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DEVELOPING DIGITAL INFRASTRUCTURE IN A HYBRID WORLD

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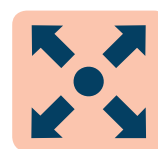
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VIEWPOINT

By Phil Alsop, Editor

Diversity and equality – time to prevent further own goals?

➤ HAVING just finished watching the Lionesses coming off second best to a frankly faster, more skillful Spanish team, my abiding memory of this World Cup has been the way in which nearly all of my friends and acquaintances have fully embraced the event on its own terms. But I remain somewhat shocked that several sports mad individuals known to me were adamant that they were not going to watch the final as it wasn't 'proper' football.

Thankfully, they were in the minority and clearly in the wrong. After all, with such an attitude, why would any parent ever go and watch a son or daughter playing any kind of junior sport? 10 year old boys and girls kicking around a pig skin is about as far away from professional football as it is possible to get – barely football at all!

And while we are on a sports (almost) digression, I shall go on record that women's golf, where they actually use every club in the bag and really have to conjur up some amazing shots, is far more rewarding watching than muscle-bound males smashing the golf ball 400 yards down the fairway, flicking it on to the green and having a putt. But then is there any need to compare the male and female versions or just enjoy each for what it is?

And here I shall try and move the focus onto the data centre and wider IT industries, which are generally still guilty of the 'male, pale and stale' label – although the landscape has improved significantly. And it needs to continue to improve, starting with education, so that more women and more minority groups are welcomed into the digital industries of the future, bringing with them many of then same skills as the 'traditional' workforce, as well as a few different and valuable perspectives as to how to set about meeting the many challenges that need to be overcome.

In all my talks with the many individuals who have participated into our ongoing series of Women in IT



video interviews (can be viewed via the DCS and DW websites), as well as with many other men working in the data centre industry, there has been universal agreement that the most diverse workforce is going to be best attuned to serve the needs of their companies' diverse customer bases. Nothing too complicated with that.

I am not sure if I have been successful in bringing together sport and data centres, other than I hope by making the point that individuals from whatever backgrounds, religion, gender etc. should be treated on their own merits and recognised for who they are, rather than for who they are not. Let us hope that long held prejudices and opinions as to how boys and girls should be brought up can be successfully adjusted so that the oft-told tales I heard of a handful of women making up just a fraction of 100+ students on engineering and computing degree courses, will soon be consigned to the history books. If not, then the current digital skills crisis is unlikely to have a happy resolution.



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Widening range of data centre challenges

Increasing demand and the need for more capacity requires infrastructure changes and new technology deployment, while stricter regulations and the need for additional skilled staff must be addressed.

UPTIME INSTITUTE has released its 13th Annual Global Data Center survey. The findings show data center operators facing stricter regulations and more pressure to reduce energy, along with persistent staffing and supply chain issues. The Report shows new technologies potentially presenting a promising way forward, but these often are found lacking in standardization and scalability. While for many organizations, investments in efficiency and resiliency are beginning to pay off, progress has been gradual.

“Our data shows operators grappling with several issues,” said Andy Lawrence, executive director, Uptime Intelligence. “In 2023, the lingering effects of the COVID-19 pandemic have receded, but other challenges have emerged. Digital infrastructure managers are now most concerned with improving energy performance and dealing with staffing shortfalls, while Government regulations aimed at improving data center sustainability and visibility are beginning to require attention, investment, and action.”

Uptime's Annual Global Data

Center survey is the largest, most comprehensive, and longest-running study in the digital infrastructure sector.

It provides detailed insights into the digital infrastructure landscape and a view into its future trajectory.

Key findings from the 2023 report include:

- Average global power usage effectiveness (PUE) levels have remained flat for four years. Additional improvements in PUE levels will require significant investment.
- As more organizations opt for a hybrid approach to IT, the share of enterprise workloads that are run in corporate, on-premises facilities has fallen to below half for the first time and is expected to shrink further.
- Enterprise operators say data security is the biggest impediment to moving mission-critical workloads to the public cloud. Resiliency and transparency are lesser concerns.
- Server rack densities are climbing steadily, but slowly. Average rack densities are below 6 kilowatt (kW) per rack; most operators do not have any racks beyond 20 kW. This suggests the widespread use of direct liquid cooling is not imminent.
- Many operators only collect a limited amount of sustainability related data and will struggle to meet emerging

sustainability reporting requirements, or in turn, the requirements of some customers and the public.

- Most operators believe acceptance of the use of artificial intelligence will grow in data centers, but operators are distrustful of its ability to make reliable operational decisions.

Outages:

- More than half (55%) of operators reported they have had an outage at their site in the past three years, the lowest number yet recorded. This continues a trend of steady improvement.
- Power outages continue to be cited as the single biggest cause of outages.

Staffing:

- Uptime Intelligence data shows that approximately 8% of the data center workforce are women. In the US (if not all countries), this rate is below that of other male-dominated industries, such as mining and construction.
- Nearly two-thirds of operators have problems recruiting or retaining staff – however, this figure is not currently growing. The largest skill gaps are in operations, mechanical and electrical roles.



Majority of data centre builds suffer disruption

A new Europe-wide report has found external site disruptions and inflationary pressures are causing delays to the construction of new data centres and preventing such projects from adopting greener practices.

THIS COMES from the second half of a two-part report series from Aggreko, titled Uptime on the Line, which explores the challenges affecting data centre construction projects, such as skills and equipment shortages, the viability of renewable alternatives and power procurement.

The report highlights the majority of contractors are having to extend timelines due to supply difficulties, with rising costs compounding the sectors difficulties – only 8% of those surveyed reported no delays due to supply chain-related disruption. The research uses insights from a survey of 700 data centre professionals consulting for large businesses in the UK, Ireland, Germany, France, the Netherlands, Norway and Sweden.

As pressures mount for adopting low-carbon construction, the report also explores the sector challenges preventing uptake of greener practices. For example, lack of skills was among the top two challenges for adopting renewable energy during the construction phase in every surveyed region besides France.

Billy Durie, Global Sector Head – Data Centres at Aggreko, said: “Exponential increases in global internet usage and the rise of high-performance computing mean demand for new data centres is set to rise rapidly. Coping with such traffic now seems vital to not only the data centre space, but Europe’s wider economic growth.

“Market disruptions, rising costs and regulatory pressures, however, mean challenges outside of contractors’ control are jeopardising project schedules. The demand for new sites to cope with traffic volumes mean this will soon become unsustainable, necessity strategies which combat delays, while supporting the transition to renewable practices.”

To support the data centre market with these challenges, Aggreko’s report highlights the bridging solutions designed to keep data centre builds on track. Such approaches use tactical strategies and new technologies to; secure power, integrate greener power, maximise energy efficiency, minimise delays and counter weather conditions. Billy concludes: “Data centre construction requires various different



parts working in unison and while delays often come part and parcel with new builds, as disruption becomes more common, comprehensive contingency planning should too. Innovations in equipment mean contractors can offset these challenges with energy and temperature control provisions throughout the building phase.

“As the demand for data centres becomes more intense, the bridging solutions discussed in Aggreko’s report offer the stability contractors need to deliver projects on-time. However, technologies that improve resilience to external disruptions, must support contractors’ bottom-lines and sustainability credentials. Doing so will be key for what is set to be a period of insatiable growth for the sector.”

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New product and process development is the foundation for the growth of the DCS industry.

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It is imperative that DCS Magazine remains a timely resource for this industry, so we are especially interested in highlighting very recent work.



Data centres 'underprepared' for forthcoming legislation

The data centre industry is 'underprepared' for the forthcoming regulatory changes and new reporting thresholds, despite monitoring requirements starting in May 2023, according to Stephen Lorimer, Group Technical Director at Keysource, the international datacentre and critical environment specialists.

SPEAKING at an event recently, Steve discussed The European Parliament's review of the European Commission's Energy Efficiency Directive (EED) recast since last year, with the directive set to be signed into law this year. He reminded the audience that in May 2024, the EED will require data centres in the EU with an annual energy use of over 2780 MWh to publicly report their energy performance.

"There will be an increased requirement on enterprises and data centre operators to publish energy action audit plans publicly, but they need to act quickly as the reporting period began in May 2023. So, in real terms you should have started!" urged Steve. "Reporting demands will require colocation

operators to source capacity and throughput data from their customers and data centre operators will need to move quickly to examine their ability to comply and ultimately create a strategy to comply with the new reporting thresholds and establish a data collection and management processes for the required information."

He went on to say that, "The new thresholds for reporting from Article 11 and 11A have changed and due to the global nature of the industry, will likely cover nearly all data centre operators. This involves reporting on annual incoming and outgoing data traffic, the amount of data stored and processed within the data centre, in addition to the temperature set points, power, water,

and carbon usage effectiveness; energy reuse factor; renewable energy use and their cooling effectiveness ratio."

"At Keysource we welcome greater transparency for the data centre industry. In order to comply with our climate change targets our industry needs to be accountable and these regulations will help to ensure everyone is working toward Net Zero. There will also be a number of benefits associated with the new regulatory changes such as cost savings, and a potential for increased investment as investors will be able to make better ROI predictions using historic data. We are working with a number of clients to help them prepare and to maximise the potential benefits," Stephen concluded.

A warm embrace for waste heat?

APPROXIMATELY 81% of survey respondents expect consumption levels to rise over the next three years and 88% expect a rise in the cost of power to increase the demand for power efficient data centre space. One recurring topic is the reuse of waste heat, with the survey showing that the concerns around economic viability of this are diminishing with a 15% decrease of respondents claiming this was an issue.

James Hart, CEO at BCS, said: "This is a positive start. Planning and permitting processes are increasingly requiring that more is done to utilise waste heat from data centres to support sustainable development and foster community resilience. Typically, excess heat is expelled into the atmosphere, contributing to urban heat islands and

overall energy inefficiency. By capturing and repurposing this waste heat, data centre operators can significantly reduce their environmental impact while providing tangible benefits to nearby communities.

"One practical application of waste heat from data centres is to integrate it into district heating systems, which are common in northern Europe. It can also provide a year-round consistent supply of waste heat for greenhouse cultivation and urban farming, contributing to local food production and reducing the carbon footprint associated with long-distance transportation of produce. It is also suitable for various industrial applications, reducing reliance on fossil fuel-based heating systems, leading to lower energy costs and decreased environmental impact.



"Fundamentally, to effectively harness waste heat from data centres, collaboration between data centre operators, local governments, and community stakeholders is crucial. It represents a valuable resource that, if properly harnessed, can benefit local communities in numerous ways. At BCS we have successfully integrated a range of waste heat schemes into many of our projects and have built up leading expertise in this area that we are keen that our clients and potential clients benefit from."

Outages are 'ordinary' for global organisations

Opengear shares research revealing that 91% of global businesses experience at least one outage quarterly pointing to the need for improved network resilience.

FEWER THAN ONE in ten CIOs can claim that they have avoided a network outage, according to new research by Opengear.

This finding is among new research by Opengear of both CIOs and network engineers globally. The scale and frequency of network outages is revealed by 91% of CIOs stating that they experience downtime at least once a quarter.

Further survey statistics reveal that network downtime has a significant financial impact for businesses. Figures show that in the UK for each minute of disruption, 23% of organisations lose between £2,001 and £4,000. As an average, this figure equates to £2,213 for every minute of downtime incurred.

Due to continued network outages and rising economic pressures, 64% of CIOs in the UK now say it's harder to meet customer expectations in today's environment, a concern also reflected by 62% of network engineers in the UK.

91% of CIOs in the UK have therefore increased their budget over the last 12 months to improve their network resilience, with 65% dedicating over a quarter of their IT budget to infrastructure spend in order to secure their operations. "Our research findings lay bare the challenges that organisations globally are facing with network outages in 2023," said Gary Marks, President at Opengear. "It's perhaps unsurprising that CIOs are allocating more investment to network resiliency to ensure that downtime doesn't occur."

The key is where this investment is being targeted. From critical first day deployments and everyday maintenance, to worst day scenarios such as network outages, organisations need always-on access to their critical resources to ensure business continuity. Smart Out of Band technologies can enable remediation of network issues from any location, helping to reinforce business resilience in a difficult economic climate."



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Operational efficiency - a key modernisation driver

Couchbase has released the findings from its sixth consecutive digital transformation survey of global IT leaders. The research shows that, despite shifting digital transformation goals, enterprises are still investing heavily in IT modernization and implementing new projects.

A FOCUS on operational efficiency is influencing how global enterprises invest in digital transformation initiatives. Nearly 60% of enterprises surveyed reported that their key modernization goal is to improve business resilience and efficiency in the face of the evolving global economy. And findings revealed that enterprises' top IT investment priority in 2023 is empowering developers to build modern applications.

The survey of 600 senior IT decision makers found that enterprises plan to invest on average \$33 million in the next 12 months. At the same time, digital transformation priorities have shifted. 78% of IT decision makers confirm their main priorities for transformation have changed in the last three years, and 54% say their digital transformation focus has become more reactive to market changes and customer preferences, in order to help the wider organization stay agile.

While these changes in digital transformation goals have helped businesses build resilience and weather a dynamic economy, they have not drastically slowed transformation. More than half (53%) of enterprises are either on target or ahead of their planned progress.

"IT modernization and digital transformation are vital strategic initiatives for an enterprise – whether helping to adopt new technologies like generative AI, creating new services or building resilience in times of uncertainty," said Ravi Mayuram, CTO at Couchbase. "These survey results show how an efficient approach to digital transformation, taking full advantage of advances in data, cloud and AI can help with business resiliency, and at the same time pursue new growth opportunities. And rightly so,

empowering developers has emerged as a key priority for enterprises, demonstrating their commitment to innovation."

Other key findings include:

Modernization enhances business resilience: 57% of respondents said their enterprise's key digitization goal is to improve business resilience and efficiency in the face of an evolving global economy. Increased business resilience was the most common benefit from digital projects in the past 12 months, while increased profitability, employee productivity and application performance are the expected benefits for the next 12 months.

Pressure to embrace new technologies:

IT leaders are most commonly under pressure from the wider business to adopt serverless computing (identified by 42% of respondents), edge computing and IoT (40%) and low- or no-code technologies (39%). And while AI demonstrates a huge promise in accelerating and transforming businesses, it is still early days. IT teams are under less pressure today to adopt large language models (LLMs) such as ChatGPT, with 35% under pressure to adopt this technology. Web 3.0 and augmented or virtual reality were less of a priority.

Developer productivity in the spotlight: Digital transformation projects are a key focus for developers. Pressure from developers on their organizations to support agile development and innovation (44%), and empowering developers to build more applications to meet customer needs (44%) were the top two drivers behind individual transformation projects. Furthermore, enterprises' top IT investment priority switched from improving application performance in 2021 to empowering developers in 2023.

IT spending under increased C-level scrutiny: 49% of respondents say their CFO is managing budgets in more detail and asking more questions about IT investment, while 37% say the pressure to achieve transformation with less budget and staff resources has increased in the last 12 months. And 35% say their IT department is under more strain than at any point in the last five years. This suggests that IT leaders are looking for ways to show cost efficiencies and reduce total cost of ownership.

Enterprises report project challenges, significant delays: Issues such as a lack of buy-in within the business, an inability to secure or stay within budgets and reliance on legacy technology meant a majority of enterprises experienced projects failing, suffering significant delays or being canceled. This cost organizations on average \$4.4 million and forced 68% to push digital transformation goals back by more than three months.

High expectations and hopes for creative modernization projects: While there have been challenges, research showed that 38% of IT teams are focusing on tangible modernization projects that will provide immediate results. Furthermore, 100% of enterprises have implemented or identified opportunities for creative digital transformation projects that seemed impossible at the end of 2021. This suggests that modern tech continues to push the boundaries of what is possible for business transformation, drive innovation and inspire new next-gen apps.

"It's clear that IT and business leaders recognize the importance of investing in modernization to drive transformation and achieve their short- and long-term goals efficiently," continued Mayuram.

Humans should be involved in AI decision-making

Workday has published the results of its latest study, which examines the state of artificial intelligence (AI) in the enterprise, including the current perception among business leaders about the technology's benefits, challenges, and opportunities.

Key findings include:

- 93% of business leaders believe humans should be involved in artificial intelligence decision-making.
- 77% of respondents are concerned about the timeliness or reliability of the underlying data.
- 29% said they are very confident that AI and machine learning (ML) are being applied ethically in business.
- 73% of business leaders are feeling pressure to implement AI at their organizations.
- 80% agree AI and ML helps employees work more efficiently and make better decisions.
- 72% of respondents said their organization lacks the skills to fully implement AI and ML.

Nearly three-quarters (73%) of business leaders are feeling pressure to implement AI at their organizations, but the vast majority are wary of giving up too much decision-making power. In the survey of 1,000 business decision-makers from around the globe, 93% said it's important for humans to have oversight of AI or ML when making significant decisions.

"Business leaders understand that AI and ML are critical to success in the future of work," said Jim Stratton, chief technology officer, Workday. "But enterprise organizations continue to lack the skills needed to implement the technology, and concerns around data integrity, ethics, and role elimination persist. Successful adoption of AI and ML require a commitment to keeping humans in the decision-making loop and working with partners who are committed to responsible AI and maintaining data integrity."

Despite the Case for AI Adoption, Concerns About Ethics and Data Accuracy Remain

More than 90% said they currently use

AI within their operations for managing people, money, or both, and 80% agree AI and ML helps employees work more efficiently and make better decisions. The need for investment in this area is clear – 80% of respondents agree that AI and ML are required to keep their business competitive.

But despite wide-spread adoption and broad agreement around the case for AI and ML in the enterprise, concerns remain about its accuracy, ethics, and security. In fact, 77% of respondents are concerned about the timeliness or reliability of the underlying data, 39% consider potential bias to be a top risk when considering AI, and 48% cite security and privacy concerns as the main barriers to implementation. Only 29% said they are very confident that AI and ML are being applied ethically in business right now, but they are more optimistic about the future – with more than half (52%) saying they are very confident it will be applied ethically in five years' time.

Outlook for Workers is Optimistic, But New Skills Will Be Required

Business leaders are considering AI's impact on the workforce of today and tomorrow. Nearly half (45%) believe AI and ML will benefit workers, augmenting workloads and creating new career paths. 43% are more cautious, warning that AI and ML will replace some tasks, causing some unemployment among workers. 12% are more doubtful, saying that AI and ML will replace humans completely and have a negative impact on workers.

While leaders agree it is critical for humans to be involved in AI decision making, the survey also found a critical skills gap to successful AI implementation. Nearly three-quarters (72%) of respondents said their organization lacks the skills to fully implement AI and ML, and an even slightly higher percentage (76%) said their own knowledge of AI and ML applications needs improvement. The full findings from the study identify widespread recognition of the potential for AI to transform enterprise business processes – along with significant gaps in how to get there.



Chief Technology Officers are critical for companies' Net-Zero targets

Eighty-four percent of CEOs and chief sustainability officers agree the CTO has the potential to become the greatest driver of sustainability in an organization.

THE SUSTAINABLE CTO, a new global research report from Intel, finds that chief technology officers (CTOs) play a critical role in aligning business strategies with technology demands to meet sustainability targets.

"Enterprise leaders are approaching the interconnected challenges of sustainability and radical digital transformation. Technology has a critical role to play in sustainable transformation," said Greg Lavender, senior vice president, chief technology officer and general manager of the Software and Advanced Technology Group at Intel. "If the C-suite, including CTOs and CIOs, rally in support of a tech-positive approach, technological transformation can propel us toward a future that is greener, fairer and smarter."

Information technology (IT) leaders have both the appetite to take on the challenge and the support from the rest of the C-suite: 79% of senior IT leaders aspire to become sustainability leaders and 82% of CEOs and chief sustainability officers (CSOs) believe the CTO role is pivotal to successful sustainability transitions. This new model of CTO is tasked with achieving "tech zero," defined as reducing the carbon footprint of an organization's IT function. Further, they must also use technology as a lever for their whole organizations to reach their net-zero goals, also known as "tech positive." Ultimately, these efforts can drive business growth and accelerate innovation, affecting the sustainable transformation of their entire organizations

Stepping into the Role of a Sustainable CTO

To support the initiative, Intel has established an advisory board



consisting of tech and sustainability leaders across various sectors. The board will collaborate to identify best practices to help organizations determine the best path toward becoming tech positive, given real-world business demands.

"The new role of the sustainable CTO will play a crucial part in an organization's transition to net zero, but CTOs can't navigate the challenges they will face alone," said Motti Finkelstein, Intel corporate vice president and digital transformation officer. "We aim to help CTOs on their sustainability journey and outline the roadmap for organizations to achieve their sustainability goals."

The research found that 70% of senior IT leaders believe their organizations require a significant change or complete transformation to become net-zero businesses. And while CTOs need to drive this transformation, a tech trilemma is preventing them from taking on this role: a lack of knowledge, investment and innovation.

Intel's global research also found that: 82% of senior IT leaders say that technology strategy and sustainability strategy must become increasingly aligned if their organizations are to

reach net zero and become more sustainable businesses.

80% of senior IT leaders believe organizations are heavily reliant on technology and their CTOs to make their businesses more sustainable. 70% of senior IT leaders believe their organizations will not be able to reach net zero without the support and action of their IT functions.

Roadmap for Sustainable CTOs
Respondents agree that the top four success factors for the CTO's Sustainability Roadmap to achieve tech zero are:

- Build skills to understand where to optimize.
- Get buy-in from the wider business.
- Understand the data and optimize existing infrastructure.
- Plan for solution and software innovation.

CEOs see sustainability as their organizations' top growth driver between now and 2030, with digitization a close second. With 82% of CEOs and CSOs believing that the CTO role has more influence on the organization's sustainability strategy than before, now is the time for CTOs to assume the mantle of the Sustainable CTO and step up to the challenge.

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Revolutionising switchgear

Addressing the environmental footprint of SF6 gas

By Peter Betts, Engineering Director at VIRTUS Data Centres

IN OUR ENERGY-INTENSIVE WORLD, electrical infrastructure is crucial for maintaining uninterrupted power networks. However, the widespread use of sulphur hexafluoride (SF6) gas in switchgear poses an environmental challenge.

SF6, perhaps best known for its effectiveness in switchgear applications, has a major drawback: its potent greenhouse gas properties. With a global warming potential (GWP) tens of thousands of times higher than carbon dioxide, we know that SF6 contributes to climate instability and worsens global warming. Complicating matters, accurately tracking SF6 emissions, particularly in developing countries, is challenging, which may lead to underestimating its release into the atmosphere.

The urgency to address this issue compels us to confront this environmental concern head-on. To combat the threat, the data centre industry and other electricity-intensive organisations such as large power stations, wind turbines and electrical sub-stations in towns and cities must take the lead. By championing innovative switchgear solutions that eliminate the use of harmful SF6 gas, these sectors can demonstrate their unwavering commitment

to environmental responsibility and sustainable practices.

Driving progress towards SF6-Free switchgear

While the European Community has taken significant strides in phasing out SF6 gas, the United Kingdom is yet to adopt similar legislation. However, even in the absence of regulatory mandates, it remains crucial for the industry to proactively embrace innovation and make environmentally responsible choices. At VIRTUS, we firmly recognise the importance of leading this transformative change. By actively advocating for SF6-free switchgear and encouraging its widespread adoption, data centre operators and the industry as a whole can demonstrate their unwavering commitment to environmental responsibility and sustainability. And, as a major consumer of energy, the data centre industry possesses the influence to create substantial market demand for SF6-free switchgear. By advocating for its use, operators can incentivise manufacturers to invest in research and development, fostering the creation of more environmentally friendly solutions.



Change can be propelled by market forces and is not solely reliant on legislation. By showcasing the growing demand for sustainable switchgear, data centre operators can spur the industry to prioritise innovation and accelerate the development of alternative, SF6-free technologies. By leading the charge within the data centre industry, operators have the potential to inspire and drive similar transformations in other sectors.

It is also essential to recognise that SF6 gas finds usage not only in data centres but also in sectors such as renewable energy production, including wind power. As the demand for electric vehicles (EVs) and other energy-hungry applications continues to rise, the usage of switchgear incorporating SF6 may increase as well. By taking a proactive stance and actively promoting the adoption of SF6-free switchgear, companies like VIRTUS aim to create a ripple effect, encouraging other sectors to follow suit and embrace more sustainable practices.

The race for alternative solutions

As the industry seeks to reduce the environmental impact of SF6 gas in switchgear, research and development efforts have been focused on identifying alternative technologies and materials that can provide effective insulation and arc-quenching properties without the harmful environmental effects associated with SF6. These alternatives aim to achieve the same level of reliability, safety, and efficiency as SF6-based

switchgear while minimising the carbon footprint and reducing reliance on non-renewable resources. The exploration of sustainable alternatives is driven by environmental regulations, customer demands for environmentally friendly products, and the industry's commitment to sustainable practices. Manufacturers, researchers, and industry stakeholders are actively engaged in developing and evaluating various options to find the most viable alternatives to SF6 gas in switchgear applications.

By embracing these sustainable alternatives, the industry aims to achieve a more environmentally friendly and sustainable future for electrical switchgear, reducing the carbon footprint and contributing to global efforts in combating climate change.

1. Air-Insulated Switchgear (AIS):

Air-insulated switchgear relies on air as the primary insulation medium, eliminating the need for SF6 gas. By harnessing air, which is a natural and abundant resource, AIS significantly reduces the environmental impact. It offers reliable performance, simplicity, and ease of maintenance. AIS has been widely adopted in various applications and is a mature technology.

While AIS offers several benefits, it is important to note that it may have limitations in terms of compactness and its ability to handle high voltages efficiently. Compared to SF6-based switchgear, AIS typically requires more physical space due to



the larger dimensions of air-insulated components. Additionally, at higher voltage levels, the insulation requirements become more stringent, which can result in larger dimensions and increased costs for AIS systems.

2. Vacuum-Insulated Switchgear (VIS):

Vacuum-insulated switchgear utilises a vacuum as the insulation medium instead of SF6 gas. Vacuum offers excellent dielectric properties, making VIS an effective alternative. VIS provides high reliability, low maintenance requirements, and a compact design. It has gained popularity in medium voltage applications and is now being developed for high voltage applications as well. The absence of SF6 gas in VIS eliminates the associated environmental risks.

The vacuum insulation in VIS not only offers superior electrical insulation properties but also eliminates the possibility of gas leaks and reduces the need for gas handling procedures. This enhances the safety aspect and minimises the environmental risks associated with switchgear operations.

3. Development of New Gases:

Researchers and manufacturers are actively working on the development of alternative gases with lower global warming potentials (GWPs) compared to SF6. These gases aim to provide effective insulation and arc-quenching capabilities while minimising the environmental impact. Some promising alternatives under investigation include nitrogen (N2), carbon dioxide (CO2), and fluoroketones (FKs). These gases exhibit significantly lower GWPs, making them more environmentally friendly options for switchgear insulation.

4. Solid Insulation Solutions:

In addition to exploring gas alternatives, efforts are underway to develop solid insulation solutions for


switchgear. Solid insulation materials offer excellent electrical insulation properties and eliminate the need for any greenhouse gases. By using solid insulation, switchgear systems can achieve long-term sustainability benefits and reduce their environmental footprint.

It's important to note that the adoption of alternative solutions may require adjustments in design, engineering, and manufacturing processes – and many are currently in their infancy. However, as industry demand for SF6-free switchgear grows and technology advances, these alternative solutions are becoming more accessible and viable.

Whilst the full cost implications of adopting SF6-free switchgear are not yet fully understood, the increasing market demand is expected to drive improved affordability. As more manufacturers invest in research and development and scale up production of alternative switchgear solutions, economies of scale can lead to cost reductions. And, as stakeholders express their preference for SF6-free switchgear, the cost-benefit equation becomes more favourable.

The environmental impact of SF6 gas in switchgear extends beyond data centres and affects various sectors heavily reliant on electricity. However, due to its rapid growth, the data centre industry has the potential to drive change by creating market demand for SF6-free switchgear. VIRTUS aims to inspire the industry by setting an example for other sectors and catalysing a ripple effect of sustainable practices. By prioritising the use of SF6-free switchgear, we can pave the way towards a greener and more sustainable electrical ecosystem. Together, we can contribute to reducing the environmental impact of switchgear and foster a more sustainable future.



A photograph of two men standing in a server room. The man on the left is wearing a light blue button-down shirt and dark jeans. The man on the right is wearing a grey sweater over a light blue collared shirt and dark trousers, holding a large white folder. They are standing in front of rows of black server racks. One rack has a red APC logo. The room is dimly lit with overhead lights.

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Will liquid cooling dominate in the data centre?

Yulin Wang, Technology Analyst at IDTechEx, offers some thoughts.

OVER THE PAST 16 years, the thermal design power (TDP) of GPUs has quadrupled. With the increasing demand for AI, cloud computing, and crypto mining, IDTechEx expects the power consumption of server boards and data centers to continue rising. With life starting to return to normal after the end of the Covid pandemic, IDTechEx has observed significant expansion in the data center industry. For example, AMD's 2022 Q4 financial statement indicates a 42% year-over-year increase in revenue from its data center segment, indicating rapid market growth. As the data center industry prospers, the data center thermal management field is also expected to experience significant growth. IDTechEx forecasts that by 2033, the global annual revenue for data center liquid cooling hardware will exceed US\$900 million, presenting a substantial opportunity for businesses.

IDTechEx has recently published a new report titled "Thermal Management for Data Centers 2023-2033", which covers the adoption of liquid cooling technologies, including direct-to-chip cooling, immersion cooling, single-phase and two-phase, coolant, regulations, coolant distribution units (CDUs), and many other key technologies.

Data center thermal management can be broadly categorized into two types based on the cooling medium: liquid cooling and air cooling. While liquid cooling has gained popularity in recent years, air cooling remains traditional and the most widely used approach, offering several advantages:

Ease of use: Air cooling solutions are relatively simple to install and operate. They typically involve the use of fans or heatsinks to dissipate heat from components, making them easy to access and user-friendly. The familiarity and simplicity of air-cooling systems make them convenient for data center operators.

Established success: Air cooling has a long-established track record of successful thermal management in data centers. Many data center end-

users have invested significant resources in building and optimizing air-cooled infrastructures.

Liquid-free operation: Unlike solutions that rely on coolants and liquid circulation, air cooling eliminates the need for liquid-related components and infrastructure. This removes risks such as leaks, pump failures, or coolant evaporation. The absence of liquid in air cooling systems simplifies maintenance and reduces the chances of malfunction or operational disruptions.

However, despite the benefits of air cooling, its low specific heat capacity limits its effectiveness in meeting the growing cooling demands of modern data centers. To address this challenge, liquid cooling has emerged as a viable solution. Liquid cooling harnesses the higher specific heat capacity of liquids, making them more efficient in dissipating heat. There are two common types of liquid cooling methods: direct-to-chip (cold plate) cooling and immersion cooling.

Cold plate cooling involves mounting a cold plate directly on top of heat sources such as CPUs and GPUs with a layer of thermal interface material (TIM) in between. The coolant inside the cold plate chamber absorbs and transfers heat away from the components. On the other hand, immersion cooling submerges the heat sources into a coolant, allowing for direct contact and efficient heat dissipation.

The collaboration between server suppliers and cold plate manufacturers has accelerated the adoption of cold plate cooling. Integrated solutions (servers with cold plates installed) are being offered directly to end users. While direct-to-chip cooling has demonstrated great performance, the limited expertise of end-users in integrating cold plates onto their off-the-shelf servers has been a factor limiting adoption. An example of such collaboration includes CoolIT Systems partnering with Intel to develop direct-to-chip cooling solutions specifically tailored for Intel Xeon Scalable CPUs. By leveraging collaborations and integrated solutions, end-users benefit from cold plate cooling, including improved efficiency and lower partial power use effectiveness

(pPUE), without integration complexities.

Another emerging liquid cooling technology is immersion cooling, which offers excellent heat dissipation performance with pPUEs as low as 1.01 demonstrated.

However, there are several concerns that have limited the widespread adoption of immersion cooling:

Complexity: Immersion cooling requires significant modifications to existing server boards. As servers are directly immersed in the liquid coolant, factors such as material compatibility between the servers and coolant fluids need to be considered, adding complexity and additional costs to the implementation process.

Lack of expertise: Immersion cooling is still in its early stages, and the market lacks sufficient expertise and experience in implementing and managing this technology.

High upfront costs and maintenance: Retrofitting existing air-cooled data centers to accommodate immersion cooling can be expensive. Immersion cooling also has the highest initial capital expenditure (CAPEX) in terms of cost per watt. Additionally, ongoing maintenance and operational costs may also be higher compared to other cooling methods. However, due to the efficient heat dissipation, the energy savings in the long term makes immersion cooling cost-effective for data center users.

Limited demand: While the power requirements of data centers have been increasing, IDTechEx believes that a combination of air cooling and direct-to-chip cooling can adequately meet cooling demands in the short to mid-term for the major applications. The urgent need for immersion cooling is not currently prevalent in the market.

In conclusion, the demand for higher cooling capacity is driving the fast growth of liquid cooling, particularly in the form of direct-to-chip/cold plate cooling. This growth presents numerous opportunities for server manufacturers, data center operators, coolant fluid suppliers, and coolant distribution unit (CDU)/pump suppliers. On the other hand, immersion cooling is expected to initially be adopted by major players like Microsoft and Meta. However, widespread adoption may take time due to factors such as high costs, limited expertise, and maintenance requirements. Collaboration among companies in the data center immersion cooling supply chain will be crucial for its broader implementation. Nonetheless, immersion cooling offers significant opportunities for various companies, such as coolant suppliers.

Data centre physical infrastructure market grows 18 percent

According to a recently published report from Dell'Oro Group, Data Center Physical Infrastructure (DCPI) market revenue growth accelerated for the fifth consecutive quarter to 18 percent in 1Q 2023.

THIS ELEVATED LEVEL of growth was supported by a combination of easing supply chain constraints, resulting in increases of unit shipments, as well as continued price realization as vendors passed on higher costs of raw materials, components, and logistics. Despite this growth, vendor backlogs did not come down from historic levels, prompting upward revisions from DCPI vendors and to our 2023 DCPI forecast.



"Discounting the market rebound in 2Q 2021, related to the soft Y/Y comparison brought on by Covid, I've never witnessed such elevated growth in the DCPI market since I began covering it in 2015," said Lucas Beran, Research Director at Dell'Oro Group. "Even as new orders expectedly declined in 1Q 2023, vendor backlogs did not, with many vendors reporting book-to-bill ratios at or near 1.0x. This was certainly a surprise, and increases my confidence in the 2023 market outlook and overall health of the DCPI market," added Beran.

Additional highlights from the 1Q 2023 Data Center Physical Infrastructure Quarterly Report:

Vertiv and Mitsubishi Electric notably gained revenue share in 1Q 2023. North America, Asia Pacific (excluding China) and Europe, the Middle East and Africa (EMEA) were the fastest-growing regions in 1Q 2023, at double-digit growth rates. The Caribbean and Latin American (CALA) revenue growth slowed to a single-digit rate, while China was the only DCPI market with revenues to decline Y/Y.

Product growth was broad-based, but thermal management and cabinet PDU and busway grew at the fastest rates as a result of easing fan and breaker supply chain constraints. IT racks and containment was the only market segment with revenue growth to meaningfully decelerate. Dell'Oro Group's worldwide DCPI revenue growth forecast for 2023 was raised to 12 percent. This upward revision was due to multiple DCPI vendors raising full year guidance as supply chain constraints ease. 2023 revenue growth will continue to be supported by historically high DCPI vendor backlogs, with higher growth in the first half of the year.

Successful project delivery in a sector that is short staffed by rapidly growing...still

It is not exactly breaking news that the Data Centre labour and materials market is under immense pressure. The ongoing and substantial sector growth is affecting every business at every level, whether it is finding competent personnel, expanding manufacturing or finding the materials.

By Nick Marlow, Senior Consultant at BCS



RICS UK Construction Monitor Q1 2023 reports that labour shortages continue to be a key area of concern in the construction market. These concerns are echoed in our latest industry survey of over 3,000 datacentre professionals which showed that 98% of respondents believe there will be a further decline in skilled staff which will impact on delivery and raise costs. This impact is more relevant in the DC sector as the industry grows across new regions with new markets dealing with the DC outbreak!

This growth means that the problem is not going to go away either. Across the board there is simply not

enough people which leads to teams being short staffed or requiring training to meet the quality of service expected. In fact, end users and developers are having to put greater control and supervision in place to try to manage the impact on time, quality and H&S.

Embed training

So how do we go about as an industry to mitigate the problem? Firstly, I think we need to increase the pool of resources both for now and the future. This sounds obvious but it is very hard to achieve at the rate of growth we are seeing. It will mean bringing



in resource from other construction sectors or from completely different sectors entirely. This needs to be something that every company is discussing at board level in the sector with a key focus on training programmes of all types – be it for apprentices and graduates or upskilling or skill transfer type training. It should be embedded in every company's core philosophy.

Keep it simple

We should consider simplifying the sector to ensure that the barriers for new entrants are lowered. For example, this might mean re-aligning the terminology with other sectors which is a typical problem over the various construction sectors, but more prevalent in the Data Centre sector. The number of acronyms in our "Glossary of Commonly Heard Acronyms" is approximately 600 and includes multiple different acronyms and terms with the same meaning...

Focus

We also need more focus on the quality of output and efficiencies. If consultants, contractors and clients focus on quality rather than quantity, I believe this will reduce the risk on programme and cost – especially with the amount of change in the industry. If we all deliver what we have been asked to do adequately, this would be a major step for the industry. Sometimes delivering the basics really well is all we need to do. This will in turn limit re-work and increase the efficiency.

Control

Applying project controls on all the various contracts whether that is the GC / Client, Client / End User or GC / Sub-contractor contract is increasingly important. This is not about creating a claim culture, but a way in which changes and issues are managed effectively. It's about setting the right project culture. There will always be issues within projects where the industry is suffering from growing pains. Bringing together clients, consultants and contractors within the project delivery team to

Whilst pushing to innovate is always tempting, in my opinion consistency and standardisation across the data sector is desperately needed. This will promote consistent and predictable performance whilst providing a backbone for steady innovation across the sector.

solve issues and working together is far more time efficient rather than finding blame.

Don't always innovate

Whilst pushing to innovate is always tempting, in my opinion consistency and standardisation across the data sector is desperately needed. This will promote consistent and predictable performance whilst providing a backbone for steady innovation across the sector. Some of the most successful developers re-produce successful outcomes and slowly develop rather than fight for the latest innovation for each development.

Try offsite

Offsite construction is an option in some cases. Modern methods of construction have the potential to help ease the labour shortage problem, making projects more efficient with people located consistently in one place and not travelling to various sites. This should also bring quality, environmental and health and safety benefits.

At BCS we are working closely with our clients to support their resourcing needs whilst actively 'doing our bit' to help the sector skills issues through our long-standing apprentice/graduate programme and recruitment and retention policies which support reskilling and skills transfer through training.

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It is imperative that DCS Magazine remains a timely resource for this industry, so we are especially interested in highlighting very recent work.





Designing sustainable data centres is key to preparing for a more digitalised and greener future

Building a greener future has become a key priority for individuals and businesses in the UK. Yet, 78% of the energy we use comes from fossil fuels which are responsible for most of the UK's territorial emissions of climate-changing greenhouse gases. Using energy more efficiently and intelligently in everyday life is vital to averting climate change.

By Dave Archer, National M&E Sales Manager at Mitsubishi Electric



BUT IN TODAY'S society, where technology is evolving rapidly and everything is digitalised, minimising energy consumption can be a real struggle as more digital information is being created and stored in huge, energy-intensive data centres. Making data centres truly sustainable by controlling energy use and preventing waste must be a priority to prepare for the future, though it isn't a straightforward issue.

The challenges raised by data centres

Data centres are becoming increasingly important as the amount of data generated in all walks of life increases. This means the sector's energy

efficiency is under increasing scrutiny. Data centres are currently responsible for 1.5% of global energy consumption, and we expect it to reach 8% in 2030. As data centre tech becomes ever-more supercharged, finding ways to conserve energy is vital. But although the industry has worked hard to increase computing capacity while controlling energy use, improving energy efficiency is not straightforward. Sustainability is not always taken into account when designing data centres.

We can't prevent data centres from consuming more energy to produce more power in the future. Data shows the largest data centres produce over

100MW of energy, and we anticipate the increasing adoption of Generative AI to double or triple energy consumption in data centres. However, addressing the rising concerns about sustainability must be a core area of focus for designers and data centre operators. With change coming rapidly, they must consider all the options available to improve energy efficiency in data centres – this will be key to achieving the industry's goal of reaching net-zero by 2030.

Selecting the right cooling solution

It is key for businesses to ensure their IT systems allow them to quickly and easily access the data they need. The shortest outages can be extremely disruptive and greatly impact productivity and revenue. Therefore, IT servers must be kept in optimal conditions, which means adopting a reliable cooling solution.

Finding areas for conserving energy is vital, and data centre cooling systems are a potential source of savings, with up to 40% of total energy consumption in a data centre coming from cooling systems. Adopting the right cooling solutions in data centres not only boosts productivity by reducing the risk of an outage but also reduces the carbon footprint, enables the use of renewable energy sources and minimises operational costs. Data centre operators aim to upgrade facility cooling systems to transition to low carbon, cost-effective solutions and future-proof against rising heat requirements.

For example, Mitsubishi Electric offers DX Computer Room Air Conditioning (CRAC) solutions that control temperature and humidity in small and medium-sized enterprise data centres. They create an appropriate environment for IT systems while reducing energy consumption and running costs.

Re-using heat to avoid wasting energy

With great power comes more heat. Data centres eject a lot of heat, and one of the most critical questions for the future will be what to do with it. What is certain is that this heat shouldn't go to waste. This is an environmental and financial question – wasted heat means wasted energy, unnecessary



costs and a significant impact on the planet.

One development gaining popularity is re-using the heat from data centre servers to heat homes and buildings and cut CO2 emissions. We expect the data-centre heating market to be worth \$2.5 billion by 2025. The heat removed from the data centre servers can provide hot water to other buildings. Some high-temperature systems can also directly heat other buildings where appropriate. The temperature doesn't

have to be high – low-temperature rejected heat can be combined with heat pumps to raise the water temperature for domestic hot water and space heating in offices and homes.

If we treat the ejected heat as a form of energy, then the combination of efficient cooling and heat pumps for modern ambient networks can make all the difference. This approach, known as an ambient heat loop or Fifth Generation heat network, saves energy and costs. For example, Dutch company Switch Datacenters has replaced its gas generator units with data-centre heating to reduce its reliance on natural gas. Eventually, the organisation delivered 97% of its server heat to homes and offices to improve energy efficiency and allow customers to save power costs.

There is little doubt that the modern world needs data centres. Today's increasing flow of digital data needs to be stored securely and in optimal conditions, but not at the price of the environment. Cutting gas emissions and energy consumption must remain among the top priorities. Harnessing energy-efficient cooling by re-using ejected heat is a practical solution to minimise waste, reduce emissions and contribute to building a more sustainable and modern future.

There is little doubt that the modern world needs data centres. Today's increasing flow of digital data needs to be stored securely and in optimal conditions, but not at the price of the environment

Why sophisticated cyber threats require a dynamic response

Cybercrime is changing. A couple of decades ago, it was limited to individual hackers who attempted to compromise systems using a single PC, but now the landscape has serious players with near-unlimited resources. It's impossible to predict what will happen to a business and where they will be targeted, which means preparation is crucial.

By Tikiri Wanduragala, EMEA Senior Consultant at Lenovo ISG



ORGANISATIONS need to put themselves in a position where they can recover, even if the worst happens. Business leaders have to be ready to defend their data wherever it is, from PCs and the edge to the data centre and the cloud. The World Economic Forum's 2022 Global Risks Report says that ransomware attacks increased by 435% in 2020 and that cyber threats are outpacing society's ability to effectively prevent them. By 2031, it's predicted that a ransomware attack will strike every two seconds somewhere around the world, according to CyberSecurity Ventures.

Businesses understand they need to be investing and doing more when it comes to cybersecurity, with Lenovo research showing that 59% of leaders

are likely to invest in security tools in the next five years. However, given the complexity of the threat landscape, companies must embrace a dynamic security response and ensure they safeguard their data by selecting devices and implementing IT infrastructure solutions which have been built with security front and centre. They must also ensure that staff understand the complexity of cyber threats and have the resources to deal with them. People say that data is gold, so it must be protected like gold.

Understanding the threat landscape

When creating an effective cybersecurity strategy, it's important to understand that threats have evolved to come from all angles. In the past, we've



thought of security as a fence in which data can flow freely across the business. As you move the compute capability closer to where the data is, the threat surface gets bigger. When it comes to PCs, hybrid working has led a growing number of employees to use their work device in a coffee shop or a hotel, which exists outside of the 'four walls' of a company fence. People still don't realise the implications of that.

In terms of the data centre, companies must ensure their defence is on a completely different level. You don't take your server or storage system to the coffee shop, thankfully, but if an attacker can get at the amount of data that is in a server, they can access all the operations in the business. It's potentially an existential threat. Leaders therefore require built-in security systems that can handle this problem.

It's also important to recognise the reputational damage caused by a cyberattack. It's not just the loss of data; if you can't get it back quickly, it can be massively impactful for customer trust and loyalty. In the eyes of the public, transparency is also a crucial element. If a company is hit by a cyberattack, it must be clear about what's happened, communicate it with its customers, and outline what actions have been implemented to resolve the issue.

Infrastructure with built-in security

So how does a company defend its data in this ever-changing world? For a start, there are smarter things they can do with their IT hardware and infrastructure. That means choosing data management solutions with end-to-end security built in, stretching from edge to cloud. Wherever your data is, it must be defended.

Modern IT infrastructure must be built to handle increasingly sophisticated security threats - and that means built-in recovery capabilities. It's becoming more essential that there is an audit trail through the whole lifecycle of machines. Servers are incredibly valuable objects to a business: leaders ideally need tamper-detection and monitoring embedded into the actual chip design.

Server monitoring, the systematic tracking and measurement of processes and operations on a server, can be used to collect insightful data and draw conclusions about the health and condition of servers. This ensures they are reaching an optimal level of performance.

Having a data protection plan is also of paramount importance. Companies must assume they will lose data and create a situation where they can recover it. No matter if it's in the cloud, or on the edge, they need a system to back it up. If businesses put data in a safe place, they can get hit and still come back. A robust data protection plan improves security and protects company assets by helping to prevent breaches and data leaks. This means that

organisations can avoid the financial impact of a security breach, protect assets, safeguard customer data, and uphold the company's reputation and brand.

To adapt to today's rapidly shifting cybersecurity environment, business leaders also need to take a longer view and adapt to current and future threats. Data must be protected from a machine's inception, through its life, to the point where it is securely deleted in a compliant way. For maximum peace of mind, leaders should opt for suppliers that have secure supply chains and knowledge of every component back to its original manufacture. Outsourcing infrastructure and software to third parties effectively spreads a company's threat surface, which means it's important to run regular assessments of security risks in the supply chain and understand the procurement standards of each supplier. This will empower businesses by identifying exactly which areas are most vulnerable and consequently which require the most investment.

Secure by design in PC hardware

Security must also be upheld throughout the design process when it comes to PC hardware. Business leaders must opt for hardware that has been built with security at the forefront, incorporating innovative features such as unified endpoint management, by which a device can be monitored, controlled, and locked down.

Devices can also be integrated with unique privacy alert features that provide additional layers of security when working remotely, such as activating a privacy blur when an unauthorised user's face is detected viewing the laptop screen. Added features like safe browsing, sandboxing and data encryption are all aspects which can be integrated into the core design of a laptop, helping leaders rest assured that they are doing everything to keep their company data safe.

Zero-trust architecture is also an effective way of safeguarding hardware to ensure data is only accessed by trusted users. It works by assuming that no one from inside or outside an organisation is trusted, with access to network resources layered with strict identity verification gateways. Using multi-factor authentication (MFA) is a key feature of zero-trust and helps create a more dynamic approach to security, regardless of where the end-user is operating beyond the four walls of an organisation. When it comes to selecting PC hardware, and even servers, it is critical that companies select products and solutions that incorporate security from the outset, not as an afterthought or add-on. Implementing security from the start of the product lifecycle ensures it's a fundamental aspect and can be enhanced or tweaked in line with product updates. Vendors can even use third parties to make sure their hardware or software is tested and approved before being incorporated into products.

Mastering cloud migration

Empowering stakeholders and workforce for success.

By Paul Campbell, Head of Cloud, Daemon

RUNNING A BUSINESS has never been easy and the pandemic made it even more difficult. To continue operating in a world where many office-based workers were mandated to stay at home, businesses had to shift operations to the cloud. With the flexibility offered by hybrid and remote working being embraced by employees and even being seen as a benefit that attracts new talent, many businesses are looking to stick with it.

According to Daemon's Digital Transformation report, 94% of businesses have accelerated their digital transformation efforts in the past two years. Cloud migration is no longer a nice-to-have, but a must for businesses that want to stay ahead of the competition. By migrating to the cloud, companies can gain access to new capabilities, improve their agility, and reduce their costs.

Embarking on a cloud journey is an exciting one, but some processes can appear overwhelming. Moving data and applications from physical data centres to the cloud presents various challenges, ranging from

planning pitfalls to technical complexities. It's essential for organisations to prioritise stakeholders and have an open and transparent relationship with them across the whole cloud journey. By doing so, stakeholders will trust the process, even if challenges come their way.

Don't let misalignment sink the cloud migration. Stakeholder alignment plays a pivotal role in driving the success of any cloud migration endeavour, as highlighted by the findings of the Digital Transformation report. This report emphasises that human factors, particularly the misalignment of key stakeholders, are often the primary reasons behind the failure of digital transformation projects.

To overcome these challenges, organisations need to move away from individual decision-making within senior management silos and instead foster a culture of collaboration and shared vision. Establishing a collective "North Star" allows stakeholders to come together, align their objectives, and set a clear direction for the cloud



migration journey. This shared vision acts as a guiding light, ensuring that all stakeholders are working towards a common goal and are aware of the benefits and outcomes expected from the migration.

While navigating the cloud migration process, companies should acknowledge that mistakes and setbacks can occur. However, it is crucial to celebrate successes as a unified team, recognising the achievements and milestones reached along the way. This collective recognition reinforces a positive and collaborative atmosphere, encouraging continued commitment and motivation among stakeholders.

Effective communication plays a vital role in maintaining stakeholder alignment throughout the migration process. Transparent and frequent communication channels should be established to keep stakeholders informed about the progress, challenges, and decisions made during the journey. By providing regular updates and addressing any concerns or questions, organisations can foster trust, transparency, and engagement among stakeholders.

Empowering the workforce

Communication with staff is equally as important as it is with stakeholders. Staff are the backbone of any cloud migration process and must be a top priority in every journey.

Just like a professional athlete needs to train and practice regularly to perform at their best, employees need to be trained and supported to be successful in the cloud. Without it, they may resist change, waste resources, and struggle to adapt to the new environment.

By implementing comprehensive training and enablement initiatives, organisations can empower their workforce with the essential skills and knowledge needed to navigate the new cloud environment. This empowers employees to embrace change, effectively utilise cloud services, optimise workflows, drive productivity, and foster innovation.

With their newfound expertise, employees become adept at navigating the currents of the cloud,

propelling the organisation to new levels of success.

A well-designed training programme equips employees with the confidence and competence to embrace change. It helps them understand the value and benefits of the cloud, dispelling any apprehensions or misconceptions. Employees who receive proper training are more likely to become advocates for the cloud, encouraging others to embrace the new technology and contributing to a positive cultural shift.

Planning for cloud success

After establishing transparent relationships with stakeholders and equipping staff to handle the cloud journey, it's time for business leaders to take action and invest time and effort in implementing an effective cloud solution. Rather than arriving with a readymade solution, it's imperative to get to know the business and then create a solution to match – often referred to as design thinking.

This methodology provides a structured approach to unlocking innovation. Through understanding the human needs involved, this approach uses two layers, the five-step process and the three 'lenses' to find the true value in the solutions to implement. A design thinking approach, combined with undertaking a Migration Readiness Assessment (MRA) is the perfect way to plan for cloud success.

An MRA enables organisations to gain insights into their progress in the cloud journey, assess their current level of cloud readiness, and formulate an action plan to bridge identified gaps. This assessment acts as a thorough examination, encompassing aspects like security, governance, and identification of any weak areas requiring strengthening.

By undertaking careful planning, investing in upskilling efforts, and fostering alignment with stakeholders, companies can successfully navigate through the complexities of cloud migration and eliminate any uncertainty surrounding the process. The cloud is no longer merely seen as a destination; rather, it has emerged as a powerful catalyst that propels organisations towards future success in the dynamic digital age.



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Cloud migration in 2023: Will sanctions or IT laws affect your move?

Navigating geo-political challenges in cloud migration

By Bharani Kumar Kulasekaran, product manager, ManageEngine



CLOUD MIGRATION is a strategic imperative for organizations seeking agility, scalability, and cost-efficiency in their IT operations. However, geo-political tensions, cloud sanctions and IT laws can significantly impact cloud migration plans. This poses complex challenges for organizations, especially small and medium-sized enterprises (SMEs).

This article explores how organisations can successfully navigate these challenges, providing a valuable insight into the necessary strategic approaches. It unpacks how issues may vary depending on cloud provider, regional variations, industry-specific requirements and legal challenges. By understanding these issues and adopting a proactive approach, organisations can make the informed decisions necessary to carry out a successful, regulatory compliant cloud migration. How do geo-political challenges impact cloud migration? As the survey findings highlight, geo-political situations, cloud sanctions, and IT laws can have a profound impact on cloud migration plans. In today's landscape, where global tensions and uncertainties prevail, organisations face a range of challenges that may compel them to reconsider or modify their cloud migration strategies.

A staggering 68% of SMEs have expressed intentions to scale back or halt their cloud migration initiatives due to these factors. The limitations imposed by geo-political challenges can obstruct access to cloud services or data centres, impeding organisations from fully realising the transformative potential of cloud computing.

Why is it important to understand regional variants?

The impact of geo-political challenges on cloud migration can vary significantly based on several factors. One crucial factor to consider is the chosen cloud provider. Different cloud providers exhibit

varying levels of availability, data sovereignty options and compliance with local regulations in different regions. Organisations should evaluate and select cloud providers carefully based on their track records in compliance, availability and data protection in the desired regions.

A good example is how Microsoft Cloud are taking it a step further with EU Data Boundary. Despite already complying with – or exceeding – EU requirements, Microsoft Cloud have further ensured that their customers' data sovereignty needs are met with the ability to store and process their data within the European Union (EU) and the European Free Trade Association (EFTA) for Microsoft 365, Azure, Power Platform and Dynamics 365 services.

For industries who deal with sensitive or regulated data, they are additional legal and compliance hurdles to consider when the organization decides to migrate to the cloud. For instance, financial services, healthcare, and government sectors have stringent regulatory requirements such as SOX, PCI DSS, HIPAA, FedRAMP, ISO 27001, etc., that need to be addressed during the migration process. It's important that organisations are aware of these industry-specific challenges, so that they can work closely with cloud providers to ensure compliance and adherence to relevant regulations.

The legal and regulatory challenges impacting cloud migration

Adopting a proactive and informed approach to adherence to regulations and relevant laws helps ensure successful cloud migrations. The following strategies can help organisations navigate the legal and regulatory challenges associated with cloud migration:

a. Vendor Evaluation:

Careful evaluation and selection of cloud providers are crucial in navigating geo-political challenges. Organisations should assess the track record of cloud providers in terms of compliance, data protection, and availability in the desired regions. It is important to ensure that the chosen cloud provider can meet specific compliance requirements and data residency obligations.

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b. Comprehensive Risk Assessment:

Organisations should conduct a thorough risk assessment to evaluate the potential impact of geo-political situations, cloud sanctions, and IT laws on cloud migration plans. This assessment should consider factors such as regional stability, data privacy regulations, and compliance obligations. By identifying potential risks, organisations can develop mitigation strategies and contingency plans.

c. Compliance and Security Frameworks:

Developing robust security and compliance frameworks is critical in addressing legal and regulatory challenges. Organisations should consider industry-specific regulations and requirements when designing their frameworks.

d. Data Residency and Sovereignty:

Ensuring data residency and sovereignty requires a clear understanding of the limitations and statutes in different jurisdictions. Organisations need to be aware of local regulations governing data storage, transfer, and protection while implementing appropriate measures to ensure data protection, privacy, and compliance with local regulations. This may involve establishing data centres or utilizing cloud availability zones that comply with local laws.

e. Business Continuity and Disaster Recovery:

Geo-political situations can introduce uncertainties that may impact the availability and accessibility of cloud services. It is essential for organisations to have robust business continuity and disaster recovery plans in place. This involves identifying backup strategies, data replication mechanisms, recovery time objectives (RTOs), and recovery point objectives (RPOs) to ensure uninterrupted access to critical applications and data, even in the face of geo-political disruptions.

f. Stakeholder Communication and Collaboration:

Effective communication and collaboration with stakeholders, including legal teams, compliance officers, and cloud service providers, are key to addressing geo-political challenges. Regular dialogs and updates on changing regulations, compliance requirements, and data protection measures can help organisations stay ahead and adapt their cloud migration strategies accordingly.

g. Legal Expertise and Consultation:

Engaging legal experts with knowledge of cloud computing and international regulations can provide valuable guidance and support in navigating the legal and regulatory challenges associated with cloud migration. These experts can assist in understanding and interpreting complex laws, ensuring compliance, and mitigating risks.

Leveraging cloud management tools and solutions

Cloud management tools and solutions can assist organisations in overcoming geo-political challenges and ensuring compliance.

Adopting these tools can provide visibility into cloud resources, data governance, and compliance monitoring. Key features include:

a. Cloud Monitoring and Observability:

Cloud monitoring tools offer real-time insights into the performance, availability, and security of cloud resources. They enable organizations to proactively identify and address issues that may arise due to geo-political challenges. By monitoring cloud services and infrastructure, organizations can optimize their operations and mitigate risks.

b. Compliance Management:

Cloud compliance management tools help organizations ensure adherence to relevant regulations and industry standards. These tools provide automated compliance assessments, documentation, and reporting, easing the burden of maintaining compliance in the face of evolving geo-political landscapes.

c. Data Protection and Privacy:

Cloud solutions that offer robust data protection and privacy features can help organizations maintain compliance with local data privacy laws. Encryption, access controls, and data residency options are essential components of such solutions, enabling organizations to protect sensitive data and meet regulatory requirements.

In today's globalized and interconnected world, organisations face many complex challenges to cloud migration. Successfully overcoming these challenges requires organisations to understand regional variations, industry-specific requirements, and engage in proactive strategies.

Thorough risk assessment, vendor evaluation, and leveraging cloud management tools and solutions are also crucial elements of a successful cloud migration strategy. It's also essential to maintain open communication and collaboration with stakeholders, including legal experts and cloud service providers.

By adopting these approaches and staying abreast of evolving regulations, organisations can leverage the benefits of cloud computing while mitigating risks and ensuring a secure and compliant cloud environment.

To summarise, while geo-political challenges can pose obstacles to cloud migration, organisations can navigate these challenges effectively if they employ a comprehensive approach that encompasses risk assessment, vendor evaluation, compliance frameworks, data protection measures, and cloud management solutions. If they do so successfully, they can harness the power of cloud computing and achieve their strategic objectives – while also remaining compliant with the ever-evolving legal and regulatory landscape.



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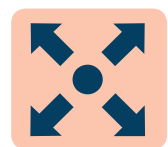
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Challenges and solutions for supporting AI-driven applications in the data centre



Artificial Intelligence means different things to different people and different organizations. This can be especially true depending on whether AI is being used to tackle small or big problems at scale.

By Keith Sullivan, Director of Strategic Innovation, AFL

GENERALLY, the accepted definition of AI is the ability of a computer system to perform a task typically thought to require intelligence, learn from that task, and refine the intelligence.

Often the tasks associated with AI are thought to require at least close to human-level reasoning ability, the difference being that AI systems can deal with data at a volume and velocity far above human ability.

At one end of the spectrum, AI can mean anything from recognising faces on your phone to reading documents to extract content or context. At the other end of the spectrum, we could be talking about large data center clusters full of telemetry relating to anything from vehicle fleets for a global supply chain operation which is using AI to optimize routes and suppliers to Large Language Models

which are trained on vast volumes of unstructured information resulting in tools such as the now popular Chat GPT.

These AI innovations require highly available, high-capacity architectures to support the volumes of data being distributed and redistributed on demand for training and serving these AI models in production. This creates significant challenges for data center operators and hyperscalers especially. They have to deal with increasingly diverse workloads at scale, which can range from batch loading of large datasets to train the models to the high volumes of smaller requests that need to be serviced when these models are deployed in production. Throwing more infrastructure at the problem is not a long-term solution.

However, we are not dealing with technologies where long-term needs are known. The challenge is compounded by the fact that data center operators can't stop to take a breath to figure it out; there is no pause button in this market. Customer demands are higher than ever, and whilst current approaches may be suitable for smaller AI workloads, this is a different story when addressing larger requirements.

Allowing for the evolution of an accidental network architecture through short-term solutions, patching capacity, or availability issues is typically a recipe for long-term pain. This is especially true in the world of AI, where an AI cluster can be formed by combining thousands of AI accelerators into one homogeneous "AI Brain".

The challenge here doesn't come especially from north-south traffic (data moving in and out of the data center), which is still important as we need to get data into these systems, but from the fact that high-performance AI systems are the aggregation of these AI accelerators, which scale horizontally (Adding new nodes to the network rather than adding hardware to each node).

This means the performance needs relating to east-west traffic or node-to-node communication within the cluster must be heavily optimized.

Connecting thousands of the highest compute capacity AI Accelerators to behave as a single AI Brain, requires a completely separate, dedicated, low latency network across all accelerators in the cluster leading to far greater fibre infrastructure density requirements in the data hall. Effectively a dedicated network needs to act as super low latency backplane for the cluster to perform as efficiently as possible.

This is demonstrated clearly by Nvidia's acquisition of Mellanox so they could include a dedicated high-speed InfiniBand network to act as the dedicated network backplane for their DGX GPU Accelerators. When you consider these needs alongside the pace of innovation in the AI developer community and the increasing scale of the models being trained and served, data centers are faced with a real challenge.

Traditional thinking suggests they need to futureproof their architecture; however, the future needs of what they may deal with in 6 months, 1 year, or 3 years ahead is uncertain. The ability to futureproof is limited, making it essential to build as flexibly as possible, allowing maximum scalability.

However, the needs in the market are so immediate and pressing, operators are forced to implement whatever the most current and highest performing networking solutions are available right now, in the knowledge that next year the technology may change and their infrastructure must accommodate that future technology.

As the pace of innovation in AI continues to accelerate, partnering with a company like AFL that has strong R&D at the core of its organization is critical.

We are working with customers on a day-to-day basis, forced with making hard decisions around where and how they compromise traditional established norms and good practices in the pursuit of not just keeping up with the market but staying ahead of it.

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The data centre, demand response and the microgrid

The Microgrid discussion in the data centre sector is gathering pace.

By Ed Ansett, Founder, i3 Solutions

WHETHER it is Microgrids, Distributed Energy Resources (DERs), co-gen, grid-interactive, islanded or integrated (decoupled or coupled) - there is growing consensus that data centres will require onsite or locally generated power delivered through microgrids.

To say microgrids will become a feature of future large data centre design would be to overlook the idea that technically most data centres of scale can be configured to operate as local microgrids. For data centres to participate in Demand Response (DR) schemes adds a layer of complexity. Designing and building a power plant or augmenting an existing power design using assets already in place is not straightforward for any industrial application such as a large data centre that wants to be a power provider to the grid or a local community.

While some suppliers are offering turnkey microgrid solutions, it is not simply a case of choosing a

microgrid and plugging it into your data centre - or plugging your data centre into it.

For the data centre operator, the starting point requires becoming more familiar with the nomenclature of the 'behind and in front of the meter' power systems.

To begin, first choose your favourite microgrid definitions and microgrid modes.

Microgrid modes

Typical microgrid modes are described as grid coupled (connected/integrated), islanded, (disconnected/decoupled), integrated, remote, rural, community, industrial etc. There are also many definitions. To quote one, the NREL says: "A microgrid is a group of interconnected loads and distributed energy resources that acts as a single controllable entity with respect to the grid. It can connect and disconnect from the grid to operate



in grid-connected or island mode. Microgrids can include distributed energy resources such as generators, storage devices, and controllable loads. Microgrids generally must also include a control strategy to maintain, on an instantaneous basis, real and reactive power balance when the system is islanded and, over a longer time, to determine how to dispatch the resources. The control system must also identify when and how to connect/disconnect from the grid.”

For example, you may wish your data centre to be in an Islanded Microgrid scenario. That is, in normal operation, the microgrid is not connected to the main power grid and relies on local power generation. This could be engine-based, for sustainability purposes using RERs with energy storage back-up, or be a mix.

Any separation from the grid means island grids must control voltage and frequency, often while managing energy demand to loads.

Challenges identified with Island Microgrids include maintaining stability of voltage and frequency output. Local generation must also be capable of switching from “grid-following mode” to “grid-forming mode.”

Clearly demand response requires some form of flexible grid connection. An Integrated Microgrid shares many characteristics of an Islanded Microgrid such as local load, distributed energy resources (DERs) for generation and power storage, distribution management and control, with the ability to operate independently. However, the Integrated Microgrid has an additional interconnection with a large regional or national power grid.

Microgrid controllers

All microgrids require a controller. The IEEE 2030.7 Standard for Specification of Microgrid Controllers provides a basis for planning and specifying a microgrid. The IEEE describes its standard, saying: “A key element of microgrid operation is the microgrid energy management system (MEMS).”

MEMS include the control functions that define the microgrid as a system that can manage itself, operate autonomously or grid-connected, and seamlessly connect to and disconnect from the main distribution grid for the exchange of power and the supply of ancillary services.

The scope of this standard is to address the functions above the component control level associated with the proper operation of the MEMS that are common to all microgrids, regardless of topology, configuration, or jurisdiction.

The IEEE standard is said to reduce microgrid complexity to two steady state (SS) operating modes and four types of transitions (T). SS1 – Steady State Grid Connected; SS2 – Stable Island.



T1 – Transition from Grid Connected to Steady State Island (Planned); T2 – Grid Connected to Steady State Island (Unplanned); T3 – Steady State Island reconnect to Grid; T4 – Black Start into Steady State Island.

Beyond the technical

Building a microgrid dedicated to a particular data centre facility or campus that can provide demand response will also entail a whole new set of planning considerations, navigating a new supply chain ecosystem and other new challenges. It will entail becoming even more familiar with power market structures. For example, the UK Government Review of Market Arrangements (REMA) which is due to report in October will change how electricity is traded. And the EUDCA recently responded to the EU’s proposed changes to the block’s power market. It cited concerns about making PPAs easier to access for its members.

The case for investing in Microgrids is strong despite the significant challenges that exist. For data centres looking to become power providers by establishing Demand Response schemes using microgrid-generated power, the financial rewards and sustainability benefits can be significant for those aware of the barriers to overcome.

An Integrated Microgrid shares many characteristics of an Islanded Microgrid such as local load, distributed energy resources (DERs) for generation and power storage

Why legacy modernisation is essential to reduce energy costs

As the demand for digital infrastructure continues to increase, new-build data centres and a large estate of legacy IT facilities will be vital in underpinning the ongoing demand for digital infrastructure. The question is, how can we best meet today's sustainability challenges, alongside the equally important imperative of reducing energy costs?

By Andy Connor, EMEA Channel Director, Subzero Engineering



IN AN IDEAL WORLD, it would be nice to imagine that any data centre over a certain age would be quietly taken offline and retired – many being inefficient and ill-equipped to deal with today's increasingly high-density IT demands. However, in the same way, that the switch to electric vehicles allows for a long transition period away from fossil fuel-powered transport, to cushion the impact and, importantly, the cost of such change, the reality of the digital infrastructure sector is that legacy data centres will be required for the foreseeable future. All such facilities are capable of being replaced in a highly ambitious five-to-ten-year period, but the investment required would be prohibitive. Closing down older data centres without replacing them would mean a massive drop in digital infrastructure capacity, at a time when the demand has never been so high.

Establishing the exact global data centre population is not easy. In terms of what might be described as the number of data centres owned and/or operated by professional data centre providers, the US International Trade Commission estimates, as of May 2021, a total of some 8,000 data centres globally¹. However, when considering the hundreds of thousands of enterprise-owned data centres globally – everything from a cupboard with a few servers, right up to large-scale buildings - then the extent of the legacy problem is truly revealed. Let's not forget that for every greenfield data centre, there's at least one older facility upon which one may rely.

Why does all of this matter?

Today, data centre PUEs have come down from an average of 2.5 in 2007 to 1.55 in 2022², but this current figure is still a long way from the ambition of 1.0. If the average is 1.55, that means that there's a substantial number of data centres that are not even close to that figure as of now, the impact of which comes at a significant financial and environmental cost.

Energy costs for the industry have risen massively since January 2021³. While the rate of the increase varies from region to region, many countries have witnessed a more than doubling of the cost of electricity. The silver lining to this energy crisis might be the accelerated development of renewable resources, for longer-term cost and environmental benefits, the reality is that, for many businesses, the price of power has become unsustainable.

In the data centre sector, where much of the cost of running a facility is the power bill, the impact has been significant. Smarter operators will pass power costs directly on to customers, which on the one hand, provides a haven from volatile energy costs, but on the other, it risks customers moving their business to cheaper or more energy-efficient colos,



as the overall operating costs will be cheaper. As for enterprise data centre facilities, the rise in energy prices across Europe is equally, if not more impactful, than it is for the colo and cloud operators. After all, enterprises are unlikely to be able to negotiate the long-term price agreements that have, to some extent, cushioned the energy crisis blow for large-scale operators.

For legacy data centre operators, the energy crisis is even worse. They are not only paying hugely increased power bills but are paying an additional premium through the inefficient use of power. Legacy data centres, for example, waste more than 60% of cooling energy⁴, meaning higher power consumption, and a much higher energy bill than is necessary. Thanks to inefficient data centre design, and a lack of truly sealed, air-tight aisles of racks and cabinets, the cooling solution deployed in many data centres is having to work for much longer and harder than it would need to do in an optimised environment.

Containing the problem

The good news is that legacy data centres have a roadmap which can take them a long way on the journey towards minimising their carbon footprint and improving energy efficiency – something essential when considered as part of a wider sustainability programme. The first step is to analyse and understand what's going on in the data centre today. Without such insight, any attempted improvements will be little more than educated guesses, with no real idea of their likely impact.

CFD analysis provides a comprehensive map of how a data centre operates in terms of how effective the existing cooling technology is. It highlights key inefficiencies, such as hot spots, providing an overall picture of where hot air leaks in and/or out of the IT racks, cabinets, and aisles, demonstrating the inefficiency of the existing cooling solution. Armed with this picture of current legacy data centre performance, it is then possible to implement a programme of relatively simple, but extremely effective, measures to bring about a significant improvement. Most notably, the implementation of a comprehensive containment strategy brings with it significant data centre operational efficiencies. These efficiencies translate into significant financial and environmental benefits, saving as much as 30% of the data centre energy bill and offering a reduced carbon impact.

The emphasis is on 'comprehensive'. For example, there is no point in building a containment system around the IT cabinets, if the power cable ingress ducts are not fully sealed as well. Similarly, if a cabinet is not fully populated with hardware, the containment solution will not be effective unless the gaps are closed with blanking panels.

Properly designed and installed, containment systems can deliver huge operational and energy

benefits to the data centre. Set alongside other measures, such as an optimised data centre configuration, increased use of free cooling where possible and/or increased operating temperatures, as allowed for in the ASHRAE standards, containment systems can improve legacy data centre performance dramatically.

Finally, comes the ongoing monitoring and maintenance requirement. Data centres are dynamic environments. The contents of racks and cabinets, hence the power supply required, will change over time. People will go in and out of the aisles, carrying out various tasks and, inadvertently or otherwise, impact the space. The performance of the IT hardware may also change over time, likely generating more heat.

The climate outside the data centre will impact the environment inside. In short, there are many ongoing variables in terms of data centre performance, and, at the most basic level, the IT load could vary dramatically on a daily basis.

Making modernisation work

Measure, contain and monitor is the mantra for an effective legacy data centre modernisation programme. Whatever the size of your data centre, understanding its current operational performance gives you a baseline from which to plan any improvements. Any such improvements will need at their core a commitment to a comprehensive containment solution. And ongoing monitoring and maintenance will ensure that the newly upgraded and optimised legacy data centre continues to run as energy efficiently as possible.

Optimising performance from an energy efficiency standpoint brings with it much-needed financial savings at a time of energy price volatility. Further, by using less energy, not only does a data centre cost less to run, but also enhances its sustainability credentials. Properly modernised and optimised, legacy data centres can continue to support the ongoing digital revolution and be seen as part of a sustainable, green future, and will no longer be seen as the industry's environmental Achilles heel.

FURTHER READING

- 1 https://www.usitc.gov/publications/332/executive_briefings/ebot_data_centers_around_the_world.pdf
- 2 https://www.statista.com/statistics/1229367/data-center-average-annual-pue-worldwide/?kw=&crmtag=adwords&gclid=CjwKCAjwjYKjBhB5EiwAiFdSfmlx0gH5seYY-3gxVaA7kti0zq1qiRhSuSeu2xk5ogn4Xs4Zo6t8xBoCAkIQAvD_BwE
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How augmented reality is impacting operational performance and total cost of ownership

Augmented Reality (AR) is gathering momentum in the world of equipment servicing and is fast becoming the new norm, impacting the way in which shopfloor operatives, service/maintenance technicians and engineers interact. The rise in popularity for AR and how it is helping maintain competitiveness in an ever changing and demanding economic climate.

By Anna Mazzoleni, Service 4.0 Global Product Manager for ABB Electrification Service



Augmented Reality (AR) is gathering momentum in the world of equipment servicing and is fast becoming the new norm, impacting the way in which shopfloor operatives, service technicians and engineers interact.

Here Anna Mazzoleni, Service 4.0 Global Product Manager for ABB Electrification Service, discusses the rise in popularity for AR and how it is helping maintain competitiveness in an ever changing and demanding economic climate.

Research shows that businesses are concerned about the impacts of energy pricing and security

and the impact that this is having on their ability to compete, invest in people and reach their sustainability targets.

This is according to ABB's Energy Insights Survey of 2,300 leaders from small and large businesses, which revealed that 92 percent of respondents believe the continuing instability of energy is threatening their profitability and competitiveness. It is also having a significant impact on the workforce with decreased investment in employees. They are also concerned about potential impacts of meeting their sustainability targets.

The priority for industry, therefore, is resilience! Operators need to build an infrastructure that is resilient to all geopolitical changes and be willing to adopt and integrate new technologies, such as AR.

For example, the likes of augmented servicing guides visible on the electrical equipment, boosts interaction and the ability for self-support, removing the need for an engineer to travel to the facility, which increases efficiency, reduces downtime and drastically cuts CO2 emissions.

So, what is AR?

Unlike Virtual Reality (VR), which replaces physical reality with a computer-generated environment, AR superimposes digital information on the physical world.

Through AR technology, operational information is presented in a completely new way – augmented in a person's view of their real environment and acting as a digital assistant. But crucially, AR makes digital



assistance interactive, more practical to absorb, as well as easier to understand and act upon. In other words, its core capabilities are visualize, instruct and interact.

The technology has been around since the early 1990s, but it wasn't until the outbreak of the COVID-19 pandemic that it was more widely adopted. With international and domestic travel bans in place, operators needed to find alternative ways to carry out essential servicing and maintenance. And that's where the quantifiable benefits of digital support technology using AR proved compelling. Indeed, AR has unlocked post-pandemic productivity by simplifying maintenance, reducing downtime costs and increasing equipment effectiveness via the quality

of repairs and speed of resolution. It has also reduced the need to travel to site, but with an expert always to hand, albeit remotely. Through innovation, we are now connecting remote live experts to 'real life' customer issues, wherever they are in the world, to reshape the way we interact with them and enable self-learning through first-rate support.

AR also delivers value; making procedures faster, smarter and safer, in a standardized way to facilitate knowledge retention and continuous improvement cycles. For example, our remote factory acceptance testing (FAT) now regularly deploys augmented reality solutions encompassing audio, video, document sharing and live annotations by overlaying digital information onto the equipment operatives are working on, removing the need for customers to visit our facility.

Solutions in hours not days

Because AR applications work on a multitude of devices, it is no longer a restricted technology either. Even the Android and iOS mobile devices we use in our daily lives can provide the operational gateway to reducing downtime and increased efficiency. The service expert gets real-time visual insight to the application, accessing chat, images or videos shared by the on-site engineer, and in turn ABB helps the customer troubleshoot by guiding through the service process with the aid of interactive tools that visualize and simplify the instructions.

Seeing is believing, of course and some recent outcomes show the value of AR in practice. Together with ABB experts the field service engineers of a leading pulp and paper producer now use Microsoft HoloLens headsets imparted with AR technology containing repair strategies and guidance documentation – so that maintenance issues that would normally result in days of downtime for travel, troubleshooting and resolution are instead solved in hours.

Additionally, one of the world's largest marine shipping operators needed remote maintenance to support problem-solving for its global fleet and

reduce the impact of issues while at sea. Service support delivered through AR greatly extended the ability of onboard technicians to address failures they would have otherwise lacked the experience to diagnose and complete.

Our experts could identify issues from thousands of miles away and provide their maintenance crews with instructions to solve problems, thereby eliminating the need for re-routes, port stops and all the associated costs.

Connected tech

ABB'S AR solutions are available as downloadable apps from Google and Apple stores and use augmented reality to overlay the instructions on real equipment to expertly assist customers quickly and efficiently.

Interactive troubleshooting using step-by-step tutorials can be accessed by customers 24/7 for fast and easily accessible guidance through the different steps of key procedures. Facilitating remotely guided repairs and replacement of critical components takes this a step further, because in addition to using live on-screen annotations and digital overlays in the engineer's

field of vision, it also allows taking pictures, as well as audio and video sharing capability and guidance via live text chat.

What's more, the new Service Assist mobile app provides information even faster and more efficiently with the additional support of ABB-e, ABB's virtual assistant, which finds augmented reality immersive guides, books appointments for either on-site or remote services, and pulls together ABB and non-ABB documentation in a single digital location. The speed of resolution is tangible and therefore vital in minimizing potentially highly disruptive and costly downtime.

Value added AR solutions should integrate multiple data sources and collaboration tools into the same augmented environment, so that teams can collaborate much more effectively, regardless of their location, and get virtually hands on. In our view, as we continue to navigate the challenges of a constantly changing energy landscape, the adoption of AR will only continue to accelerate. Why? Because providing operators with the visual information needed to fix problems and issues is a winning formula for achieving ongoing improved efficiency, quicker and safer resolutions, plus enhancing asset life and performance.

Quite simply, it empowers end users and boosts positive and proactive interaction, so that for both parties service support is conducted in a faster, more optimized and sustainable way.

Augmented Reality is very much a smart business reality!

Four common reasons firms face downtime

There isn't a great deal of tolerance for downtime. In a world where technology is increasingly available and accessible in all areas of our lives, it can be both shocking and immediately frustrating when it is suddenly no longer there.

By Tim Whiteley, co-founder, Inevidesk



AS SOMEONE who has been providing IT services for many years (and therefore responsible for the uptime of systems), the threat of downtime can bring on a cold sweat: the barrage of emails and calls to query/ complain/ demand and the pressure to get things back up and running again as soon as possible.

Downtime is traumatic for all parties. But it shouldn't be. For two reasons. One: downtime is going to happen at some point and we all should be able to cope with this. It's very rarely the end of the world, whatever we may feel at the time. Let's get a bit of perspective. Two: the risk of downtime can be minimised through good system and process design. If we undertake this well, and communicate it to all relevant parties, we can all manage the (hopefully rare) situations when downtime occurs with more confidence and understanding.

Here are the four most common reasons firms face downtime:

Power outage – Whether it's down to adverse weather conditions, equipment failure, human error or something unexpected (we once had an annual DR test ruined by a Canadian Geese strike...), power outages can stop on premises systems, which often only have a single source of power, dead in their tracks. Having only one source of power is a huge risk factor.

Internet outage – Many, if not most, of our systems now rely on connectivity so losing net access can be paralysing. As above, the key here is not to have critical systems supported by a single feed. Dual feeds and diverse suppliers will provide the necessary redundancy.

Hardware failure – All hardware has a lifespan. And all hardware components can fail. If you can afford it, ensure hardware redundancy and maintain this in an appropriately managed environment. Do not keep your office bottles of Prosecco in the server room...yes I have seen this!

Network problems – Hardware failure, misconfiguration, dodgy cables, network loops. It's



critical that your organisation uses the proper expertise to manage your network which can easily be taken out by one person plugging in a cable in the wrong place.

Networks in large organisations can be extremely complicated, which can often extend downtime due to the time required to identify root causes. Expertise. Documentation. Monitoring. All the basics.

Reducing the risk of downtime by moving from on-prem to hosted

To reduce the risk of downtime in your organisation, you need to limit the exposure that your system has to these key risk elements. Hosted solutions, for example, often minimise the risk of downtime because they are typically held in physically secure, environmentally managed data centres with extensive redundancy for the common points of failure, which generally includes dual and diverse power feeds, backup generators, dual and diverse connectivity, high availability configuration of equipment and more.

Hosted infrastructure also reduces dependency on your office (or home) infrastructure, which will likely only have one power and internet feed.

Though hosted solutions can be more expensive than on-prem options, there exists a range of options and suppliers to meet different budgetary

requirements from public to private cloud arrangements. It's not a one size fits all solution and it's important for any organisation to find the right balance of price, risk mitigation and operational fit.

To provide an example, London-based architectural company, Cullinan Studio, moved its entire server infrastructure and workstation resources to the cloud to build resiliency and to ensure that no matter where employees were based, they could continue working on the same infrastructure with the same high level of performance.

And this also enabled the firm to make better use of its building – a Victorian, former industrial property on the canal side in Islington. It was able to pull its own office footprint back to just one of the building's three floors and use the newly free space to create a multi-disciplinary hub that it could sublet to tenants as a revenue driver.

Final thoughts

Downtime will happen for you and your organisation at some point, no matter how well managed your infrastructure. But areas of vulnerability and potential impact can be addressed to reduce the likelihood and the damage it can incur and provide you with, hopefully, confidence in your systems (and their poor administrators) when, and if, it happens.

DCS DATACENTRE SOLUTIONS

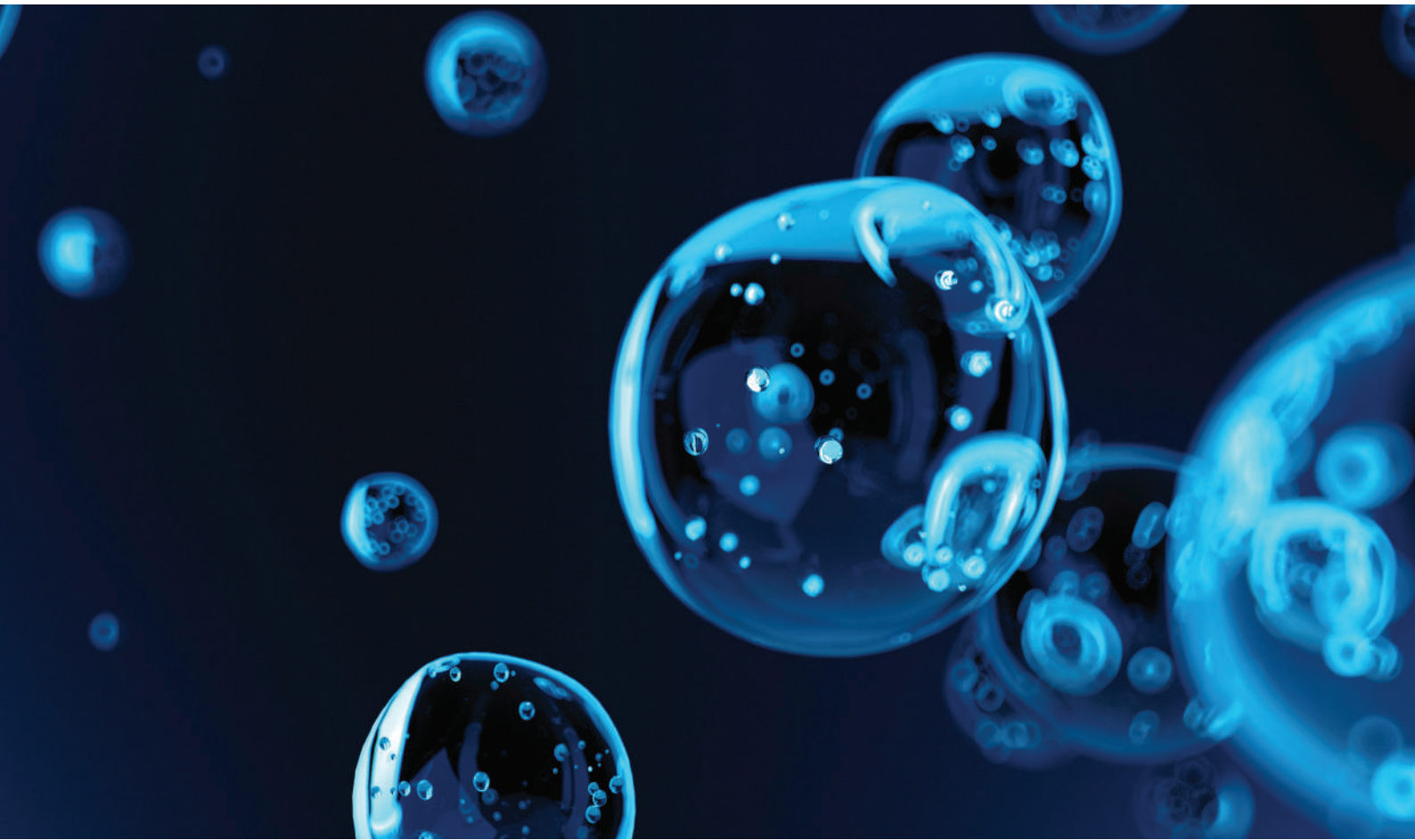
Developing digital infrastructure in a hybrid world

New product and process development is the foundation for the growth of the Datacentre industry.

If you want to highlight the recent important breakthroughs that your company has made, please submit an abstract to philip.alsop@angelbc.com

It is imperative that DCS Magazine remains a timely resource for this industry, so we are especially interested in highlighting very recent work.





Paying attention to data centre storage cooling in 2023

Making today's technology more efficient and removing limiting factors for new and game changing data storage methods can help us meet the global challenges we face and is a step forward towards enabling a better future.

By Neil Edmunds, Director of Innovation, Iceotope

WITH CONSTANT STREAMS of data emerging from the Internet of Things, video, artificial intelligence and more, it's no surprise we are expected to generate 463 exabytes of data each day by 2025. How we access and interact with data is constantly changing and is going to have a real impact on the processing and storage of that data. In just a few years, it's predicted that global data storage will exceed 200 zettabytes with half of that stored in the cloud.



This presents a unique challenge for hyperscale data centres and their storage infrastructure. According to Seagate, cloud data centres choose mass capacity hard disk drives (HDDs) to store 90% of their exabytes. HDDs are tried and tested

technology typically found in a 3.5-inch form factor. They continue to offer data centre operators cost-effective storage at scale. The current top-of-the-range HDD features 20 TB capacity. By the end of the decade that is expected to reach 120+ TB all within the existing 3.5-inch form factor.

The practical implications of this show a need for improved thermal cooling solutions. More data storage means more spinning of the disks, higher-speed motors, more actuators – all of which translates to more power being used. As disks go up in power, so does the amount of heat produced by them. Next, with the introduction of helium into the hard drives in the last decade, performance has not only improved thanks to less drag on the

disks, but the units are now sealed. There is also ESG compliance to consider. With data centres consuming 1% of global electricity demand, and cooling power accounting for more than 35% of a data centre's total energy consumption, pressure is on data centre owners to reduce this consumption.

Comparison of cooling technologies

Traditionally, data centre environments use air-cooling technology. The primary way of removing heat with air-cooling methods is by pulling increasing volumes of airflow through the chassis of the equipment. Typically, there is a hot aisle behind the racks and a cold aisle configuration in front of the racks which dissipates the heat by exchanging warm air with cooler air. Air cooling is widely deployed and well understood. It is also well engrained into nearly every data centre around the world. However, as the volume of data evolves, it is becoming increasingly likely air cooling will no longer be able to ensure an appropriate operating environment for energy dense IT equipment.

Technologies like liquid cooling are proving to be a much more efficient way to remove heat from IT equipment. Precision Liquid Cooling, for example, circulates small volumes of dielectric fluid across the surface of the server removing almost 100% of the heat generated by the electronic components. There are no performance-throttling hotspots and no front-to-back air-cooling, or bottom to top immersion constraints which are present in tank solutions. While initial applications of Precision Liquid Cooling have been in a sealed chassis for cooling server components, given the increased power demands of HDD, storage devices are also an ideal application.

High-density storage demands

With high-density HDD traditional air-cooling pulls air through the system from front to back. What typically occurs in this environment is that disks in the front become much cooler than those in the back. As the cold air comes and travels through the JBOD device, the air gets hotter. This can result in a 20°C or more temperature differential between the discs at the front and back of the unit depending on the capacity of the hard drive.

For any data centre operator, consistency is key. When disks are varying by nearly 20°C from front to back there is inconsistent wear and tear on the drives leading to unpredictable failure. The same goes for variance across the height of the rack as lower devices tend to consume the cooler air flow coming up from the floor tiles.

Liquid cooling for storage

While there will always be variances and different tolerances taking place within any data centre environment, liquid cooling can mitigate for these variances and improve consistency. In 2022, Meta published a study showcasing how an air-cooled, high-density storage system was re-engineered to

utilize single phase liquid cooling. The study found that Precision Liquid Cooling was a more efficient means of cooling the HDD racks with the following results:

- The variance in temperature of all HDDs was just 3°C, regardless of location inside the JBODs
- HDD systems could operate reliably in rack water inlet temperatures up to 40°C.
- System-level cooling power was less than five percent of the total power consumption.
- Mitigating acoustic vibrational issues

While consistency is a key benefit, cooling all disks at a higher water temperature is important too. This means data centre operators do not need to provide chilled water to the unit. Reduced resource consumption – electrical, water, space, audible noise, etc. – all lead to greater reduction in TCO and improved ESG compliance. Both of which are key benefits for today's data centre operators.

As demand for data storage continues to escalate, so will the solutions needed by hyperscale data centre providers to efficiently cool the equipment. Liquid cooling for high-density storage is proving to be a viable alternative as it cools the drives at a more consistent temperature, and removes vibration from fans, with lower overall end-end power consumption and improved ESG compliance.

At a time when data centre operators are under increasing pressure to reduce energy consumption and improve sustainability metrics, this technology may not only be good for the planet, but also good for business.

Enabling innovation in storage systems

Today's HDDs are designed with forced air cooling in mind, so it stands to reason that air cooling will continue to play a role in the short term. For storage manufacturers to embrace new alternatives demonstrations of liquid cooling technology like the one Meta conducted are key to ensuring adoption. Looking at technology trends moving forward, constantly increasing fan power on a rack will not be a long-term sustainable solution.

Data halls are not getting any larger and costs to cool a rack are increasing. The need for more data storage capacity at greater density is exponentially growing. Storage designed for Precision Liquid Cooling will be smaller, use fewer precious materials and components, perform faster, and fail less often.

The ability to deliver a more cost-effective HDD storage solution in the same cubic footprint delivers not only a TCO benefit but contributes to greater ESG value as well. Making today's technology more efficient and removing limiting factors for new and game changing data storage methods can help us meet the global challenges we face and is a step forward towards enabling a better future.

The DCA – Data Centre Transformation Conference 2023



EVERY YEAR since 2010 The Data Centre Alliance has hosted its Data Centre Transformation Conference for Partners and Members.

The intention of the event has always been for delegates to expand their knowledge of the Data Centre sector and to keep up to date with innovative new solutions. The conference programme is varied and includes specialist keynotes, presentations, panel sessions and interactive workshops.

After the conference the DCA community has the opportunity to come together for a relaxed networking session followed by dinner. On the 18th May this year we hosted the event at The IET in Birmingham and were privileged

to have the support of a number of outstanding organisations. We have included a round up from the supporters of the 2023 Conference in this feature – thank you to Red Engineering, QIO Technologies, Portman Partners, Enel X, Critical Power and Arcadis.

Data Centre Transformation 2024 will take place on 04 July 2024 at The IET in Birmingham. To stay informed of DCA activities you are welcome to register as a subscriber:

<https://dca-global.org/registered-user-status>

If your organisation would like to know more about the benefits of becoming a DCA Partner please contact drop me an email: steveh@dca-global.org

Keep the lights on and keep it cold

By James Rix, Project Director and Global Lead for the Data Centre Community of Practice



The current situation

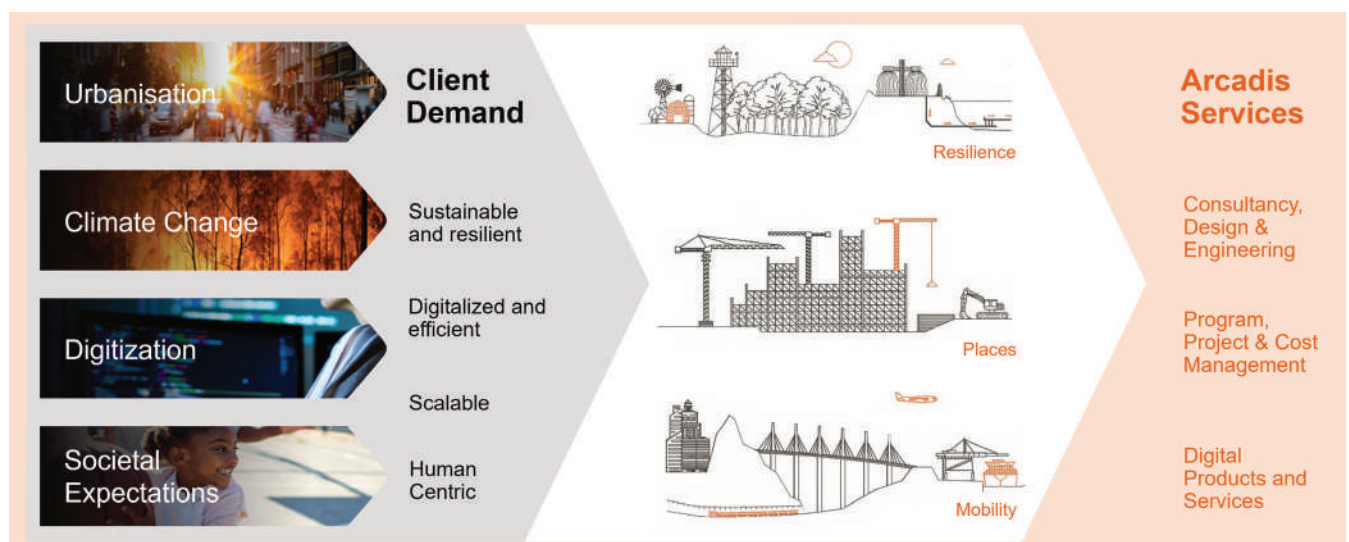
The mantra 'keep the lights on, keep it cold' is oft quoted by data centre engineers when asked to define their roles. However, is this the right approach to energy efficiency and the environmental impact of what are, essentially, utility-hungry sheds that consume the equivalent power of small towns every day?

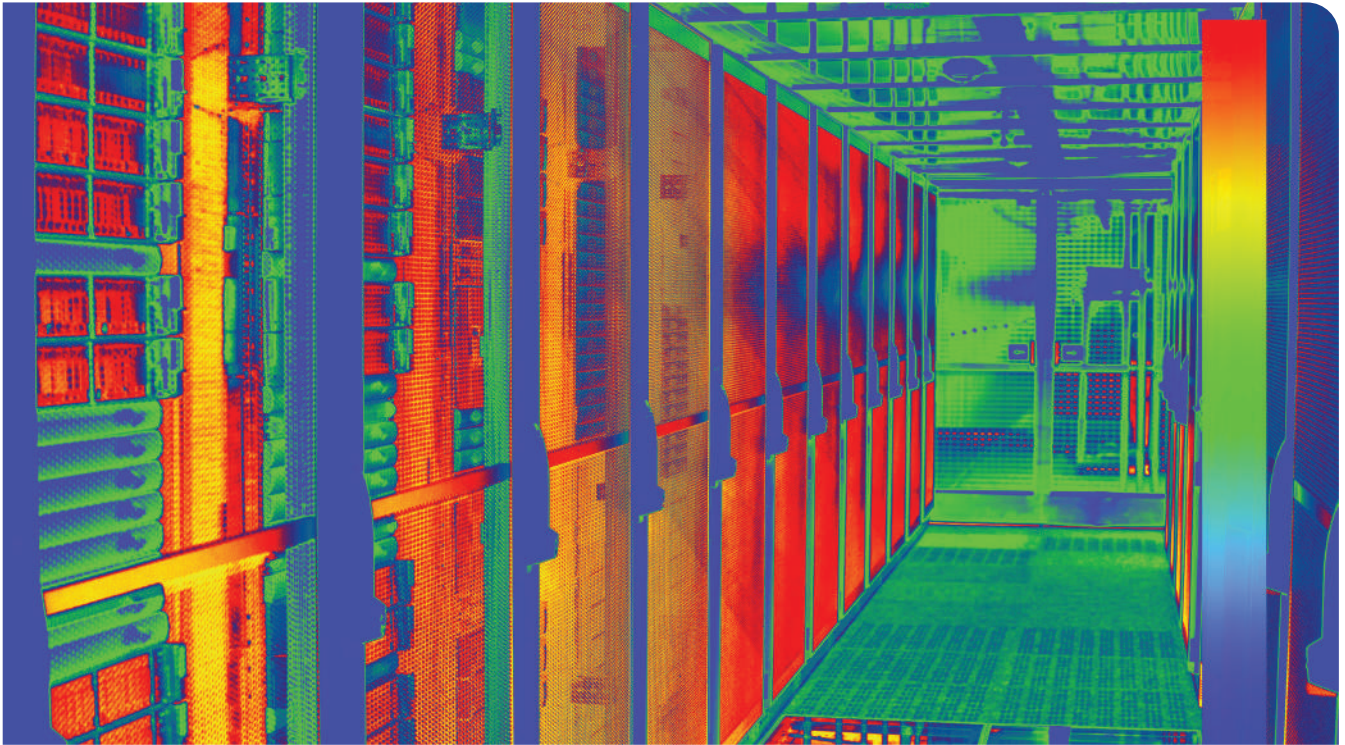
The accessibility of data and ease of its use is a great example of the Jevons paradox – "technological progress increases the efficiency with which a resource is used, but the rate of consumption of that resource rises because of increasing demand" - in other words, the easier

you make it to consume the product the greater the consumption will be!

Here is some statistics to ponder, a Google search takes as much energy as to light a low energy light bulb for 17 seconds, a single ChatGPT costs around £15/hour to run and consumes 50-100 times as much energy as the single Google search mentioned above. It is likely that neural network data models will consume more power.

There have been many opinions postulated on how best to curb the use of such huge amounts of energy, an 'end of pipe' solution to restrict data centre usage would be foolhardy at best,





and probably cause global uproar in the extreme. However, 'think before you click'.

The AI conundrum

There is a lot of talk within the industry of using AI to deal with cooling strategies, however, true AI, which has its own cognitive ability mimicking the intelligence and behavioural pattern of humans, is still some way away from being sentient. Deep Machine Learning is where the industry is currently, where computers learn from data, using techniques similar to an artificial network and builds a hierarchy of data representations. However, for this deep learning to take place there must be a wide pool of data to draw from and the manner in which this is collected needs to be standardised. If not, data can be manipulated to show something that is not accurate or transparent. Legislation needs to prohibit that.

AI is not the sentient saviour some would have us believe. It is a tool to be used with knowledge and thought. Just because we can appear to have a conversation with a large language model, does not mean it knows anything. Rather it can look for patterns, predict 'what if' analysis and a human can then work out how best to implement this.

Where are the solutions?

Consider this, companies such as Meta, Apple, Microsoft and Google were all started by people under the age of 30. They had ideas that were not mainstream and challenged the way of thinking. Sir Tim Berners-Lee was 34 when he invented the world wide web. Therefore, we need to look to the younger generation as the source of the new and smart ideas that will revolutionise the use of data centres. They are not incumbered by countless

years of 'this is how we have always done it'. Those who may have been around a while, might say 'that can't be done', however, the challenge coming back to them should be and has to be 'why not?'.

Arcadis

Arcadis has been investigating all of these new technologies and has come to some sensible opinions and conclusions. Our use of sustainability has been globally recognised as one of the top 1% globally, by our EcoVadis Platinum award.

Tools such as Cost Clarity, Data Frame and carbon calculators have all strengthened our position as one of the best consultants to employ. We are making use of Low Code solutions and investing in start-up incubators such as Tech Stars. Therefore, to ensure you are taking advantage of the current thinking, by a people first and data driven organisation, come and talk to us about your next project. With a global team of over 36,000 Arcadians we have the latest thinking, tools and processes around the built and natural assets to help you succeed. The Global Community of Practice which I have the privilege to lead consists of over 330 members around the world, with experience from across the data centre industry. Arcadis is one of the very few organisations that can give you a service from site selection, investment decisions through to design and construction, right up to the point of operation.

We constantly innovate new delivery ideas and work with organisations from lenders and investors, smaller DC operators through to the major hyperscalers to deliver projects both locally and globally.

www.arcadis.com



The Future of Data Centre Power: Ensuring the Right Backup Power Infrastructure



DATA CENTRES are at the forefront of our digital revolution, handling vast amounts of information and supporting critical infrastructure. The exponential growth in data consumption and the increasing frequency of power outages necessitate a closer look at the future of data centre power and the importance of implementing the right backup power infrastructure.

The Current Power Landscape:

Data centres are power-intensive environments, relying on a constant and uninterrupted power supply to sustain their operations. However, the escalating energy requirements of these facilities and the persistent threat of power outages pose significant challenges to their reliability.

The Future of Data Centre Power

Sustainable Energy Sources: In response to growing environmental concerns, data centres are embracing sustainable energy solutions. Renewable energy sources like solar, wind, and hydroelectric power are gaining popularity as viable alternatives. By integrating these sources into their power systems, data centres can reduce their carbon footprint and achieve long-term cost savings.

Energy Storage Solutions: Advanced energy storage technologies, such as large-scale batteries and flywheel systems, offer reliable backup power during grid outages. These solutions also help stabilise the electrical load, ensuring a seamless transition between primary and backup power sources.

Microgrids and Local Generation: Data centres can establish microgrids with their own power generation capabilities. By incorporating on-site power sources like natural gas generators or

fuel cells, they gain greater control over power supply and reduce dependence on the main grid. This approach enhances resilience and ensures uninterrupted operations.

Modular Power Infrastructure: Modular power infrastructure is gaining traction due to its flexibility and scalability. Data centres can deploy pre-engineered, containerised power modules that can be rapidly installed or expanded to meet evolving energy demands. This modular approach minimises downtime during power system enhancements and upgrades.

Ensuring the Right Backup Power Infrastructure

Assess Load Capacity: Conduct a thorough analysis of the data centre's power requirements and evaluate the criticality of different equipment. Determine the minimum load capacity necessary to sustain essential operations during power disruptions.

Redundancy and N+1 Design: Implement redundancy in power systems by using redundant Uninterruptible Power Supply (UPS) units, generators, and transformers. The N+1 design principle ensures there is at least one extra backup component available to take over in case of failure.

Regular Maintenance and Testing: Establish a routine maintenance schedule for backup power infrastructure to identify potential issues and rectify them promptly. Regular testing of generators, UPS systems, and transfer switches will help verify their functionality and reliability.

Scalability and Futureproofing: Anticipate future growth and scalability requirements when designing backup power infrastructure. Ensure the system can accommodate increased loads and technology advancements without major disruptions or overloading.

Monitoring and Remote Management: Implement a robust monitoring system that provides real-time data on power consumption, backup power availability, and any potential issues. Remote management capabilities enable immediate response and proactive maintenance.

Conclusion

As data centres continue to play a crucial role in our data-driven world, it is imperative to ensure a reliable and uninterrupted power supply. The future of data centre power lies in embracing sustainable energy sources, adopting advanced energy storage



solutions, establishing microgrids, and leveraging modular power infrastructure.

To ensure the right backup power infrastructure, data centre operators must assess load capacity, implement redundancy, conduct regular maintenance and testing, plan for scalability, and employ robust monitoring and remote management systems. By proactively addressing these aspects, data centres can safeguard their operations and contribute to a more resilient digital ecosystem. In navigating the complex landscape of data centre power and backup infrastructure, partnering with experts like Critical Power Supplies can provide

invaluable support. With their extensive knowledge and experience, Critical Power Supplies can assist in assessing your data centre's power requirements, designing and implementing the right backup power solutions, and ensuring ongoing maintenance and testing. Their expertise in sustainable energy sources, energy storage solutions, microgrids, and modular power infrastructure enables them to tailor solutions to meet your specific needs. By leveraging the expertise of Critical Power Supplies, you can have peace of mind knowing that your data centre is equipped with the right backup power infrastructure for a resilient and uninterrupted operation.

Data centres: a net zero barrier or opportunity?

By Lucy Plant, Manager Strategic Partnerships, Energy Solutions at Enel X

DATA CENTRES attract considerable criticism due to the amounts of energy they consume. Just recently, the Central Statistics Office revealed data centres in Ireland used more than a fifth of Irish electricity in 2022, a 400% rise since 2015. However, data centres also underpin 21st century life and the operations of most organisations.

Data centres may be perceived as a hindrance to net zero goals but the strategies they employ to maintain their own operations are proving vital to enabling a flexible, secure electricity system, facilitating the net zero agenda rather than restricting it.

Flexibility programmes

As we transition to net zero, a flexible electricity grid is crucial to respond to supply fluctuations which can be caused by variable renewable energy generation. While data centres are big energy users, their demand is consistent and predictable which makes them ideal participants in grid flexibility programmes like demand side response (DSR).

DSR programmes incentivise businesses to free up grid capacity during periods of peak demand. When electricity demand exceeds supply, data centres can switch from mains electricity to back-up systems such as onsite generators or battery storage, temporarily relieving pressure on the grid so it can meet demand without powering up fossil fuel plants.

Participating in DSR may seem difficult for data centres, especially where operators have service level agreements targeting 'uptime' and requirements to report whenever the site switches to back-up systems. Some data centres are also contractually bound to request permission weeks before using back-up systems for non-emergency use.

A solution lies in data centre cooling systems which account for about 40% of a site's electrical load. Typically, data centres use a closed water loop with connected chillers to deliver chilled water to computer room air handler (CRAH) units in each data hall. Attaching thermal storage allows the chillers to be turned off for periods without affecting data centre operations, enabling data centres to participate in DSR schemes.

With greater control over operations, hyperscale data centres have led the way engaging with DSR but now we're seeing colocation data centres adopt grid flexibility measures too, showing a growing confidence in the technology that maintains a flawless data service alongside DSR participation.

Decarbonisation and decentralisation

Data centres are also investing in renewable energy through power agreements (PPAs). Some operators plan to locate new sites near local renewable energy projects to directly power their operations. For instance, Echelon Data Centre and SSE Renewables are looking to install a private



wire to connect a proposed offshore wind farm to a proposed data centre in Arklow, Co Wicklow. This partnership will support the wind farm development, create 250 jobs and cut Ireland's annual carbon emissions by around 1%.

Decarbonisation strategies for data centres will also benefit any organisation using data and pursuing ESG targets. Businesses are increasingly interested in the role of data centres in supply chain emissions with 51% of business leaders recognising the benefits of eco-friendly data in their decarbonisation strategies.

This is reflected in regulatory recommendations too. BREAAAM now caps companies at a 60% score if they neglect demand flexibility and EU Data Centre Energy Efficiency requirements are expected to recommend grid interactive uninterruptible power supplies services from September 2023.

By disregarding data centre energy strategies, organisations risk regulatory non-compliance, disappointing stakeholders and harming business performance and reputation.

Data centres may be power-hungry, but they offer significant opportunities to further the net zero agenda. The world needs data centre services so it's time we took a more balanced view and consider how data centres can support the grid and renewable energy transition, rather than just the energy they consume.

Data centres will continue to innovate to decarbonise and find new ways to work collaboratively with the grid. Working with a skilled energy management partner ensures that appropriate plans and technology are in place to help data centres optimise their energy flexibility and become even better grid citizens.

Looking beyond the traditional CV for better decision making



WHILST THE CV has long been a key summary document that highlights a candidate's suite of qualifications, experience, and capabilities, it is not the only, or indeed, the most illustrative indicator of a candidate's capacity to be a good fit for the role on offer.

The long standing global 'talent challenges' experienced by the digital infrastructure sector offers an opportunity for recruiters to look beyond the traditional CV for several reasons. The first, and the most important is that associated with transferable capabilities.

A CV is limited in its capacity to offer insights into the ways in which capabilities in other sectors, industries or organisations might effectively be applied elsewhere. The recruiter/hiring manager must be capable of making an 'inferential leap' from what the person has done, to what they can do. This, of course requires a deeper intellectual engagement to establish a more expansive view of what's on the page.

Fundamentally, when looking to engage with candidates from non-traditional sources such as disparate industries or personal backgrounds, the onus shifts from the candidate to make a case as to why they should be considered to the recruiter/hiring manager who may look to more creative ways of establishing potential personal and professional fit.

For example, someone who has no digital infrastructure experience but has capabilities in critical infrastructure or resilience roles elsewhere may have well developed aptitude that is hard

to train and with technical training may become a well-rounded employee. Discounting based on the lack of easily developed skills may deprive the hiring organisation of more difficult or expensive capabilities that are transferable from one role to another – capabilities that may well be picked up by competitors.

Important nuances such as context can not be determined from a written CV and of course, while they can be hinted at, important skills such as those associated with communication and capacity to interact appropriately with others, can not be effectively conveyed on paper.

In a tight talent market, hiring managers should consider more robust and reliable methods of assessing candidates than the CV. This is particularly so when considering candidates from other sectors who may have transferable technical abilities and qualifications.

While some sectors continue to experience ongoing labour and talent challenges, others are letting people go in response to shifting economic



circumstances. One sector's loss is another's potential gain, but it is incumbent on the flexibility and capacity to see where capabilities employed in other contexts can be employed successfully in the digital infrastructure organisation.

One of the best ways of achieving this is to be adaptable and realistic with what is actually required for successful execution of duties and achievement of outcomes associated with the role. While much examination is associated with what the candidate might bring to the role, sometimes less than adequate critique is made of the essential requirements as stated in the role description.

Looking past the one-dimensional story presented in the CV to what impact a person can make is another way of expanding the pool of potentially successful candidates. Portman Partners offers the GC Index as an advancement on, or augmentation

to traditional psychometrics such as MBTI or DISC. The 'organimetric' offers deep insight into the individual (or collective) impact potential of a candidate and can illustrate where they are likely to contribute to organisational or departmental objectives. While the CV can give a good overview of technical capacities illustrated via qualifications, the opportunity to measure potential impact and future engagement with overarching objectives extends confidence when considering people from diverse professional and personal backgrounds. A robust but flexible recruitment process that looks beyond the unidimensional CV is key to enhancing selection decision-making through expanding the boundaries of the talent pool.

Portman Partners is a niche DI Search Firm with an exceptional collection of relationships specialising in senior level appointments across the vast range of specialisms within this sector.

How to meet the new sustainability challenge for data centers



How to meet the new sustainability challenge for data centers

In the year ahead, a key challenge for the data center sector will be how owner/operators can measure and improve operational sustainability and efficiency.

On one side, energy price volatility will continue to remind us that it is better for both planet and profits if energy is used efficiently.

Then there is the impact of the EU's Corporate Sustainability Reporting Directive (CSRD). This will require any data center owner/operator in Europe with a turnover of over €150m to find a way of measuring and reporting on their sustainability performance. CSRD is estimated to impact around 55,000 businesses.

In addition, as of May 15 2024, companies with data centers over 500kW will have to report on the previous year's data (starting May 15th 2023) under the European Energy Efficiency Directive, which is likely to be similar (if not the same) metrics, based on the ISO 30134 / EN 50600.

Based on the discussions I led at the recent DCA Data Centre Transformation 2023 conference in Birmingham, there is still significant work for data center operators to do to meet these challenges.

The metrics that will matter

The first task for the sector is to understand the metrics that will matter going forward.

Until now, Power Usage Effectiveness (PUE) has

been seen as the golden ratio for efficiency. While the quest for lower PUE figures has undoubtedly contributed to greater data center efficiency in the last ten years, future efficiency gains and reporting requirements under CSRD will require more nuanced measurements covering nine areas of resource use and IT equipment.

Of these, two metrics - IT Equipment Energy Efficiency (ITEESv) and IT Equipment Utilization (ITEUsv) – both are key to future efficiency and sustainability gains.

In the future, it will be imperative that all operators can measure and improve these key metrics from the IT stack.



A shared responsibility with one clear owner

A second priority will be the allocation of one clear owner for data center efficiency.

Today, that responsibility typically falls between two teams with conflicting agendas: the facilities or estates team responsible for managing the energy budget; and the IT team tasked with maintaining a high-performing, high-availability IT estate.

Going forward, both teams need to work together with clear targets around efficiency and reduced energy costs. As neither function is likely to want to report to the other, this will likely require a cross-functional team working into sustainability lead to deliver agreed goals.

Leveraging emerging tools

A third task for data center operators is to find and assess the emerging tools which can help identify opportunities for efficient, sustainable use of assets at both server and infrastructure level.

QIO Technologies is just one of a new generation of sustainability tech businesses using AI to manage workloads, use predictive analytics to

identify efficiencies in IT asset usage and learn how to control systems with levels of sensitivity and responsiveness beyond human ability.

Allocating responsibility for evaluating this burgeoning ecosystem to find the right technology solutions and partners who can help make rapid gains in operational efficiency and sustainability reporting will be critical for every data center operator.

While the sustainability agenda is challenging for any business tackling digital emissions, it is manageable. What is required is for data center owner/operators to grasp the need to build new internal capability and knowledge in the area, influence facilities and IT teams to work together for mutually compatible goals, and use proven technology to tackle the jobs which are too big and complex for humans to manage alone.

Venessa Moffat is General Manager Data Centers at QIO Technologies - an AI sustainability tech business supporting asset-heavy and energy-intensive businesses to deliver rapid reductions in GHG emissions and energy costs.
www.qio.io

RED ICT – Data centres of the future

By Phil Beale, RED Engineering Design



RED Engineering Design is a market-leading engineering design consultancy specialising in built environment, data centres, sustainability and ICT.

RED has over 900 employees working across 11 international offices on projects in over 75 countries worldwide.

RED ICT Design

RED's award-winning expertise helps clients make informed decisions on planning, investment, location selection, infrastructure design, technology adoption, energy, sustainability, and decarbonisation.

RED ICT partners with clients to challenge convention, innovate solutions and helps deliver a more sustainable, connected world.

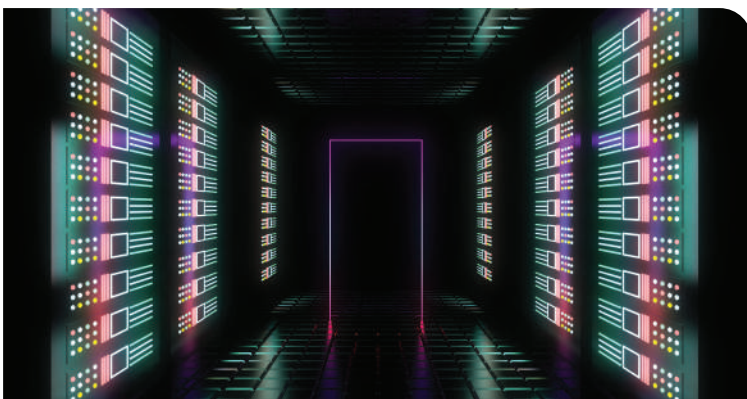
Our design team leaders and project delivery staff bring many years' experience in international consulting engineering and the provision of outstanding professional ICT services.

Specialists in data centre solutions for global clients, experts from team RED were invited to host Thought Leadership workshops at the DCA Data Centre Transformation 2023 conference at Birmingham's IET, with a focus on data centres of the future.

Workshop: Data Centres of the Future

Moderated by RED ICT Director, Phil Beale, and Head of Energy Transition, Phil Reid, over 150 data centre industry professionals attended our engaging and insightful workshops, providing a unique opportunity for multidisciplinary experts to discuss critical topics, collaboratively and transparently.

With various roles represented at the workshops, including developers, operators and end-users, delegates were asked to leave their day-jobs outside the room and to adopt an open mind, applying their personal experience to the workshop debate.





For the purpose of the workshops, participants were encouraged to consider themselves as 'futurists', opening the discussion up to challenge conventional thinking and consider new innovations.

To stimulate the discussions, RED cited some common data centre development considerations, as illustrated below;

under three key categories, Evolution, Drivers and Innovation:

Thought Leadership

Find out more in our Thought Leadership white paper for professional stakeholders:

'The 2030 Data Centre – Are you Future-proofed?'

Workshop Findings

Participants were asked to focus key two themes; Energy and Technology, and organise their findings




DCS ONLINE ROUNDTABLE

BASED around a hot industry topic for your company, this 60-minute recorded, moderated zoom roundtable would be a platform for debate and discussion.

MODERATED by an editor, this online event would include 3 speakers, with questions prepared and shared in advance.

THIS ONLINE EVENT would be publicised for 4 weeks pre and 4 weeks post through all our mediums and become a valuable educational asset for your company

Contact: jackie.cannon@angelbc.com

A photograph of two men standing in a server room. The man on the left is wearing a light blue button-down shirt and dark jeans. The man on the right is wearing a grey sweater over a light blue collared shirt and dark trousers, holding a large white folder. They are standing in front of rows of black server racks. One rack has a red APC logo. The room is dimly lit with overhead lights.

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