystem is essential for customer uptime, especially when we look at the growing demands placed on critical infrastructure. IDC states that by 2025, 75 percent of business leaders will leverage digital platforms and ecosystem capabilities to adapt their value chains to new markets and industries, meaning the role of technology partners is becoming increasingly important.

In many cases, service providers are beginning to bridge the skills gap, using their expertise, their position with vendors and digital technologies to support customers seeking to mitigate the impacts of downtime. Such services might include remote monitoring, on-site troubleshooting and next-day replacement parts for mission-critical applications, where an outage will have a direct effect on



profitability or customers. One barrier to this approach has previously been cost. However, research detailed in Schneider Electric white paper #283 found that the savings gained by using a partner or service provider increase substantially as equipment ages. With a fleet of 100 Uniterruptible Power Supplies (UPS), for example, working with a service partner can offer savings of up to 59 percent under a typical managed service level agreement (SLA), demonstrating a highly cost effective way of increasing resilience.

For businesses dependent on IT uptime, access to service partners with specialisations in critical power, data centres and edge computing also offers on-demand support to help ensure reliability across distributed sites. Yet many organisations are also embracing technology as the enabler, using cloud-based software solutions to gain real-time insight into the health and status of their mission-critical infrastructure remotely.

So what's the answer?

With demands increasing at a rapid rate and growing skills gap to address, having access to expert service partners is essential for business continuity. And with the accompanying pressure to ensure IT uptime across a greater number of sites, both customers and service providers also need access to the right tools or software solutions to reduce the pressure caused by unexpected downtime.

Today Schneider Electric is helping both to minimise stress for IT Professionals and increase reliability via vendor-agnostic artificial intelligence (AI) software; delivering data-driven insights that offer visibility from anywhere, at any time. Moreover, by employing a proactive approach to maintenance or servicing, end-users could also save up to 59 percent over the lifecycle management of their IT – as compelling a business case for reducing stress, as any.

In a time of crisis, these four digital disruption mistakes may cost you dearly

What does disruption mean to you? In the pre-pandemic days of 2019, disruption was the dream; in business it was a byword for innovation, transformation, dreaming big.

BY GARY HARROLD, CEO UK & IRELAND, SWISS POST SOLUTIONS

A GLOBAL PANDEMIC later and 'disruption' has lost its sheen as we've attempted to mitigate the disruptive elements of lockdown to stay afloat in a tide of challenges. Digital remedies have been front and centre in our responses and there is no going back. However, with any period of change and transformation, mistakes will be made.

In the year since the pandemic broke, the mistakes organisations are still making are becoming ever clearer. Our idea of digital disruption needs a reset. If we don't, the next crisis (in whatever form that takes) will put us right back where we were - scrambling for continuity and resilience.

Based on our research, on our conversations with businesses and in the solutions we've implemented for our partners throughout this crisis here's what we've learned…

1 - Getting distracted by technology

As GlobalData recognised in its recent report on the role technology will play in pandemic recovery, 'targeted, tactical digital transformation will be vital for companies to survive in the new post-Covid world'. Of course, there's no doubt that technologies can help solve the most challenging of business needs. When a global crisis hits, it may seem entirely reasonable to respond with rapid deployment of technological solutions. But what if the most obvious problem isn't actually the most pressing one?

In the face of disruption you certainly need to act fast to avoid meltdown, but what if you're inadvertently

storing up a whole load of other problems for the not-so-distant future?

The paperless office is a classic example of the wrong business issue taking precedent. The scenario is this. You rely on a whole raft of paper documents - forms, customer communications, reports etc to keep business processes running. What happens when you can't access those paper documents? Potentially, disaster.

Surely, a prudent response is to eliminate paper from processes?

But the problem isn't paper. It's data. It's about moving away from documents to understanding the value of the data they hold. It's about how to get to the data you need in the most efficient way, how to safely share it, how to enable it to do more. Whether paper or some other form, data is the issue. Removing paper from your processes in order may actually store up far worse issues for customers and colleagues that only become obvious once it's 'too late'.

In fact, rather than do away with paper, many businesses are upgrading long-forgotten mailrooms into data processing hubs; in recent research from NelsonHall 80% of organisations they surveyed were to digitise mailrooms, with over 70% seeking to digitalise document processes.

The lesson? Technology is just a tool that helps deliver a data-led transformation strategy.

It should never drive it. Instead, strategy should focus on maximising data; how it's used, the journey it takes through an organisation, the hurdles it has to jump, the compliance or security requirements it has to meet - and the crisis' it has to survive.

2 - Believing in borders that no longer exist

At the start of lockdown we can assume that a raft of organisations brushed the dust off business-continuity plans and realised that they were entirely unfit for the purpose of this pandemic. Despite operating within a global economy, hit by global crisis; what was painfully clear at the start of lockdown is that localised thinking still reigned.

These well-intentioned business continuity plans were often centre and city specific rather than enterprise-wide. In other words, there was an assumption that there would never be a need to close multiple offices and worksites. If one office had to go offline, its sister sites would pick up the slack. That's no good for scenarios where your sister, brother and second-cousin sites are also forced to close doors.
In revisiting crisis-ready digital transformation strategies, we must take a view of digital transformation that is location-agnostic. And where does this start? Always with data - set data free from the binds of centralised workflows and the rest can follow.

3 - Accepting 'good enough' from partners

'To build greater resilience, enterprises must open themselves to more digitally led partnerships'. That's the verdict handed down by Accenture on how organisations will build back better. As McKinsey says, the outsourcing industry has been an "integral partner in companies' crisis response across sectors".

In the months following lockdown, satisfaction with outsourcing partners was just 38%. A third viewed the readiness of outsourcing partners to respond to crises as 'low'. You were looking to partners to help you weather the storm. It's clear that some were more focused on putting on their own lifejacket than helping you find yours.

Now is a good time to assess your relationships with partners and consider how they handled the immediate aftermath of the crisis. What should you expect as part of a crisis-ready digital partnership?

- Make business continuity planning alongside providers your priority; consider flexibility, location and geographical limitations
- Make sure to investigate and leverage the expertise of partners as back-up resource, they can bring experience and knowledge from a wider perspective
- Ensure access to easily monitored and updated crisis dashboards across outsourced services that ensure service levels are being met

As Deloitte states in its report 'COVID-19: A wake up call for the BPO industry, 'the 'DNA' of the outsourcing model needs to become more flexible and responsive, so that it can anticipate and respond to seismic shocks to their clients' businesses and markets, and provide solutions at speed.' Seek partners that are borne of this DNA, not those that have yet to mutate to fit the new normal.

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4 - Turning your nose up at quick fixes

We've said that it's a mistake to act too rashly on immediately obvious issues - but that doesn't mean that quick fixes are off the cards. Sometimes you have to act. According to Accenture's Technology Vision 2021 many enterprises are compressing a decade of digital transformation into just one or two years. 92% report their organisation is innovating with "an urgency and call to action".

Here, we're not talking about 'quick and dirty' fixes that will need to be dismantled as soon as we return to 'business as normal' (whatever shape that takes). We are talking about taking a strategic decision to act fast to implement proven strategies that will deliver organisational resilience and business continuity right now.

In recent months, Zurich UK & Ireland implemented a two-year digitisation programme in just two weeks. Other stories of two-year or even five-year plans being achieved in mere weeks are proving that where there is a will, there's a way. Just three years ago McKinsey analysts spoke of the need to build five-year digital roadmaps. In May 2020, their research suggested that …'businesses that once mapped digital strategy in one- to three-year phases must now scale their initiatives in a matter of days or weeks'. This research showed that top performing companies were accelerating tactics such as data-mapping and learning new technologies from quarterly or even annual priorities to weekly routines.
Accenture echoes this approach in its Trends Vision 2021 report; 'If businesses continue to have a clear-eyed perspective and sharp focus on their expedited digital transformations, reimagining everything from their people, to data, architectures, and ecosystems, they can emerge as leaders'.

Simply put, we no longer have the luxury of time. Right now, quick wins count. In fact, they are now a prerequisite for digital success.

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Building agility through workforce engagement in a post-pandemic world

Just over a year ago COVID-19 swept across the globe, forcing changes across our personal and working lives. Without a doubt, one of the biggest impacts to organisations was the shift to remote work – forever changing the future of workforce engagement.

BY CLÉMENT WEHRUNG, PRODUCT STRATEGIST, FUZE

HEADS OF BUSINESSES EVERYWHERE have taken notice of the positive impact of work-from-home. An employer survey conducted by PwC found that 72 per cent of remote workers want to continue working remotely at least two days a week post-pandemic.

This comes close on the heels of many large technology companies, such as Twitter and Google providing their workers with the option to permanently work remotely. Given the move to a more distributed workforce, businesses need to proactively prepare themselves from a technological and cultural standpoint in order to accommodate greater remote working flexibility and ensure optimal workforce productivity. Embed a “video first” policy into your culture

Over the past year, communications and collaborations tools have proven essential in keeping remote workers engaged and connected. More specifically, video conferencing has become a "must have" tool to drive workforce engagement. At Fuze, our cloud communications and collaboration software platform enabled us to experience this benefit first-hand. In fact, we saw a 596% increase in video meetings usage across the Fuze Platform in the weeks following the initial outbreak of COVID-19.

Prior to the pandemic, video conferencing was typically reserved for full-time remote employees. However, at Fuze, we have always embraced a "video first" policy for all employees. One of the reasons we adopted this policy is due to our proven and time - honoured "work from anywhere" culture, which provides Fuze employees with the flexibility to work from wherever they are the most productive. I recently had the pleasure of recruiting and onboarding a new hire for my team who lives in another country. We have never met in-person and I still don't know when we will get the chance to do some. Yet, thanks to our frequent video 1:1 meetings, we are able to feel like we actually know each other.

At Fuze, we've witnessed a dramatic increase in employee engagement during video meetings. In fact, our workplace communications and collaboration report found that video meeting attendees stayed connected for 87% of the meeting when a visual element like a screen share was used. Without a visual element, attendees only remained connected and engaged for three quarters of the meeting.

Although numerous companies have incorporated video meetings since the start of the pandemic, it's important that they maintain a "video first" policy post-pandemic. Since it's expected that a growing number of businesses will follow in the footsteps of Twitter and Google and embrace a hybrid working model – where a portion of employees work from the office and others work remotely – video conferencing will prove to become even more essential in post-pandemic work environments.

Video conferencing is quickly becoming an indispensable tool to ensure that remote workers not only get the same collaborative experience as in-person workers, but that they feel connected to the larger company culture. That said, video conferencing fatigue can and does happen. To help remote workers avoid it, it's important that business leaders remind their remote staff of when video conferencing isn't necessary, such as in large group meetings, webinars, or when they are just a passive attendee.

Keep the inclusivity and empathy momentum going
One of the key benefits of the rapid shift to remote work was that it made business leaders and workers more empathetic towards each other. Whether an employee was working remotely for the very first time or they were a remote work veteran who required flexible working hours to accommodate family requirements during the pandemic, businesses were forced to become more flexible with a greater understanding of their workers' schedules. This collective sense of empathy was reinforced by the fact that everyone – managers and non-management workers – were in it together.

The inclusivity and empathy borne from the change in work environments provided a valuable experience for business leaders and managers, one that they should continue displaying even after the threat of COVID-19 subsides. One way to keep the momentum is by being more inclusive to remote workers at every interactive moment during the workday.

The team I manage at Fuze is distributed across multiple continents and time zones, so I've always prioritised thinking about the remote experience. To keep meetings engaged and efficient, I challenge my team to prioritise asynchronous communications first to protect quality time for video meetings. Async work is a key to reduce meeting fatigue and streamline access to shared knowledge.

Some meetings can be replaced by proper documentation, well-written emails, or messages; keep meetings for what can't be done better another way such as performance reviews, discussions on strategy, interviews, 1-1s, etc.
One outcome of the pandemic is that business leaders have realised that flexibility makes workers more productive, boosts morale, and ultimately improves talent retention. While COVID-19 made business leaders more accepting of remote work and gave them insight into its many benefits, it is now up to them to keep the culture of empathy and inclusivity alive.

The growing market for High-Performance Computing (HPC)

We live in a world that is increasingly driven by technology. As we continue to increase the number and variety of technical software, hardware and appliances in our everyday lives as well as our work lives, the need for HPC to maintain those technologies will inevitably increase.

BY NEVILLE LOUZADO, HEAD OF SALES AT HYVE MANAGED HOSTING

THE CONCEPT of High-Performance Computing (HPC), also known as supercomputing, has been around for years. The first supercomputers were introduced in the 1960s. It wasn't long until they became a great attraction to the scientific community due to their capacity to process huge volumes of data at high speed. Decades later, there have been continued advancements in the high-performance computing space, especially over the past few years.

A great way to illustrate this is by looking at the improvements in relation to their performance. A few decades ago the fastest supercomputer had a peak performance of 3.2 teraflops. Today, the newly named world's fastest supercomputer, Fugaku, can achieve a total of 415.5 petaflops. This new supercomputer, produced in Japan, is currently being deployed in the fight against the coronavirus.

The popularity of HPC has expanded exponentially in recent years. Previously, HPC systems were used mainly by large corporations, universities or government agencies that required high-performance data computation. Now, nearly every single industry uses HPC, from the manufacturing and oil & gas industries to healthcare, robotics and aerospace.

The demand in different fields to process large volumes of data, with speed and accuracy, has significantly boosted the global HPC market. A recent report showed how the global HPC market is expected to continue growing, going from USD 37.8 billion in 2020 to USD 49.4 billion by 2025, at a compound annual growth rate of 5.5% during the forecast period.

Factors driving the HPC market growth

With technology rapidly evolving, our technological capabilities become more complex and so do calculations. The advancements in the technology industry have created new needs as large volumes of data demand incredible amounts of power to process those numbers requiring larger and more powerful computers.

Due to the adoption of smart devices and gadgets, technology is more present than ever before in our daily lives. We are constantly generating enormous amounts of data that need to be converted into relevant insights.

Moreover, the increasing focus on emerging concepts such as machine learning, artificial intelligence and IoT goes also hand in hand with the demand for HPC solutions. But it is not only these technologies behind the HPC boom. The development of new models of processing and automation have outdone the hardware being used today. Innovative technologies require new sophisticated hardware capable of performing millions of calculations per second.

In the past, HPC was an expensive and out-of-reach option for many. However, cost-effective solutions are now made available, and so small and medium-sized businesses are starting to adopt HPC.

What are the benefits of HPC?

High-performance computing is synonymous with speed. The increased processing speed HPC systems provide is one of the key advantages, as they are able to process data and solve complex calculations within seconds – far less time than traditional computing. Supercomputers are incredibly powerful and their reach goes beyond what humans can do.

The use of HPC systems streamlines business operations, allowing businesses to do more in less time. These systems are also able to identify issues that can be fixed by the IT department in order to improve speed and performance. HPC's ability to process and deliver fast results means less time, hence less money.

In addition, the affordability of HPC has recently improved as new cost-effective solutions emerge allowing businesses to afford the services. Moreover, new alternative options such as HPC in the cloud enable businesses to get performance benefits, paying only for what they use.

The future of HPC

As the importance of data collection increases and technology becomes more complex with applications requiring faster processing, high-performance computing is set to become a necessity. There is no doubt that, as technology evolves, HPC systems will become more powerful and a wider range of affordable HPC solutions will appear. As a result, the number of businesses demanding HPC services will continue to increase with much of this growth focused on cloud-based HPC deployments.

We live in a world that is increasingly driven by technology. As we continue to increase the number and variety of technical software, hardware and appliances in our everyday lives as well as our work lives, the need for HPC to maintain those technologies will inevitably increase.

The use of HPC systems streamlines business operations, allowing businesses to do more in less time. These systems are also able to identify issues that can be fixed by the IT department in order to improve speed and performance

The future of sustainable HPC

It is an unavoidable fact, high performance computing (HPC) is an energy intensive environment. But, what steps can we take to address this and achieve a more sustainable future for HPC in universities, research centres and other organisations?

BY MISCHA VAN KESTEREN, PRE-SALES ENGINEER AND SUSTAINABILITY OFFICER AT OCF

PRIMARY CONSIDERATIONS include getting the most out of your power usage and considering renewable electricity sources. There are also options in offsetting the power you use within your organisation to make your operations more sustainable and 'green'. Organisations like Plan Vivo can help legitimise the carbon offset programme you choose to work with really is sustainable. The important thing to remember with offsetting is that it is best used a tool to incentivise the reduction of resource consumption.

Offsetting helps to internalise the environmental cost of consuming power, however for it to be effective the additional cost must be passed on to the people consuming that power. If users are currently being billed or allocated resource based on core hours / job run time they won't see the additional power cost as clearly. Switching to a resource allocation scheme based on power consumption would be more effective. Tools such as the EAR energy management framework can be used to provide per-job energy

consumption accounting through integration with Intel CPUs and SLURM accounting functionality.

When building a new build HPC system, it is important to understand what your workload is going to look like. Energy efficiency comes down to the level of utilisation within the cluster. There are definitely more energy-efficient architectures. Generally, higher core count, lower clock speed processors tend to provide greater raw compute performance per watt, but you will need to have an application that will parallelise and is able to use all those hundreds of cores at once. If your application doesn't parallelise well, or if it needs higher frequency processors, then the best thing you can do is pick the right processor and the right number of them so you are not wasting power on CPU cycles that are not being used. When cycles are not being used, the CPUs should be configured to downclock to save power.

HPC managers will be assessed on how satisfied users are with their service, so many will artificially force all of the processors and nodes to run continually at 100 percent clock speed, so the processor won't be put in a dormant state or be allowed to reduce its frequency. Ultimately, energy consumption just isn't a major concern.

If customers come to us and want to improve energy efficiency based on their current estate, we would look at features being used in the scheduling software which can power off compute nodes, or at least put them into a dormant state if the processor supports that technology. We would check if these types of features are enabled and if they are making the most of them.

However, for some older clusters that do not support these features and generally provide much less power per watt performance than today's technologies, it is often worth replacing a 200-node system that is 10 years old with something that is maybe 10 times smaller and provides just as much in terms of computing resource.

You can make a reasonable total cost of ownership (TCO) argument for ripping and replacing that entire old system, in some cases that will actually save money (and resources) over the next three to five years. Sometimes replacing what you have got is the best option, but I think the least invasive way and the first thing that we would look at with customers is: are they being smart with their scheduling software and are there benefits they can get in terms of reducing the power consumption of idle nodes.

Cloud bursting is another useful approach for sustainable HPC, particularly for instances when users have peak or infrequent workloads that don't fit in their normal usage patterns. Using an automatic cloud resource for these workloads makes a lot of sense for temporary workloads. Rather than having 100 nodes on all the time, you may only need that capacity for four hours a day or once a week.

Large cloud providers can offer bigger benefits from economies of scale with power and energy efficiency using the latest cooling technologies and situating their data centres in more power efficient locations with greater renewable energy, like for example, Iceland. This approach also helps to outsource concerns over environmental efficiencies for an organisation.

Many universities have already voluntarily agreed to abide by the principles of the Paris Agreement for net zero by 2050. Some more ambitious institutions have committed to net zero by an earlier date. The high performance computing departments of these universities will certainly become an important factor in these considerations in the near future.

Ultimately computing is burning through energy to produce computational results. You cannot get away from the fact that you need to use electricity to produce results so the best thing you can do is to try and get the most computation out of every watt you use. That comes down to using your cluster to its maximum level, but then also making sure you are not wasting power.

By configuring the cluster in more environmentally sensitive ways, considering cloud options and giving people the conscious choice to do this will all help towards creating a more sustainable HPC in the future.

The growth of the cloud in 2021

Growth in cloud technology has experienced a steady incline within the last decade. Despite a global pandemic, social unrest and political uncertainties, this pattern has continued unabated through the last 12 months. As a result of the COVID-19 pandemic, there has been a dramatic and sudden need for global businesses to enable full remote working through technology.

BY ROBERT BELGRAVE, PAX8 UK, CEO

WHILE MANY BUSINESSES are reaping the reward of diving into the world of the cloud headfirst, this leap can introduce numerous obstacles and operational complexities if a cloud operating model is not properly defined. The implementation of cloud technology needs to be carefully incorporated in order to succeed in effective digital transformation cloud-driven projects.

A simplified cloud adoption process

Most organisations are directly expanding their primary use of the cloud at an accelerated pace in order to maintain their competitive advantage. The COVID-19 pandemic has additionally increased both the scale and speed of cloud adoption throughout multiple industries.. However, whilst cloud is still top-of-mind for many industries, there is still additional work to be done to manage the complexity of cloud services.

The adoption of cloud technology and the innovative processes that it can be used for is essential to many organisations' future strategy and growth, said 83% of survey respondents from The State of Cloud-Drive Transformation by Harvard Business Review. This dramatic increase of focus and reliance on cloud technology has led to new strategies, experiences and workflows across multiple industries. 66% of respondents say that incorporating real time data analytics, mainly artificial intelligence (AI), is an integral part of monitoring and gaining insights across cloud services and infrastructure.

The growing cloud market

Over the past year, the cloud market has accelerated beyond all previous expectations. It has become a necessity for survival for many businesses as they seek to accelerate the pace of their digital transformation, keep up with their competition, and continue to innovate. One of the key reasons for this growth of the cloud market is the increase of remote-working. This has required organisations to communicate online and work entirely digitally, and the utilisation of cloud services has been integral to this.

Technological advancements in a post-pandemic landscape

As a direct result of the global pandemic, businesses slowed down their rate of overall investments in technology, according to a report from Deloitte the cloud computing market grew even faster in 2020 than in 2019. What's more, it's highly likely that as a result of the pandemic, many organisations will look to implement extensive remote working policies far beyond lockdown which could see cloud adoption only increase further than it already has.

Now is the pivotal time for businesses to reassess and readjust their internal approaches in order to take full advantage of the agility, scalability, availability, and speed of the cloud at a time when it is more important than ever.

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Branding: Message delivery to high level influencers via various in house established magazines, web sites, events and social media

Semiconductor (Silicon/Compound)
Publications include: Compound Semiconductor, Silicon Semiconductor, CS China, SiS China

Power Electronics
Publications include: Power Electronics World

Future Mobility
Publications include: TaaS Technology, TaaS News

Data Centres
Publications include: DCS Europe, DCS UK, SNS International

SmartSolar UK & Ireland
Publications include: Solar and Power Management, Solar UK and Ireland

Sensors
Publications include: Sensor Solutions Magazine, Sensor Solutions International

Digitalisation
Publications include: Digitalisation World, Information Security Solutions, Managed Services

Photonics
Publications include: PIC Magazine, PIC Conference

Expert Moderators

Dedicated technical and time-served experts/editors

MARK ANDREWS
Mark Andrews is technical editor of Silicon Semiconductor, PIC Magazine, Solar+Power Management, and Power Electronics World. His experience focuses on RF and photonic solutions for infrastructure, mobile device, aerospace, aviation and defence industries

PHIL ALSOP
Journalist and editor in the business to business publishing sector for more than 30 years currently focusing on intelligent automation, DevOps, Big Data and analytics, alongside the IT staples of computing, networks and storage

JACKIE CANNON
Director of Solar/IC Publishing, with over 15 years experience of Solar, Silicon and Power Electronics, Jackie can help moderate your webinar, field questions and make the overal experience very professional

DR RICHARD STEVENSON
Dr Richard Stevenson is a seasoned science and technology journalist with valuable experience in industry and academia. For almost a decade, he has been the editor of Compound Semiconductor magazine, as well as the programme manager for the CS International Conference

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The trend to co-managed IT service delivery

The Covid-19 pandemic has triggered a shift in how enterprises manage their IT.

BY BOB PETROCELLI, CTO, DATTO

RESULTING FROM LOCKDOWNS and social distancing mandates, organisations needed to quickly set up secure, large-scale work-from-home environments – and with IT departments having to downsize, the need for external technology expertise to provide additional scalability and agility had never been greater.

These changes have become the driving force towards co-managed IT services, an IT business model where managed service providers (MSPs) support the in-house IT teams of larger organisations. In most cases MSPs provide some, but not all, of IT responsibilities. This growing trend was recently substantiated by a Canalys channel community survey, where nearly 60 percent of respondents agreed that adoption of such co-managed services has increased during the global pandemic. Forty-one percent said they are seeing IT co-management 'frequently' or 'almost' always.

As the new normal begins to take hold, one that blends remote workers with office-based employees, the IT setup in many organisations will become even more complex, further increasing the need for external IT support.

The co-managed IT model

The co-managed IT delivery model contains a couple of fundamental differences to a fully outsourced service.

First, it's a true partnership model, where the MSP works jointly with the in-house IT department on

common goals. Second, it's delivered under a long-term agreement rather than on a project basis, and can consist of a variety of forms, depending on the enterprise's needs.

In most cases, MSPs are secured by the enterprise to provide additional expertise, resources, scalability, and agility for a specific and clearly defined task. For example, MSPs may provide IT helpdesk services, run the network or security operations centre, monitor hardware, support applications such as Office 365, or assist with digitalisation.

The agreement the enterprise enters with the MSP can be in the form of loaned staff, on-site technical support, remote monitoring, strategic advice or training. Essentially, it can be anything that an MSP already provides within its offerings.

Organisations get the 'extra set of hands' needed to help the enterprise respond more quickly to evolving IT needs. This enables organisations to efficiently handle IT needs, without having to spend time and money on hiring and training additional in-house staff. It provides a cost-efficient way of bridging internal skills gaps, especially in key areas such as threat monitoring or cloud transformation – where the MSP has proven experience.

In addition, we are continuing to face an ongoing skills shortage in the IT sector, making talent difficult to find and retain. Although the pandemic accelerated the need for co-managed IT services, the downsizing of internal IT teams began before Covid-19. According to the Canalys survey, the biggest drivers for businesses to partner with an MSP were increasing IT complexity (33 percent) and cost considerations (29 percent). A separate MSP survey, conducted by Datto, found that organisations cited 'security issues' and 'the need to manage multiple clouds or technology stacks' amongst their reasons for a co-managed approach.

Adoption of co-managed IT is accelerating

While the term 'co-managed IT' was coined fairly recently, the idea of running co-hosted environments is not a new concept. In the UK, corporations, local governments, and healthcare organisations have been outsourcing elements of their IT since the 2009 recession.

Perhaps triggered by the sudden shift to remote working, the global demand for co-managed services is rapidly accelerating. In the US, enterprises with

150 to 1,000 network users are increasingly engaging MSPs for support, and this trend is now extending into other regions.

Cyber security concerns, exacerbated by the global crisis, are prompting an increasing number of organisations to partner with external experts for support. It is likely that the pandemic will bring lasting change in how businesses operate. To facilitate and support flexible working on an ongoing basis, and to shift face-to-face processes and interactions to online formats, organisations will have to implement new solutions. By partnering with an MSP that offers 'as-a-service' or a consumption-based commercial model, enterprises will be able to speed digital innovation, while keeping costs manageable.

One MSP delivering co-managed IT services to clients across the UK is Complete I.T. Out of their 700 customers, one in five have signed up for co-managed IT services - their Complete I.T. Support Service. These tend to be larger businesses and therefore, larger contracts. The important thing, according to MD Colin Blumenthal, is "for organisations to understand that the MSP is not trying to be a competitor, not threatening to replace the in-house IT team. If, instead, the in-house team can see the MSP as an ally whose role is to support and help, as a valuable external resource of experts who will work alongside the team – that is when the partnership becomes a successful one. The way we see it, we're here to make both our clients and their IT look good."

MSPs may provide IT helpdesk services, run the network or security operations centre, monitor hardware, support applications such as Office 365, or assist with digitalisation

Multi, hybrid and distributed cloud pros and cons - and taking an API-first approach

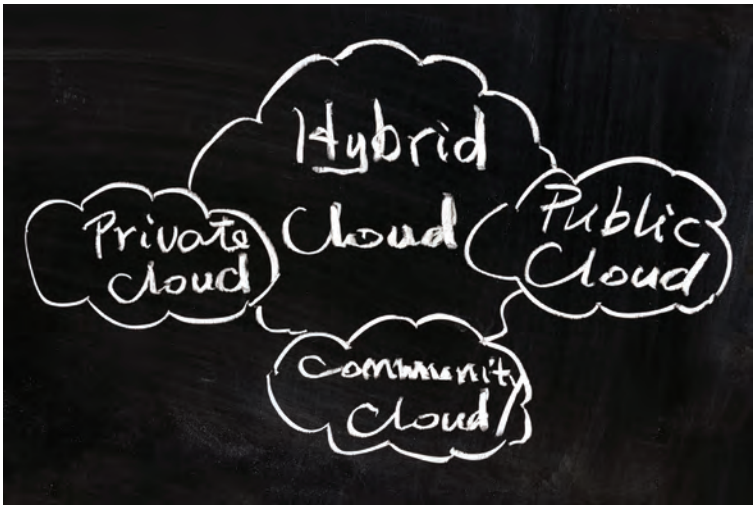
As their cloud deployment matures, many organisations are moving beyond single cloud use and are choosing to adopt distributed, multicloud or hybrid cloud approaches.

BY OLAF VAN GORP, PERFORCE SOFTWARE

THIS HELPS THEM make the most of each type's advantages, but what is critical to success is maintaining flexibility, control and security regardless of the cloud environment. Creating a more API-centric strategy can make a major contribution.

Understanding different categories of cloud is a good starting point. Multicloud refers to an approach where there are multiple cloud providers, instead of being limited to just one. For example, a company might have a blend of Microsoft Azure and Amazon Web Services. 81% of public cloud users are adopting this approach, according to Gartner, and it's a good option for businesses that need cloud independence.

Multicloud adoption avoids vendor lock-in or dependency, and improves disaster recovery by replicating workloads across different cloud providers. It could also reduce costs by optimising cloud deployment based on choosing cloud options that provide the lowest cost depending on each situation. On the downside, the administrative burden can be onerous and security may be more challenging to manage compared to using a single cloud. Estimating costs according to usage is potentially complex, and some of the proprietary features of each cloud lost due to needing to keep workloads portable across different environments.



Hybrid cloud and distributed cloud

Hybrid cloud involves a combination of both public and private clouds, but they could all be from the same provider. It is a good option for organisations with regulatory concerns, or simply have certain content that needs to be held privately in their own data centres, while having other content that is fine to store in public clouds. Like multicloud, disaster recovery is improved by replicating workloads, but with some added benefits, such as more flexibility to scale up or down according to demand, thus maximising availability. Hardware configurations not in the cloud can be supported (while still minimising unnecessary on-premises equipment), and latency decreased. On the other hand, disadvantages include: increased complexity of maintaining a private cloud and a higher administrative effort, bottlenecks as workloads move between clouds, security challenges, plus less visibility of resources once they are separated into public and private clouds.

In a distributed cloud environment, a public cloud infrastructure can be run in multiple locations: on

the cloud provider's infrastructure, on-premises, even in other cloud providers' data centres, while all is managed from a single point of control. It has been said that distributed cloud can – in theory – overcome some of the management and operational challenges of both hybrid and multicloud. It also supports edge computing, where servers and applications are brought closer to where the data is being created.

That can assist with local legislation, while enabling flexibility to use other cloud options in other regions. Distributed cloud is relatively new, so its market-proven pros and cons are still emerging.

The role of API management in modern cloud deployments

Regardless of the selected cloud strategy, an 'API first' approach will help organisations keep control of different environments. As part of that, API gateways are increasingly used to create a layer that decouples client applications from the complexity of the cloud landscape, while also securing system access, providing a unified interface, and simplifying management.

Many business APIs are already deployed using API gateways, which accept API calls and aggregate the services required to respond and return the appropriate result. Extending the role of API gateways into modern cloud environments is a logical continuation of the single-point advantage. Cloud service providers do, of course, offer their own API gateway-style services, but choosing a separate gateway provides independence across all providers. Their gateway services can still be used, but will perform as proxies within their own clouds.

Having a separate dedicated API gateway layer provides greater flexibility across regions, network and deployment zones, while still maintaining centralised management. From that position, components can be more easily provisioned and decommissioned. Security configuration, reporting, and other processes and policies can be uniform regardless of the cloud environment, location or type.

In practice, this means that irrespective of where resources are being hosted, client applications can interact with business APIs seamlessly. If those cloud environments shift in any way, that has no impact on the client app. Both management and reporting across multiple clouds can be centralised. The API gateway sits between the client and target landscape, regardless of on which cloud/edge the target service is situated.

In a multicloud situation, client apps can automatically be directed to the API gateway closest to them, or one that is judged to deliver the highest performance (such as capacity) at that moment in time. Similarly, in a hybrid cloud set-up, API gateways can be deployed both in the public cloud and on-premises, again with centralised management and reporting.

Security can also be enhanced, because API security can be implemented in – and delegated to – the API gateway, thus ensuring a consistent approach. Regardless of where the target is situated, the API gateway will only allow access to those services for authentic, authorised clients that submit valid requests (within their SLA, if applicable).

WITHOUT API gateways – in other words, without a well-defined and centrally managed API interaction layer, how do you get a proper overview of operations across clouds? How can you consistently apply API security and report on it in an aggregated, consolidated manner? How can you seamlessly point to one target or another without interrupting traffic / affecting the client?

As cloud deployments evolve and mature, the need to be fluid and scalable, while keeping on top of management and security, will only increase. So, putting in place a solid strategy with APIs as a unifying level will help organisations keep their cloud operations robust and flexible.

Cloud integration:
shining a light on dark data

In today's world, good use of business data can result in growing revenue. Yet, for many businesses, this opportunity remains completely untapped.

BY SIMON HAYWARD, VP OF DOMO EMEA

FOR MOST, cloud environments such as data lakes and data warehouses are not new concepts – on average, 60% of data lives in a data warehouse with the other 40% living as dark data. The catalyst?

Users without access to live data take it offline and run analysis locally, removing control and visibility from the rest of the business (e.g., spreadsheets or forecasting documents), creating an additional knock-on effect of data governance.
The key to overcoming these barriers is to move and shape the vast volumes of data into one centralised location, creating one source of truth. This allows businesses to extract insight, helping inform business decisions at speed, as recently shown by ESPN.

The nature of sports broadcasting is competitive in itself. User experience is paramount to avoid subscriber churn. ESPN needed a way to quickly aggregate customer comments to spot emerging issues with ESPN access and identify which services were affected. This was initially a slow process as there was a lack of visibility into existing activity, which was holding back any decisions that would improve the experience. For example, ESPN would need to refer to reports made after a sporting event, usually

provided via PowerPoints and Excel documents, sometimes taking weeks or months to create. It was only from there that decisions could be made on how to improve based on customer feedback.

ESPN took it upon itself to streamline this process, knowing that online viewing of sporting events is only going one way. It knew it was crucial to provide customer service in real-time, utilising call center activity and social media platforms to monitor fan interaction. To do this, Domo and RXA developed and deployed a solution capable of extracting keywords and information, analyzing sentiment, and summarizing everything that's been pulled from various channels for sharing with ESPN's customer care teams. To further aid viewers, ESPN now pushes out notifications through AI chatbots, FAQ alerts, and live-site announcements. As a result of these efforts, over the 12 months ending March 7, 2020, customer satisfaction was up by 9%, and customer self-service by 200%.

So how can your business get there?

The first part of this process is to determine where the 'dark data' resides. Dark data takes shape in many forms, from offline excel spreadsheets to Salesforce pipelines to monthly profit and loss statements. Gaining insights from this segregated or siloed data can take hours, if not weeks, of data analysis and reporting. Senior leads will often call upon departments to produce these reports individually before dissecting it and finding common themes to inform their next steps. This process is slow and naturally affects consistency across the business, as many departments find themselves singing from different hymn sheets.

The solution is to integrate and automate how people see data across the business, providing one consistent line of truth for all departments. This integration happens by plugging all 'dark' siloed data platforms into one data visualization platform. At ClearScore, this process helped the data analyst teaming more efficiency field questions like "how much money we made yesterday" or "how many users we signed up last week." This shift in data management allowed its team to move away from time-intensive reporting toward larger data science initiatives that have an impact on the bottom line, such as building credit risk or eligibility models in developing markets.

Democratising dark data and hosting it under one roof allows all departments to foster a culture where decision-making happens without going through IT support. Business leaders should focus on driving this behavior change, helping department leads innovate in how their teams are deployed and operate, using live data as a tool for creative and impactful decision making.

While democratising data is crucial, certain datasets may need to be governed or only seen by certain team members. However, data integration in the cloud doesn't mean losing control, as each user of the central platform can be assigned a role or attribute – meaning they have certain access levels from the moment they log in.

An example of this is Domo's Dynamic Personalized Data Policies (PDP), which makes it possible to create policies based on user attributes instead of individuals. This tool allows a business to scale policies with growth without editing entitlement policies. Business can take scaling a step further through augmenting built-in roles to maintain governance policies, which still champions the use of one unified platform and ensures only certain members can export and share data.

Whether it be shielding the IT team from endless data requests or activating chatbots via AI to speak with your customers, the possibilities of uncovering and using dark data are endless. Once a data-driven culture is created across your business, you are only bound by the creative use of its application.

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DCA data centre energy efficiency SIG: An introduction from DCA CEO Steve Hone

AS THE Trade Association to the Data Centre sector the DCA understands that it is imperative that key issues affecting the sector have a point of focus. The DCA SIG's (Special Interest Groups) / Working Group regularly come together over shared interests to discuss issues, resolve problems, and make recommendations. Outcomes can result in best practice guides, collaboration between group members, participation in research projects, this includes clarification and guidance for decision and policy makers. Members find these groups are a great way to ensure their opinions and views are considered in a positive and cooperative environment.

The DCA currently facilitates nine Special Interest or Working Groups. DCA members can join any of the groups and contribute find out more here: https://dca-global.org/groups

The DCA Energy Efficiency SIG

The DCA Energy Efficiency SIG has members that sit on the EU and UK Standards Development Organisations and provides a two-way conduit for the discussion and development of the ISO TS 22237 series, the EN 50600 series and the ISO 30134 series of data centre design, build and operate standards and data centre key performance metrics.

The Energy Efficiency Steering Group is chaired by John Booth. John is also an author and committee member of the EU Code of Conduct for Data Centres (Energy Efficiency) best practices and requests applications from members for new, amended or deletion of best practices on an annual basis for discussion at the European wide EUCOC best practices meeting held in September/October every year.

This SIG looks at emerging concepts for the sustainability of the data centre building in terms of energy flexibility and waste heat reuse as well as alternative on and off-site energy generation for primary and backup purposes.

The group work very closely with the sustainability group to provide DCA members with an entire overview of data centre energy efficiency and sustainability.

To request to join this group please contact the DCA: mss@dca-global.org

DCA energy efficiency SiG update

All Data centres use energy, in some cases significant amounts, and globally there is an increasing focus on data centre energy consumption and as a result, pressure from consumers, business and governments to do more to reduce data centre energy use.

THE Energy Efficiency SIG (one of the longest standing DCA SIGs) has in the past kept a close eye on ISO standards (ISO30134, ISO22237), European Standards, (the EN 50600 series) and the EU Code of Conduct for Data Centres (Energy Efficiency) best practices. Committee members represent the DCA on the appropriate standing committees for all the standards mentioned.

The Energy Efficiency SIG used to also have Sustainability in its title but due to its increasing importance this has now become a separate group. So, the Energy Efficiency SIG focus has changed somewhat and, in the future, will maintain its watching brief on the Standards, but also look at heat extraction and cooling solutions in the data centre where they touch on smart cities, waste heat re-use options and energy flexibility solutions.

The EE SIG is in the process of developing an energy efficiency guide that will be published by the DCA.

The Energy Efficiency SIG is the first port of call for all thing's energy related in the Data Centre and works closely with other SIGs such as the Sustainability, Thermal Management, Commissioning and Certifications Groups.
In this update we'll provide the latest information on current standards, impending standards, an overview of the recently announced Climate Neutral Data Centre Pact and its relationship with the EU Code of Conduct for Data Centres and the European Commission, the impending EE SIG Energy Efficiency Guide, a statement on the split of the energy efficiency and sustainability group into two separate entities and a look forward.

Current Standards

The EE Chair maintains seats on the EU Code of Conduct for Data Centres (Energy Efficiency) and the BSI TCT7/3 committees, and as such communicates pre-publication draft documents to the membership for comments and dissemination.

The Current Published Standards portfolio is listed below but is also contained in the forthcoming DCA Energy Efficiency Best Practice Guide, as is our usual practice, standards are listed

globally, regionally and then nationally, additional guidance such as industry best practices are listed at the end.

It should be noted that standards development has not been curtailed by the Coronavirus pandemic, but activity has definitely slowed, most meetings now take place virtually and it would be safe to say that the process has slowed down somewhat.

Global
- ISO 30134 Series – Data Centre KPIs
- ISO TS 22237 Series – Data Centre, Design, Build and Operate (EN50600)

Regional
- EU Code of Conduct for Data Centres (Energy Efficiency) – 12th Edition

EN 50600 Series
- EN50600 – 1 General Principles
- EN 50600 -2 Building Construction Power Supply and Distribution, Environmental Control, Telecommunications Cabling, Security systems
- EN 50600-3 Management & operational information
- EN 50600 -4 Data Centre KPIs (ISO 30134 Series)
- EN 50600 Technical Reports
- TR-99-1 Energy
- TR-99-2 Sustainability
- TR99-3 Guidance to the Application of the EN 5060 Series

Impending Standards

Standards are in a constant phase of development, normally on 5-year refreshment cycles, so work to review and edit a standard commences in year 3/4 of its life ready for the next edition, the following standards are in either in public consultation phase, the last phase before publishing, or in development.

ISO 30134 -6, 8 & 9 Energy Reuse Factor, Carbon Utilisation Effectiveness, and Water Utilisation Effectiveness.

Some of the earlier EN 50600 are in the process of being updated.

Climate Neutral Data Centre Pact

The Climate Neutral Data Centre Pact was announced in late January and at the time of writing consisted of 20 European Data Centre Trade Associations and 34 Data Centre or Cloud operators agreeing to adhere to 5 pillars, being energy efficiency, clean energy, water, circular economy and circular energy systems. The methodology and reporting requirements are yet to be agreed with the European Commission, but the DCA has input into these discussions via the EU Code of Conduct for Data Centres (Energy Efficiency) committee and via the DCA's relationship with the EUDCA and will report progress at the next EE SIG meeting or via the Newsletter.

DCA SIG Energy Efficiency Guide

The energy efficiency guide has been published internally to the DCA executive and we'll be publishing it more widely at our next meeting, all DCA members are free to contribute or comment on the contents in order to achieve a comprehensive concise and useful document that all members of the DCA and the wider data centre community can use.

John Booth

John Booth is a well-known figure in EU data centre circles, primarily for his role as reviewer for the EU Code of Conduct for Data Centres (Energy Efficiency) (EUCOC) programme and his work with the Certified Energy Efficiency Data Centre Award (CEEDA) which assesses data centres to a subset of the EUCOC best practices.
He is also the chair of the Data Centre Alliance's (DCA) Energy Efficiency & member of the Sustainability steering group, shaping the DCA's policy on these topics as well as providing support to the DCA in other steering groups and the Alliance's wider activities.

He is the V Chair of the BCS Green IT specialist group.
He also represents the BCS/DCA/Carbon3IT Ltd on the TCT7/3 committee that works upon the EN50600 Data Centres Design and Build Standards and KPI's (PUE ETC)
He runs his own Green IT consultancy, Carbon3IT Ltd, providing support to organisations that are preparing to adopt various data centre standards including the more general standards such as Quality, Environment, Business Continuity, Information Security, and Energy Management. They also provide specialist niche consultancy in the field of Green IT.

Carbon3IT Ltd has recently completed work on the EURECA project, www.dceureca.eu , this EU funded project was rated as "exceptional" by the EC and dealt with the procurement of green data centres and services for the EU public sector.
John has worked with Green IT Amsterdam to provide programme management for the CATALYST project http://project-catalyst.eu/

John is a lead auditor for ISO50001: (2011/2018) Energy Management Systems and ISO 22301 Business Continuity Management Systems, is a Certified Data Centre Audit Professional CDCAP TM (Recert 2018) and is an ESOS registered Assessor.

He is also the Technical Director of the National Data Centre Academy, which hopes to provide practical technical training to the data centre community in the near future.

The "Split" – Energy Efficiency & Sustainability

Energy Efficiency, Sustainability and Data Centres are the hottest of hot topics at the moment and it was becoming clear that one group could not keep up with the varying aspects of the subjects, which cover Data Centre construction, energy efficiency (building) materials usage, energy efficiency (ICT), skills development, workforce retention, standards, and guidance etc.

So, the DCA split them into 2 new groups, the first, the Energy Efficiency group will maintain its focus on global standards, the EU Code of Conduct for Data Centres (Energy Efficiency), waste heat reuse and energy flexibility and where interactions

are required externally to the data centre boundary, whilst, The Sustainability Group, led by Astrid Wynne looks mostly at the ICT side of things, material usage, energy efficiency of ICT equipment, skills development and workforce retention. Both groups will work closely together any topic which crosses the virtual boundaries. The EE group also maintains close links with other SIGs including Thermal Management, Commissioning and Certifications.

Looking forward

Data Centres and Electricity have a unique, almost symbiotic relationship, data centres certainly cannot exist without electricity in some form, but in the future, where the electricity comes from will be an interesting debate, will it be on-site generation using renewable energy (wind, solar, biomass) or hydrogen networks with the associated fuel cell plant or the old fashioned direct utility connection or something else, no one knows for sure, but you can rest assured that the DCA EE SIG will be keeping an eye on it.

We have the revised version of the Climate Neutral Data Center Pact (CNDCP) to look forward to, and of course the core data that the reporting will provide, will give us, the policy makers and the supply chain a very accurate view of the state of the sector in Europe in terms of the 5 pillars.
The CNDCP and the EUCOC together could make the future of data centres in Europe a very interesting place to be.

Conclusion

The EE SIG is one of the oldest groups in the DCA SIG portfolio, which clearly represents the importance of energy efficiency to not only the Alliance, but to its members, those that run data centres and those that supply products and services into data centres, and the future is bright.

Lesser known data centre efficiency metrics and their contribution to Net Zero

By Nour Rteil, KTP Associate at University of East London and Techbuyer and Lead Researcher and Developer at Interact

ACHIEVING a PUE close to 1 and attaining a CUE close to 0 is great, but how sustainable would the data centre be if its IT energy consumption is twice as it should be? Imagine a data centre that has done everything right to sustain a PUE of 1.1 by optimizing its cooling infrastructure and power distribution, whether it be by utilising free cooling, effectively managing the airflow, or switching to efficient chillers and UPSs. It all sounds great, but would you consider this data centre energy efficient if it had an abundance of servers that are either sat on idle or are not being optimally utilised? Or, if most of these servers are inefficient or misconfigured models?

PUE and CUE are not designed to capture the efficiency of IT load, which is the main energy consumer in data centres. Given this, we are shifting the focus in this article on other great KPIs that are specifically designed to measure servers' inefficiencies and are unfortunately less popular than PUE in the industry.

The International Standard ISO/IEC 30134 for data centres defines a total of nine KPIs that cover different sustainability aspects, from renewable energy down to energy reuse, considering the energy, water, and carbon efficiencies within the data centre. Of these nine KPIs, two target server inefficiencies:

- **IT Equipment Energy Efficiency for servers [ITEEsv]**
  This metric quantifies the energy efficiency of servers in a data centre by measuring the maximum performance per kW of all servers or a group of servers in the data centre.
- **IT Equipment Utilization for servers [ITEUsv(t)]**
  This is the average CPU utilization of all servers or a group of servers in a data centre at a given time t. It can be improved by reducing the number of operating servers with virtualization techniques.

Model	Idle power (W)	Max. power (W)	Max. performance (ssj_ops)
A	90	300	3,000,000
B	50	300	2,700,000

ITEEsv requires benchmarking servers to determine their performance and power consumption (at full load). The process of benchmarking servers is time-consuming. Running a commonly popular benchmark such as the SPECpower_ssj2008 or SERT to determine the server's performance per kW, requires several hours between setting up the testing environment (controller, the system under test, power analyser, etc.) and executing the test.

Though SPEC has published a list of all the accepted benchmarking results, tested by several manufacturers and hardware vendors, not every server model can be found in this repository. Also, energy efficiency differs significantly for the same model with different hardware configuration (for example more RAM capacity), as demonstrated in this recent IEEE paper about optimizing server refresh cycles. Therefore, server benchmarking, in this case, is required to determine the ITEEsv.

It is important to mention that the ITEEsv metric does not reflect the energy effectiveness of servers in a real operating situation. The actual server energy consumption and efficiency need to be evaluated at a realistic load taking into consideration the idle consumpti on. Consider this example of calculating the server's power and energy efficiency, at maximum load and average load assuming 25% server utilisation rate (estimated utilisation among service providers in 2020 according to the United States Data Center Energy Usage Report). For the sake of this example, the two server models A and B with the following power and performance values are evaluated. Performance in this example is measured in ssj_ops, which is defined by SPEC as the number of server-side JavaScript operations per second.

Looking merely at the max. performance per watt, you might think that server B is less energy efficient than server A because it executes fewer operations per watt at full load:

- Performance per watt at max. load for Model A: 3,000,000/300 = 10,000 ssj_ops/W
- Performance per watt at max. load for Model B: 2,700,000/300 = 9,000 ssj_ops/W

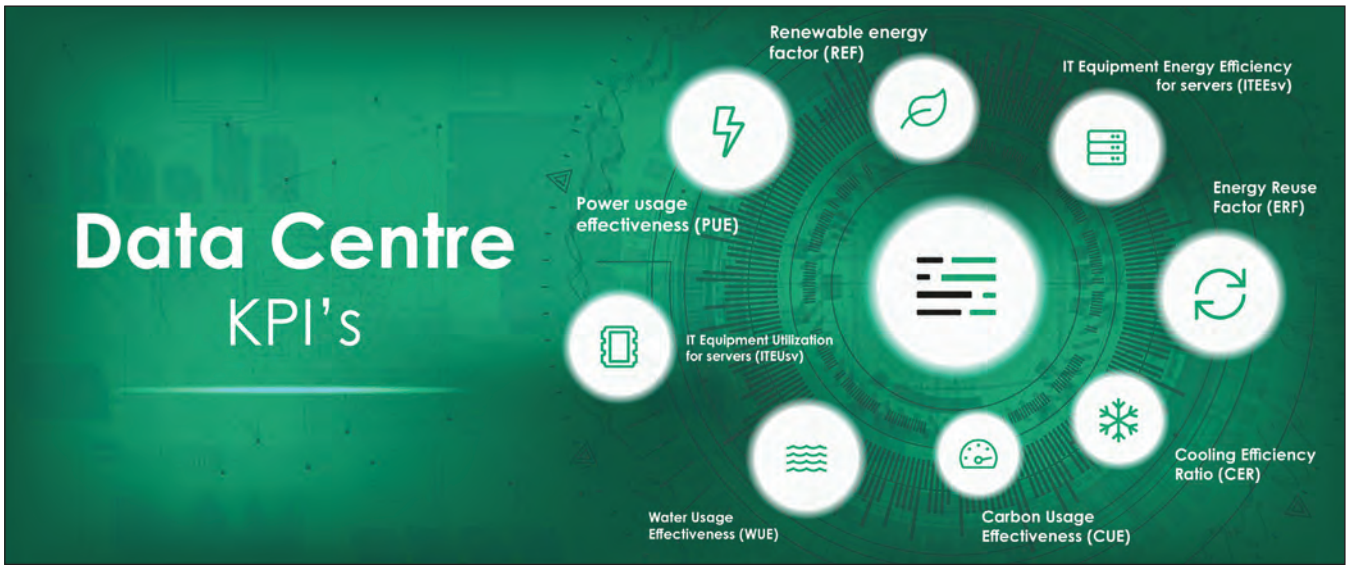
However, considering the actual load and the idle consumption, the average power for the servers should be determined as demonstrated in A Comprehensive Reasoning Framework for Hardware Refresh in Data Centers, and is calculated as follows:

- Average power for Model A: (300*0.25) + (90*0.75) = 142.5 W
- Average power for Model B: (300*0.25) + (50*0.75) = 112.5 W

The actual performance per watt for two servers should then be determined as shown below, which makes Model B more energy-efficient than Model A in a real-life scenario:

- Performance per watt at 25% utilisation for Model A: 3,000,000 * 0.25/142.5 = 5,263 ssj_ops/W
- Performance per watt at 25% utilisation for Model B: 2,700,000 * 0.25/112.5 = 6,000 ssj_ops/W

Ideally, we'd like to see hardware vendors and manufacturers work on establishing a common server label that indicates how efficient the server is, under specific operating conditions and workload types, to help purchasers make the right sustainable choices from the start. We'd also hope to see them declare the embodied environmental impact associated with manufacturing and transporting the server. But while we wait for these labels to be established, Interact offers a practical solution that is based on machine learning, trained using the SPECpower_ssj2008 published results, to predict the performance and power for any server configuration. It can be used not only to assess the data centre's ITEE and the actual servers' energy consumption but also to guide procurers in choosing the best energy-efficient server models and configurations available in the market, with more than 400 pre-configured models, within their budget and other business considerations.



Teledata; powering businesses forward - responsibly

By Anna's career in tech marketing spans 15 years, having worked with brands including Microsoft, BlackSpider and Seagate. Anna now heads up the marketing for Manchester-based colocation and cloud provider - Teledata.

ESTABLISHED IN 2004, Teledata has grown to be one of the best-connected data centres in Manchester, offering premium colocation and cloud hosting solutions to customers across the UK, from its 70,000sq ft facility close to Airport City.

As an intensive energy user Teledata had always followed good practice, but as the business grew, the firm decided it was time to make investments not only into improving infrastructure, but into energy efficiencies and well, and approached the GC Business Growth Hub for advice.

With the advice and support of a specialist energy management partner and one of the Growth Hub's Energy Efficiency Advisors, the firm was able to take steps towards its goal of reducing the amount of energy it uses, in line with Manchester's pledge to become a carbon neutral city by 2038.
The firm has since invested over £1.5 Million into cutting edge technology – including a number of industry firsts. Initially, Teledata began extensive energy logging of the site in order to measure consumption in the various different areas of the facility. This helped the firm to understand its energy profile on a very granular level and to monitor exactly where all the power was being used.

The next step was to install submetering so that certain areas of the building could be switched off when they weren't in use. This led to some behavioural changes such as turning things off in the evening and at weekends. Because of the size of Teledata's building - some 70,000 sq ft - this process alone saved the firm £2,000-3,000 a month from the outset, in addition to the directly related carbon emissions savings.

Next, Teledata upgraded the fans and motors in the air conditioning units so they could operate at variable speeds. By putting temperature sensors into the cold aisles in the data centres, the firm was able to use software to tell the air con units how hard they needed to run to maintain an acceptable temperature.

Previously, and without this data, the units had always run at 100%. This process took Teledata to the point where the system could turn two out of every eight air conditioning units off completely, and still maintain the right temperature.

Teledata then rolled out a larger, two-part project. This involved installing an ultra-low loss transformer to minimise waste electricity coming in from the mains, combined with some cutting-edge voltage optimisation technology to regulate incoming voltage. Through this, the firm could set the voltage level and stop it from fluctuating, reducing both energy wastage and wear and tear on the equipment. This project alone created an 8-10% efficiency saving.

Finally, Teledata installed a 2MW battery storage system which is charged up on a daily basis and discharged according to need. When the grid is struggling with demand during busy periods – which is when electricity is at its most expensive, the firm can now pull power from the batteries instead of pulling it from the grid. Teledata was the first co-location provider to do this in the UK.

Matt Edgely, Director of Teledata commented; "As we grow, power use is constantly increasing, which is a real challenge from an energy management point of view. The more efficient we can be, the more capacity we have to grow within our existing infrastructure. We had always been energy aware, and followed best practice to the best of our abilities. Now however, we can even narrow it down to the kitchen on the 7th floor and see when the table-top coffee machine has been left running!

"Our project has had a big impact from an efficiency savings point of view, but also from a capacity point of view. Without these investments our expansion as a business would have been limited because our supply from the grid would have been limited, so the benefits are three fold - better for the environment, better for our bottom line and better opportunities for growth."

The technology deployed by Teledata carries a number of advantages;

- The low loss transformer, with voltage optimisation is proven to save between 8-10% of annually consumed kwhs and therefore carbon emissions.
- Customers are insulated against increases in power pricing at the most expensive times of day/year as Teledata can intelligently switch its power source to battery storage during these periods. This saves a huge amount of cost on the annual electricity bill of an intensive user.
- Voltage optimisation allows the firm to regulate voltage at 225v at the transformer level, reducing energy wastage and extending the lifespan of equipment by up to 40%. Eliminating spikes in power delivery also reduces the likelihood of under or over voltage 'tripping', meaning more reliability and less outages.
- As a power generator, Teledata can participate in Firm Frequency Response (FFR) and as a service provider to the National Grid, can use the firm's approved storage assets to quickly reduce demand or increase generation to help balance the grid and avoid power outages. The current UK power network is becoming increasingly challenging to balance and so this is a huge benefit to the grid.

To date, Teledata's energy efficiency projects have resulted in a 700 tonne carbon saving, and earned the firm the title of Data Centre Energy Efficiency Project of the Year at the 2020 DCS (Data Centre Solutions) awards.

Now, armed with the knowledge to make fully data driven decisions, the firm has plans to continue to improve its efficiencies where required, as it carries out its mission to make data green, and to support Manchester in becoming a carbon neutral city.

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