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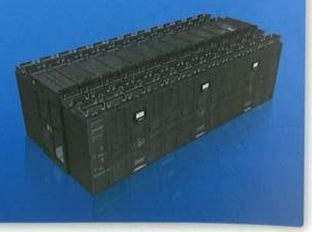


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Managing blended infrastructures and delivering critical ICT applications through the cloud.

Design + Strategy
The big picture: organisational strategy and design issues for on-premise data centers.

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Critical Environment
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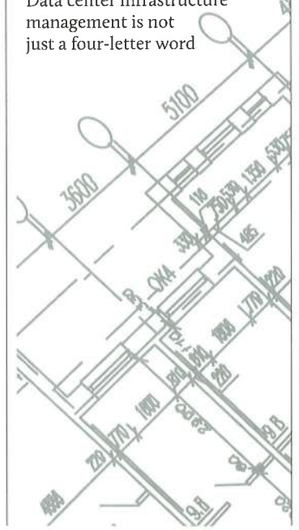
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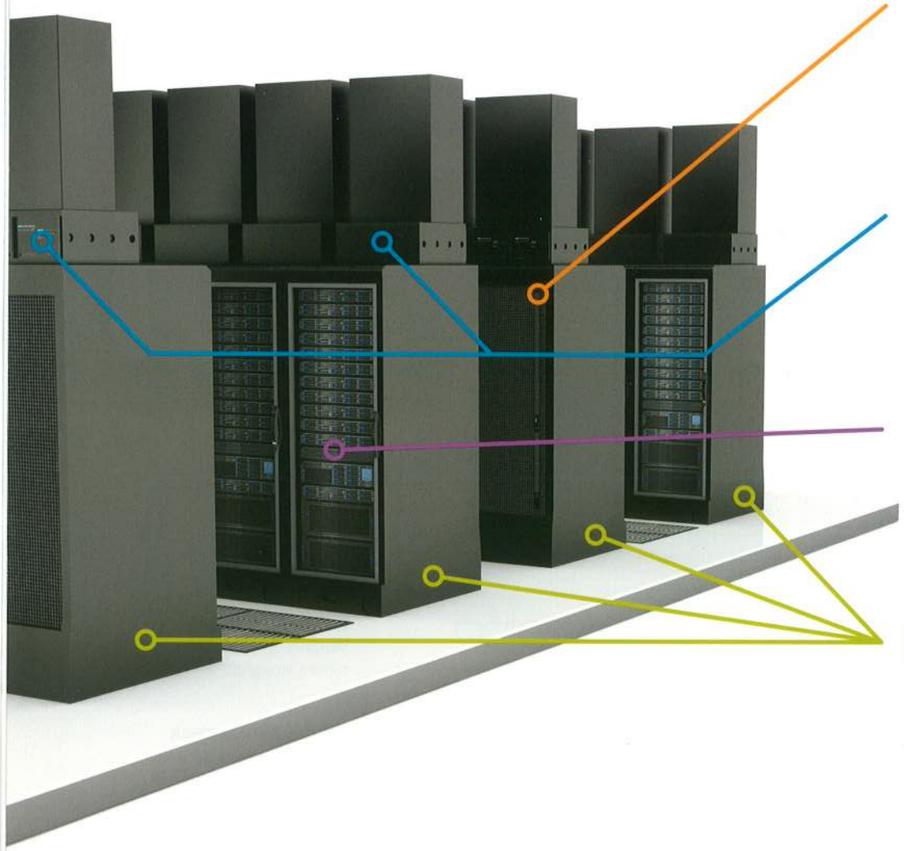
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The guide to a successful data center



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Is 'big' beautiful?

Are "mega projects" good or bad (p24)? In the real world, our experience is that giant tech projects are often doomed. Governments in particular have been landed with vast, wasteful contracts. Some are learning their lesson and commissioning tech in smaller chunks.

In data centers, economy of scale is a thing. You can buy more power and cooling in bulk, and resources in one place are more easy to consolidate. So businesses and governments are engaged in a process of replacing an array of tiny sites with larger central services.

Alongside these two dynamics, there's the public cloud. It offers cheaper services for those that outsource there, because these are delivered from massive bit-barns, built with the latest efficiency measures in mind.

We see one trend that might counter this. Waste heat can't be distributed easily, so there is no economy of scale there. There are a few outfits (Cloud&Heat, Qarnot, Nerdalize) that are going in the opposite direction, towards data centers constructed from tiny units distributed to where their waste heat can be used. That's an outlier for now, but keep an eye on it.

Mega or micro, we want to hear about any projects for our Awards scheme (p28). This year, the Awards do away with old-size classifications in favour of more categories that show up innovation in technology that can be applied to data centers, no matter how big.

Our Awards is where we find out what is happening in real-life data centers, and each year we are delighted to hear of new approaches and advances. Get in touch if you might be a contender!

Meanwhile, all projects, mega or micro, need management. Our DCIM (data center infrastructure management) supplement should be timely (p35), especially as after years of doubt it now seems that DCIM is getting its act together.

Is DCIM an ugly duckling, a daffodil pushing for the sun, a mythical unicorn... or the Wrath of Khan? Some of that will make sense in our supplement.

Finally, if you are running a data center and your customers want high reliability, we think you should look at page 32. Your high reliability could literally be a matter of life and death. Arc flash is a risk – and it might be the final push to make you outsource to a mega project.

•

Peter Judge – Global Editor
@PeterJudgeDCD



In the real world, giant tech projects are often doomed, but in DCs, economy of scale is a thing

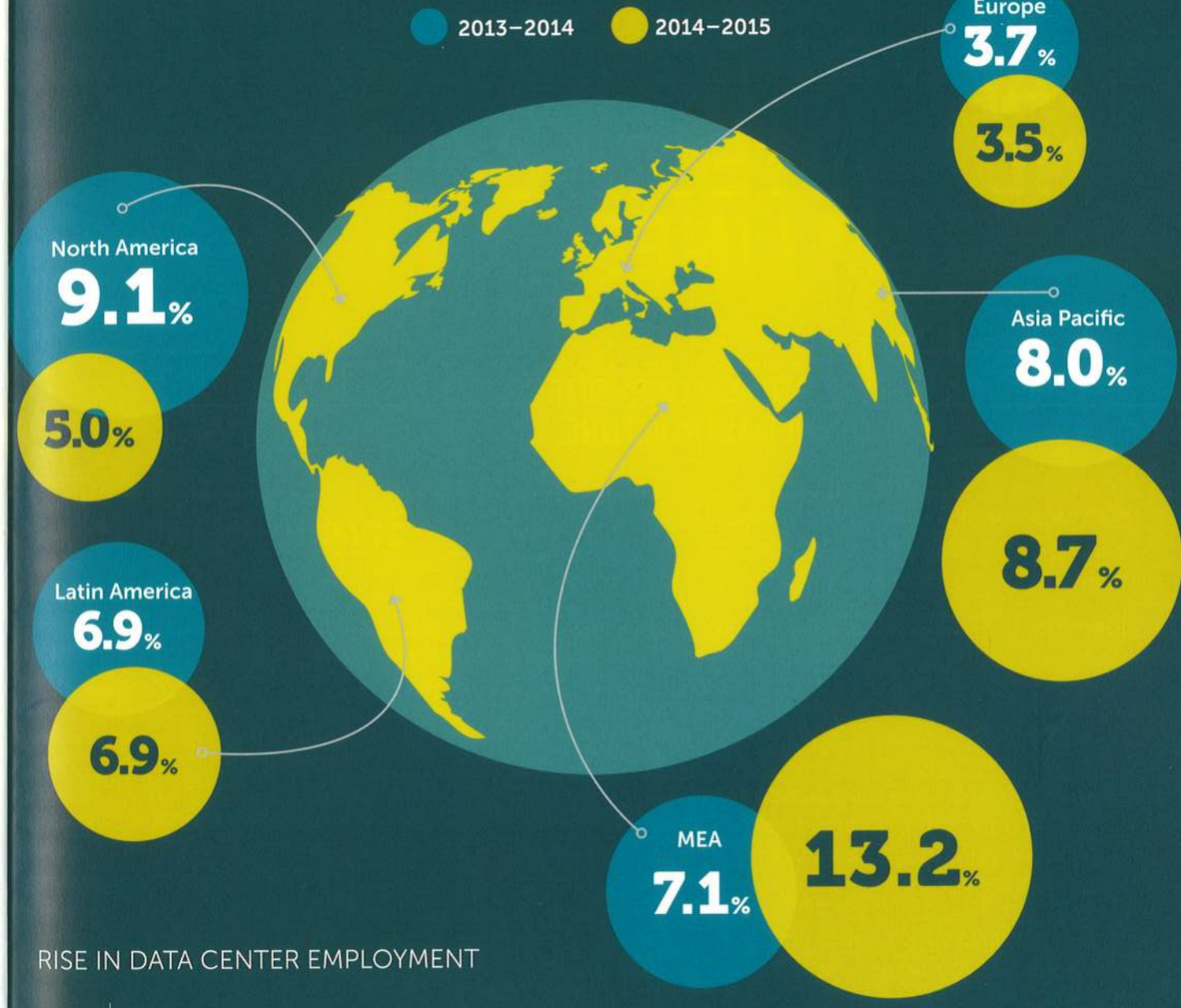
40%

of electrical injuries are from arc flash

Data center jobs

INCREASE IN EMPLOYMENT BY REGION 2013–2015

Data from DCD Intelligence



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Coraid bites the dust

Data center storage vendor Coraid has closed down and auctioned off its assets, after 15 years and $130m of investment. The founders are back with South Suite, promising SATA storage over Ethernet.
http://bit.ly/1aY2rfK

Ubuntu does containers

Ubuntu Linux 10.04 has a new LDX hypervisor and a "Snappy" core, both designed to give good support for cloud applications and containerization.
http://bit.ly/1d9081w

NTT spreads out to Mumbai

NTT Communications will open a new data center in India with Netmagic Solutions, a managed services provider 74 percent owned by NTT.
http://bit.ly/1KcI4lh

Nokia buys Alcatel-Lucent

The resurgent remains of Finnish phone giant Nokia have absorbed the French networking equipment firm that owns Bell Labs. Watch for more from Nokia!
http://bit.ly/1Gf4Ew7



Rackspace shares its free-cooled London site design

Managed cloud provider Rackspace has opened a 6MW data center in Crawley, south of London, built by Digital Realty, and the first large facility in the UK to use only outside air for cooling.

The design has been offered to the Open Compute Project, which allows data center players to share ideas and resources. Rackspace says the facility is designed to have a power usage effectiveness (PUE) of 1.15. All the power and cooling equipment is on the roof for efficiency and to allow an efficient vertical flow of power and air.

The cooling units are from Excool, using indirect outside air – or "free" cooling – taking in air to circulate through a closed loop system based on contained hot aisles. When the air temperature is warm, the Excool units add in evaporative cooling with a water spray system. This allows the site to operate without mechanical chillers, reducing its energy usage.

The power distribution system uses a conventional battery-backed UPS with conversion to direct current on the roof and back to AC for distribution to the racks.

The building has a BREEAM "excellent" rating and supports the latest (2011) ASHRAE guidelines. It is based on contained hot aisles that rest on a solid concrete floor; the air inside the building is at 24C, and the hot aisles 36C.

Open Compute Project principles mean the site equipment has less weight, waste and power requirements, but it can accommodate both Open Compute racks and conventional systems. At capacity it can hold 50,000 physical servers, and its current 6MW capacity can be extended to 12MW.

The site extends an ongoing Digital Realty and Rackspace partnership onto a third continent, says William Stein, CEO of Digital Realty: "We are delighted to see Rackspace establish its new managed cloud data center with such outstanding eco-credentials."

The ribbon was cut by local Conservative MP Henry Smith, who visited the project during its genesis and is currently standing in the UK's General Election. "I fully understand PUE," he quipped." And if I am not re-elected in May, I will be sending my CV to Rackspace."

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The Future of Data Centers

COMING JULY 2015

CORNING

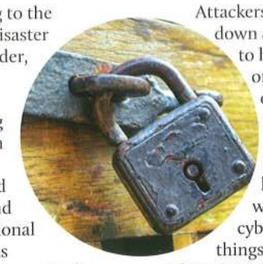
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Data centers face threat from SCADA

Embedded systems are an established attack route for industrial systems. Now they are being suggested as a risk affecting data centers, according to Ed Ansett, a leading expert on critical facilities.

The risk of embedded systems came to light when the Stuxnet malware was used to attack industrial controllers at an Iranian nuclear plant five years ago. Data centers are built to be secure, so it's assumed the risk doesn't apply there. But Ansett realized this was untrue when he stumbled upon a wireless gateway attached to a hardware controller in a data center. Attackers could go through programmable logic controllers (PLCs) or the SCADA control system to hit cooling systems, generators, switchgear, universal power supplies (UPS) or batteries connected to servers, as well as air-conditioning systems and plumbing systems that circulate chilled liquid, and even fire and security systems.

A successful cyber attack could result in the loss of power or cooling to the data center – a disaster of the highest order, says Ansett.



"While data centers are being assessed through TVRA [Threat, Vulnerability and Risk Analysis] and various international standards such as ISO27001, there seems to be little emphasis on security threat vectors via PLC/SCADA angle," said Leonard Ong, a professional advocacy committee member at ISACA, an international professional association focused on IT governance.

Attackers might try to take down a whole data center to hit one occupant, or else hold a data center operator to ransom. "The industrial control systems industry has been dealing with the threat of cyber attacks on such things as nuclear power plant, aviation, chemical, oil and gas for the past 10 years or so," said Ansett. "So, the methods of protection used by these industries can be applied to data center embedded systems."

http://bit.ly/1HzOCRD

Academics describe 'power attack'

Researchers in the US have suggested that attackers could hit the physical infrastructure of a cloud data center without any knowledge of undisclosed vulnerabilities, using the cloud service itself.

A malicious customer could wreak havoc in the data center by simply maximizing power consumption of the racks they have paid for, according to a team of researchers from College of William and Mary in Williamsburg, Virginia, together with colleagues from Ohio State University in Columbus.

Cloud-scale data centers frequently overprovision their power, in the same way that airlines often sell more tickets than there are available seats on an airplane, safe in the knowledge that one or two passengers will fail to show up.

If customers go to the limits of their capacity, very high consumption could trip the circuit breakers and take the whole facility offline, say the academics.

Researchers have successfully carried out the attack against virtual models of real-world data centers, including one of Google's facilities in North Carolina.

Experts have confirmed to *DatacenterDynamics* that such an attack is possible, but only in cases where there is no policy-based power capping in place. In a nutshell, a 'power attack' would use legitimate software to intentionally push power systems beyond their limits. If the attacker manages to buy up cloud resources hosted in one location, and send all of their racks into overdrive at the same time, power demand will reach levels where it could trip the circuit breaker.

Even if it doesn't, heat damage would degrade the performance and lifespan of servers.

http://bit.ly/1bAxKym

Apple rejects Irish swimming pool



Apple has filed an application to build a data center in Galway in Ireland, but rejected a request to include a heated swimming pool.

The company announced a plan in February to put €1.52bn ($1.7bn) into two new European data centers, in Ireland and Denmark, to open in 2017. The Irish proposal is understood to have been lodged with Galway County Council and features a single-story data center measuring more than 263,000 sq ft (24,000 sq m).

If approved, the new facility will be built on a 500-acre forest site in Derrydonnell, Athenry, and includes a single-story logistics and administration building measuring 56,000 sq ft, as well as a 3,000 sq ft maintenance building. There will also be huts for fiber networking, a power substation and standby generators.

$1.7bn

Apple's investment in two new European data centers

Apple rebuffed a request from local senator Fidelma Healy Eames that waste heat from the site should be used to warm an Olympic-sized public swimming pool, according to an early Connacht Tribune report.

Apple has said it currently has no plans to reclaim and reuse the site's heat, although it is understood it will be reclaiming heat from the proposed site in Viborg, Denmark. The site will, however, include its own water treatment plants and harvest rainwater.

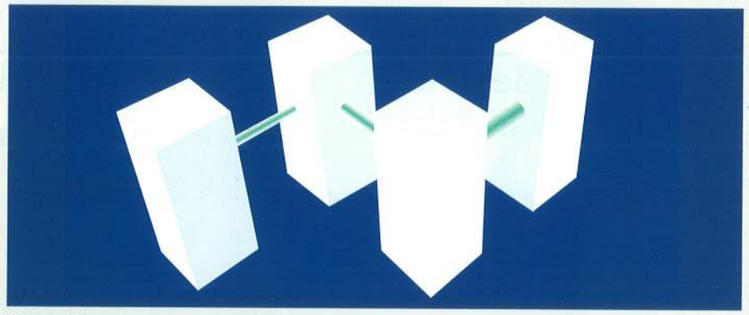
Around 300 jobs will be created, and the site will have parking for 200 cars. There will be landscaping and a 2.4 metre high perimeter security fence.

http://bit.ly/1KcGJkH

Network Migration: High-Performance Structured Cabling

Increasing bandwidth demands are requiring server and network hardware technologies to become more versatile to compensate for multiple migration options throughout their lifecycles.

Every data center faces the same challenge: the need to support increasing bandwidth demands while meeting the demands for scalability, flexibility and redundancy. In an attempt to control the associated costs, data center planners are looking to use high-density cabling architectures and computing equipment to maximize floor space utilization. However, given the pace of innovation in data center internetworking technology, not designing the structured cabling infrastructure correctly today may lead to costly upgrades, increased downtime and reduced competitiveness in the future.



Network interoperability becomes significantly compromised when data centers neglect the importance of cabling system design

A Standards-Based Approach

When Anixter created the original Levels program in the 1990s, it recognized the challenges designers faced when attempting to select the correct type and grade of low-voltage communications cabling necessary to support the emerging Ethernet protocol being deployed across enterprise networks. Even though the industry has evolved from those early 10 Mbps systems to established industry standards that support the 100 Gbps systems seen in today's data centers, the same challenges exist: the myriad of choices relating to media selection, cabling architecture and cable management.

Traffic is Changing the Data Center

Before the advent of cloud and server virtualization technology, most of a data center's traffic traversed from the data center local area network (LAN) to the wide area network (WAN). With server virtualization technology, the ability to decouple the operating systems and programs from the physical server improves server utilization as multiple virtual sessions can be hosted on a server. In today's virtualized environments, server-to-server communication accounts for 76 percent of traffic in the data center.[1] This change in traffic has led to a shift in the top concerns for investment of mid-market data center operators as the server capacity demands have increased[2]:

- Data center connectivity: 82%
- Availability and resilience of data center power, space, cooling and connectivity: 80%
- Control over the facility: 78%
- Access to the cloud: 75%

Data Center Road Blocks to High-Performance Structured Cabling

Migrating to a high-performance structured cabling system isn't as simple as a rip and replace of the current cabling. Five distinct areas need to be addressed when evaluating a data center migration:

a. Amortization of cabling investment
b. Infrastructure complexity
c. Pace of innovation and adoption
d. Speed of deployment
e. Restrictions of legacy systems

When determining a network migration strategy, you need to address these areas while preparing to support future technologies, whatever they may be. However, they will certainly require increased storage, speed, reliability and responsiveness. In Anixter's network migration strategy, it's important to address several criteria within the data center:

- Cabling topology: importance of design and cabling systems
- Media selection: copper and fiber technology
- Complexity
- Switch and general architecture
- Flexibility: design for growth

In next month's article, Anixter analyzes and explains the above strategy for network migration and looks at how this can create a viable data center cabling infrastructure that can last through multiple technology refreshes.

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[1] Source: Cisco
[2] Source: Forrester Research, US Firms< US$500M Revenue, 2014

Scotland approves build of the largest purpose-built colo in Fife

Queensway Park Data Centers has obtained permission to build Scotland's largest colocation campus in Fife in a £100m ($150m) development powered by energy from a nearby biomass plant. The site will hold 900 racks and is being built to BREEAM outstanding standards, with a projected PUE (power usage effectiveness) rating of less than 1.15. The campus is set to be one of the 'greenest' in the UK, since all of its power will be derived from a nearby biomass plant.

"This s an important piece of business infrastructure," said Robin Presswood, head of economy, planning and employability services at Fife Council. The business is a joint venture between established commercial property developers County Properties Group and AOC, both new entrants into the data center market.

The two-building campus in Glenrothes is less than an hour's drive from Edinburgh. Phase one will deliver a 75,000 sq ft facility incorporating 30,000 sq ft of technical space – enough to host 900 racks – and plenty of office accommodation. It is expected to open its doors by the end of 2016.

All power for the data center will be supplied by the recently built RWE Markinch Biomass Combined Heat and Power (CHP) plant, which runs on wood waste from a nearby paper mill. The plant in Markinch is the largest of its kind in the UK, capable of producing up to 65MW of electricity. Meanwhile, excess heat from the center will be used to heat adjoining offices. The development is set to produce the largest purpose-built data center outside the M25 corridor which encircles London.

http://bit.ly/1HNN2LU

IBM shares 700TB of threat data

IBM has launched X-Force Exchange, a cloud-based cybersecurity service that shares real-time data on threat intelligence and vulnerabilities. The platform allows guest access, but gives registered visitors access to more security intelligence, and lets them collaborate on security actions with IBM experts and other users.

At 700 terabytes of data and counting – and driven by IBM Cloud – X-Force Exchange will have a "vast library of security intelligence data." Among its features, it will provide "access to volumes of actionable IBM and third-party threat data from across the globe, including real-time indicators of live attacks, which can be used to defend against cybercrimes."



Security is one of the priorities CEO Ginni Rometty (left) has set for a services-led IBM, and this platform can add up to a thousand malicious indicators each hour. Information on the X-Force Exchange will come from QRadar – IBM's own threat research technology – in addition to data aggregated from its global clients, and provided by its global network of security analysts and experts employed by IBM Managed Security Services.

Data sources for the platform's reporting will include: threat info based on the monitoring of more than 15 billion security events per day; malware threat intelligence from a network of 270 million endpoints; threat information based on more than 25 billion web pages and images; intelligence on more than eight million spam and phishing attacks; and reputation data on nearly one million malicious IP addresses.

Further, IBM said it would provide support for the STIX and TAXII standards for threat intelligence sharing.

http://bit.ly/1DNa8je

Equinix builds $97m Sydney facility



Data center specialist Equinix is building a $97 million facility in Sydney – its fourth in the city and fifth in Australia.

The new site codenamed 'SY4' has been designated as an International Business Exchange (IBX) and will host 3,000 racks once finished.

"The NSW Government has worked with Equinix to support the company's growth in Sydney and we welcome the company's latest investment which will help to ensure that New South Wales businesses have the opportunity to leverage world-class interconnection services," said Stuart Ayres MP, New South Wales minister for trade, tourism and major events.

"These services assist in unlocking new revenue opportunities and drive growth in our digital economy."

According to a recent report from Frost & Sullivan, the Australian data center services market is expected to grow at a compound annual rate of 13.9 percent for the next five years, reaching AUD$1.7 billion in revenue by 2020.

The new 135,000 square foot data center will be located in Alexandria, a suburb on the south side of Sydney. The project has been divided into two phases which will deliver space for 1,500 racks each, and the company expects the first data hall to open its doors by the second quarter of 2016.

SY4 customers will get access to more than 250 cloud providers and more than 130 networks, and enjoy direct connections to the company's three existing facilities through a dedicated fiber loop.

The project brings Equinix' total investment in Australia to almost $360 million.

http://bit.ly/1JX2eoX

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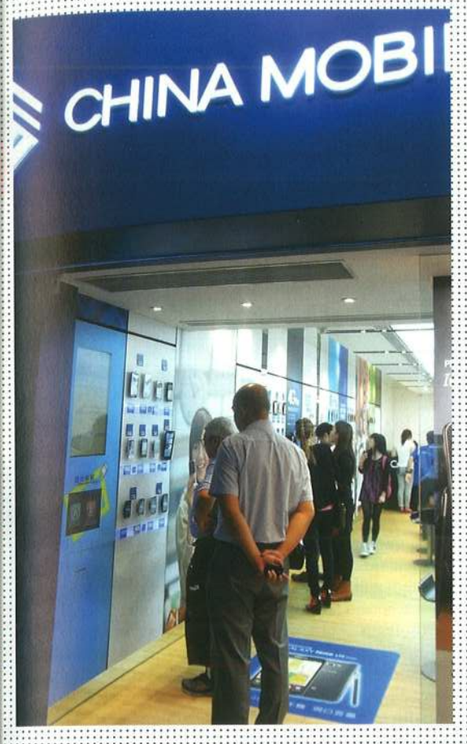
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China Mobile to build giant site at Karamay

Building has started on the largest data center in northwest China, located at the Karamay Cloud Computing Industrial Park, and owned by the local subsidiary of China Mobile.

The site covers an area of about 27.8 acres and will offer 119,000 sq m of floor space, capable of hosting 14,000 racks once fully complete. Phase one will be built at a cost of CNY5bn ($806m) and deliver 39,000 sq m capable of hosting about 3,600 racks. It is expected to be put into use by the end of 2016.

China Mobile's Xinjiang Data Center is designed to fulfill the Strategic Cooperation Agreement for Building Smart Cities and Promoting the Development of the Cloud Industry, signed in September 2014 by the Xinjiang subsidiary of China Mobile and the Karamay Municipal Government.

It also represents an important step taken by the telecommunications player for implementing the country's "One Belt and One Road" strategy, for promoting the nation's content and information consumption.

Once complete, the data center is expected to serve users from the electronics and internet industry first, followed by companies that develop the Internet of Things, aiming to foster a hi-tech information industry cluster and facilitate the efforts in restructuring and upgrading Xinjiang's industries.

The Karamay Cloud Computing Industrial Park, where the new project is located, boasts a strategic geographic position since it is located on the Eurasia Land Bridge, which is the rail transport route for moving freight and passengers overland from Pacific seaports in Russia, the Far East and China to seaports in Europe.

http://bit.ly/1Kd8Wlb

TALKBACK



It is clear there will be an alternative to x86 and, quite frankly, I think the world will be happier if there are two alternatives to x86. (p30)

-Brad McCredie, President OpenPOWER Foundation

See page 30



The White House, if you think about it, is like a new start-up company every four or eight years. We are still trying to weed out floppy drives.

-Alissa Johnson Former deputy CIO, The White House

http://bit.ly/1bQ7b8x



At a company I worked at previously, a worker was killed during construction of a data center. Data center employees deserve to be safe. (p32)

-Chris Crosby CEO, Compass Datacenters

http://bit.ly/1DxCJWb



80%
fewer reboots, as promised by the Nano Server

Microsoft offers Nano Windows Server for DevOps

Microsoft has announced Nano Server, a new slimmed down mode for Windows Server, designed for containerized applications, DevOps and virtualized environments.

The new "refactored" Nano version is designed for cloud applications and cloud infrastructure in a DevOps environment. Nano servers will require minimal patching and maintenance, and support containerized software. The rebuild goes beyond the previous reduced Windows Server option, Windows Core, offering an operating system with no GUI, no 32-bit support and no remote desktop support.

The refactoring comes with a promise that the new version of the operating system will need fewer patches, according to Mike Neil, Microsoft's general manager for Windows Server. In a conversation with *DatacenterDynamics*, he said it will run reliably with only remote management.

The Nano version is intended for large sites that have shifted to a DevOps model, in which applications are shipped from development to production inside lightweight containers.

To this end, Microsoft is supporting a fork of Docker, which supports Windows, and is offering its own containerization option hosted on its Hyper-V hypervisor. The result is an operating system designed for software-defined data centers that is intended to run in a more automatic mode, intended to head off open source contenders such as CoreOS.

"As we did the refactoring work in Nano Server, we went back historically and looked at what caused reboots, what are the dependencies, and what are the pieces of functionality for a server that are frankly not paramount capabilities?

"A lot of refactoring was driven by how to reinvent that. There was a trade-off – to make sure it can run apps, and provide the necessary infrastructure to build the cloud," said Neil.

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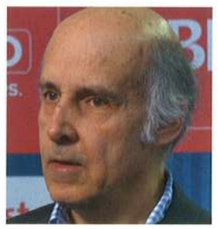
VOX BOX / DCD VIDEO



What's happening with fiber optics – are traditional methods obsolete?
There are new ways to do networks: faster, lower latency. Leaf-and-spine. Ways to take advantage of 25G over a pair of fiber versus doing 40G over four pairs of fiber. We have ways to support that and split the signal out to get some redundancy. We are a big proponent of OM4 fiber and the new colour scheme, which we are calling Erica Violet.

Michael Salvador
Technical solutions manager, Belden

http://bit.ly/1I4mMgG



Is there an economic case for using sustainable technology?
If we don't, the human race will collapse by the end of the century. Doing something now is essential, and there is also a business case for it. If you use less equipment, there is a capex benefit. If you bring down energy consumption, you have an opex benefit. Using renewable energy has a big impact on your brand.

Robert Tozer
Managing director, Operational Intelligence

http://bit.ly/1Fk8DeE

RagingWire opens 'cutaway' data center in Sacramento

NTT-owned RagingWire, one of the world's largest colocation providers, opened a data center in Sacramento – literally cutting the ribbon during a 600-guest gala event. The 180,000 sq ft CA3 site is built on a campus known as 'The Rock,' and is fully integrated with its CA1 and CA2 siblings, for a total of 680,000 sq ft of data center estate, making it the largest campus in California. A raised-floor facility, CA3 can host 14MW of critical IT load and offers a 69kV power substation, 70,000 sq ft of server space and 10,000-ton cooling capacity.

The technical specs of CA3, however, are just footnotes in this latest data center expansion for Japan-based NTT Communications (NTT Com), which purchased RagingWire in 2013. RagingWire says CA3 is a revolutionary shift in design, appearance and accessibility, with one source calling it the "Crystal Cathedral" of the data center industry. In most data centers, visitors must enter into secure areas to view the facility's features, but CA3 is different, says RagingWire's CTO, Bill Dougherty. "I think we have really raised the bar for what a colocation data center can and should be," said Dougherty. He said CA3 is an example of RagingWire's latest design methodology, and employs the "cutaway data center" principle. "We designed CA3 so we can show it off and tour it, and let a partner or customer see every critical space without having to enter a secure area."

And the key to accomplishing this goal? Glass, glass, and more glass. Transparent corridors throughout the data center give visitors a chance to take a closer look at its technical features, without compromising security. Dougherty pointed out, for example, that visitors first encounter a glass wall that allows them to look directly under the raised floor in CA3.

Next is the Executive Briefing Center, where more glass gives an insight into the network operations center. "You get almost a 200-degree view of the data center floor from here. Perhaps CA3's most unique feature is a glass-enclosed sky bridge that juts out above part of the floor. From here, Dougherty continued, staff can explain how cages are wired, or demonstrate how customer data is protected. "The sky bridge is secure enough that during the opening, attendees were able to carry their glass of champagne into it – now that's something you would never have allowed above a data center floor before."

http://bit.ly/1Gp6ltr



Global colo revenues to reach $36bn by 2017

The worldwide colo market will bring $36.1bn in annual revenues by the end of 2017, according to industry analysts 451 Research. That's a considerable increase from $22.8bn in revenues projected for this year – 78 percent of which belongs to small local players. "This is a fragmented industry," said Kelly Morgan, research director for North American data centers. "It is becoming harder for them to compete with the more geographically diverse providers. We will see continued consolidation."

Hadoop will hold half of all enterprise data

Hadoop is set to expand massively, with ambitious predictions suggesting it might hold up to half the data in the enterprise by 2020. "Fifty percent of enterprise data will be in Hadoop by 2020," said Rob Bearden, Hortonworks chief executive, from the stage of the Hadoop Summit in Brussels. Companies including British Gas and JustGiving are using the system, and the universe of Hadoop projects both inside and outside the Apache Foundation continue to expand.

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Education stats

- The population of Indonesia is estimated at around 250 million.
- School-age population: from 0-14 years (26.2 percent); and 15-24 years (17.1 percent).
- Only 22 percent of the college-age population are enrolled in a school in Indonesia. This figure is lower than countries such as Brazil, Russia and China.
- 11.1 percent of data center professionals have graduate degrees in Indonesia, which is significantly lower than the global average of 33.7 percent and the South East Asia average of 20.5 percent.
- 43.1 percent of data center professionals have a post-graduate degree in Indonesia, which is higher than the global average of 36.4 percent.

Indonesia's skills gap

Data centers in Indonesia are booming. *Paul Mah* asks if the country can find enough skilled staff to run them



Paul Mah
South East Asia Correspondent
@PaulMah

Indonesia is the fourth most populous country on Earth, with a buzzing tech sector. But with a population of more than 250 million, it has a shortage of data center staff. How come?

Indonesia's tech is definitely growing: ownership of mobile devices and better internet connectivity is allowing more people to tap into cloud services and use social media, creating demand for data center services. But the government's Rule 82, which calls for certain types of data – particularly data from financial institutions – to be kept inside the country unless prior approval is obtained, is also creating demand.

Ajay Chakravarty, the APAC director of data center talent advisory firm Datacenterpeople, explains that a "very large Indonesia bank" recently moved data from its Singapore data center to a new disaster recovery center in Surabaya to comply with the regulation. Chakravarty says that a number of foreign-owned banks have also cited the regulation as a major reason to upgrade their local data center capacity, with "on-shoring" being one of the top items on IT to-do lists.

So how is this demand affecting the data center and cloud space? Is the existing base of data center professionals in Indonesia sufficient to keep up with the rapid growth there?

Apparently not, according to Sudev Bangah, IDC's head of Indonesia operations, says there is a shortage of manpower, and that new data center operators may find it difficult to retain the right professionals with the required mix of skills due to increased competition. "This [data center] skillset is scarce because they get stolen [head-hunted] very quickly," he says.

Anecdotal evidence suggests this shortage is not going away. We have heard of an increase in instances of job hopping, as well as companies being forced to hire managers that may be less than fully qualified for their roles.

Sumit Puri, vice president of regional operations and technology for insurance giant Prudential in Indonesia, confirms that there is "huge competition for skilled data center professionals." He says this is particularly acute when it comes to data center migration specialists, which he says is a direct result of Regulation 82.

"The primary reasons for these talent shortages stem from the stupendous growth of the Indonesian economy, the rapid growth of the services sector, and the weakness of the nation's educational system to prepare students for careers," says Chakravarty (see box, Education stats): "With the current situation, Indonesia will only be able to fill about half of their entry-level jobs with fully qualified candidates. At senior level, modest shortages of a skilled workforce will emerge, but many of the candidates will lack the global exposure and leadership skills needed to succeed."

22% of college-age Indonesians are in education

Better pay is an obvious measure to meet immediate manpower needs for staff with a desired skillset, but this will only work for the largest enterprises or data center operators with the financial clout to pull it off, and can be harmful to the industry in the long term.

As Chakravarty says, hiring from competitors sends an unhealthy message that employees need to change jobs to advance their careers, as opposed to enhancing their skills. What's more, pay may not always be the only consideration when attracting top talent.

"Besides adequate remuneration, I think some other factors, like organization, culture, work-life balance and stress caused by daily travel, are also at play here," said Puri, alluding to the more laid-back and "less ambitious" attitudes of Indonesian culture in general.

Ultimately, this means that training is the key towards progression for the data center industry in Indonesia. Fortunately, there is evidence that the industry is moving towards up-skilling their existing IT workforce in order to address the manpower issue.

"BFSI [Banking, Financial Services and Insurance] and resources sectors have deep pockets to spend on their IT talent, and they are in the midst of transforming their workforce and sending them for the right kind of training," says Bangah of the current manpower crunch.

Bangah pointed to IDC data which shows that "up-skilling of existing IT workforce" is the number one strategy advocated by Indonesian organizations. Given that the "average" solution across Asia Pacific revolves around "hiring the right talent," this shows that Indonesian organizations are actually very aware of the situation – and working to rectify it.

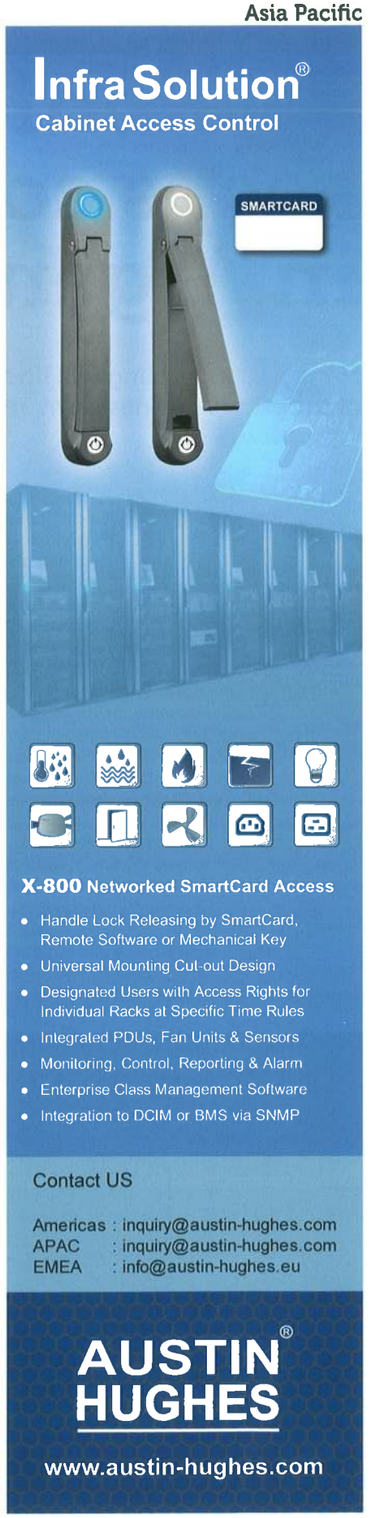
What about businesses that may not be able to afford sending their workforce for additional training, though? "[The government] has to give more tax incentives for carriers and data center operators," says Puri, who also believes that more training institutes should enter into partnerships with corporations in order to train students from colleagues and universities.

There is a huge opportunity for global technical training providers operating in the region to move in and work closely with government and academic institutions to train the workforce, says Chakravarty.

And while it may take some time for existing professionals to get trained, the situation is probably not dire yet. According to Nick Parfitt, DCDi analyst, the high growth projection for Indonesia is partly due to the average figures being brought down by Japan, which is facing limited growth. "There is also more limited projected growth in the more established markets of Australia, New Zealand, Singapore and Hong Kong," he explains.

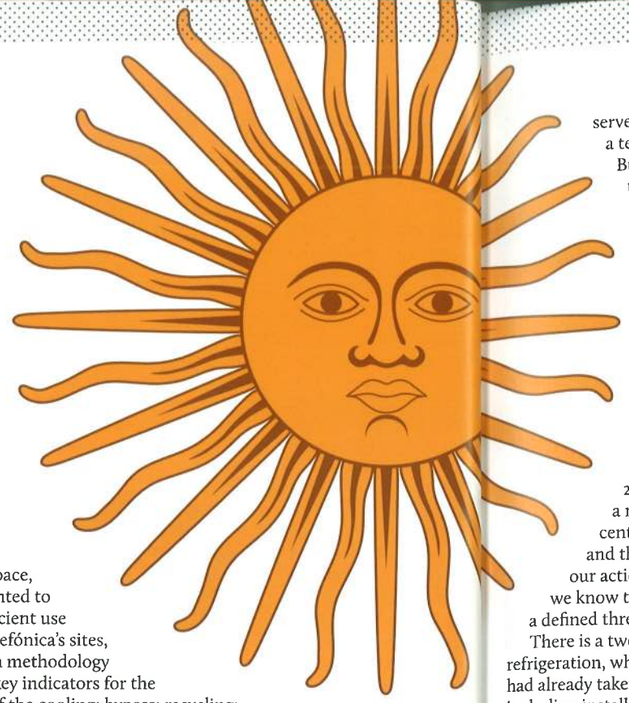
Regardless, any additional efforts towards training – or even a better alignment of college courses to meet the needs of the data center and cloud sector – would go a long way towards addressing the manpower crunch. And where there are no government initiatives that have been announced yet, those we approached agree that there is a greater likelihood of it happening under the administration of Indonesian President Joko Widodo, who came into power in October 2014.

"The acid test will depend upon how well Indonesia is able to train its own workforce, how long that will take, and how far the continuing growth of other markets in South East Asia will create a market for skilled labor that crosses national boundaries," says Parfitt. ●



Telefónica keeps cool in Argentina

Managing its cooling will boost the cloud business of the telco's business arm, reports *Virginia Toledo*





Virginia Toledo
Editor LATAM
@DCDNoticias

Telefónica Empresas Argentina (Telefónica's enterprise arm) has optimized its data center cooling, and done it well enough to earn last year's *DatacenterDynamics* Latin America award for "improving the energy performance of a data center."

But it's not about the prizes. The real reason for the cooling plan is because it fits Telefónica's company strategy, to provide enough infrastructure resources to services like hosting, Infrastructure as a Service (IaaS) and applications – an area that is growing fast.

Right from the start, the idea was not to grow linearly in space or square meters, but to consolidate and virtualize servers to upgrade the existing facility and have more IT equipment per square meter, making its space occupation more efficient, says Andrew Oteiza, head of data center services design and implementation at Telefónica Business.

As well as space, Oteiza also wanted to make more efficient use of power in Telefónica's sites, so he adopted a methodology based on four key indicators for the management of the cooling: bypass; recycling; negative pressure/obstruction under false floor; and balance. "These indicators allow us to control the variables that intervene in the data center from the point of view of cooling, but also show us where we need to implement improvements for satisfying the requirements of the new IT equipment," says Oteiza.

Oteiza must decide what's needed for a new IT load, without triggering a service problem. From the start, the system detected problems, including a very low temperature in the server rooms, which meant an additional cost above the required consumption: "In the server room, cold aisles were at a temperature of about 21°C." But IT kit is now guaranteed to operate at temperatures of 23°C plus, or minus 2°C.

$10.8bn

Telefónica revenue worldwide (2012)

The system takes information from about 5,000 sensors located in the more than the 800 racks of the data center, and can then control the operation and cooling inside the server room. It's a dynamic system because the sensors measure temperatures for 24 hours and they can make a map of all halls of the data center. "We are still improving, and the system allows us to direct our actions to the areas where we know the indicators are below a defined threshold," says Oteiza.

There is a two-year plan to optimize refrigeration, which began in June 2014 and had already taken several steps by October, including installing massive blanking panels to minimize recirculation.

Other containment tools seal the passage of power wiring below the raised floor so cold air does not come out in areas where it is not needed. Other actions are planned to keep cooling efficient in future.

Technical manuals and responsibility matrices have been translated internally so the company knows what type of equipment is suitable for its data center racks. For instance, the servers must be rackable and manage air in a front-to-back direction: "This has enabled us to adjust the specifications and purchase orders for both servers, storage and networks," explains Oteiza.

In 2015, he expects to take on more tasks, such as building more confined corridors, automating physical controls that deal with opening doors, and improving the power-consume monitoring inside the racks.

Finally, all these things are being done in a live data center with more than 500 customers, without any impact on services or availability.

"The situation became more complex because every action must be validated and agreed with each customer," says Oteiza. Each change is implemented in a controlled window, and customers are kept informed by the change management process of the company, which has an ISO 20000 certificate for IT services management.

"If you run a task with risks, it should be under controlled conditions, and in a time window that does not affect production services, but always with the formal approval of customers," says Oteiza. "Clearly, the impact can be minimized if it is carried out methodically."

Telefónica Empresas is just part of a larger body, of course. Launched in Argentina in 1990, the Telefónica Group is now one of the largest operators in Argentina, offering other services including broadband, and local and long-distance telephone services. It also has a mobile business run by Telefónica Móviles through its brand, Movistar.

Telefónica Empresas, the enterprise brand, is also diversifying, with a portfolio including colocation services, hosting and IaaS. "We offer virtual servers and will soon also offer virtual data center services to customers. You can autoprovision your own virtual server farm," says Oteiza.

Telefónica wants to offer this cloud infrastructure beyond Argentina, with data centers in several Latin American countries, so it can add value for regional customers. ●

Latin America



Telefónica Argentina

- Founded in 1990
- Mobile brand Movistar
- Business brand Telefónica Empresas
- Turnover US$690m (2014)
- Broadband, fixed and mobile phones
- Colocation, hosting and IaaS
- Headquarters in Buenos Aires

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Digital Transformation: an opportunity to innovate, differentiate and grow

So what does Digital Transformation really mean? – It is the realignment of, or new investment in, technology and business models to more effectively engage all stakeholders at every touch point in the customer experience lifecycle.

Digital Transformation and hybrid cloud computing are delivering the most sustainable platform for business growth and change seen in decades. Senior executives and Business unit managers are now demanding these services replace legacy systems to deliver greater efficiencies and improved business outcomes. Cloud is a game changer and is driving decisions that will revolutionise Application, IT and Data Centre Infrastructure.

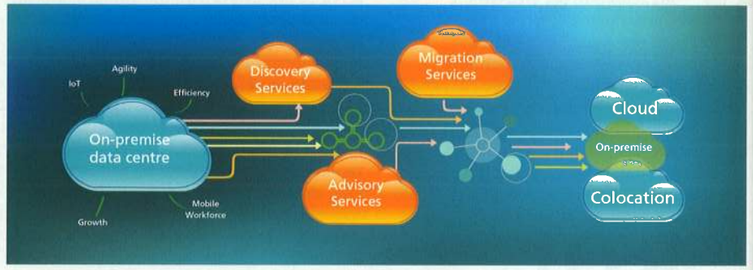


Image Source: Green Global Solutions Copyright 2015

Based on the explosive growth of Cloud applications, market forecast showed Asia Pacific (excluding Japan, including ANZ) overall CAGR growth is 21.7% and a total of US$7,952 million. The growth in the number of Cloud users in Asia Pacific is spectacular, here there are less legacy IT systems than in other more mature regions. It is expected that there will be significant further investment into Cloud Service/Managed Service Providers (MSPs). In turn it is expected this investment will lead to a rapid uptake in Cloud applications, as customers Digitally Transform from Private Networks and Applications to varied Hybrids of MSP and Public/Private Data Center based ones. Consider examples of Cloud startups like Xero in New Zealand: they have been doubling their revenues over the past three years since they started offering online accounting applications in 2006, with their customer count soaring to 400,000 in December 2014 from 1,000 in 2008. However, while cloud computing offers big benefits, a number of vital questions require answers before this journey can begin. These include ways in which business engages with their stakeholders, application performance expectations & the security and privacy of their information. Each must be viewed in the context of exactly how planned cloud services will be used and the systems and infrastructures on which they are to be built.

Therefore an opportunity exists to provide a holistic approach to this journey by integrating best of breed, subject matter experts and associated tools into a suite of professional consultancy and programme management services. The outcome can then drive a more holistic view of the entire Digital Transformation process by aligning customer's on-premise Applications, IT Infrastructure, Data Centre Infrastructure and present operational processes to maximise the savings of any Hybrid Cloud strategy. Customers can make informed decisions based on accurate information rather than industry hype.

The above graphic illustrates the Digital Transformation process as we see it. Digital Transformations is a journey customers, and service providers, take to be able to deliver cloud based services of varied options. One solution does not fit all. It takes a process by which discovery is made of the customers' unique circumstances, today, as well as their plans for future expansion. Following this discovery process is a range of advisory and migration services/processes to be considered. There are technological and business process change options along the path: many are technically feasible; some are viable in TCO terms; but, only a few are genuinely suitable given a true understanding of the customer needs. Green Global Solutions is set to be the trusted advisor for many companies venturing out on this journey. Green Global has secured their first AsiaPac Customer – Aion Technologies Pte Ltd and is undertaking a Feasibility Study for their Hybrid Cloud/Digital Transformation.

Sources:
https://www.appsrunthecloud.com/opinions/index/150
http://www.stuff.co.nz/business/industries/64042041/xero-customer-numbers-hit-400000

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Global Data Center DCIM Market Overview 2014

$68.66 billion
Global: Total invested (US dollar) in power, cooling, monitoring, UPS, DCIM and modular systems in 2014

31.9%
Global: Proportion of total invested in in-house DCIM equipment, solutions and services in 2014

42.6%
UK/Ireland: Percentage invested in DCIM in 2014

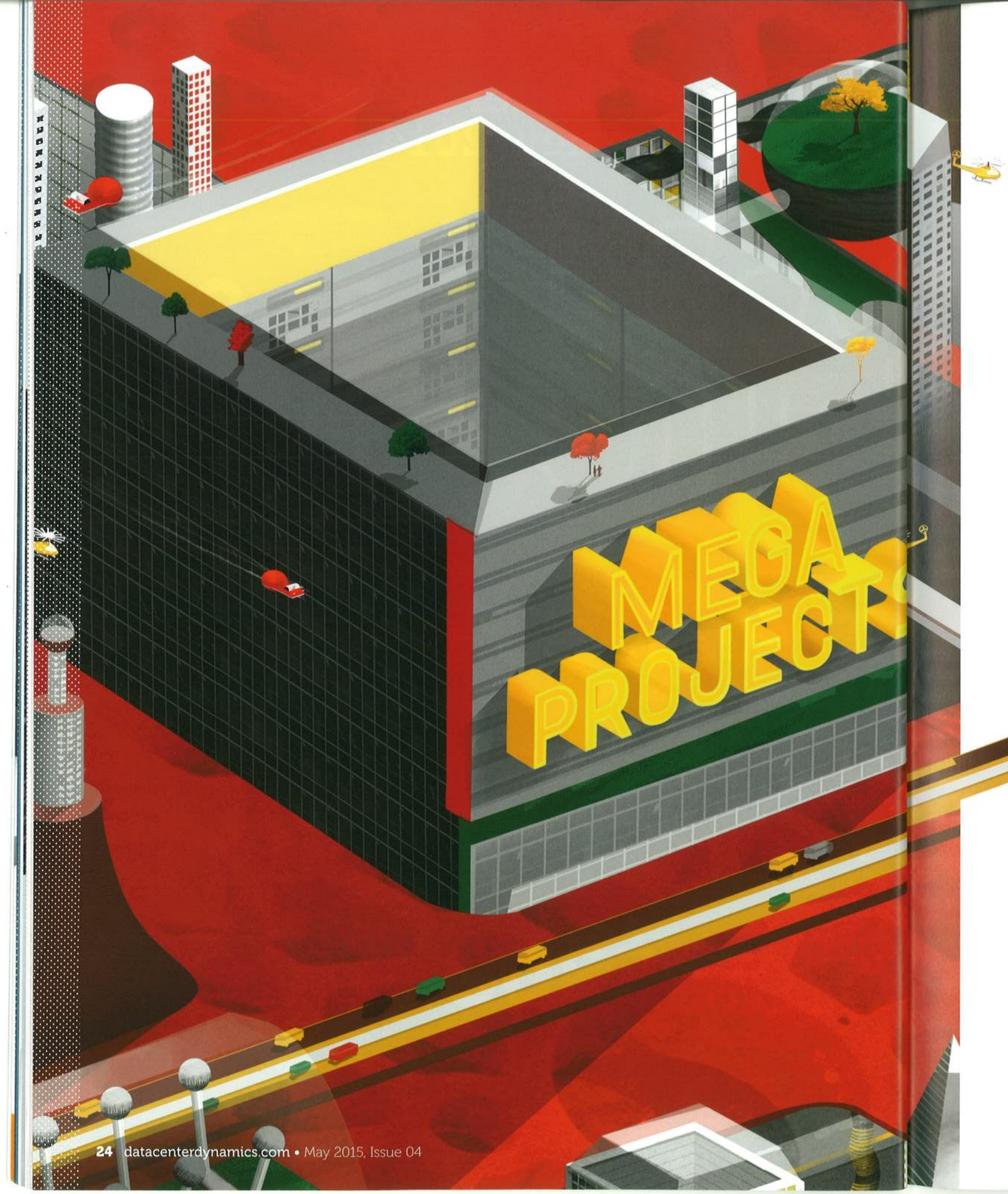
$22.10 billion
North America: Total invested (US dollar) in power, cooling, monitoring, UPS, DCIM and modular systems in 2014

$3,300 million
Germany: Total invested (US dollar) in power, cooling, monitoring, UPS, DCIM and modular systems in 2014

35%
Netherlands: Proportion invested in DCIM in 2014

$800 million
Nordic markets: Total invested (US dollar) in power, cooling, monitoring, UPS, DCIM and modular systems in 2014

Information taken from DCDi Global Data Center Market Overview. Available here: http://bit.ly/1FhM7yG



Bill Boyle looks at billion-dollar data centers and asks if they are the future of the industry – or its enemy

Mega projects have a bad image. Today we tend to think that small is better, and want things to be less global and more local, but it looks as if giant data centers are here to stay.

Mega projects are usually defined as ones costing more than US$1bn; they attract public attention because of their impact on communities and the environment. The European Cooperation in Science and Technology categorizes mega projects as having "extreme complexity and a long record of poor delivery."

So there we are – already talking failure. Right now, data centers are getting bigger – and quickly.

We are producing, gathering and analyzing ever bigger data sets, and keeping them for longer, creating a need for vast storage. But, in many ways, our bigger data centers feel like a move backwards, towards the era of huge mainframes housed in air-conditioned buildings.

Large enterprises face economic problems that are forcing them to consider what for many would have been unthinkable earlier – outsourcing their IT. Massive cloud companies such as Amazon Web Services (AWS), Facebook and Google have emerged with mega data centers that can, and will, do that job.

According to Jeff Paschke at 451 Research: "Four of the largest-scale internet firms – Amazon, Apple, Google and Microsoft – continue to invest heavily in building out mega data centers globally, with capital spending at the four companies over the past two years totaling more than $56bn, according to publicly filed earnings releases. In 2014, capex spending at the four companies increased 31 percent over 2013 spending, part of a continuing trend of increased spending on data centers and their infrastructure."

Large data centers exploit the economies of sheer size. The most efficient providers build data center space at about $5-9m per megawatt, compared with roughly double that range for most enterprise data centers at the moment. "Large internet providers are further able to improve their efficiency through expansion because they often build additional capacity at existing campuses, where basic infrastructure already exists," says Paschke. "We [451 Research] expect that a higher level of capex spending will likely continue over the next few years for these companies as they continue to build out data center capacity."

If outsourcing continues, in a decade the traditional enterprise data center will not exist. What will remain are enterprise IT control centers; managing processing that is done in mega data centers.

All the enterprise data will be stored in these mega data centers, alongside data from cloud service providers and data aggregators. Multiple telecoms operators will provide long-distance links to users, partners, suppliers and other mega data centers.

These facilities will be software-defined, with compute, storage and network functionality provided by layers of control software running on commodity hardware. ▶

$56bn
invested by Amazon, Apple, Google and Microsoft in cloud data centers in the past two years

Storage will be located close to the servers in a "Server SAN" model.

The new architecture has lower costs of IT management and can access vast amounts of industrial internet data at high speed.

Effective enterprise IT leaders will realize they can get far better results – probably minus the downtime and appalling gaffes in choosing software and hardware – using a cloud provider. This will let them exploit the data avalanche from the internet and Internet of Things, with real-time analytics.

They will also get a seat on the board because they will be seen as strategic and not technical, since they will have given up hugging the server in the basement.

In the public sector, initiatives such as the UK Government's G-Cloud will be revived worldwide to bring sense to government IT procurement. The independent software vendor (ISV), quietly grazing like a modern-day brontosaurus on lucrative government contracts handed out by witless civil servants, will die out.

Colocation will still be needed. Legacy applications will run on their original hardware, but shifted into the mega data center using a colocation model, allowing transport of data to and from other clouds, Infrastructure as a Service (IaaS) or Platform as a Service (PaaS) applications.

Most business executives see IT as inefficient, badly designed, slickly marketed, high cost, very slow to change, and run by people who speak a language designed to exclude them. Line-of-business executives want to use external IT services to achieve business goals and expel the last High Priests of IT.

The software defined data center will be the key ingredient. Its components are: open hardware stacks (eg, Open Compute Project) and open software stacks (eg, OpenStack). For example, a combination of OCP and OpenStack, plus a data center integration and orchestration layer to optimize power and cooling, provides a powerful base for next-generation cloud infrastructure.

With this low-cost automated infrastructure, mega data centers can provide the best platforms for IaaS and PaaS offerings to enterprises, cloud service providers and large government organizations. The next-generation of cloud operating systems will control server, storage and network resources, as well as facilities infrastructure; that means power, cooling, lighting and routing of connectivity will all be controlled by the operating system.

The traditional data center will radically change over the next decade from one that is stacked and hardware-centric to one that is software-led. Organizations should keep what remains in the enterprise IT control centers to a minimum. ●

Sweden

Facebook extends in Luleå



Facebook hasn't said how much it is spending on its giant data center site in Luleå, Sweden, but construction costs on the first building were estimated at five billion kronor ($760m), and the second one will be similar.

Near the Arctic Circle, the site can use external air cooling all year round, and has renewable energy from multiple sources.

A set of three buildings, each 28,000 sq m (300,000 sq ft) were planned. One came online in 2012, and work began on the second one in 2014, using Facebook's rapid deployment data center (RDDC) design, which has been shared with the Open Compute Project for other operators to use.

In Luleå 1, compute equipment is on the bottom floor, a hot air plenum makes up the middle floor – used for transporting air throughout the building and mixing cold air coming in and exhaust going out – and the top story contains a full cooling system.

See May/June 2014 issue for more details.

USA

Google adds $1bn to Iowa site

A $1bn investment in Council Bluffs will take Google's total spend on the site to $2.5bn, and could make it Iowa's biggest economic development project.

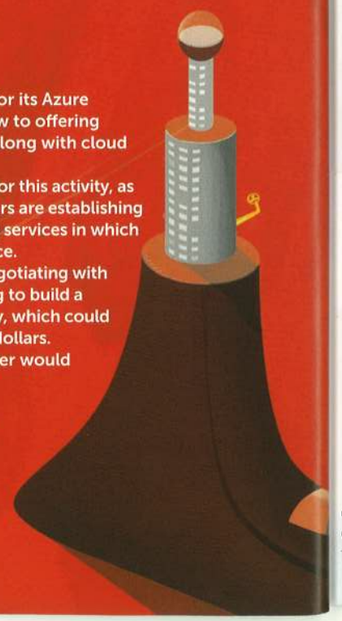
The site has been developing since 2007, and is supported by $16.8m in tax incentives from the Iowa government. The search giant is expected to ask for $19.8m more in sales and use-tax refunds. In return, the company would have to create as many as 70 new jobs in the area if the new funding is approved.

Iowa makes an attractive location for data centers thanks to cheap land, a low natural disaster risk and access to renewable wind energy.

Microsoft is currently building its second data center in Iowa, at a cost of $1.2bn. Codenamed 'Alluvion', the facility in West Des Moines will power its Azure public cloud service. And Facebook has recently opened the first phase of its modular, air-cooled data center in nearby Altoona – its first to be powered by 100 percent renewable energy.

Korea

Microsoft's big plans



Microsoft is rapidly building data centers for its Azure cloud service around the world, with a view to offering customers business software as a service along with cloud infrastructure.

Asia is going to be an important region for this activity, as the cloud is growing fast there, and providers are establishing data centers to meet demand for delivering services in which data is held locally for reasons of compliance.

For the past year, Microsoft has been negotiating with government officials in South Korea, aiming to build a data center in the country's largest port city, which could well mean an investment of several billion dollars.

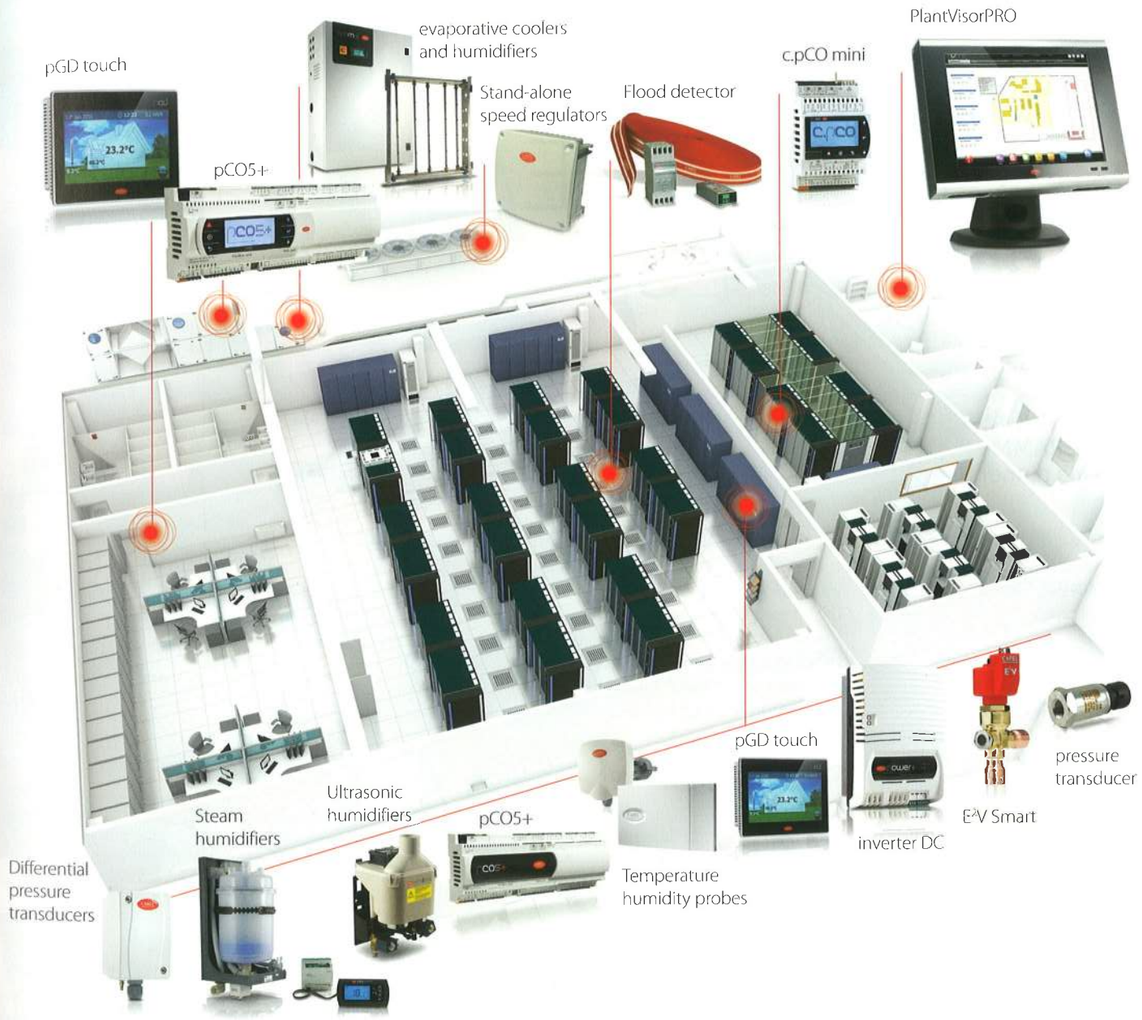
Reports say that any eventual data center would most likely be built on a 1.8 million sq ft site near a data center run by LG.

In the meantime, Microsoft covers the region with services delivered from data centers owned by Equinix in Hong Kong and Singapore.

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RISC wars: there will be blood

Two different takes on the RISC architecture will slug it out to the end, with ARM and Power spoiling for a fight, says *Max Smolaks*



Max Smolaks
Reporter
@maxsmolaksDCD

In one year, the OpenPower Foundation has achieved the impossible: it has managed to make IBM's venerable Power architecture exciting.

The non-profit organization has attracted a hundred members, including heavy-hitters Google, Nvidia, Canonical, Samsung and Mellanox. It has announced its first server – the TN71-BP012 – made by Taiwan-based Tyan, soon to be available in SoftLayer's cloud (note the irony of IBM being the first major customer for a non-IBM Power-based system).

OpenPower aims to advance the development of Power chips, with IBM sharing intellectual property including processor specifications, reference designs and code.

After selling off its chip foundries in 2014, IBM has focused on core design, moving closer to the model pioneered by ARM, the British hardware designer that was fabless before it was cool. The plan is to license the Power architecture, so members can build a full hardware and software stack.

Five years earlier, AMD sold off its foundries to the Emirate of Abu Dhabi (to become GlobalFoundries); Nvidia is also licensing its designs to OEMs the same way ARM does.

"I remember when I first announced OpenPower; some of the first people who stood up and took notice were from ARM," says Brad McCredie, vice president of Power systems at IBM and president of the OpenPower Foundation.

OpenPower wants to do for servers what ARM did for mobile devices – create an open ecosystem, says McCredie. "But the business model is modelled after ARM."

Despite this mutual respect, both are developing low-power RISC (reduced instruction set computing) chips to compete with Intel's dominant x86 instruction set. The titans must clash.

In the red corner is ARM: a small, clever company that has proven you don't need a foundry to corner a chip market. Its designs are in nine out of 10 smartphones and tablets, and for a while it seemed as if ARM-based silicon would transform the data center.

In March, ARM boasted that it expects a 20 percent server market share by 2020. So far, only one OEM, Applied Micro, is shipping 64-bit ARM-based chips, and HP's diminutive Moonshot remains the only server that runs them – alongside alternative blades with Intel's Atom inside.

In the blue corner (where else?), we have IBM's tried and tested Power, with all the sex appeal of your father's Volvo – until recently. The Power architecture was born in the late eighties. IBM produced nine generations of proprietary Power chips, and spawned an extensive family tree that includes Apple computers and the Nintendo GameCube.

IBM licensing its designs to third parties amounted to a declaration of war. The OpenPower collaboration has produced the Tyan server, a GPU developer board, and will figure in Summit and Sierra, two US Department of Energy supercomputers IBM is building.

Meanwhile, Rackspace is cooking up a hearty stew with ingredients from OpenPower, Open Compute and OpenStack to deploy in its own data centers. And Applied Micro was in Power.org, IBM's earlier architecture effort. Could it make Power silicon alongside its ARM-based X-Gene chips?

ARM admitted that its server chips are late (see box) at 2014's DatacenterDynamics Converged event in London.

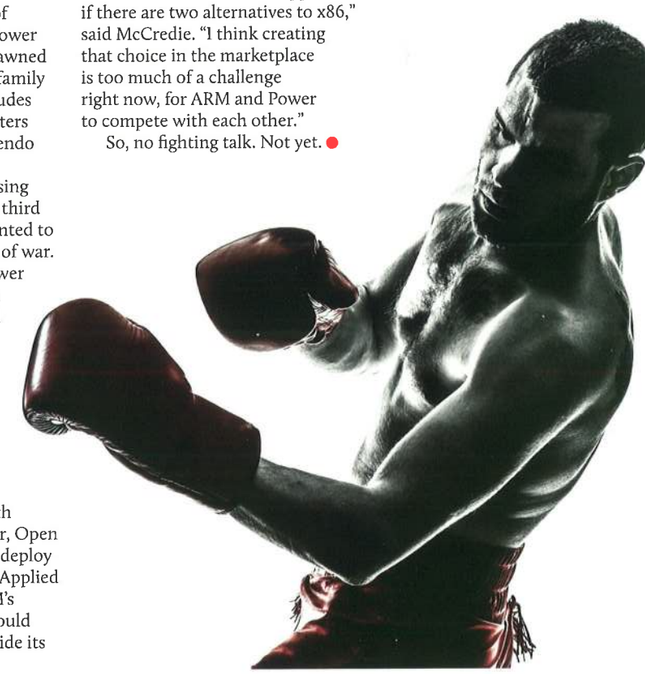
Both IBM and ARM are promising dense, cold, low-power servers to challenge Intel's dominance in the data center. But individual customers can only accommodate one take on RISC.

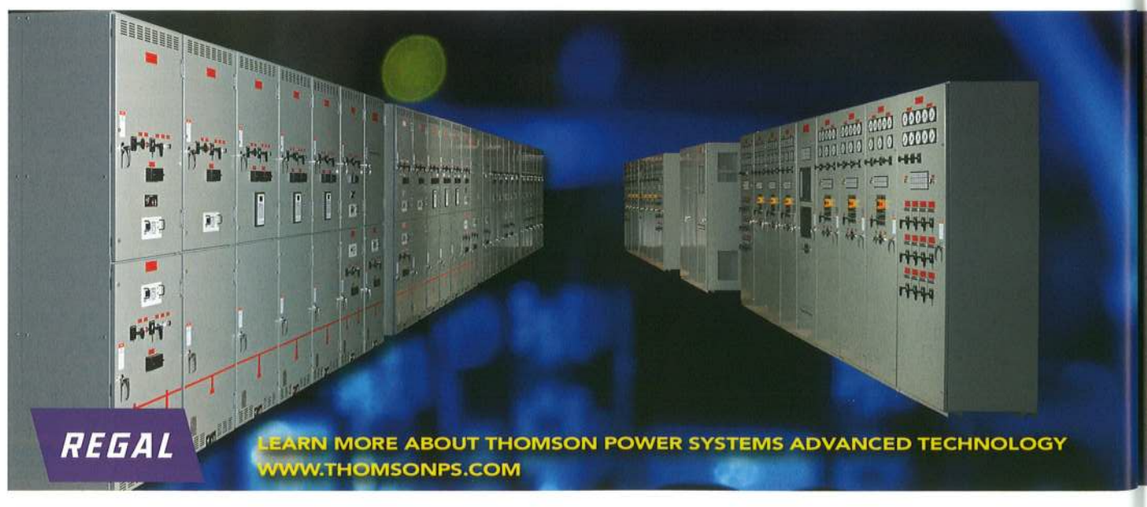
"It is clear there will be an alternative to x86 and, quite frankly, I think the world will be happier if there are two alternatives to x86," said McCredie. "I think creating that choice in the marketplace is too much of a challenge right now, for ARM and Power to compete with each other."

So, no fighting talk. Not yet.

ARM delays

AMD's eight-core Opteron A1100 ('Seattle') won't ship until later in 2015. Cavium's ThunderX will squeeze up to 48 ARM cores onto a single die, but no servers have been announced. Qualcomm has promised 64-bit ARM server chips, but there is no date announced. Calxeda went bust in 2013.









Stop arc flash: discharging a moral duty

The industry's insistence on 100 percent uptime could be putting lives at risk. *Michael Kassner* reports

Electrical discharge in the data center – known as arc flash or flashover – is a serious issue for a number of reasons. It can cause damage and fire, but also injury and death. An industry leader has told us that the industry is courting this danger by insisting on very high reliability.

"Arc flash events occur when electrical systems do not do what you want them to," says Chris Crosby, founder and CEO of Compass Datacenters. "Basically, a lightning bolt comes out, with heat approaching 35,000°F, and often creates a pressure blast of up to 2,100 pounds per square inch. That's enough to kill someone without getting electrocuted."

An arc flash will release energy rapidly, due to unexpected arcing between two phase busbars, or a phase busbar and a neutral or ground. Electrical expert Mike Holt of NEC says it is a self-sustaining process like that used in electric-arc welding.

A fault is started when something connects the busbars, or if insulation breaks down, but it continues after the physical fault is removed. "The cause of the short normally burns away during the initial flash, and the arc fault is then sustained by the establishment of a highly-conductive plasma. The plasma will conduct as much energy as is available and is only limited by the impedance of the arc. This massive energy discharge burns the busbars, vaporizing the copper, and thus causing an explosive volumetric increase; the arc blast, conservatively estimated, has an expansion of 40,000 to 1," explains Holt.

You might expect a circuit breaker to prevent this from happening, but despite the big energy surge, this may not happen, warns veteran engineer Paul Estilow of DLB Associates: "The problem is that the fault current during an arc flash event may be less than the rating of the circuit breaker. Because there is high resistance in the arc, the current level remains relatively low, while the amount of energy builds, leading to an explosion."

There are specialized circuit-protection devices designed to mitigate arc flash, but they are expensive and may not always work as expected. Arc flash is complicated.

Three reasons to work on live equipment

1. **Interrupting the electricity supply would endanger human life**
2. **Shutting down power would make the life-threatening situation worse**
3. **There are tests that can only be performed with the equipment energized**

Arc flash accidents have been around as long as man-made electricity, and they happen more often than you might expect: "A common estimate of arc flash occurrence is that there are between five and 10 arc flash explosions in electrical equipment every day in the US, but the origins of this estimate are unclear," say Richard B Campbell and David A Dini, in a recent Fire Protection Research Foundation report focusing on occupational injuries caused by electric shock and arc flash.

Burn injuries are often ignored by research that focuses on actual shock and electrocution, say Campbell and Dini: "Research on electrical burns nevertheless shows that burns from electric flash are responsible for many of the work-related burns treated at burn centers (see statistics)."

So why is this happening? Some experts say it is the nature of the beast – that accidents will happen. "A technician could innocently switch a circuit breaker on and trigger an arc flash event; for example, it could happen simply because a nest built by a field mouse in the electrical box controlled by circuit breaker shorted out," says Estilow.

An arc flash accident can happen anywhere that electricity is used, but Crosby is concerned about what he sees as an inordinate number of flashovers in data centers. For instance, a series of arc flash incidents hobbled construction work at the NSA's giant Utah data center, delaying for a year the opening of the controversial facility that is dedicated to monitoring private communications.

Electrical problems, mostly in backup generators, caused 10 meltdowns in 13 months, according to Siobhan Gorman, writing in the *Wall Street Journal* in 2013. An official described one event producing a flash of lightning inside a 2ft box, leading to a fiery explosion.

An excessive focus on availability is making this worse, says Crosby. When data center operators guarantee 100 percent uptime, staff end up working on energized equipment, in order to keep the customer-facing equipment up and running.

Data center staff are working on energized equipment for reasons other than those stated above – and this should not be happening, says Crosby. If a data center is offering 100 percent uptime, there should be redundancy in place, and this should allow staff to work on electrical systems that are isolated and de-energized.

In the Uptime Institute's Tier-rating system, a Tier III "concurrently maintainable" site should have redundant capacity components and multiple independent distribution paths serving the computer equipment. Typically, only one distribution path serves the computer equipment at any given time.

A Tier IV "fault-tolerant" site will have multiple independent, physically isolated systems that each have redundant capacity components and multiple independent, diverse, active distribution paths simultaneously serving the computer equipment.

In effect, Tier III has two independent power systems – A and B. If system A is down for repair or maintenance, system B is powering the data center. However, if system A is down for maintenance, and then an outage occurs with system B, a Tier III data center could go down.

Tier IV provides two redundant power systems and is fault-tolerant, meaning that upon failure of any individual equipment the system will switch to the redundant system without affecting the IT load.

In any case, both Tier III and Tier IV allow technicians to work on electrical equipment when it is powered off.

Data center management must weigh the risks against the consequences, and Crosby has seen it go wrong. "At a company I worked at previously, a worker tragically was killed during construction of a data center when a pressurized safety system exploded," he told *DatacenterDynamics*. "I don't want anyone in our industry to be exposed to unnecessary risks, and the risk of arc flash is dramatically minimized when the right procedures are in place. Data center employees deserve to be safe, and their families deserve to know that safety is a top priority in our industry.

"Arc flash can be deadly, and companies in our industry should be doing much more to create safer working conditions that minimize the chance of it happening. It's certainly the law, but it's also our responsibility. As employers, the lives of our workers are in our hands." ●

34%
of work-related injuries at a Michigan burn center were flash injuries

55%
of electrical work-related burn injuries were arc flash, according to an Ontario research project

40%
of burns at a Texas burns center were electrical arc injuries, over a 20-year period

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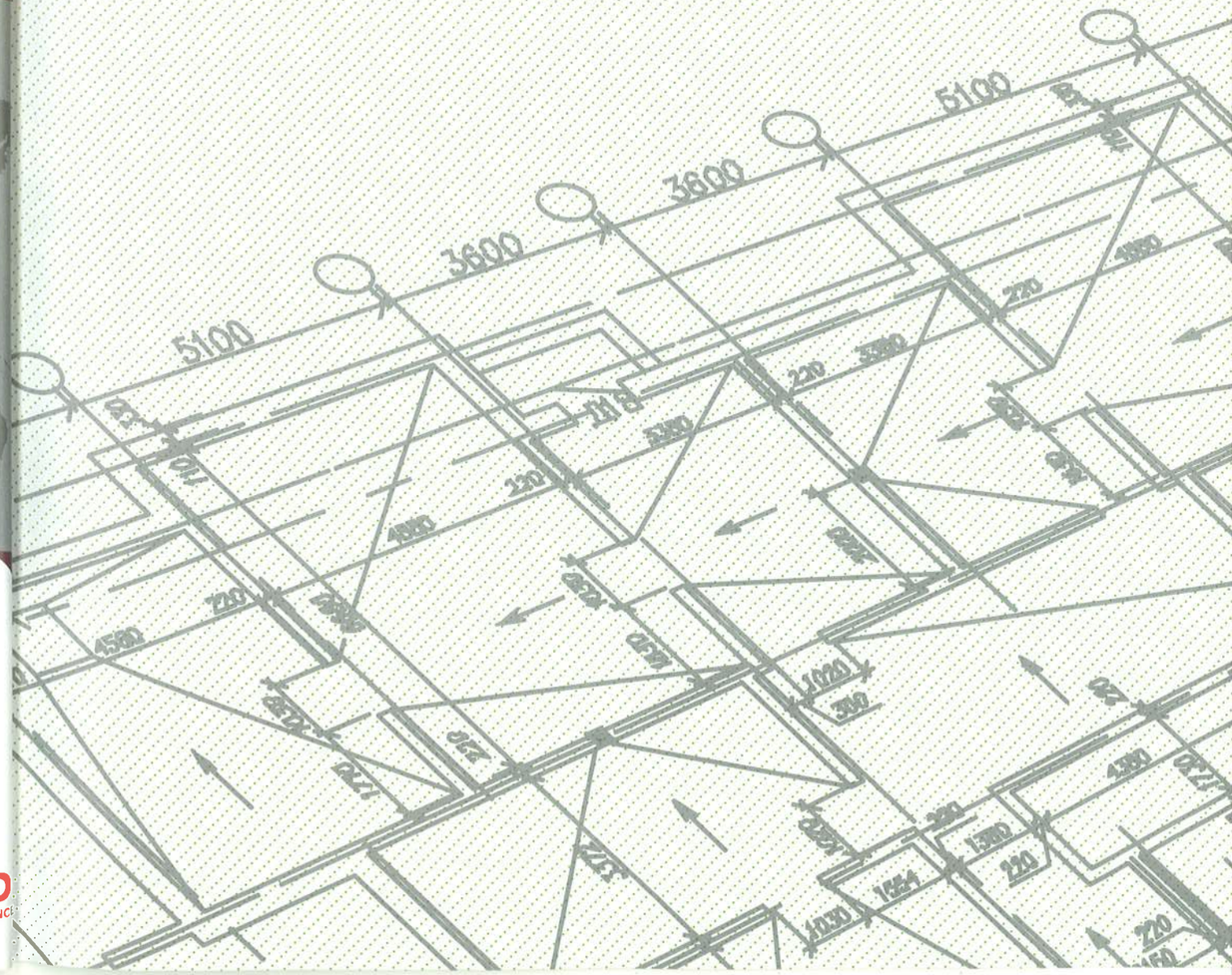
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DCIM





Peter Judge
Global Editor
@peterjudgeDCD

The Wrath of DCIM

Hollywood star Ricardo Montalbán – perhaps best known for playing the role of Khan in *Star Trek II* – once described the five stages of an actor's career in terms which any data center infrastructure management (DCIM) vendor would understand.

An actor's life, said Montalbán, goes like this:

- Who is Ricardo Montalbán?
- Get me Ricardo Montalbán.
- Get me a Ricardo Montalbán type.
- Get me a young Ricardo Montalbán.
- Who is Ricardo Montalbán?

Montalbán's words have come back to us as we track the trajectory of DCIM in the following pages.

A few years ago, DCIM was an interesting new idea, and then it rapidly became flavour of the month, with analysts feverishly placing startups into quadrants and conjuring visions of a vast market.

At this point, all investors needed was a "DCIM-type firm" as the star to put their money on. Then the excitement vanished. It became clear that DCIM had to be open and multivendor if it was to deliver what it promised, but all the players were busy plowing their own furrows with proprietary products. What users and investors needed was a young, alternative idea.

Our own analysts at DCD Intelligence tell us (p40) that after the classic hype and disillusion, DCIM is emerging as something real, that customers can invest in with some confidence.

Others agree in our overview feature (p37). We think there is more change to come, though. Once an open platform emerges that does the job in a truly multivendor way, the concept of DCIM will melt into the infrastructure, and it will become a given in any hardware installation.

At that point, it will be taken for granted, and as unremarkable as air. We will then reach the final stage of Montalbán's journey and ask: just what is DCIM, and why did we ever get excited about it?

•

Peter Judge – *Global Editor*
@peterjudgeDCD



Is DCIM finally real?

After years of tall tales, it looks like data center infrastructure management is becoming a real thing, reports *Martin Courtney*

High expectations of data center infrastructure management (DCIM) technology have largely subsided in the past two years, with vendors and potential buyers alike settling down to make more realistic assessments of their options.

There is still a large number of DCIM suppliers in the market, and from a wide range of backgrounds – from those specialising in hardware power usage and monitoring utility tools for strips, racks, IT enclosures, cooling units and UPS like Emerson Network Power, Rittal and Schneider Electric, for example, right through to building infrastructure management (BIM) specialists and big IT players traditionally focused on IT service management (ITSM) such as IBM and CA.

A sprinkling of more specialist companies have emerged in the past few years, examples being FieldView Solutions, which concentrates on monitoring and alerting, and iTRACS (acquired by CommScope in 2013), with its strong focus on 3D modelling. Others, such as Power Assure, are geared more towards energy management.

15% penetration of DCIM in mid-sized data centers

Demand and deployment are difficult to gauge. Frenzied supply-side activity has produced a vendor landscape that many feel is ripe for further consolidation. Meanwhile, the actual scale of DCIM software adoption by data center operators and managers themselves is much more difficult to know.

Rhonda Ascierto, research director of data center technologies at 451 Research, estimates that commercial off-the-shelf DCIM applications have penetrated no more than 15 percent of mid-to-large 3MW+ data centers, though she thinks the actual level of interest is higher, with proof of concepts and pilot deployments often taking as long as 12 months to complete.

A lot of hesitancy among buyers stems from the fact that DCIM is rarely a quick plug-and-play deployment, while it can be hard for operators to pull the data they need from all of their infrastructure devices, particularly those such as generators, which are not connected to IP networks.

Jennifer Koppy, research director for data center management at IDC, agrees that most end-users continue to struggle with integration and collecting all the data they want in a single platform. ▶

"There are a lot of really big, expensive tools, but DCIM is like an ERP system that requires everybody to be marching along the same path and have the same vision – and that has slowed down adoption," she said.

Many of the large cloud service providers and internet companies that on paper stand to gain most from DCIM appear to have developed their own internal tools, or are loath to reveal which commercial off-the-shelf DCIM products they have deployed.

One exception is social media networking giant Facebook, which publicly announced in January 2014 that it is using CA's DCIM application to gather millions of energy-related data points from physical data center and IT resources across its global footprint, to help it improve its power efficiency as part of its broader Open Compute Project.

There may be good reasons why it makes more sense for cloud service providers to build their own DCIM platforms from a cost perspective, primarily due to their scale and the associated licensing expense, though Ascierto argues that in terms of DCIM monitoring – and maybe ITSM too – it is still often cheaper, quicker and easier to use third-party software.

The service-oriented world of cloud and colocation turns out to be a boost for DCIM (see box, right), although enterprise sites also need to reduce human error in keeping track of their facilities' types of equipment.

One of the difficulties in painting an accurate picture of end-user adoption is the mosaic of different tools that can be included in the DCIM platform definition.

"DCIM is not a thing, but a category of things, like Microsoft Office, with lots of components to it," said Sev Onyshkevych, chief marketing officer at FieldView Solutions. FieldView's DCIM software targets data centers with a minimum of 5,000–10,000 sq ft (around 500–100 sq m) of colo space, though the company stresses that most of its customers are actually 10–100 times that size – mainly banks, cloud service providers and colocation providers.

"One of those [components] is ITSM, another is data center facilities monitoring, which together account for more than 80 percent of the whole DCIM side of it. Everybody is doing at least some monitoring, even if it is only keeping some data manually, or linking islands or monitoring around building management, circuits, power strips that may have currently used separate tools, and bringing those under one pane of glass."

Certainly, the fundamental drivers for DCIM implementation do not appear to have altered significantly, with operators still most keen to monitor environmental conditions and power usage while keeping track of their infrastructure and IT equipment spread across their facilities, typically for business continuity, security or SLA purposes.

Those offering cloud services, whether to their own business divisions as part of internal billing processes, or to customers under commercial hosting agreements, use that information to help with both costing and capacity management.

"The biggest driver is capacity management, and that has not changed, but the software has gotten better in terms of being more functional, easy to use and reliable, while having more analysis features," said Ascierto. "There is a lot of data coming out of smart PDUs, power meters and sensors, and at its fundamental level it is about aggregating that data across the facility and normalising it so you [the data center operator] can make sense of it."

"People are still struggling to get where they want to be with their technology," added Koppy, although she does see a lot more interest among data center operators in sensors that make it easier to keep accurate performance and maintenance data. IDC research indicates that many data centers have plans to deploy increasing volumes of radio frequency identification (RFID), wired and optical fiber sensors in their facilities over the next year, for example, as they monitor environmental conditions and improve locational tracking of equipment.

More recently, DCIM has been applied further up the IT stack, with vendors paying more attention to its integration with ITSM to enable end-to-end workflow, network and port management. Software as a Service (SaaS) based products specifically aimed at smaller facilities have emerged – Device42 and its focus on ease of use is a good example – and these are often used as an on-ramp or proof-of-concept exercise that can lead to more comprehensive DCIM deployments.

While it remains difficult to assess what size of facility would require DCIM, estimates suggest that those operating at 1MW and above could benefit in the future.



Cloud and colo need DCIM

A big DCIM adoption trend over the past couple of years has come from colocation companies offering a mixture of hosted and cloud services that look to beat or match their competition by offering customers DCIM-based dashboards or portals that detail power consumption of the equipment they are leasing. It has also found favour in geographically disperse data facilities, often very small pre-fabricated modular data centers located closer to network points of presence (PoPs).

"Service providers have realised that DCIM is a great way to manage remote sites where they cannot have people physically present but want to feel like they have something there to protect their investment," says Jennifer Koppy, research director for data center management at IDC – although she believes the really big opportunity for DCIM is in large enterprises.

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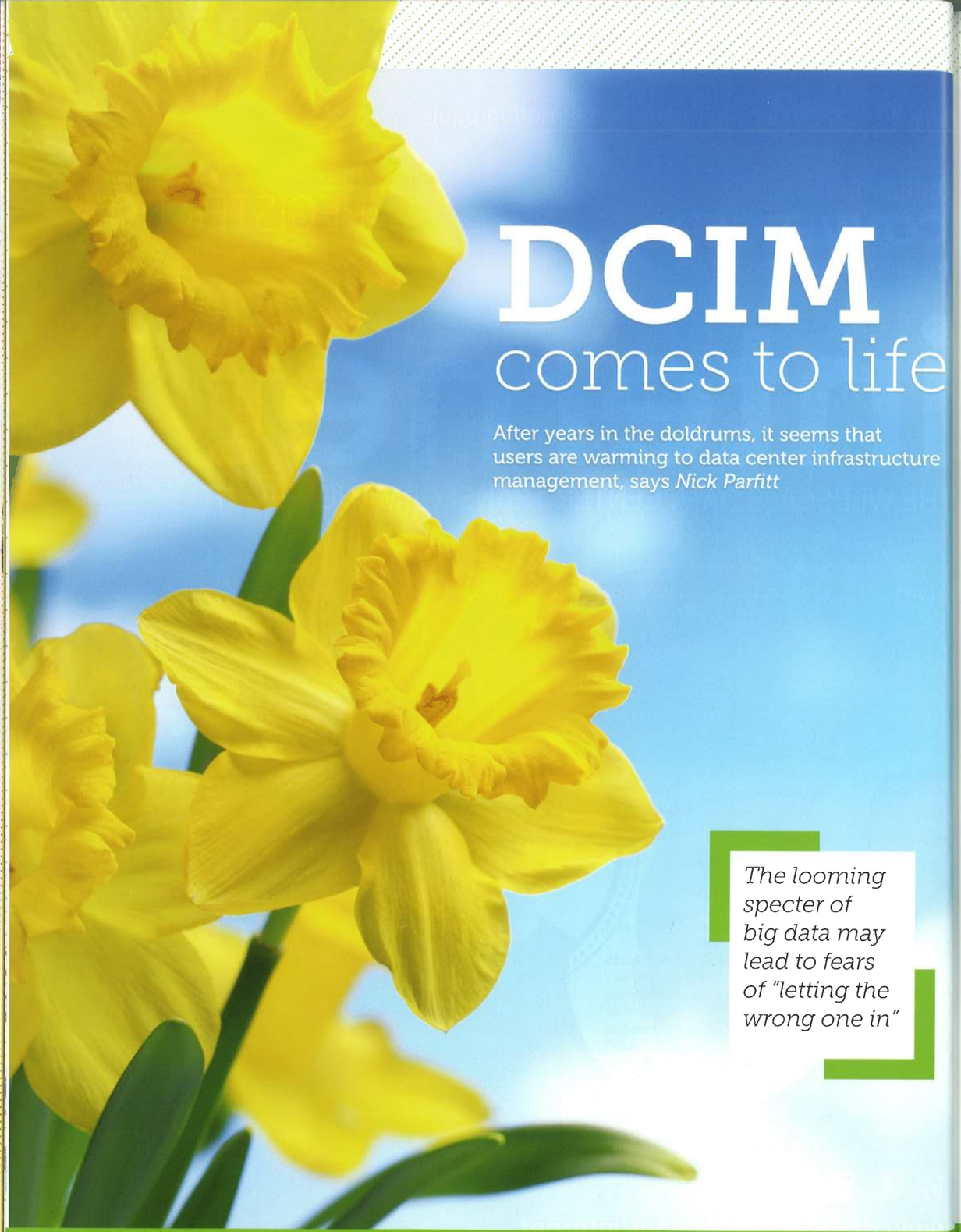
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DCIM comes to life

After years in the doldrums, it seems that users are warming to data center infrastructure management, says *Nick Parfitt*

The looming specter of big data may lead to fears of "letting the wrong one in"

Over the past four years, the DCD Intelligence Census has consistently revealed a gap between the number of companies thinking about DCIM and the number going on to deploy it. But it looks as if things are changing.

The proportion of the global sample considering DCIM has remained consistently in the 30-40 percent range since 2010, while the proportion investing remained below 20 percent until the 2013-14 time period.

The sample we are referring to here includes almost 3,000 owners and operators, 24 percent of whom operate on a global or multinational basis, and a further 47 percent of whom have multiple locations across a continent or within a market. Between them they use over nine million square meters of data center space (a total boosted by the presence of a number of large and global colocation providers within the sample), although the rise of the cloud and virtualization means less of their capacity is now housed in physical racks. Nevertheless, the sample would appear to represent the core constituency for DCIM at the upper- and larger-end of the global data center market.

The gap between intention and deployment is unusual. For most data center technologies and solutions, the reverse is usually true – the eventual level of deployment is usually higher than was anticipated. Not everyone can accurately predict future needs, and for essential technologies such as cooling, power protection and distribution equipment, along with IT investments that enable convergence, 25-40 percent of investments are not anticipated in advance.

The other solutions that share a similar profile to DCIM are non-traditional technologies such as containerized and modular solutions.

Why does DCIM have such strange buying patterns? Some of it is due to convoluted decision-making and deployment processes. Each year from 2011, around 25 percent of the deploying organisations have been new entrants, while the remainder continue to invest in an existing process.

There is also some flexibility about what DCIM actually means. Industry terms like the Tier reliability categories and PUE (power usage effectiveness) tend to get diluted from their original precise, controlled (and patented) definitions, towards more general statements of principle.

The majority of the market understands that DCIM relates the measurement of IT activity to the measurement of the facility support required by the IT. The measurement of these two key areas is well established, not least through the provision of monitoring systems by the vendors of equipment and solutions to both sides of the facility. So, even breaking the silo structure that collects and looks at the spreadsheets can be deemed as part of the DCIM process.

All available evidence suggests that the proportion who have invested in branded DCIM solutions is nothing like 30 percent, or even 20 percent. Respondents are describing a process and a way of looking at the information that comes from their data centers, rather than a specific set of products.

The broader reasons for the state of affairs at least until 2013 have been covered extensively in DCD media and elsewhere – suspicions of a vendor conspiracy (or at the very least of a sledgehammer-nut scenario), failure to demonstrate more precisely where the return on investment comes from, and a lack of adaptability that seems at times to take a leaf from the approach used for 'high in fibre, low on taste' cereals.

At the same time, the looming specter of big data may lead to fears of "letting the wrong one in" and creating your very own in-house source of big data. The accelerating trend away from IT that is located and managed in-house may also make earlier incarnations of DCIM look dated. Given this, what has changed over the past 18 months to spark DCIM deployment back into life?

The first analysis is that the proportion of investors (companies rather than dollars) that are entering the market for the first time has risen strongly from 3.9 percent to 10.6 percent (while those continuing with a previous investment have risen more sedately from 15.5 percent to 19.6 percent). Noticeable increases have occurred among personal service companies (retail, travel, tourism, hospitality), media/telecoms and colocation.

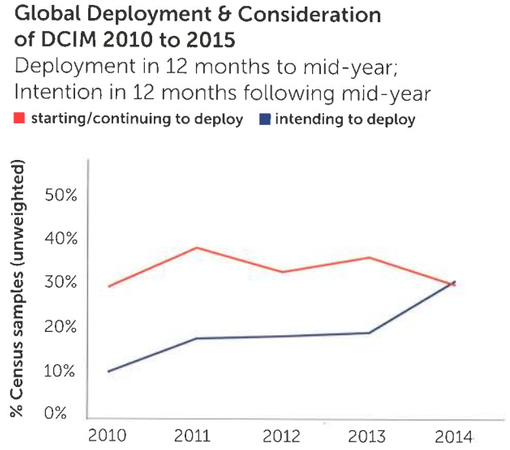
These sectors indicate another factor in growth – that DCIM has moved across strongly into shared facilities – and in so doing can capitalise on some key industry mega-trends. Analysis indicates also that deployment has moved into smaller and more localised end-user portfolios.

Increased investment in DCIM is still designed to help with the perennial drives for investment – reducing operational expenditure (opex), keeping a tight watch on energy consumption, or minimizing ▶

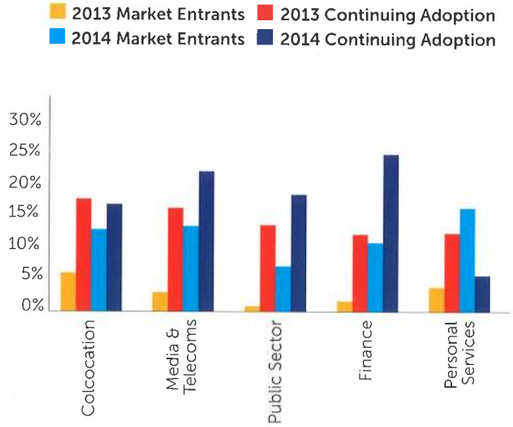
Deployment of DCIM within selected market 2011-2015: Census market samples

% DCIM uptake	2011	2012	2013	2014	2015 (e)
Brazil	13%	11%	19%	39%	36%
US	25%	26%	28%	39%	31%
Canada	17%	14%	27%	45%	45%
UK	24%	23%	22%	43%	28%
Germany	10%	13%	18%	32%	32%
Japan	–	19%	20%	22%	25%
China	12%	19%	18%	14%	18%
India	12%	17%	18%	23%	44%
Singapore	14%	16%	28%	37%	51%
France	17%	14%	22%	30%	27%
Russia	6%	1%	4%	9%	12%
Spain	12%	10%	21%	30%	25%
Netherlands	35%	30%	33%	35%	30%
Australia	22%	31%	32%	37%	30%
Mexico	22%	12%	20%	42%	29%
Turkey	17%	13%	14%	18%	29%

Global Deployment & Consideration of DCIM 2010 to 2015
Deployment in 12 months to mid-year; Intention in 12 months following mid-year



Profile of 'DCIM' deployment into 2013 and 2014 by sector: annual % split between market entrants & continuing deployments



service interruption. But it is a lot more than that. The big change is that the data center world is shifting towards converged facilities and a more strategic approach. It is this change that is creating a demand for information systems that inform the transitions using real data.

The key to the deployment of DCIM therefore lies not inside the data center, but around it. DCIM systems have attracted adverse comment for their 'wholistic' nature – an aspect that has been over-promised. Paradoxically, this characteristic now lends itself to a strategic context that engages all layers of the data center stack.

DCIM has long suffered from perceptual issues, but now it is finding a real demand. At last, DCIM seems to be emerging from its years of struggle.

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Nighthawks at the diner

Every corporation has its own version of The American Dream. For Amazon Web Services (AWS), it is to replace all traditional corporate compute with a simple diner-type menu that all businesses can order from.

According to Synergy Research: "There are now six companies that can lay claim to having annual cloud revenue run rates in excess of $5bn – AWS, IBM, HP, Microsoft, Cisco and Salesforce. However, on a like-for-like basis, AWS remains streets ahead in cloud infrastructure services." It's almost a $5bn business – it grew an astounding 49 percent in 2014 to $4.6bn in sales.

Jeff Bezos, CEO of Amazon, is clearly delighted with the path the business has taken. "We manage by two seemingly contradictory traits: impatience to deliver faster, and a willingness to think long term. We are grateful to our AWS customers and remain dedicated to inventing on their behalf." Amazon is seen as having a feature-rich lead over its cloud rivals; it has certainly been innovating and introducing new products. Lambda, which runs code in response to events, and the EC2 Container Service, a management service for Docker containers, are now generally available.

AWS has also made quite a few recent launches: Aurora (an enterprise-class database); Zocalo (a cloud storage/file-sharing platform for corporate users); and WorkMail (a cloud corporate email platform). This should prove an interesting comparison for Google partners, particularly VMware, which has struck a deal with Google to offer a slew of Google services through its vCloud Air platform, specifically Google's Cloud Storage service, BigQuery business intelligence query service, Cloud Datastore NoSQL (unstructured) database service, and Cloud DNS.

For a focused company such as this, there is always a reason for additional effort – it may be planning to spin off AWS separately. It is, after all, a completely different beast from the retail business. The nighthawks at the diner may just be corporate vultures looking for a good old-fashioned IPO.

Bill Boyle - *Global Managing Editor*
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Amazon Web Services grew an astounding 49 percent in 2014 to $4.6bn in sales

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