

Data Centre Review Magazine

Issue: June 2019

www.datacentrereview.com

# Empowering the dream-makers

How Animal Logic grew their moviemaking power with an Oscar-worthy Prefabricated Data Centre.





**AI &** Automation Optimise your machine learning investments.



### Green IT/ Sustainability

The importance of green power (and how to harness it).



### Industry Insight

With 30 years' industry experience David Bond of Centiel imparts some data centre wisdom.



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### Editors **Comment**

It's an exciting time here at DCR HQ, as by the time this issue goes to press we will have had our annual Electrical Review Excellence Awards, which are taking place at the ever so swanky ballroom of the Four Seasons Hotel in London on May 30th and quite frankly I can't wait.

Last year it was just Electrical Review in on the action, but this year DCR is along for the ride so I am more than excited to don my posh frock, get a drink in my hand and hopefully see lots of new as well as familiar faces to celebrate our winners.

Over the last week or so myself and the other wonderful members of our judging panel, Professor Ian Bitterlin, Steve Martin of the ECA, Steve Hone of the Data Centre Alliance, Peter Hunt of Lumicom, and Jon Belfield of the BCIA have been combing through all your entries and deciding on our favourites. Even I have no idea who our winners are at this stage, and I won't until the night, so I await the announcements with bated breath.

We've had some brilliant entries this year and we also have ourselves some great sponsors, the likes of Wago, Starline, Vertiv, Heatload, Smart Grid Forums, Recolight and many more. And thank heavens for Schneider, who are looking after us as our drinks sponsor, as well as Riello, our partners for the event.

With regards to our winners, if you didn't attend our fabulous awards (why not, what else could you possibly have been doing?) keep your eyes peeled on the DCR Twitter page @DCRmagazine (and website) where I shall be posting updates and maybe (probably) some drunken photos, who knows.

Anyway, that's about it from me, in this issue we have a new special feature for you on AI, Automation and Machine Learning, which is just as well really as my inbox overfloweth lately with a plethora of AI innovations. From curing cats to fighting crime there is quite literally nothing that can't be touched by AI, whether that be good or bad is a matter of opinion.

As always, if you'd like to get involved in any aspect of DCR, whether it be print or online I'm always looking for new faces and contributors, so get in touch via clairef@datacentrereview.com and let's chat (preferably about data centre stuff) and if you came to the awards, hopefully I saw you there and my future self thanks you for being part of it.

Claire Fletcher, Editor, Data Centre Review

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### DATA CENTRES CAN EARN REVENUE **AS NEW ENERGY PROVIDERS**

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## News

Highlights from all corners of the tech industry

### Scientists use light pulses to create energy free superfast computing

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uperfast data processing using light pulses instead of electricity has been developed by a group of scientists. The

innovation uses magnets to record computer data which consume virtually zero energy, solving the dilemma of how to create faster data processing speeds without the accompanying high energy costs.

Today's data centre servers consume between 2-5% of global electricity consump-

tion, producing heat which in turn requires more power to cool the servers. The problem is so acute that Microsoft has even submerged hundreds of its data centre services in the ocean in an effort to keep them cool and cut costs.

Most data is encoded as binary information (0 or 1 respectively) through the orientation of tiny magnets, called spins, in magnetic hard-drives. The magnetic read/write head is used to set or retrieve information using electrical currents which dissipate huge amounts of energy.

Now an international team has solved the problem by replacing electricity with extremely short pulses of light – the duration of one trillionth of a second – concentrated by special antennas on top of a magnet. This new method is superfast but so energy efficient that the temperature of the magnet does not increase at all.

The team includes Dr Rostislav Mikhaylovskiy, formerly at Radboud University and now Lancaster University, Stefan Schlauderer, Dr Christoph Lange and Professor Rupert Huber from Regensburg University, Professor Alexey Kimel from Radboud University and Professor Anatoly Zvezdin from the Russian Academy of Sciences.

The team demonstrated this new method by pulsing a magnet with ultrashort light bursts (the duration of a millionth of a second) at frequencies in the far infrared, the so-called terahertz spectral range.

However, even the strongest existing sources of the terahertz light did not provide strong enough pulses to switch the orientation of a magnet to date. The breakthrough was achieved by utilising the efficient interaction mechanism of coupling between spins and terahertz electric field, which was discovered by the same team.

The scientists then developed and fabricated a very small antenna on top of the magnet to concentrate and thereby enhance the electric field of light. This strongest local electric field was sufficient to navigate the magnetisation of the magnet to its new orientation in just one trillionth of a second. The temperature of the magnet did not increase at all as this process requires energy of only one quantum of the terahertz light – a photon – per spin.

Dr Mikhaylovskiy said, "The record-low energy loss makes this approach scalable. Future storage devices would also exploit the excellent spatial definition of antenna structures enabling practical magnetic memories with simultaneously maximal energy efficiency and speed."

Mikhaylovskiy plans to carry out further research using the new ultrafast laser at Lancaster University, together with accelerators at the Cockroft Institute which are able to generate intense pulses of light to allow switching magnets and to determine the practical and fundamental speed and energy limits of magnetic recording.

### 93% of organisations committed to AI but skills shortage proves challenging

Research has found that inadequate access to skilled talent, technology, and data is holding back AI initiatives. Most organisations are fully invested in AI, but more than half don't have the required in-house skilled talent to execute their strategy, according to new research from SnapLogic.

The study found that 93% of US and UK organisations consider AI to be a business priority and have projects planned or already in production. However, more than half of them (51%) acknowledge that they don't have the right mix of skilled AI talent in-house to bring their strategies to life.

In the UK, this in-house skill shortage is considerably more acute, with 73% lacking the needed talent compared to 41% in the US. In both the US and UK, manufacturing and IT are challenged the most from this in-house talent shortage.

Indeed, a lack of skilled talent was cited as the number one barrier to progressing their AI initiatives, followed by, in order, lack of budget, lack of access to the right technology and tools, and lack of access to useful data.

### Digital skills shortages blight UK jobs market

Research from The Edge Foundation has suggested that around half of all employers (51%) have been forced to leave a role open because there are no suitable candidates available, and that tech job vacancies are costing the UK economy £63 billion a year.

LinkedIn data indicates that cloud and distributed computing is the most valued skill among employers, with user interface design, SEO/SEM marketing and mobile development also featuring in the top 10.

## **Batteries Not Included**

### **UPS Battery Replacement**

We can't include the batteries, but we can include the labour.



\*Battery replacement labour included with qualifying Riello UPS Ltd maintenance contracts.

According to a new report from eSentire, cyber-attacks were (and still are) on the rise. Although it would appear that UK employees are actually better at preventing phishing and malware incidents than the rest of the world.

The critical takeaway from eSentire's report is that the global growth in botnet activity drove a 140% year-over-year increase in the number of cybersecurity incidents experienced by UK businesses. This increase in attack traffic also caused nearly 40% of small and medium enterprises in the UK to experience at least one cybersecurity incident.

Yet despite this rise, it would appear that UK employees are indeed better at preventing phishing and malware attacks than their global counterparts. In the last 12 months, only 13% of UK businesses experienced some form of successful malware execution, compared to the global average of 17%.

Over the same time period, UK businesses experienced 20% fewer phishing incidents. Because most malware and phishing incidents are initiated accidentally by employees, these lower rates indicate that the UK workforce may be better at adhering to email and web browsing best practices than employees in other countries.

### Google's new pilot aims to measure environmental impact of fashion industry

he UN's Fashion Industry Charter has committed to reducing greenhouse gas emissions in the fashion industry by 30% by 2030.

In response, Google Cloud has announced a new pilot, in close collaboration with Stella McCartney, aimed to empower fashion brands with greater insight on the impact of their supply chains.

Now more than ever, the fashion industry is heeding the call to sustainability. Its environmental impact is significant and growing — among other statistics, the fashion industry accounts for 20% of wastewater and 10% of carbon emissions globally. Much of this impact occurs at the raw materials stage in the production process, where brands have little to no visibility.

This is an industry wide problem, where supply chains are highly fragmented and with little transparency. Many organisations and brands have been trailblazers in an effort to collect and surface data that can lead to better sourcing decisions, but gaps in the data continue to persist due to its complexity and global nature.

After working with Current Global, an innovation consultancy that empowers fashion brands to reach their sustainability goals through the use of relevant technologies, it was determined that Google could help be part of the solution through the use of cloud-based tools for data collection and analysis.

At the Copenhagen Fashion Summit, one of the fashion industry's key sustainability events, an experiment to do exactly that was announced. To bring said experiment to life, Google will be collaborating closely with Stella McCartney.

This brand has been a pioneer in leading the fashion industry towards sustainability, helping to launch the UN Fashion Industry Charter for climate change, and recently introducing Stella McCartney Cares Green, one of the arms of the Stella McCartney Foundation, to further promote sustainability and environmental protection.

To start, a tool will be built that uses data analytics and machine learning on Google Cloud to give brands a more comprehensive view into their supply chain, particularly at the level of raw material production, referred to in the industry as Tier 4 of the supply chain.

Initially cotton and viscose will be examined, each chosen due to the scale of their production, data availability and impact considerations. It is hoped that this experiment will give fashion brands greater visibility of impact within their supply chain and actionable insights to make better raw material sourcing decisions with sustainability in mind.



### AWS Get IT: One for the girls

AWS Get IT is a new initiative from Amazon Web Services, designed to introduce all Year 8 students (12- to 13-year-olds) in the UK to cloud computing and digital skills and inspire more girls to consider a career in technology.

The programme, developed together with non-profit organisation Future Foundations, will educate students on cloud computing technology and then invite them to create an application to solve a real-world issue faced by their school or community.

AWS will shortlist 10 teams to present to an expert panel of judges at the AWS Summit London 2020, where a winning team will be selected. The most innovative application idea will be developed and maintained for the school by AWS.

As part of the AWS Get IT programme, students will attend digital skills boot camps where they will learn about the different stages of developing software, including how to identify a target audience for their application, problem solving, brainstorming and research techniques, prototyping, and test and development.

Students will spend time at AWS' offices learning about Amazon's working backwards approach to innovation and get guidance from AWS and industry experts about application development. The students will also be introduced to female leaders within AWS and other organisations to show them the different types of career paths available in technology and learn about the positive impact that women are having on the industry.



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Who's doing what and where they're doing it – Global news from the data centre world.

### **Microsoft** Washington

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At its headquarters in Redmond, Washington, Microsoft has begun work to construct 17 new buildings totalling 2.5 million square feet. The company will remove fossil fuels from these new buildings and run this new addition, as well as the rest of its campus, on 100% carbon-free electricity.

The amount of carbon associated with the construction materials of the new buildings will also be reduced by at least 15%, with a goal of reaching 30% through a new online tool. Combined with smart building technology, Microsoft will be the first large corporate campus to reach zero-carbon and zero-waste goals. Virtus

London

Virtus Data Centres' LONDON5 data centre has achieved a Tier III design certification from Uptime Institute. Following in the footsteps of Virtus' LONDON1, LONDON2 and LONDON4 facilities, LONDON5 has also attained UKAS accredited ISO 27001, ISO 9001, ISO 14001, and ISO 50001 certifications.

The Uptime Institute Tier classification system is the globally recognised standard for data centre performance, with over 1,200 certifications for data centre design, construction, and operational sustainability issued in over 85 countries.

Uptime Institute's Tier certification is the industry standard for data centre reliability. A Tier III data centre is designed to run without interruption. Tier III also ensures that every component needed to support the digital environment can be shut down and maintained without impact on live operation. This accreditation signals to investors, customers and the marketplace that a facility meets the highest standards for infrastructure design, functionality and capacity.



### Maincubes Frankfurt

For its planned data centre relocation, Daimler has chosen maincubes as its new colocation partner. The German automobile manufacturer and mobility service provider wants to further advance the main fields of the mobile future, i.e. networking, autonomous driving, flexible use and electric drives.

In maincubes' colocation data centre in Frankfurt, Daimler can flexibly operate its IT services and react to future requirements for hybrid cloud solutions. Among other reasons, this is why Daimler is now relocating its central data centre from Stuttgart to Frankfurt – a location for internet and cloud with high bandwidths and low latency on various services.

### Equinix

### Amsterdam

It would probably be quicker to say where Equinix isn't, as the company gears up to open 12 new International Business Exchange (IBX) data centres and expand 23 existing IBX data centres in 2019. The expansion is part of an expected \$1.730 to \$1.920 billion of non-recurring capital expenditure expansion programme for the year.

This substantial investment includes new and expanded sites across Europe, not only in Amsterdam, but with growth markets also including London, Frankfurt, Hamburg, Helsinki, Madrid, Paris, Sofia, Stockholm, Warsaw and Zurich.

### CYBERSECURITY PREPAREDNESS: A WORLD VIEW

The colours on the map depict the level of commitment countries across the world have to cybersecurity preparedness. Dark green indicates the highest commitment and red the least.

Australia, Canada, Egypt, Estonia and Finland are leading the way, mobilising resources to build and implement consistent information security strategies country-wide.

Countries such as China, Germany, Iceland, Poland or Peru fall mid-tier, as their cybersecurity programmes are in the process of maturing.

At the same time, El Salvador, Lebanon, Sudan, the Vatican, and a long list of other countries are just initiating or establishing their information security programmes.

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### Huawei

Shanghai

Huawei, alongside China Real Estate Association and China Mobile (Shanghai), have jointly launched the world's first 5G+five-star shopping mall - the Shanghai Lujiazui L+ Mall.

The L+ Mall is a huge full-service shopping complex, spanning 12 floors (including one underground floor) and over 140,000 square metres in gross floor area. Services such as shopping assistance, delivery, and destination guidance offered by 5G smart robots improve the service efficiency of the shopping mall.

In addition, other services are available in 5G-covered shopping areas, such as 5G and AI face recognition, 5G and 8K HD video, indoor precise navigation, and people flow analysis. In this way, the unique 5G+five-star shopping mall is set to provide customers with an outstanding and diversified shopping experience, and lays a solid foundation for digital transformation of registered stores.



### Bringing characters to life for the silver screen

With over 25 years experience, independent Australian company Animal Logic has been at the forefront of creating digital content, award winning visual effects and animation for the film and television industries.

The studio recently delivered work on Guardians of the Galaxy Vol. 2 (2017), Alien: Covenant (2017), The LEGO® Batman Movie (2017), The Great Wall (2016), and The Master: A LEGO® Ninjago Short (2016). Animal Logic is currently in production on The LEGO® Ninjago Movie (2017), Peter Rabbit (2018), and The LEGO® Movie Sequel (2019). Other film credits include: The LEGO® Movie, Avengers: Age of Ultron, The Great Gatsby, Legend of the Guardians: The Owls of Ga'Hoole, 300, and Happy Feet.

Animal Logic Entertainment (ALE), is the development and production arm tasked with establishing a strong slate of innovative, commercially minded, story driven projects stamped with the visual and technical innovation that has become the hallmark of the studios' work.

Most recently, Animal Logic Entertainment announced a joint venture with Imagine Entertainment to develop, produce, and finance 6 feature length animation and hybrid animation projects over the next 5 years.

Animal Logic is one of the world's most highly regarded digital production studios with locations in Sydney, Los Angeles and Vancouver — leading to a larger need under pressing industry demand — for the perfect data center.

### Data needs and deployment speeds

Alex Timbs, Head of IT at Animal Logic, explains the Animation studio's growth challenge: "Because our business is cyclical in nature, the demands of the productions we're working on dictate how many people we have working for us, and how much infrastructure we need. So, speed of deployment for our data center environments is absolutely critical to our success."

Alex provides perspective on the need for high-density data capacity: "Around 90% of the data center houses high-density compute, which is used for the process of rendering images ... the other 10% is high-capacity storage used for production, which houses the images that are generated by that render process."

Animal Logic prides itself on dreaming big for the big screen and as a result their data center solution needed to be equally as ambitious. Alex says he chose a Schneider Electric prefabricated data center solution because it allows for customization, has a reputation for flexible engineering, and promises fast deployment.

### Goal

Align data center infrastructure strategy to meet business needs.

### Approach

Deployment of a modular scalable data center architecture based on Schneider Electric's customizable prefabricated data center solution.

### Story

Increasing demands of high performance computing resources. Business impact of latency bandwidth costs and security and increased data sovereignty demands forcing Animal Logic to come up with an alternative solution.

### Results

- Animal Logic experienced a massive boost in animation productivity; the direct result of deploying a render farm with an average operations speed of 1.25 petaflops per second for their most common workloads, all within a 30 kW per rack power density.
- The on-premise system is more reliable than their prior one, removing creative "bottlenecks," reducing latency, and reducing their utility bill.
- With our services supporting the present and future of Animal Logic's data center, they're operating in peak condition.

### The new state of Animal Logic's data capacity

Understanding Animal Logic's unique needs for capacity and delivery, Schneider deployed a custom prefab DC in just under four and a half months. The new infrastructure delivered a major boost in data processing, which in turn enabled greater performance and operational agility.

For example, the newly implemented 30 kW per rack power density empowers Animal Logic's facility to process 1.25 petaflops per second on average — exactly the depth of capability the graphics house required for advanced animation production and design.

Alex said, "We selected a high-density Schneider prefab for the purposes of meeting the new business requirements. We needed an extremely high capacity, highly dense solution. We selected Schneider Electric based on their engineering capabilities and ability to meet the businesses needs quickly."

Furthermore, a data center infrastructure management (DCIM) software was deployed to provide complete visibility across the facility, improving planning and operational performance. StruxureOn™, a cloud-based monitoring service offers Animal Logic maximum protection of critical equipment. It features 24/7 remote monitoring, remote troubleshooting,





and data-driven insights that provide visibility and live metrics — right to their smartphones.

### A partnership secured

Within four and a half months, Animal Logic's prefabricated data center arrived. They soon began experiencing the returns from investing in a Schneider Electric<sup>™</sup> prefabricated data center as their compute capability quickly grew and business-risky latency shrank. The prefab unit will continue to power the studio's movie-making magic. "Schneider was the only vendor to be able to deliver in that four and a half months, and has very rapidly become what we call a partner in creating these fantastic images that you see on screen," says Alex, "Schneider Electric is our partner in making movies."

Animal Logic Sydney is currently in production on LEGO Ninjago (2017) and Peter Rabbit (2018) while its Vancouver studio is currently working on The LEGO Movie Sequel (2019). Keep an eye out for their continuing contribution in Hollywood animation.

### For more on Animal Logic's work and persona, click these:

http://animallogic.com

http://www.animallogic.com/About

"We selected Schneider Electric based on their engineering capabilities and ability to meet the businesses needs quickly."

 Alex Timbs, Head of IT at Animal Logic



# **Steps to success**

So, you're all aboard the machine learning bandwagon, but what now? **Mathias Golombek**, CTO at Exasol outlines three steps to ensure your investment is optimised.

he age of machine learning (ML) is upon us. Last year we saw ML technology gain the recognition and practical applications that it deserved. Stepping out of a Hollywood-induced shadow that foretold an apocalypse and human enslavement, for me the practical reality of machine learning and AI now looks a lot more like better healthcare systems, more energy efficient facilities and our very own virtual PAs – Siri, Alexa, Google Now.

Businesses today want their data to do the heavy lifting for them, addressing the ever-present challenges of cutting costs, streamlining operations and increasing margins with new tricks. Applying ML to business processes helps to make granular analysis and improvements possible at scale – it's a force multiplier. What's more, your competitors are also paying attention: a Deloitte survey revealed that 57% of businesses increased spending on related technology in 2018.

Translating this impressive technology into useable, supportable applications can be daunting for many, and organisations should be cautious to avoid rushing into ill-defined projects. Tech giants Amazon, Facebook and Google have paved the way for new ML breakthroughs, making the latest and greatest frameworks more accessible than ever, but there is a lot more to successfully applying ML than plugging some data into TensorFlow. Disregarding the hype for a moment, I would like to share three steps that are crucial for organisations to successfully apply ML to their data.



#### Prove the concept

Some organisations jump on the ML bandwagon without a realistic strategy to create direct business value, or to rationalise the sizeable investment they need to make. In fact, according to the report, 'Driving the rise of AI and ML with Data' one in four business leaders found that their ML investments didn't deliver the expected time savings or estimated cost savings, largely due to unrealistic expectations and a lack of clear objectives.

Organisations looking to begin their ML journey should start with a clear proof of concept. An unrealistic project will be dubbed a failure and set back progress throughout an organisation, so it is imperative to have a clear proof of concept in mind before investing. The journey to success is only as achievable as the road map used to chart the process from start to finish.

Such a clear, concise road map also helps secure vital C-suite and senior executive support. Moving ahead without this support is a very tangible risk – a quarter of organisations studied in the 'Moving the Enterprise to Data Analytics' report reported a lack of board buy-in as the primary cause of failure in their data-driven initiatives.

Many executives still regard ML as a cost, and regard it as unlikely to drive revenue or improve current business operations. However, it is imperative to reverse these preconceived ideas in order to reap the huge potential business benefits of this advanced technology. To get buy-in, you need to show how ML projects will add value – the C-Suite need proof, in numbers they value, from a real project.

#### **Reinforce the database**

Data science combines ML with statistical models, algorithms and numerous processes to exploit data. But whether it is applied to supply chains and stock control or the automation of repetitive tasks, it relies entirely on a consistent feedstock of clean data. Each project requires a single source where data is collected, collated and manipulated to allow the algorithms to exploit its value.

Findings from the 'Driving the rise of AI and ML with Data' report revealed that nearly half of organisations recognise this reliance on data, and are already investing in data quality services to ensure their information is serviceable for ML.

The foundation of an organisation's ML infrastructure is a fast analytical data repository, which provides access to multiple datasets and enables algorithms to process large volumes of data quickly. Any organisation that is applying data analytics across their business will already have a data warehouse and an in-memory analytical database in place to ensure this data retrieval process and their analyses are performant – for the rest, there is a lot of catching up to do.

For ML applications, specifically, businesses should ensure they provide a common data infrastructure that all data professionals can work from. For the BI team, this will typically be accessed through SQL, but data scientists will need an infrastructure that can run scripts on the data using their preferred languages – typically Python. This standardisation of data infrastructure allows businesses to be more flexible in their use of ML across all parts of the organisation.

### Applying ML to business processes helps to make granular analysis and improvements possible at scale - it's a force multiplier

#### **Build skills and education**

Employing and retaining the right skills is important to all areas of a business, but it is vital to success in ML investments. A quarter of UK business leaders cite a lack of employee skills for the failure of their ML initiatives, so it is critical to have both widespread understanding of data and specific skills in data science and relevant programming within an organisation.

In fact, according to LinkedIn's 2019 annual skills report released earlier this year, the second most in-demand technical skills are artificial intelligence and machine learning. As AI and ML technologies become increasingly important for all industries, business leaders must recognise the importance of the employees who implement and maintain these systems.

There is no sure-fire way to guarantee the success of an ML or AI operation, but organisations can safeguard their investment by ensuring they properly understand the capabilities of machine learning, form a strategy with demonstrable value for the C-Suite and build the data infrastructure and skill base to make it possible. As machine learning is applied to richer data sets and real time data feeds, I hope to see organisations become more efficient and more innovative in providing better service to the people they serve.



# An automated era

**Wendy Zhao,** senior director, Alibaba Cloud Intelligence takes a look at AI and automation within the data centre from the perspective of public cloud, exploring where we're at with this technology now and where it's heading in the future.



he era of automation and AI is fast approaching, and promises to change many industries and aspects of daily life. The data centre, being a space where relatively few people work with different layers of technology at vast scale, is a

leading candidate for the use of such advanced technologies to monitor and intervene in operations in order to maximise utilisation, optimise efficiency and guarantee reliability.

Autonomous, self-operating connected facilities containing the physical infrastructure running public clouds – where fully automated monitoring systems instruct AI powered robots to carry out physical maintenance and repair without any human involvement – is an attractive vision, but is not, as yet, today's reality.

But already, AI technologies and automation are helping run hyperscale data centres and solving seemingly traditional DC operation problems. All data centres want improved reliability, increased availability and lower capex and opex.

As public cloud infrastructure scales beyond 100,000 servers in a single facility, with 100s of petabytes or even exabytes of storage and where networking IO speeds of 200Gbps are normal and 400Gbps is the target, then clearly any improvement in uptime and utilisation has major implications for both the operator and customers.

#### Managing failure at scale

For example, in terms of operational efficiency, the number of hardware failures increases linearly with the number of servers, while maintaining the same hardware quality (i.e. failure rate), which requires new modes of operation to resolve issues such as failure detection, root cause analysis, and repair, efficiently.

Cost at scale becomes a critical factor for the business. The physical shell, data halls, the electrical/cooling infrastructure, servers and networks all need to be co-designed and co-optimised during operation to achieve the best performance at the most effective cost.

And as important as cost is, reliability is not simply a cost factor. Because of the critical nature of customer workloads, the data and applications being hosted on public cloud IaaS or PaaS infrastructure, means any failure would result in real customer dissatisfaction, or hurt many businesses in significant ways. Failure prevention and recovery through prediction, anomaly detection, and self-healing becomes necessary in the cloud era.

#### Self-driving data centre

Can a self-driving data centre become a reality? One where monitoring of every integrated piece of technology from batteries to UPS's to cable infrastructure to servers and hard disks means failures are predicted and automatically fixed before they occur? Where whenever there is an outage of any component, the infrastructure itself is self-healing? The answer today is no. But the journey has started.

Automation and AI is the clear direction of travel for data centre operations. The constant development and introduction of technologies for monitoring and failure detection to deliver far shorter scheduled downtime, better MTBF (mean time between failure) and predictive maintenance and reduction in failure duration and MTTR (mean time to repair) is ongoing.

AI technologies such as deep learning, machine learning, statistical learning, and optimisation algorithms are used to model complex components and operational models inside the data centres. Together with sensing technologies and automation systems, the aim is to achieve more efficient and reliable data centre infrastructure with lower cost.

Adding additional sensors or data collection mechanisms to the equipment and critical components inside the data centre means the data is collected with required frequency to capture fast transient events, and transmitted to the AI-based monitoring system via high bandwidth networks without interruption.

It is happening at every level. By constantly collecting data on failure rates in normal operations, whether in technology which suffers degradation with relatively high failure rates – such as hard drives or SSDs, or low probability events such as battery defects – predictions allow the operator to inform and prepare customers in advance of potential risks. It requires experimenting with different techniques where the goal is to create a close-loop system where the patterns and insights gained from massive amounts of data are used to guide operations, with all decisions and actions being truly data-driven.

#### Just around the corner

So why aren't data centre operations fully automated and overseen by AI today? It is partly cultural, partly technological and partly timing. Public clouds are built on trust at a business and technology level. When moving applications to the public cloud (as opposed to building one's own data centre IT infrastructure), customers can benefit from better performance, reliability, and lower cost. But they must trust the infrastructure. And, in the cautious world of data centre operations, entrusting your critical infrastructure ture and workloads to an AI-run operation would today be considered an audacious move.

Yet it is likely that many of the AI and automation advances will happen within the public cloud providers who face the much more prominent scaling challenge, and who can leverage economies of scale to innovate and find new solutions to evolve the data centre industry more rapidly. They will provide value through gradual introduction of new concepts and technologies, especially after validating them first with their own applications. The open sharing of advances to build industry standards will be vital to success.



### Failure prevention and recovery through prediction, anomaly detection, and selfhealing becomes necessary in the cloud era

In terms of timing, AI models require large data sets in order to learn. Before anyone switches over an entire public cloud data centre to AI, trust in system accuracy has to be built to a point where operational safety can be guaranteed. Currently, human domain expertise provides the oversight and has intervention and final decision-making powers. As the AI becomes better and better, more automation comes into play – though human intervention will always exist as the last resort.

#### New expertise in traditional domains

Traditionally, data centre operation is very much process and procedure based, heavily relying on human inspection and response. The new skills required in the data centre are in data mining techniques and in advanced AI technologies such as machine learning and deep learning.

There is also a need for applied engineering expertise of data centres, networks and servers to help build more accurate models, achieve faster convergence and to make sense of the patterns and insights discovered from the data.

There is experimentation with simulation techniques or mathematical models to cover new scenarios which do not have enough historical data to work with. Applying AI and automation to the data centre world opens up lots of new opportunities for professionals and public cloud operators. This is just the beginning of this journey and an exciting time to explore the space and help reinvent the industry.

## **The impact of IT downtime:** Lessons from the banking sector

You can't put a price on trust – until it's broken. Karl Lycett, Rittal UK's product manager for IT Climate Control, discusses why maintaining customer trust is crucial (particularly in the baking sector) and explores how damaging downtime can really be.

018 brought us a cavalcade of sensationalist headlines from numerous media outlets, describing the 'Meltdowns' and 'Litany of

Failures' of IT systems in the banking sector. The periods of downtime that followed have caused thousands of customers to be locked out of their online banking and account details, derailing something which has become a necessity of everyday life...the instant access of data.

You may think that the loss of a couple of hours here and there in the grand scheme of things might be minimal, but this is a chink in the armour which users of the service notice and it can significantly knock their trust in the business.

Nicky Morgan MP, the head of the treasury committee wrote an open letter to banks after a recent service interruption in which she stated, "It simply isn't good enough to expose customers to IT failures, including delays in paying bills and an inability to access their own money. High street banks justify the closure of their branch networks on the basis that they are providing a seamless online and mobile phone banking service. These justifications carry little weight if their banking apps and websites cannot be relied upon."

For businesses and stakeholders in any industry, the currency of 'being reliable' and the concept of 'availability' is firmly in the zeitgeist. As we become an increasingly 24/7 economy its value will only increase.

Turn the spotlight onto your company and think of your customers' reaction if your IT network goes down for even a day. What sort of impact would that have for your workplace? No emails, production lines stopping, an increase in workloads, plus associated logistical issues as warehouses are increasingly reliant on software and digital resources.

It's not just a case of everything correcting itself and going back to normal the following day; major blackouts can have ramifications that cause workload backlogs for many weeks.

In more and more situations today, employees are working remotely, doing non-traditional hours and streaming meetings with teams based around the world. The constant striving for more output per employee and better service for customers via electronic means ensures that the weight of responsibility is squarely on the shoulders of your IT infrastructure.

To ensure your IT network can withstand the increasing demand, it's wise to undertake both a regular appraisal of your equipment to make sure it is up to the task and also very importantly a review of the environment in which it operates.

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Maintaining a protective environment for your IT equipment is crucial as it can reduce the probability of unexpected downtime. What's more, if the right systems are in place, it can detect potential issues before they arise, so corrective action can be undertaken and failures such as I've described can be avoided.

There are many important factors that contribute to a protective environment, such as appropriate redundancy, the correct housing of equipment, a stable power supply and adequate and effective climate control. These can all play a factor in delivering the best environment and delivering the longest life span for your IT equipment, plus, more importantly, keeping your infrastructure online so your customer can receive your goods and services.

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After all, the impact that neglecting your IT infrastructure can have on your customers can be boiled down into one famous quote -

"It takes 20 years to build a reputation and five minutes to ruin it. If you think about that, you'll do things differently". 🏮

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"It takes 20 years to build a reputation and five minutes to ruin it. If you think about that, you'll do things differently



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### **Michael Rostad,**

information technology director at Sims Recycling Solutions (SRS) Global, explores six ways to ensure data security when decommissioning your facility. lobally we are producing more data than ever with no signs of slowing down. As data storage continues to grow so do data threats. Data threats can come from an insider, an outsider, a personal item, a cyber-attack or potentially from a physical device, making them difficult to control.

In the past 12 months, 46% of all UK businesses identified at least one cyber breach and the International Data Corporation (IDC) predicts a quarter of the global population will be affected by a data breach by 2020. But why care so much about data threats? Those who have suffered a data breach or cyber-attack have experienced the following:

Severe costs: Data breaches have cost the global industry more than \$400 billion (£307 billion) annually. Costs may include loss of business,



### **Data breaches have cost** the global industry more than \$400 billion (£307 billion) annually

fines and penalties such as those that fall under the General Data Protection Regulation (GDPR). GDPR penalties can reach a maximum of  $\notin$ 20 million (about £17 million) or four percent of global annual turnover, whichever is greater.

Loss of client trust: Especially if sensitive data is involved, data breaches may leave current and prospective clients feeling less confident in the security of the information being stored.

#### Where to start?

Keeping track of IT assets with some sort of IT asset inventory list is a great place to start. Ponemon Institute surveyed a group of risk professionals regarding their awareness of the physical devices in their environment that were connected to the internet. Results showed only 9% of survey respondents to be fully aware.

An IT asset inventory list can help data centre managers understand the use, disuse, connectivity and specifics of all assets. It is also recommended to consider various data scenarios to establish the appropriate level of protection. In general, it is good to understand:

- If the equipment contains data
- If that data is encrypted or protected by passwords.

When it comes time to remove these assets from their live environment, this list will help support a system to track which items are in need of data destruction. At that point, it is smart to follow these six practices to ensure a secure data centre decommissioning programme.

#### 1. Don't let items sit in storage

When removed from the live environment, physical security of retired data centre assets is often overlooked. Once replaced, items may end up being stored for a certain period of time. Stored data bearing assets can present risks and have the potential of being lost or stolen. This is where that inventory report can come into play and is important for tracking assets, even those sitting in storage.

Note: Stored items that are not assessed for resale opportunities will only lose value over time, which makes it harder for businesses to maximise the value of their devices.

### 2. Understand data destruction methods for different devices

Data centre managers need to be confident that all data is removed on retired IT assets. Some devices can only undergo certain procedures for data destruction to be successful. Here is a breakdown of the data destruction options for each device:

- Magnetic Drives: These drives can be either erased, degaussed, or physically destroyed via crushing or shredding.
- Solid State Drives (SSDs): These drives can be either erased or physically destroyed via shredding. Degaussing is ineffective for destroying data on solid state drives. Crushing methods used for magnetic drives are insufficient for solid state drives due to the need to ensure all chips within the SSD are destroyed.
- Tapes: These can be either degaussed or shredded.

Any data destruction services should be compliant with the HMG IA Standard No. 5 (and/or with NIST 80-888 r1). All services should be controlled with formalised Standard Operating Procedures (SOPs) and offer systematic handling of drives. This will ensure all hard drives are 100% overwritten, and that no hard drive is skipped in the process.

#### 3. Consider where data destruction will take place

When decommissioning data bearing IT assets, a defined plan should be in place for how data will be managed and destroyed. Sometimes companies choose to destroy data while storage media are still in their custody. These on-site erasure and shredding services decrease the need for secure transport to an IT asset disposal facility and eliminate the risk associated with transporting data bearing assets.

If data bearing assets are transported to an IT asset disposal facility, it is common to use dedicated vehicles, security seals and GPS trackers. Once items arrive at an IT asset disposal facility, storage media can be wiped of data and assessed for reuse, and/or destroyed using a high-capacity hard drive shredder. The entire hard drive is shredded into small pieces, making it impossible to reconstruct the media or data. Alternatively, the hard drives may be erased using commercial software. Erasing hard drives allows for safe reuse and can yield higher financial return.

#### 4. Review security features

In September 2018, CargoNet recorded a 16% increase in electronics thefts, including two million-dollar cargo thefts of computers. Vehicle security should always be considered when transporting data bearing equipment. Some features might include vehicles that can be fitted with alarms and immobiliser systems. Vehicle crews should be able to have contact with control rooms at all times.

Enhanced security options to consider might also include:

- Point-to-point logistics
- Split loads across more than one vehicle
- Vehicles with CCTV recording on board
- · Vehicles with slam locks that can only be controlled remotely
- Geo-fenced routes that if deviated from will cause an alert to the control room
- Sealed vehicles
- · Back up vehicles in case of accident or breakdown
- GPS vehicle tracking

While it is important to ensure secure transportation of IT assets, it doesn't just end there. Facility security at the IT asset disposal facility is

also important. The security of the building should include features such as restricted access, 24/7 surveillance, on-site guards and metal detectors.

#### 5. Understand the resale process

Most equipment will still hold some resale value, so refurbishing and remarketing services can be a great way to maximise your return-on-investment. At a time when the economic life of a device is ending, ITAD companies can help add market value to a device that has a book value of zero. This revenue could then become a budget to help fund more sustainable goals.

When reviewing an IT asset disposal company's reuse process, understand how these items are resold, and if possible, visit the site to see the process in person. Often knowing and understanding the process, infrastructure and the extent of the vendor's buyer network, will allow you to differentiate between different standards of operators.

#### 6. Ensure responsible recycling

IT assets that are beyond economical repair (BER) should be recycled. Ensuring this final phase is performed responsibly and ethically is important as some recyclers have been caught cutting corners when recycling electronics. Illegal disposal of hazardous wastes and dumping e-waste into parts of the developing world continue to be problematic.

Choosing an industry-certified recycler is important to ensure your equipment is responsibly recycled, protect your company's brand, ensure data security, and comply with regulatory requirements.



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# **Best of**



New cooling technologies that use evaporative mechanisms play a significant part in helping data centres reduce their energy consumption. However, does this simply shift the environmental burden from energy to water use? Yan Evans, global director for FläktGroup's data centre business argues why this isn't the case, and how adiabatic systems can be designed to minimise both energy and water consumption.

he energy used for climate control and UPS systems can be around 40% of a data centre's total energy consumption, and efficient cooling systems can significantly cut carbon footprints and energy costs. That's why, in recent years, technologies have been introduced to the data centre market that take advantage of local climates for energy efficient operation.

both

This includes adiabatic cooling, which is based on the simple principle that evaporating water removes heat from its surroundings. Units that use this method spray water to cool the warm outdoor air via evaporation – this now cold outdoor air draws heat through the heat exchanger from the data centre air which then is cooled as well, instead of using compression refrigeration systems which consume more electricity.

In doing so, some argue that evaporative cooling needs vast quantities of water – an increasingly scarce and costly resource in parts of the world. But a number of technologies have been developed for data centres which rely on adiabatic solutions, that reduce their water consumption without compromising on energy efficiency.

#### **Reducing water consumption**

Water needs to be treated before it can be used for evaporative cooling to prevent limescale. Softened water is the norm for many of the adiabatic solutions on the market. However, at FläktGroup we recommend the use of reverse osmosis (RO) water for our Adia-DENCO AHU system, which can achieve in excess of 10 cycles of concentration before it is discharged to drain.

Instead of treating water with biocides to maximise hygiene, RO removes over 99% of water contaminants and 100% legionella by passing water through membranes with microscopic pores. These are between 0.0001-0.0005 µm in diameter, which is only slightly larger than individual water molecules. Many contaminants, includ-

ing legionella bacteria that are  $0.3-0.9\mu m$  in diameter, are too large to pass through these pores and are left behind.

RO also removes more of the magnesium or calcium ions which cause limescale. This demineralisation leads to a lower concentration of dissolved solids in the water after some of it is evaporated in the AHU heat exchanger. That's why it can be recirculated and dramatically reduces flush cycles from every hour to typically once a day. With softened water, these ions are not removed; the treatment process simply replaces the limescale-causing compounds with sodium ions. As the water evaporates, their levels become more concentrated, reaching a conductivity limit where the water becomes too saturated with these solids and cannot be reused.

Not only does the right water chemistry help to reduce its consumption, the mechanics of how it is sprayed onto a heat exchanger also plays a role. By coating the plate heat exchangers in our Adia– DENCO units with a hydrophilic coating, the angle at which the water droplets hit the plates changes from 80 to 20 degrees – often referred to as the "contact angle". This creates greater cohesion between the water and the surface of the plate heat exchanger, increasing the energy transfer efficiency of the heat exchange process, and further minimises the amount of water needed.

Although additional expenditure would be required to provide RO water, the reduction in water consumption would lead to a payback period on the capital investment of within four to five years out of the AHU's 15-year lifespan. Further benefits can also be gained; the use of reverse osmosis water considerably reduces the amount of cleaning, maintenance and sampling required.

#### Improving energy efficiency

In addition to water-saving technologies and design, it is important to remember that adiabatic cooling and the water supplied for the process is not used constantly. At ambient conditions below approximately 21°C (at 25°C supply air, which only accounts for a low number of hours per year), colder outdoor air can be employed to provide precision cooling with minimal energy requirements – otherwise known as "free cooling". This further negates the need to rely on refrigeration technology and direct expansion systems, thereby reducing energy usage.

Water chemistry can contribute to energy savings too. By specifying RO water for our adiabatic system, less water is needed, which means operators can use less power-hungry pumps in their plant.

#### Conclusion

More than ever, there is a need to employ smarter technologies that deliver close climate control in a more energy efficient way. But this should not, and need not, be done in a way that compromises the availability of other natural resources.

The latest adiabatic systems show that energy consumption can be significantly curbed, especially when combined with "free cooling", without putting a strain on water supply. If other water-saving

### The use of reverse osmosis water considerably reduces the amount of cleaning, maintenance and sampling required

measures such as rainwater harvesting are installed, data centres that operate in wetter climates can save even more water.

As the industry continues to be heavily scrutinised for its impact on the environment, solutions that are efficient in both energy and water usage can have a big impact on the bottom line, whilst meeting increasingly important environmental objectives.



# More than a feeling



A trillion-dollar industry must be driven by more than feelings, says Paul Finch, COO, Kao Data, as he discusses why following the proper standards when it comes to cooling your data centre, will yield a far more efficient and effective facility.



eelings, nothing more than feelings ... 'The words of the old song could sum up many data centre operators, especially when it comes to decisions on cooling these multi-million-pound construction projects.

Traditionally, and even today, there are facilities managers and data centre directors who believe that a cooled IT space is a good place. Well, it turns out that their instincts are wrong; not only is this ineffective, but also inefficient.

More and more organisations are taking heed of the latest research in technology reliability and energy-efficiency performance underpinning the evolving global guidelines, standards, environmental policy and simple economics. These changes are signalling a departure from the embedded data centre mind-set, that mechanical cooling is an efficient response for colocation data centre design and operations.



Arguably, as far back as 2004, what were then known as "closecontrol" environments started to be eroded, driven by the creation of the Thermal Guidelines and Environmental Classes which have continued to evolve over the last 15 years.

Change also came back in 2011 when ASHRAE widened the Environmental Classes, introducing the Allowable Range. A key consideration was the impact that increased server inlet temperature would have, not only on energy-efficiency, but more importantly, server reliability, driving data centre availability higher.

The ASHRAE TC9.9 guidelines, Green Grid initiatives such as PUE (and other metrics), and other energy reduction programmes like the EU Code of Conduct (EuCoC), have created the opportunity to operate data centres to better meet the needs of the servers, storage and networking equipment they are designed to support and increase their effectiveness.

ASHRAE TC9.9, for example, through the correct application of the Environmental Classes and when coupled with the appropriate cooling technologies, can provide a real opportunity to deliver data centre operations requiring no mechanical cooling, across many geographic locations around the world.



Image 1. Green Grid Free Cooling Map – EU - Courtesy of Green Grid

This industry shift continues to confound many, but this process allows operators to reduce short-term capital expenditure, longer-term operational expenditure, increase reliability, reduce maintenance and servicing costs, and benefit from on-going operational savings due to optimised data centre operating environment (therefore reducing energy use). It is a solution that is effective for many situations and locations in temperate climate countries.

Data centres live or die based on their up-time and availability, therefore equipment reliability is paramount. That is part of the

### The more equipment on-site, the greater the overall complexity and the lower the reliability is likely to be

conundrum; how, in this industry, do we increase reliability, whilst reducing engineering complexity?

Working with ASHRAE TC9.9 guidelines, servers, storage and networking manufacturers have for some time been engineering their devices and equipment to not just perform across the full 'Recommendation' range, but also into the wider 'Allowable' environmental range, for much longer periods. This allows IT equipment to operate more efficiently, and we gain by two outcomes: 1. The data centre uses less absorbed power dedicated to cooling and

- reduces energy costs
- 2. As the air inlet temperature increases, so does the free-cooling opportunity, and when applied innovatively with appropriate cooling technologies, can eliminate the need for any mechanical refrigeration.

Some IT equipment manufacturers in specific applications even allow for specified time excursions to environmental temperatures up to 45oC, without affecting the manufacturer's warranty.

In real-life environments, the primary factor determining system failure rate is component temperature. Equipment improvements now in place provide high reliability and a reduction in the risk of device thermal shutdown, which has caused major data centre outages over the past few years.



Graph 1. - ASHRAE TC9.9 Environmental Classes - Courtesy of ASHRAE

Delivering lower server inlet temperatures can result in large, complex, expensive equipment and cooling infrastructure. The more equipment on-site, the greater the overall complexity and the lower the reliability is likely to be. Plus, all equipment requires maintenance and servicing, and it is sensible to assume at some point during the life-cycle it will fail.

Furthermore, energy is the biggest Op-Ex for a data centre, and mechanical cooling represents the largest proportion of energy use, beyond the IT load. Therefore, this represents the greatest opportunity for energy and cost savings. Correspondingly, to reduce the energy used within the data centre infrastructure, effectively releases that capacity for more IT utilisation.

Reducing complexity is a critical approach to efficiency and sustainability. Achieving a 'flat PUE response' from 25% to 100% load drives up availability and uptime, demonstrating that low PUE, down to 1.2 - 1.0 is achievable, and not simply a marketing tool, but a fiscal responsibility for data centre operators.

#### **Indirect Evaporative Cooling - IEC**

In comparison to traditional chilled water or refrigerant based systems, IEC is relatively uncomplicated, although it still requires mechanical ventilation in the form of fans and heat exchangers with few moving parts.

Air heat-rejection occurs when the return warm air is passively cooled through contact with a plate that has been evaporatively cooled on an adjacent atmospheric side. A benefit is that no moisture is added to the supply side air stream as it returns to the data hall, maintaining the humidity within the hall.

This ensures the precise supply air inlet conditions can be delivered to support the IT load. However, air movement, even within a confined space, can be chaotic. Our data centre design principles incorporated the use of CFD (computational fluid dynamics) to model the air movement around the IT space. The modelling is complex, but greatly reduces risk as it provides a detailed theoretical model on how the technical space will perform and react to dynamic loads.



Diagram 1 - IEC Layout - Courtesy of FlaktGroup

### *Energy is the biggest Op-Ex for a data centre, and mechanical cooling represents the largest proportion of energy use beyond the IT load*

Modelling also assists in rack layout, and our results demonstrated that hot aisle containment (HAC) systems, (as they stop hot and cold air mixing in and around the cabinets) offered the most efficient design to allow controlled air-flow circulation around the IT hall.

HAC draws cool air into the front of the contained cabinets and through the IT equipment and then expels hot air up and out into the ceiling space to return to the IEC system where the heat is rejected.

IEC, when used effectively, allows data centre designers to match the environmental conditions in the data halls to the freecooling opportunity available within their specific geography. This ensures that evaporative cooling is effective for far longer throughout the year.

The latest IT equipment technology (servers, storage and networking equipment) is developed to operate within the parameters characterised in non-mechanical cooling systems, such as IEC, even with maximum predicted annual temperature excursions. In many locations and business strategies, the capital cost of installing a traditional chilled water and refrigerant based system can be avoided.

#### Conclusion

The data centre market has become increasingly competitive, and the industry continues to expand into untouched regions whilst the growth of our industry consumes increasing amounts of energy. Economic as well as political and social pressures demand more efficiency, and energy is a large component in the data centre cost structure.

Developments in cooling technology and the correct application of techniques offers a transparent path to designing and implementing non-mechanical cooling strategies, which reduce complexity, increase reliability and maximise the operational hours of minimal cost cooling.

The correct application of the ASHRAE environmental classes and broader thermal guidelines will drive PUE lower, not only at peak load, but consistently deliver sub 1.2 PUE, resulting in a far lesser impact from a sustainability perspective.

Our industry is no longer reliant on feeling our way forward to reduced energy use. We have standard processes that provide scientific support to more efficient and effective data centre businesses.

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# The perfect partner



### Darren Watkins,

managing director of VIRTUS Data Centres, outlines five key considerations when it comes to choosing the perfect colocation partner. few years ago, you may have heard that colocation was dead, and that cheap cloud computing would take its place. But it is clear today that colocation is not going anywhere.

In fact, in the face of industry scepticism, analysts across the sector predict continued growth thanks to ongoing digital disruption and the proliferation of business ecosystems, the leveraging of AI/machine learning and the power of the cloud.

To keep pace with the speed of business today, organisations have to continually reinvent themselves and, consequently, their supporting digital infrastructure. The result is that IT directors and CIOs have sprawling environments – which are almost always complex in nature – to manage.

This is where colocation comes into its own. It is designed to have maximum flexibility with total transparency and solves some of the most frustrating problems faced by IT departments without introducing new problems. It requires the same skills needed to run servers in-house, but the provider takes full responsibility for the physical environment, i.e. the state of the network cables, power availability, physical security and even the level of cleanliness are somebody else's problem.

There are two scenarios where colocation becomes an attractive prospect: firstly, when businesses are looking to simply expand their IT estate, and secondly when a large IT overhaul is being implemented. However, before



deciding which colocation facility to choose, businesses must go through a checklist to make sure the multi-tenant data centre suits the requirements of the business.

Here are the top five things to consider when choosing a colocation partner: location, security, connectivity, flexibility and Total Cost of Service.

#### Location

Businesses today expect low-latency and reliability from colocation providers, with zero tolerance for downtime.

Smart providers chose optimal locations combining low cost availability of ample space and power for hyper-efficient data centres with low cost availability of broad and rich connectivity (fibre that today's digital businesses need).

These facilities are far enough from city centres for disaster recovery purposes and avoiding expensive city centre premiums, but close enough to deliver application performance that local and international businesses demand.

#### Security

Security is one of the primary reasons that some large organisations have traditionally preferred to build their own data centres. As this is becoming financially unviable, providers must demonstrate that the security of their customers' IT infrastructure is one of their highest priorities. Both external and internal security are paramount and should be reviewed in three key ways: physical, process and digital.

#### Connectivity

Businesses use public clouds for access to huge amounts of data and massive compute capability, for on-demand computing when needed, or simply for storage. However, organisations still maintain their own private clouds as a way of processing and adding value to their own sensitive data that they collect and to handle complex computations. This is the hybrid world that is becoming the de facto standard.

Connectivity to the right carriers is critical if cloud is to work. It ensures that multiple public clouds can be accessed, which will increase performance. The term for this is "on-ramp to cloud". Companies should be aware that whilst some data centre providers can build the best highperformance computing platform, without connectivity provisioning on-ramp to other clouds, businesses won't be able to adopt a hybrid cloud strategy.

Colocation providers are designed to be connected to carriers. Those data centres that own a fully diverse fibre duct infrastructure to meet all of the fibre owner/operators, make every other possible carrier or related supplier just a cross connect away, providing limitless connectivity, cost effectively.

#### Flexibility

Overly rigid long-term data centre contracts are no longer palatable for many global cloud and digital organisations, where the fast pace of business and technology can require them to change direction quickly.

If enterprises and IT agility are held back by antiquated and inflexible data

### To keep pace with the speed of business today, organisations have to continually reinvent themselves

centre platforms or contracts that can't react quickly in line with business plans, it can lead to missed opportunities and severe IT cost inefficiencies. This is a serious concern for businesses today.

Flexible contract options provide true commercial and technical agility which benefit enterprises. Providing the ability to flex the contracted power, space and time of the service at any point allows businesses to take full advantage of the differing costs per compute as they increase or decrease IT density.

#### **Total Cost of Service**

Today, the data centre market has matured and buying colocation space has become the strategy of choice for most businesses. Companies should make sure they aren't paying more than they need and look for a disruptive commercial model, which gives absolute flexibility from a rack to a suite, for a day to a decade and total transparency and control of usage.

Things to look out for when calculating Total Cost of Service (TCS):

- Lower build costs per MW of IT load
- Reduced energy costs through low PUEs and ultra-efficient cooling technology
- · Flexibility to provide high-density cooling capability
- In-built monitoring and operating support
- · Connectivity-rich data centres with ecosystems
- Flexible contract terms for both colocation space and connectivity.

#### The future of colocation

In the immediate future, the Internet of Things (IoT), AI and Machine Learning are having an impact on colocation demands and providers. Products such as smart home and smart car applications are generating huge amounts of data.

As IoT-enabled products become more prevalent, machine-to-machine communications using open protocols will see devices consume data in ways that we are only just starting to explore. The volumes of data and speed required for this type of processing can only be housed in buildings designed specifically for this purpose – a data centre.

As for the next ten years, colocation providers will need to adapt to emerging technologies such as network functions virtualisation, software defined networks and Platform-as-a-Service (PaaS) if they are to continue to support the scale and functionality needed by modern businesses. **TRX 01** 

# Underpressure



High Performance Computing puts pressure on colocation credentials. **Simon Bearne**, commercial

director at Next Generation Data explores some key colocation considerations for meeting HPC expectations. igh Performance Computing (HPC) is now firmly established, evidenced by the increasing demand for compute power from existing users and the growing number of organisations identifying use cases. However, the thirst for compute power and relatively short refresh cycles is proving difficult for self-build on-premise installations in terms of financial returns and logistics (parallel build) as well as upgrading of plant and utilities to site (power).

Yet would-be HPC customers are already finding it challenging to find colocation providers capable of providing suitable environments on their behalf, especially when it comes to the powering and cooling of these highly-dense and complex platforms. Suitable colocation providers in the UK – and many parts of Europe – are few and far between.

For many HPC applications, be they academe, commercial research, advanced modelling, engineering, pharma, extractives, government or artificial intelligence, self-build has been the preference. But there is a gradual realisation that this is not core business for most. Increasing dependence on the availability of platforms is driving towards critical services environments, making it operationally intensive for in-house teams to maintain and upgrade these platforms – the facilities required often cost as much as the computers themselves.

While there are many colos out there, and many have enough power, it is the latter which can skew the relationship with space by potentially using up the facility's entire available supply while it remains half empty.

Furthermore, the majority of colocation providers have little experience of HPC, and their business models do not support the custom builds required. Additionally, the cooling required demands bespoke build and engineering skills – many colos are standardised/productised so unused to deploying the specialist technologies required.

#### **Cloud constraints**

Faced with such constraints, the public or private cloud is a possible option but currently remains unsuitable for many HPC workloads, despite cloud computing's premise of elasticity for providing additional at-will compute resource for specific workloads. Cloud may be fine for standard workloads, but for HPC use cases there are issues with data protection, control, privacy and security, not to mention compute performance, I/O and communications limitations.

HPC is considerably more complex as there is a need for different CPU and GPU server capabilities; highly engineered interconnects between all the various systems and resources; and storage latencies to be maintained in the low milli, micro or even nanoseconds.

All this requires highly specialised workload orchestration that is not available on general public cloud platforms. Attempting to create a true HPC environment on top of a general public cloud is very challenging. Aside from the technical issues, trust would also appear to remain a significant barrier. If the decision is taken to go the colocation route, there are a number of key criteria to consider.

#### Power

Highly concentrated power to rack in ever smaller footprints is critical as dense HPC equipment needs high power densities, far more than the average colocation facility in Europe typically offers. The average colocation power per rack is circa 5kWs and rarely exceeds 20kWs, compared to HPC platforms which typically draw around 30kWs and upwards – NGD is seeing densities rise to 40, 50, with some installations in excess of 100kWs.

Achieving much higher power to space ratios will therefore be a major game changer in the immediate future, segmenting facilities that can from those that can't. The ultimate limitation for most on-premise or commercial data centres will be the availability of sufficient power to the location from electricity utility companies.

So it is essential to check if the colocation facility can provide that extra power now – not just promise it for the future – and whether it charges a premium price for routing more power to your system. Furthermore, do the multi-cabled power aggregation systems required include sufficient power redundancy?

### Would-be HPC customers are already finding it challenging to find colocation providers capable of providing suitable environments on their behalf

#### **Critical services**

There will always be some form of immediate failover power supply in place which is then replaced by auxiliary power from diesel generators. However, such immediate power provision is expensive, particularly when there is a continuous high draw, as is required by HPC.

UPS and auxiliary power systems must be capable of supporting all workloads running in the facility at the same time, along with overhead and enough redundancy to deal with any failure within the emergency power supply system itself. This is not necessarily accommodated in colocation facilities looking to move up from general purpose applications and services to supporting true HPC environments.

#### Cooling

HPC requires highly targeted cooling and simple computer room air conditioning (CRAC) or free air cooling systems (such as swamp or adiabatic coolers) typically do not have the capabilities required. Furthermore, hot and cold aisle cooling systems are increasingly inadequate for addressing the heat created by larger HPC environments, which will require specialised and often custom-built cooling systems and procedures.

This places increased emphasis for ensuring there are on-site engineering personnel on-hand with knowledge in designing and building bespoke cooling systems, such as direct liquid cooling for highly efficient heat removal and avoiding on board hot spots. This will reduce the problems of high temperatures without excessive air circulation which is both expensive and noisy.

#### Fibre connectivity/latency

Consider the availability of diverse high-speed on-site fibre cross connects. Basic public connectivity solutions will generally not be sufficient for HPC systems, so look for providers that have specialised connectivity solutions, including direct access to fibre.

While the HPC platform may be working well, what if the link between the organisation or the public internet and the colocation facility goes down and there is no capability for failover? As many problems with connectivity come down to physical damage, such as cables being broken during roadworks, ensuring that connectivity is



through multiple diverse connections from the facility is crucial.

Other areas where a colocation provider should be able to demonstrate capabilities include specialised connections to public clouds, such as Microsoft Azure ExpressRoute, AWS Direct Connect and specialised networks such as Jisc/Janet. These bypass the public internet to enable more consistent and secure interactions between the HPC platform and other workloads the organisation may be operating.

#### Location

The physical location of the data centre will impact directly on rack space costs and power availability. In the case of colocation, there are often considerable differences in rack space rents between regional facilities and those based in or around large metro areas such as London.

Perhaps of more concern to HPC users, most data centres in and around London are severely power limited and relatively low in power capacity. The Grid in the South East is creaking and potential upgrade costs to bring more power to locations are astronomical. Out of town facilities are not facing such challenges. Fortunately, the ever-decreasing cost of highspeed fibre is providing

### Achieving much higher power to space ratios will be a major game changer in the immediate future

more freedom to build modern colo facilities much further away from metro areas but without incurring the latency issues of old.

In summary, most HPC users have so far taken the on-premise route, but will now struggle with increasing costs and the challenges of obtaining more power to site, operating complex cooling, and ensuring the duplicated plant environments that critical services require.

Those considering colocation solutions as an alternative must thoroughly evaluate the ability of their potential data centre providers to offer facilities which are truly fit-for-purpose. NGD, for example, has a permanent presence of on-site consulting engineers and is geared to tackle custom HPC builds.



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**Lex Coors,** chief data centre technology and engineering officer at Interxion, discusses how the company is helping fly the flag for green technology and what data centre operators can do to follow suit and harness that all-important green power.

oday, the colour green has taken on a brand-new significance as the symbol of the booming green energy movement. That has become a vital component of Europe's economy.

As the preeminent data centre provider in Europe, Interxion is helping to lead the charge in both efficient energy practices and the use of renewable energy, showing that being green is a crucial way to win customers in Europe.

Demonstrating green practices can be a notable business differentiator for service providers looking to sell services to the European market. Europeans care strongly about sustainability: eight in 10 EU citizens felt that environmental impact was an important element when deciding which products to buy.

At Interxion, energy efficiency is a company-wide policy, with energy-saving measures built right into its data centres. For more than 20 years, Interxion has pioneered energy-saving designs and harnessed everything from arctic winds to underground aquifers to the Baltic Sea to reduce its energy use and thus reduce its carbon footprint.

For data centre providers, much of the daily operations involve ensuring the equipment is kept cool to ensure customers' mission critical

# **Once feared as a source of pollution, data centres are now embraced for their energy contributions to surrounding communities**

applications are kept running 24/7/365. Interxion is innovating and implementing advanced energy-efficient cooling technologies: for example, free-cooling reduces the use of electricity, which is still predominantly produced from conventional fuels.

In addition to energy efficiency, Interxion pioneered the use of 100% sustainable energy sources, including water, solar, and wind to power its data centres across Europe. And between 2017 and 2019, Interxion chose to redeem all of its data centres' electricity usage in the form of renewable energy produced in Europe, either via supplier's green tariffs or Guarantees of Origin.

### Hyperscalers like Apple and Google have applauded the Nordics for their energy efficient data centres

Interxion has played a critical role in the sustainability efforts of its host cities. A notable example is Stockholm: in the 1970s, Stockholm took energy efficiency to a new level by building infrastructure that reused excess heat to warm households in the city. Interxion is a key partner in this initiative: together with Stockholm Exergi, Interxion is transferring the excess heat energy into residential heating. In 2018, Germany's two biggest TV networks travelled to Interxion's Stockholm facility to film documentaries about the city's power-saving technology with hopes that other countries or cities will soon adopt similar practices.

In Denmark, Interxion has developed groundwater cooling as an energy-saving measure. Previously, cooling in the summer months had been based on traditional refrigeration machines that used a lot of power. But Interxion worked with the city of Ballerup to develop a groundwater-based cooling system that can replace the traditional refrigerants with geo-energy. The result is a system that, summer and winter, can always provide sufficient cooling while significantly reducing energy consumption.

Denmark and the whole Nordic region have evolved into Europe's leaders in energy efficiency. Not only are Interxion's Nordic facilities designed specifically with by-products like excess heat in mind, they are among the only data centre providers covering the whole of Europe with 100% sustainable energy. Hyperscalers like Apple and Google have applauded the Nordics for their energy efficient data centres.

The great supply of power from sustainable sources like hydro and wind power, combined with the cold climate makes the Nordics an ideal place for building sustainable data centres. Due to this and a fast-growing market in Northern Europe, Interxion is seeing an increased number of hyperscale data centre projects emerging in both Denmark and Sweden.

Green-laden Ireland is another region in Europe where energy efficiency is thriving. The Emerald Isle's temperate climate makes it perfectly suited for free-air cooling, which uses approximately 40% less electricity than typical cooling methods. In addition to energy efficiency, Ireland is a leader in sustainable energy: 26% of the energy that Ireland produced in 2016 came from sustainable sources. It also possesses the third-highest wind penetration in the world. In fact, Ireland has set a target of having 40% of all its energy generated from renewable sources by 2020. It's quite ambitious, but completely reachable.

In addition to sustainable energy, Interxion's Ireland data centres are making major contributions in energy efficiency. Interxion has pioneered new approaches to data centre design and management, including improvements around power usage effectiveness and the industry's first-ever modular approach to data centre design. Interxion even designed its newest Ireland data centre DUB3 with a specific focus on energy-saving modular architecture, incorporating cooling and maximum efficiency components.

Interxion's efficient and sustainable facilities have changed the conversation around data centres. Once feared as a source of pollution, data centres are now embraced for their energy contributions to surrounding communities. Enterprises that wish to boost their business in energy-conscious Europe have also embraced data centres equipped with green technology. With such enormous benefits to the data centre industry, environment, and local communities, it is easy to imagine Interxion's green energy initiative is a win for all.





# Making the IT landscape greener

Crisis is often the food of innovation. Six IT experts share their insights on how companies can innovate in order to minimise their environmental impact.



ith countless news stories, documentaries, and high-profile protests flooding our media in recent times, there is certainly no escaping the catastrophic damage that we have inflicted on our planet.

This is not just the problem of the people, but of large companies too, including those in the tech sector. There is increasing pressure on the people in charge at the very peak of our technological landscape – namely companies that provide and support the core infrastructure – to action change from the top down.

#### Change starts at home

Rik Williams, head of data centre operations at Node4, explains the importance of seeing the bigger picture. "Climate change action can and should come from the top down, so while data centres continue to be essential hubs that power our ever-growing digital age, they too have a big responsibility to the planet."

He continues, "With climate change front of mind in recent times, the IT industry is more aware than ever that it plays a big part in global emissions. Now, many data centre providers are taking the initiative in using greener technology to make a difference and fulfil the requirements of climate-conscious businesses."

"We can all recognise the importance of looking a little closer to home when considering the challenge presented to our planet by climate change. However, it's not just up to individuals alone," agrees Christian Lang, VP of EMEA at Commvault.

"Alongside that we need to recognise the role that big business has to play in the movement towards more sustainable, greener, global commercial practices," Lang adds. "All organisations, especially those in the technology sector, can (and should) be doing more to identify better ways to lower the carbon footprints of their daily business operations."

#### **Real advice for a real crisis**

Williams points out some practical advice that data centres themselves can take. "The most obvious thing that data centres can do is deploy the latest energy-saving technologies. There are plenty of these available, such as cold aisle containment, free cooling chillers and adiabatic cooling systems."

Eltjo Hofstee, managing director at Leaseweb UK, adds to this argument for companies across the technology sector, "Another solution to achieving sustainability is virtualisation. This enables IT teams to fully utilise the capacity of a physical server, which means in most cases that you can run the same environment on less physical servers, without performance decrease. As customers become increasingly aware of the cost and availability of power, data centres have some of the most advanced tools of any sector for improving energy efficiency – so why not use them?"

"Businesses across all sectors can commit to simple yet effective acts that go a long way in helping the world become more green, such as having no single-use plastic in the office, planting trees with local governments, or offering electric vehicles as company

### **Data centres have some** of the most advanced tools of any sector for improving energy efficiency – so why not use them?





Christian Lang Commvault





Hvve

m Marcroft



Rik Williams

Node4

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Steve Wainwright Skillsoft

Jason Wells Cradlepoint

cars," comments Graham Marcroft, operations and compliance director at Hyve Managed Hosting.

Eltio Hofstee

Leaseweb LIK

"But, what can the tech sector in particular be doing?" he asks. "At Hyve, our data centres have invested over 100 million dollars in energy efficiency upgrades, and in 2015 made an industry-first commitment to long term goals of using clean and renewable energy to power 100% of their global footprint."

"Reducing energy consumption will not only ecologically benefit the environment, but also financially benefit the data centre operator – it truly is a win-win," concludes Hofstee.

#### A more connected world could be the answer

In the modern digital landscape, connected devices are changing the way we live and work, and there are increasing suggestions that this new, flexible, technology-driven landscape could be the answer to some of our climate problems.

"As people, places and things become increasingly connected all around us, smart technology has an important role to play in homes, offices, commercial buildings and vehicles," explains Jason Wells, VP and GM EMEA at Cradlepoint.

"Smart technology is already providing a variety of functions, from reporting a broken light bulb, to recording how much energy is being used and even alerting us to the fact that the garden may be in need of a drop of water," he continues.

"For example, while LED technology has made lighting far more efficient in recent years, connected lighting is taking this one stage further. The ability to remotely manage street lighting via the Internet means local authorities can ensure street lights are dimmed when not in use during the night, only returning to full brightness when they sense a car or pedestrian approaching. This can reduce energy consumption significantly, while also improving living conditions and security for local residents."

Steve Wainwright, managing director EMEA at Skillsoft, adds to this point, with the concept of eLearning for employees. "Have you ever considered the impact your L&D programme has on the environment? If your programme is entirely classroom-based and doesn't utilise any digital learning tools, it is likely not the greenest option. For example, less fuel is used by employees travelling by car, train or air to take classes, and less paper is used because more courses and materials are online rather than physical.

"The US alone cuts down approximately 68 million trees every year just to make paper and associated products," he adds. "Striving to create a paperless office is one of the best ways to reduce your organisation's carbon footprint and help the environment."

#### The time for greener IT is now

The overriding message from every angle is perfectly clear; there is no planet B. With carbon balancing making headline news, governments being pushed into action to align with the Paris agreement, and even children taking Fridays off around the world to stand up for our planet, there is no time to waste.

When it comes to improving our impact on the world, companies across all parts of our IT landscape are owning up to their responsibilities, and with practical advice and technological advancements available to all, there is no time like the present for the technology sector to stand up for change.



# **Pushing closer** to the edge



### In this Q&A. Patrick Hubbard.

head geek at SolarWinds, gives us his insight into the edge and provides data centre professionals with his top tips for making sense of it all.



### hat is edge computing?

Edge computing is a surprisingly loose term, describing the technology to support computing, data collection, and physical systems actuation, performed near to where data is produced or control is required.

This is in some ways counterintuitive and opposite to cloud vendors' calls to concentrate operations in a handful of huge data centres.

But recent service additions make it easier to deploy and manage applications at the edge, enabling edge's primary benefits, like overcoming physics-based latency limits and reducing bandwidth into the cloud. Perhaps nowhere is the push to edge greater than with the Internet of Things (IoT).

### What's triggering the shift to edge?

Whether typical end-users know it or not, they are well and truly entrenched in the cloud computing era. Despite having more memory, drive space, and CPU horsepower on our personal PCs than

# Perhaps nowhere is the push to edge greater than with the Internet of Things

ever, we increasingly use them to access centralised services such as Dropbox, Gmail, Office 365, and Slack.

Smart devices like Amazon Echo, Google Chromecast, and Apple TV wouldn't even be possible without content and intelligence made possible by the power and scale of cloud. From infrastructure to hosting, machine learning to computer power, the majority of companies in the world today now rely on an oligopoly of cloud providers: Amazon AWS, Microsoft Azure, Google GCP, and IBM Cloud.

Amazon still dominates the public cloud space with 49% market share, but Azure and GCP continue their acceleration as we begin to dig into the real work – legacy enterprise modernisation. And while the path to cloud-centric and hybrid architectures are relatively well-defined at this point, there's another option seeing renewed promotion from public cloud vendors. We're increasingly encouraged to explore "cloud" computing at the "edge."

#### What are the challenges holding us up?

Technology succeeds or fails in the ways it answers the age-old question of the chicken or the egg. When new technologies emerge, there's an immediate battle fuelled by a warehouse of technical debt and incomplete features in new tech.

Typically, new solution drives changes from the outside-in, driving new requirements to infrastructure components and increasing overall complexity as the by-product of supporting niche applications. Although the concept of pushing processing to the network's fringe, the edge, has been around for years, it won't be possible to support knowledge generation and remote decision-making in billions of devices with cloud and on-premises alone.

Pre-processing newly collected data along with supporting billions of devices connecting at once is a real need, and the race is on to see which public cloud provider's technology will power remote processing and simplify networks between cloud, edge, and on-premises systems. Computing boundaries are expected to be pushed even further to meet the needs of the IoT's demanding applications next year. In fact, new research has shown that Europe has been leading the way in industrial IoT, with implementations that are three times more extensive than in the US.

#### What are your top tips for data centre professionals?

No matter what, an edge computing strategy will need to factor in compliance and security, even more so than centralised systems. Edge doesn't necessarily imply more security investment but does demand shifting resources to planning and observation and eliminate reactionary post-deployment remediation wherever possible. Proper documentation should provide a clear checklist of what is required and verification plans to assure policies are consistently adopted.

Edge also rewards planning in another way — homogenisation. Data centre pros who create uniform hardware and software profiles for their edge systems, find that when there are fewer differences to manage, the whole process is a lot easier. Commonality is a significant accelerator with edge adoption, just as it has been with cloud.

Data centre pros shouldn't be afraid to ask tough questions to vendors and leadership alike:

- Are we using a consistent platform?
- What user experiences are we supporting, and is it a good fit for edge?
- How can we maintain a reliable change pipeline?
- How will the recovery process differ vs. monolithic or cloud-based applications?
- How will our business be affected in the event of a failure?

The right network, systems, cloud management, and monitoring tools will include distributed APM, SIEM, logging, and infrastructure monitoring to provide a solution to the questions above. It will also ensure optimisation and protection across each environment. With real, not proof-of-concept edge, ensuring service quality is more important than ever because of the relative intimacy of IoT.

Car manufactures are judged by mechanical sounds as we interact with doors, shifters, and switches, and IoT will extend that assessment to countless newly connected things we touch, talk to, and watch. It's not good enough to expect users to sit for 2,000 milliseconds while the HVAC system decides if occupancy rules are sufficiently satisfied to flip on the lights. IoT will be compared directly with the non-intelligent systems it augments, and the brands with the most seamless experiences stand to win.

While single points of failure at the edge — like bricking millions of IoT devices — are less likely with distributed resources, large failures could cause not only thousands of pounds in repaid and lost revenue, but also tarnish a company's reputation.

Further, deploying a new, larger attack surface at a time when data privacy and security is at the top of customers' agendas, requires extra attention. Data centre pros need to make sure that the entire team, from the director to the support team, takes part in the testing and recovery phase. Even the best security infrastructure can fail when teams assume existing security approaches won't require adjustment to support edge.



# Mind the Visibility) cap



It is predicted that by 2020, 'digital experience' will overtake price and product as a key brand differentiator.

### Alex Henthorn-Iwane,

VP product marketing at ThousandEyes, takes a look at how businesses can hope to ensure a strong digital experience for their customers, whilst navigating the serverless architecture of a multi-cloud landscape. he need for agility in today's digital world means most companies can only realistically provide a reliable, seamless digital experience to their customers and employees by leveraging cloud and third-party technologies. What this means is that companies are relinquishing much of the control they've previously had of their IT systems and infrastructure.

Now, IT architectures have evolved from a controlled, managed environment to something that is shared, requiring a profoundly different way of thinking. Given that an estimated 96% of businesses use the cloud in some manner, nearly every company is now operating on networks outside of their ownership, leading to an increasingly a multi-cloud, serverless, IT architecture.

While this approach has a myriad of benefits, not least in increased agility for businesses, there can be some aspects to watch out for. By relying on a wide variety of third-parties, companies are creating a digital footprint with a host of security issues and vulnerabilities that they may simply be unaware of, through no fault of their own.

Meanwhile IT teams can be in a situation where they find it extremely difficult to predict, understand and deal with performance issues. For example, ThousandEyes recently looked at how companies are treating their ever-expanded network and

### Gartner predicts that multi-cloud will actually become the norm for 70% of enterprises by the end of this year

found that seven out of 10 FTSE 100 firms are still vulnerable to outages. Overall, this evolving landscape creates a "visibility gap" for companies.

Yet multi-cloud and its associated complexities are here to stay, despite this clear issue. Gartner predicts that multi-cloud will actually become the norm for 70% of enterprises by the end of this year, compared to less than 10% in 2015. Meanwhile, Cisco estimated that more than half of enterprises already use an average of four different cloud vendors.

However, despite this shift to serverless services, and the critical issue around visibility, downtime just isn't an option for companies in today's interconnected world. For example, Amazon lost an estimated \$70+ million due to IT issues during last year's Prime Day retail event.

Such loss of control and network visibility is hugely damaging for a company. It not only impacts upon the IT team, but can have a profoundly negative impact on everything from brand reputation, to employee productivity, to revenues, as experienced by Amazon.

Network issues can also of course affect digital experience, which has emerged as a key competitive factor. By 2020, it is predicted to overtake price and product as the key brand differentiator.

This move to serverless computing is driving the need for enterprises to develop a digital experience strategy, a relatively new challenge for organisations. Digital experience visibility isn't just about maintaining your presence online, but is actually a business-critical issue, that will only grow in importance as the digital experience becomes a key differentiator for companies.

Essentially, monitoring digital experience gets you to why an issue might occur, which sounds simple but can be hard to diagnose in this age of multi-cloud. If something goes wrong, the operations team needs to know why. Depth of visibility matters.

Digital experience monitoring offers a lens to view how every network including your WAN, the Internet and cloud provider networks are impacting app delivery (even public cloud providers can at times experience performance issues). Sometimes those are internal to them, and sometimes they are due to forces beyond anyone's control, like power outages or compromised internet routing halfway around the world.

If a business' workloads and monitoring are both in the same public cloud provider, when there's an issue with that provider, they're going to be both down and totally blind. This is not a great plan for having visibility over a sprawling IT infrastructure.

Getting to why can make the difference between hours or days of service disruption or keeping your digital users and customers delighted. There has never been so much choice for the customer, which means that no business, regardless of size, can afford to take their digital experience, or their ability to deal with issues related to it, for granted.







### Industry Insight: David Bond, chairman, CENTIEL



With over 30 years' experience in the UPS industry, **David Bond**, chairman at CENTIEL Ltd discusses just how far technology has come, what makes a successful data centre and shares with us some of his biggest bugbears.

### What were you doing before you joined Centiel and how did you first get involved in the industry?

My background and education is electronic and communications engineering before moving into sales, selling military and paramilitary radios into regions of the world that may not be so attractive to visit these days.

However, with a wife and three children, being away from home for typically six months each year was tough so, armed with my newly acquired management school qualifications, I applied for a technical services manager role in a UPS start-up in the UK.

I had never heard of a UPS but managed to bluff my way into the role. I used to have to take the technical manuals home and read them in bed to help me pretend to know what I was talking about. That was 1988 and I have now worked in the UPS industry for more than 30 years.

### What are the biggest changes you have seen within in the data centre industry over the last few years?

In the 1980s, UPS were large, noisy, inefficient machines. A 75kVA (60kW) UPS in 1988 weighed 700kg and was the size of a triple wardrobe. They were beautifully engineered back then but were only 85% efficient and, unlike today, nobody ever considered environmental impact, energy efficiency or PUI. Nowadays a 60kW UPS is smaller than a suitcase and weighs less than 60kg.

We have moved from mainframe to file server to the cloud and now to edge computing. The rapid accumulation of data is driving change exponentially with all data now being processed and stored regardless of how useful it is.

This ever-growing tsunami of data will result in the continued growth of the data centre industry and the increasingly important edge data centres needed to locally process critical information before it is sent to the cloud and the mega data centres.

### Are there any emerging or existing technologies that are perhaps gaining more traction than they once were, or any industry trends you've noticed?

The introduction of modular UPS revolutionised the availability and flexibility of UPS systems, but energy storage technology has not changed much at all in decades. The industry uses the same batteries today as it did 30 years ago. This is set to change with the introduction of Li-ion battery technology.

CENTIEL's Li-ion solution is already being installed by its most forward-thinking clients, who are looking to capitalise on the advantages that Li-ion has over lead-acid batteries, namely: they are smaller, lighter, have a high power density, a longer useful working life and can safely operate at higher ambient temperatures, thereby significantly reducing the need for air conditioning.

### How would you encourage a school leaver to get involved in your industry? Do you feel there is a current skills gap?

The UPS industry is brilliant! It is hugely varied and incorporates electrical and electronic engineering, power engineering and AC and DC applications. Also, because UPS are now intelligent devices in a network, we are also in the data communications industry and



we work in interesting environments such as data centres. With the growth of data, it is also an expanding sector.

In truth, most people stumble upon the UPS industry as I did. However, there are some UPS specific apprenticeships and training schemes available nowadays and the industry is always looking for good people. We have recently taken on a qualified electrician as a trainee UPS engineer and are teaching him about critical power protection.

### What, in your opinion, is the most important aspect of a successful data centre?

Availability! Our always on, always connected environment means we cannot function if our mobile phone or Facebook etc. go down. Just imagine the impact of a security breach at one of Facebook's data centres which took the application offline for a few hours. In today's world we need to be "connected" all the time and as a result, data centres need to be 100% available 100% of the time.

It is for this reason that CENTIEL developed its three-phase modular solution CumulusPower. Unlike traditional multi-module systems, CumulusPower technology combines a unique Intelligent Module Technology (IMT), with a fault-tolerant parallel Distributed Active Redundant Architecture (DARA), and ultra-rapid repairs to provide industry leading availability of 99.9999999% (nine Nines).

### With regards to sustainability, with data centres using so much power, how important do you think it is for the industry to do its bit to help the impact of climate change?

It's essential – however, the main purchasing driver is still financial. The increase in UPS efficiency from 85% in the 1980s to 97% today is a 12% improvement that reduces the UPS' carbon footprint, but purchase decision makers are still focused only on the bottom line, missing the bigger picture.

Of course, increased efficiency and lower TCO are closely linked and the most environmentally friendly systems enjoy ongoing operating cost savings. However, given a choice, decision makers still purchase the lowest cost system thinking they are "saving money" for their company despite the company's environmental and sustainability policies. Whilst this behaviour is understandable, it is "old school" and needs to change.

CENTIEL considers everything to reduce environmental impact by improving efficiency. Even tiny details like the length and routing of cables and experimenting with different combinations of components to maximise the system's operating efficiency are painstakingly undertaken. Yes, such attention to detail adds to the cost of the product's development, but CENTIEL thinks it's worth it.





#### What's your biggest pet peeve?

I'm 57 years old so I could write a book about peeves. However, the thing that really irritates me currently is roadside litter. It is not OK to throw food wrappers out of a car window to keep your car tidy. CENTIEL's Asia Pacific subsidiary is based in Singapore and in Singapore there is no litter. Their zero-tolerance policy works and it's a really clean and tidy place.

#### What are your hobbies/interests outside work?

I'm a fanatical Chelsea fan and a keen golfer. I combine the two by using Chelsea ball markers and my golf clubs have Chelsea head covers.

I enjoy the length of time a game of golf takes. It's all-absorbing and mentally challenging. One of my ex-chairmen once said, "if you play golf with someone you learn all you need to know about them." Golf's like life in miniature – it exposes how you cope with good and bad luck, injustices and disappointment. It's also good fun!

### Can you remember what job you wanted when you were a child?

Initially I wanted to be a pilot, but when I realised how difficult it was to qualify, I wanted to be a carpenter. In my role, you often can't see what you've achieved today as the outcome of a decision may not become apparent for several years. A chippy, however, will arrive, hang a few doors and go home having seen the fruits of their labour. Also, the smell of cut wood is better than the smell of a board room.



## Supporting **your business journey** to



# Project Success

11

# When choosing an electrical or electrotechnical contractor, minimise your risk by selecting an ECA Member.

### **ECA members:**

- ✓ Are thoroughly assessed for technical capability
- Are supported by the ECA Warranty & Bond
- ✓ Have access to industry-leading technical support
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 Have access to eRAMS – task/project-specific risk assessment and method statement software



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### Schneider Electric expands Easy UPS 3 Series with Easy UPS 3M



chneider Electric has added the new Easy UPS 3M, a 60 kVA to 100 kVA (400V) Uninterruptible Power Supply

(UPS), to its 3-Phase UPS family of products.

Available in most countries, the Easy UPS 3M personifies simplicity as it is easy to install, easy to use, and easy to service, providing business continuity for small and medium businesses, and making it an excellent fit in both the data centre space and in industrial environments.

This new offer is rugged, with a wide input

voltage window and strong overload protection, all in a compact footprint. Designed and tested following Schneider Electric's

standardised rigorous procedures, the UPS rolls into position quickly and installation is simple.

It features an intuitive display interface for easy configuration and monitoring, and,



with optional network management card, customers can monitor and manage the UPS status remotely through Schneider Electric's EcoStruxure IT cloud-based software suite.

This unit saves on CapEx investment while also delivering up to 99% efficiency in energy-saving ECO mode. Customers benefit from the included start-up service to ensure the Easy UPS 3M is properly and safely configured for best performance, reliability, safety, and peace of mind. **Schneider Electric 0870 608 8608** www.schneider-electric.co.uk

### Marvell revolutionises edge data centre switching



arvell has announced its Ethernet switch solution portfolio, ranging from 2 to 12.8 Terabits per second (Tbps), designed for

edge and private data centres utilising composable infrastructure. The Marvell Prestera CX 8500 family is architected with a robust feature-set to meet the distinctive data centre requirements needed to support the approaching tsunami of connected intelligence, edge computing and 5G applications.

The Marvell Prestera CX 8500 portfolio represents a revolutionary approach to data centre architectures with features offering unprecedented workflow visibility, analytics and network simpli-



fication to support QoS, traffic management and scalability. To manage the network complexity of composable infrastructure, Marvell's new switch solutions utilise Storage Aware Flow Engine (SAFE) technology. SAFE facilitates virtual storage orchestration by providing greater insight into network flows with per flow visibility, advanced telemetry and comprehensive diagnostics that identify and resolve network congestion. At the same time, integrating innovative Forwarding Architecture using Slices of Terabit Ethernet Routers (FASTER) technology, the Marvell Prestera CX 8500 family brings high radix cores and congestion-aware load balancing. By enabling virtualisation for scalability, FASTER results in a reduction in the number of network layers and simplifies complexity, allowing edge data centre networks to be collapsed into a single layer, ultimately lowering power, space and latency. Most importantly, FASTER can reduce overall network costs by more than 50%.

Marvell 01296 678920 www.marvell.com

### IDEAL Networks launches world's first handheld Industrial Ethernet network and cable tester

DEAL Networks has launched NaviTEK IE, the first purpose built handheld network tester, designed for commissioning, preventative maintenance and troubleshooting of PROF-INET Industrial Ethernet networks, plus standard Ethernet IP networks.

The new, rugged NaviTEK IE copper and fibre trouble-shooter has been developed to simplify the process of testing both cabling and networks in Industrial Ethernet networks that utilise the PROFINET protocol. Previously, a laptop with specialist software would be required to identify and test network nodes and configuration, which



could prove cumbersome in these typically 'desk-free' environments.

With its compact, touchscreen design, NaviTEK IE has been designed to be a more convenient and efficient alternative to using a laptop, while catering for the physical differences between Industrial Ethernet cabling and other networks. With just one tester, technicians can troubleshoot at any point in a network and benefit from greater functionality than any other individual tester on the market.

IDEAL Networks www.idealnetworks.net 01925 428 380

### **Riello UPS launches new rack-mounted version of popular Sentinel Pro**



iello UPS has expanded its best-selling Sentinel Pro range with two rack-mounted versions. The Sentinel

Rack (SER) 1500 and 3000 ER models deliver the same high-quality online double conversion UPS protection as the existing tower-style designs but can easily be installed into standard 19-inch cabinets.

Both of the new Sentinel Rack products sit at just 380mm deep, making them an ideal option for upgrading power at facilities with 600mm deep legacy server racks. The SER 3000 ER version is also fitted with a 6A battery charger and additional



batteries for applications requiring several hours' extended runtime.

With a power factor of 0.9 and a high

overload capacity of 150%, it is capable of handling a range of input voltages from 140 V to 276 V. Users can also choose from several operating methods such as Smart Active, Frequency Converter, or Eco mode, to enhance performance and reduce power consumption.

The Sentinel Rack is also fully-compatible with the range of Riello UPS monitoring and communications software including PowerShield3 and comes with USB and RS232 slots for additional network cards. **Riello UPS** 

www.riello-ups.co.uk 01978 729 297

### Quality meets familiarity with Mitsubishi Electric's s-MEXT IT cooling range



itsubishi Electric is expanding its offering in the IT cooling market with its new s-MEXT high precision air conditioning systems.

The s-MEXT is a high precision air conditioner that connects directly to Mitsubishi Electric's DX Mr Slim Power Inverter outdoor units to create a full inverter split system, designed according to the best quality standards and dedicated to the most reliable IT environments.

The s-MEXT is the first Mitsubishi Electric Hydronics and IT Cooling Systems (MEHITS) product to carry the three diamonds, taking advantage of more than 50 years of experience of the RC brand within the IT cooling market, coupled with Mitsubishi Electric renowned quality standards.

The units are available in capacities from 6kW up to 42kW and are ideal for applica-

tions where high sensible cooling and close control of temperature and humidity are required, such as small and medium



sized businesses (enterprise data centres) with on premise IT cooling requirements. They are also available in both upflow and downflow variants.

The s-MEXT is available as a packaged solution, meaning both the shipping and installation times are also reduced, unlike many of the traditional IT cooling systems where lead times can be a lot longer. The s-MEXT comes complete with Mitsubishi Electric's standard three-year warranty.

Mitsubishi Electric les.mitsubishielectric.co.uk 01707 20282480

### Cool, quiet, ready for use: New platform for micro data centre and edge computing



ith EdgeGo from R&M, companies can spontaneously provide data centre infrastructures.

Ready-for-connection cabinet does away with the need to build server rooms.

R&M is supporting the current trend for creating compact, high-performance data centre infrastructures on the edge of the cloud. Here providers, companies, utilities and cities all over the world are installing large numbers of additional edge data centres. This means they are creating cloud-like, autonomous computing performance.

R&M believes the ready-wired edge solutions could be implemented particularly in industrial



companies producing in leased buildings. There would be no need to plan and integrate additional server rooms with raised floors and further elaborate components. A move would be simple, as EdgeGo can simply be disassembled and moved on. Further areas of use are in trade, banks, law firms, hospitals, authorities and the transport industry as well as in the military.

R&M equips the EdgeGo housing with sound protection, cooling and a security camera. Users add cabling and IT equipment as required and can start operating the micro data centre immediately.

R&M www.rdm.com 044 933 8111

## The Brexit burden



With Brexit being delayed until October and no final agreement on a 'deal', the economic landscape remains uncertain. **Andy Bevan**, cloud sales specialist at Pulsant, discusses why although wider issues of trade, skills and legal matters may be out of an organisation's control, businesses need to focus on elements they can take charge of such as IT and data.

ata represents close to £240 billion for the UK economy and, perhaps more importantly, 10% of the world's data moves through the UK. In light of Brexit, with data jurisdictions changing, it is paramount for all businesses to be prepared and have a plan in motion.

But where to start? An important element of the managing, storing and transferring of data is compliance with legislation. One of the most important changes to data privacy and protection law took place last year in the form of the General Data Protection Regulation (GDPR).

Looking at how this relates to Brexit, GDPR is an EU regulation, but its principles are sound. However, if a business imports goods from the EU, there are likely to be changes in the way data is stored, transacted and processed. For example, data relating to VAT and shipping costs, customs duty, tax reporting, invoicing and supplier data may all require processing differently.

The European Commission has already made provisions for countries outside the European Economic Area in terms of data privacy. This data adequacy enables companies to conduct cross-border transfers while complying with EU data protection rules.

This is an important step which is needed for the UK, especially in light of the changes to the data agreements between the US and EU. The Privacy Shield pact between the US and EU enables companies to conduct cross-border transfers while complying with EU data protection rules. The pact replaced the Safe Harbour Privacy Principles which allowed companies to transfer the personal data of EU citizens to the US, ultimately deemed invalid by the European Court of Justice.

As a result, if a business transfers data between the UK and the EU, it will need to ensure that measures confirming data adequacy are in place. In addition to amendments to business processes, ensuring that the means to store, process and evidence best-practice data handling within your IT infrastructure and applications is key to compliance. Again, this ties back to GDPR; many of the steps and best practices are the same.

Until a final Brexit plan is agreed, it remains difficult for organisations

to put solid plans in place regarding their data. Nonetheless, it seems likely that even in a no deal situation – given the value of reciprocal trade – the UK would be granted third country status under the data adequacy arrangements, meaning that data could still be transferred between the UK and the EU.

Looking to the advice of other industry bodies, such as chambers of commerce and research bodies, it is clear that the impact of Brexit will be felt long after the separation. Therefore, businesses should focus on the elements they can control, increasing their agility and flexibility to be prepared for any eventuality.

#### How can hybrid cloud help?

Using a hybrid hosting environment is one way to achieve this. If a business has a strategy in place that allows it to consume cloud services which are integrated with existing on-premises services and traditionally hosted environments, then it already has the flexibility in place to deal with change.

This doesn't mean that businesses have to move everything to the cloud, but it provides a way to plan ahead, as well as a potential exit route, should it be needed — that is, moving data and applications into the cloud. It can also help with both mitigation of supply chain issues and resourcing through reduction in staffing requirements if these become issues moving forward.

#### What next?

Currently, this is a question with no answer. However, businesses still need to be prepared. This means engaging with stakeholders and staff, including IT partners to ensure a business is compliant and secure, regardless of the Brexit outcome.

It is imperative to understand where data is held, stored and transacted. Working with the right partner can also help to alleviate some of this burden around compliance and help to achieve the business agility needed to be competitive within the post-Brexit environment.



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Key Note Speaker

### Jim Phillips

Jim is Vice-Chair of IEEE 1584 and International Chair of IEC TC78 Live Working. For over 35 years, he has been helping tens of thousands of people around the world understand electrical power system design, analysis and safety. Having taught over 2500 seminars during his career to people from all seven continents, he has developed a reputation for being one of the best trainers and public speakers in the industry. For more information about Jim, visit www.Brainfiller.com

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