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DIGITALISATION WORLD

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MODERN ENTERPRISE IT - FROM THE EDGE TO THE CORE TO THE CLOUD

Contact: Jackie Cannon
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ANGEL EVENTS

Editor's View

By Phil Alsop, Editor

ITOps offers improved business outcomes

CONFESSION TIME: of the many technologies and topics i've bumped into during my time working in the it space (and I started in the days when fibre channel was just starting to make inroads as the storage networking protocol of choice), two have caught my imagination like no others. The first is sustainability.

I am fascinated to see how the apparently contradictory aims of global capitalism/consumerism and halting, if not reversing, climate change, will be reconciled over the coming years. It's a massively complex problem that promises massive disruption to the status quo, but quite how, when and where market forces and the environment will be re-balanced, if ever, is not very clear. That's the slightly depressing focus.

Happily, my other fascination promises a much happier ending. Ever since i first bumped into AIOps I have been intrigued by how it works and what benefits it offers. The marketing folk have decided that it needed a new name, hence 'observability' is the new name for the combination of AI and IT operations which can deliver a range of major benefits to almost every organisation.

It's been fascinating to watch as vendors from a range of backgrounds (networking, storage infrastructure, databases, application performance monitoring and the like) have all worked towards the idea of developing that much-fabled, single pane of glass which presents end users with a holistic view of their hybrid IT infrastructure. Such a view enables an understanding of what is going on, what might go wrong, what has gone wrong, how to resolve a problem – in short, how best to optimise infrastructure performance. And infrastructure performance matters so much, because the applications

which drive business rely on the servers, the networks and the storage, not to mention the cybersecurity for reliability, resilience, flexibility, agility, scalability and speed.

This issue includes a wealth of articles on the topic of ITOps, which covers not just aiops and observability, but DevOps, DevSecOps, Netops and, no doubt, a few other Ops as well. I hope you find them useful as you plan your own digital transformation journeys.

DIGITALISATION WORLD

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Skills gap threatens digital transformation

Competing priorities and skills shortages in IoT, AI/ML data science and robotics undermine potential progress in IT/OT convergence and security.

HITACHI VANTARA has released the findings from a 451 Research report commissioned by Hitachi Vantara that found a lack of digital skills is jeopardizing industries' digital transformation initiatives.

The report "Industry 4.0: Maturity of Adoption and Its Impact on Sustainability and ESG"1 surveyed more than 600 IT and OT leaders engaged in Industry 4.0 initiatives across the manufacturing, transportation, and energy and utilities sectors.

The report provides a broad view of the confidence, concerns, and next steps regarding enterprises actively engaged in digital transformation. Key findings include:

While 100% of companies surveyed are engaging in or planning digital transformation projects for their operations or supply chains, more than half of companies said they lacked sufficient skills in key areas.

The most critical gaps cited are in data science (42%) defined as artificial intelligence, machine learning and analytics; IoT deployment and development (48%), or robotics deployment and operations (60%).

Given the technology skills gap, at least 37% of respondents indicated that they had no plans to implement IoT-led initiatives.

Once viewed as a potential barrier to Industry 4.0 and digital transformation initiatives, IT/OT convergence is happening with 95% of respondents saying the two departments collaborate adequately or better for IoT projects.

"Faced with too many priorities and too few people, companies need a focused, sustained approach that derives outcomes as quickly as possible," said Sid Sharma, IoT Practice Leader at Hitachi Vantara. "At Hitachi Vantara, we focus on an outcome-centric approach enabled by our deep industry expertise and experience. Our ready-to-deploy industry-specific templates, data models and automation libraries help us in scaling and accelerating results."

For more information on Hitachi Vantara's IoT Solutions and Services Digital Transformation Drivers Reveal Competing Priorities

The survey also revealed that companies are facing a plethora of competing digital priorities from business optimization to employee retention to ESG (environmental, social and governance). The top driver for digital transformation continues to be optimization of business processes and operations, followed closely by reducing risks, innovation/new revenue streams and increasing revenue/cutting costs.

"Digital transformation and its potential to create value for society, environment and economies will depend on how fast certain industries can adopt and ready their workforce for the cloud, cybersecurity, 5G, AI/ML and IoT.

Companies must be selective about their business' most critical outcomes and appropriately align it with the necessary investments in software, automation and services," added Sharma.

Despite ESG finishing eighth as a company driver, more than 80% of respondents see ESG regulatory requirements as having at least a medium impact on their organization and expect the impact to increase significantly in the next two to three years.

"While regulation will have some impact, companies indicated that the primary drivers to meet ESG goals are coming from other market and social pressures," as stated in the report by Ian Hughes, Senior Research Analyst for Internet of Things at 451 Research, a part of S&P Global Market Intelligence.

"Increased efficiency and sustainability are competitive factors for enterprises. Digital transformation helps make these efficiency improvements, and many of the ESG requirements achieved are almost a bonus."

Confidence In Cybersecurity Increases
The August 2022 report also reveals that more than three-quarters of respondents are confident in their company's skills for IT and OT security, operations, and application development.

However, that degree of confidence may be overestimated given the findings of a recent cybersecurity study that suggested nearly four of five IT respondents reported a ransomware attack at their company within the last year and that nearly three quarters (73%) were financially or operationally impacted by these attacks.

Cybersecurity is the leading business concern for IT leaders

Rackspace Technology has revealed that over half (59%) of global IT leaders cite cybersecurity one of their C-suite's top-three business concerns, ahead of issues such as inflation (51%) retaining and hiring talent (45%) and supply chain/logistics management (45%), according to a new survey of 1,420 global IT professionals conducted by Rackspace Technology.

DESPITE SIZABLE INCREASES in their cybersecurity investment, greater board visibility and increased collaboration between the security team and the C-suite, less than half of respondents (43%) say that they are protecting critical data and assets from threat.

Moreover, a large majority report being either unprepared or only "somewhat prepared" to respond to major threats, such as identifying and mitigating threats and areas of concern (62%), recovering from cyberattacks (61%) or preventing lapses and breaches (63%). When asked to name the top three cybersecurity challenges their organization is facing, migrating and operating apps to the cloud led the way (45%), followed by a shortage of workers with cybersecurity skills (39%), and a lack of visibility of vulnerabilities across all infrastructure (38%).

"As more and more organizations migrate their IT infrastructure away from data centers and advance their cloud transformation initiatives, they are increasing attention on how these changes can impact their security posture," said Karen O'Reilly-Smith, Chief Security Officer, Rackspace Technology. "As the survey results demonstrate, cybersecurity continues to be far and away the leading business concern and a major focus of IT investment, but with talent at a premium, more organizations are looking outside their four walls for guidance in this new cloud-first world."

Cloud Security Leads Investment Priorities

Despite the economic challenges brought about by the pandemic, organizations show no sign of decreasing their investment in cybersecurity, with 70% of survey respondents reporting that their cybersecurity budgets have increased over the past three years.

The leading recipients of this new investment are cloud native security (59%), data security (50%), consultative security services (44%) and application security (41%). According to the survey, cloud native security is also the area where organizations are most likely to rely on an outside partner for expertise. These investments align closely with the areas where organizations perceive their greatest concentration of threats, led by network security (58%), closely followed by web application attacks (53%) and cloud architecture attacks (50%).

"We are seeing a major shift in how organizations are allocating resources to address cyberthreats, even as budgets increase," said Gary Alterson, Vice President, Security Solutions at Rackspace Technology.

"The cloud brings with it a new array of security challenges that require new expertise, and often reliance on external partners who can help implement cloud native security tools, automate security, provide cloud native application protection, offer container security solutions and other capabilities."

Security Teams and the C-Suite

The survey also looked closely at the relationship between security teams, boards and C-suite executives. 70% of respondents say there has been

an increase in board visibility for cybersecurity over the past five years, while 69% cite better collaboration between the security team and members of the C-suite. Only 13% of respondents said there were significant communications gaps between the security team and C-suite, while 69% of IT executives view their counterparts in the C-suite as advocates for their concerns.

"It is gratifying to see that IT security and leadership teams have made strides in eliminating silos and facilitating better communication and preparedness plans around threats and priorities," commented Jeff DeVerter, Rackspace Technology Chief Technology Evangelist.

"Overall, companies are much more sophisticated about cybersecurity, and better understand they where they face challenges. At the same time, given the dearth of IT talent and the new skill sets that the cloud requires, they also understand where they need guidance."

Decentralised IT comes under scrutiny

ManageEngine has published the findings of its latest research. It found that almost all organisations globally (94%) are on the path to decentralisation of IT. In stark contrast, however, almost a third (31%) of companies in the UK have no plans to decentralise IT.

THE REPORT, *IT at Work: 2022 and Beyond,* draws from a global survey on the empowerment and democratization of IT. ManageEngine commissioned independent market research agency Vanson Bourne to conduct the research. Responses were received from 3,300 decision makers from across IT and line of business functions, including 300 in the UK and Ireland. It found that around the globe, IT departments are responding to the trend for personalised IT by decentralising their IT structure.

Two-thirds (64%) of organisations globally have already decentralised, with a further 30% currently attempting to do so. In the UK and Ireland, respondents said the decentralisation drive has been spurred by a desire for innovation (55%) and to acknowledge IT's role more prominently (51%).

Eight out of 10 respondents (79%) claim non-IT employees in their organisation are more knowledgeable about IT than they were before 2020, which is increasing the appetite for rapid, accessible innovation.

However, concerns that decentralised IT functions will open the door to fraudsters are leading many businesses in the UK and Ireland to maintain their own IT sovereignty, and with good reason; those on the path to decentralisation cite IT security as their main concern (47%) followed by maintaining regulatory structure and reliability of ongoing support (both 41%).

Other key findings are as follows:

- IT teams face bigger expectations but have limited influence
- Eight out of 10 (82%) respondents said collaboration between IT teams and other departments has increased over the last two years. This is partly because autonomy in decision-making is increasingly common across departments, placing more technology choices into each department's hands.

However, collaboration is not always harmonious. Although business decision-makers report feeling IT has an important advisory role in decision-making across departments, one in five (19%) IT leaders feel they are "not consulted at all" or "consulted inadequately" about flexible working models.

This speaks to other findings indicating that although IT leaders face higher expectations post-pandemic, innovation is being stifled by the under-representation of IT teams at a leadership level (according to 79% of respondents). Although the vast majority (89%) believe IT is more responsible for business innovation than ever before, 59% believe IT is not expected to drive innovation, but simply assist innovators.

This might be an unsustainable state of affairs: IT professionals report that, in terms of the next five years, they are most motivated by a desire to guide change (22%) rather than by the prospect of promotion (19%) or the chance to gain new skills (15%).

IT Owns Security

The majority of companies claim to be exposed to risk, with 74% believing that to protect their business from cyberattacks, existing security strategies must change. Of business decision makers, 95% believe IT departments have considerable authority to prevent business decisions based on security concerns. Likewise, of these respondents, 61% believe IT approval is required for decisions relating to security, which would give IT more influence in this area than any other department.

Nearly a quarter (23%) of UK companies hold all employees accountable for cyberattacks, compared to a mere 7% worldwide. The need to protect personal data is the key motivator for this over company performance concerns, and 73% believe employees try to help protect their organizations against threats.

IT Teams Are Feeling the Pressure

Underpinning all these factors is that economic uncertainty is beginning to be felt by IT teams. The job market is slowing down, leading 59% of IT professionals to hold off looking for new positions. More worryingly, the majority (52%) are more nervous about losing their job than they were six months ago.

These sentiments are strongly influenced by the impacts of the pandemic. Almost half of IT professionals (45%) say they feel less loyal to their employer than they did two years ago, and six in 10 (62%) employees are not satisfied with the level of support they received during the pandemic.

Unsurprisingly, flexible working models are now the most important factor in job retention (56%), followed closely by pay increases in line with inflation (55%), a need felt strongly during the cost-of-living crisis.

Arun Kumar, regional director at ManageEngine, says: "Post the pandemic, it has become crucial for organisations to focus on various functions, specifically IT functions. It is imperative for IT to become more democratized and empowered. We believe the important statistics derived from this survey will shed light on the current scenario in the UK market and draw attention to the factors that command immediate action."

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Making moves on the metaverse

Ciena global study explored business professionals' views on utilizing more immersive and connected digital applications in the workplace.

CIENA global study explored business professionals' views on utilizing more immersive and connected digital applications in the workplace.

A new global study commissioned by Ciena has uncovered just how ready business professionals are to collaborate in the virtual world.

Ninety-six percent of the 15,000 business professionals surveyed across the globe recognize the value of virtual meetings, and more than three-quarters (78%) say they would participate in more immersive experiences like the metaverse versus current tools, such as video conferencing.

Additionally, while appetites grow for the new digital world, unreliable network performance was cited (by 38% globally) as the top concern holding organizations back.

While the data reveals a significant push toward more digital and immersive platforms on a global scale, there are regional differences. On a global level, 87% of business professionals confirmed they would feel comfortable conducting HR meetings in a virtual space. At a country level, this was as high as 97% in India and 94% in the Philippines, and as low as 57% in Japan.

According to the respondents, the top two benefits of virtual meetings are: improved collaboration and convenience. And, when it comes to selecting their avatar for the virtual world, 35% of business professionals would choose an avatar that reflects their real-world self, 22% would choose an idealistic version and only 10% would pick a pop culture figure.

Globally, 71% of professionals can see the metaverse becoming part of existing work practices, and 40% think their business will move away from traditional/static collaboration environments to more immersive and virtual reality-based environments in the next two years.

Despite growing interest among working professionals, barriers to widespread business adoption of immersive technologies still exist. According to survey participants, network reliability is a higher concern than the belief that immersive applications/tools are not yet widely available.

"Clearly, the business world is ready to move to the metaverse and start using enhanced reality tools for collaboration and innovation," commented Steve Alexander, Senior Vice President and Chief Technology Officer of Ciena.

"Network reliability may be seen as a barrier to making this possible today, but service providers know the demand is there and are already investing and testing to make networks faster, smarter and bring them closer to the user."

Alexander added, "We will continue to hear talk around what the metaverse is or could be in the coming months and years, but none of the exciting use cases can be achieved without a robust underlying network, laced with the latest and greatest technologies that support the ultra-low latency and high bandwidth that enhanced reality demands.

Digital transformation delays cost organisations over £3 million per project

Research from Toca finds that spiralling cost overruns, legacy systems and a demand for speed are causing organisations significant challenges when delivering digital transformation.

AS DIGITAL TRANSFORMATION remains top of the agenda for many businesses, research conducted for low-code application development platform, Toca, reveals the extent of the challenges faced by IT teams in delivering these projects. Looking at the top barriers to successful transformation, IT decision makers cited budget constraints, a lack of collaboration across the wider business, legacy systems, a shortage of developers and integration challenges as the top five. Consequently, 88% of IT decision makers are facing costly project delays – with the average digitalisation delay lasting five months at a cost of £20,200 a day, totalling £3,070,400.

The survey of 200 IT decision makers reveals:

- 68% of organisations' digital transformation projects are now expected to be delivered three times faster than five years ago.
- However, 72% of IT leaders say the waiting lists for digital projects are getting longer.
- As a result, 71% of IT leaders are struggling with the pressure of innovation.
- Employee satisfaction, customer service and productivity are the top three areas being negatively affected by failure to match the speed of expected delivery for new applications or systems.
- 72% of IT leaders believe the days of large-scale projects are over, favouring smaller projects that deliver incremental business benefits faster.

"Organisations are focusing attention on digital transformation projects to drive new business opportunities and to meet the growing expectation for seamless customer journeys, which

have been heightened by newer, digital-first competitors entering the market," comments Mat Rule, Founder and CEO of Toca. "This has placed IT teams under significant pressure, with issues like shorter timelines, tight budgets and legacy processes impacting the success of the projects. And with spiralling cost overruns and delays lasting months at a time, businesses are facing a growing issue as they try to deliver value with new applications and systems."

Despite organisations making progress with digital transformation, almost all (94%) IT leaders confirm that "building apps, connecting systems and automating processes faster is business imperative." To combat this, 89% of IT decision makers state they would prefer to leverage legacy systems to speed up digital projects, rather than rewrite and platform them.

Yet the pressure to deliver is forcing organisations into sacrificing best practice for quick delivery. In fact, 80% of IT leaders agree that the need for speed with digital projects is increasing technical debt at their organisation. This can impact other projects by creating a knock-on effect, with 76% of IT decision makers in agreement that technical debt holds them back from taking on new projects.

This is hampering organisations' ability to deploy digital technologies, with respondents reporting that on average they are only able to address one in four problems with digital transformation. Over three quarters (79%) of IT decision makers confirm that processes aren't automated because of time, cost, or complexity, despite the data revealing that automating manual tasks could save the average employee over five hours a week.

"Digital transformation projects are proving challenging for businesses, as they tackle delays and cost overruns," continues Mat Rule. "In order to drive quick digital wins and to solve more business problems, organisations need to empower their development teams to be more productive and to overcome the restraints of legacy technologies. To achieve this, businesses are increasingly looking at solutions like low-code development, which can enable IT teams to deliver flexible digital services in a matter of days, drastically reducing the cost and time of traditional development. Using low-code, businesses can build digital wrappers around their legacy systems and then integrate apps and portals to drive digital journeys."

Responsible AI - a top management issue

While 84% of global executives believe responsible AI (RAI) should be on top management agendas, only 25% have comprehensive RAI programs in place, as shown in a joint study published today by MIT Sloan Management Review (MIT SMR) and Boston Consulting Group (BCG).

WHILE 84% of global executives believe responsible AI (RAI) should be on top management agendas, only 25% have comprehensive RAI programs in place, as shown in a joint study published today by MIT Sloan Management Review (MIT SMR) and Boston Consulting Group (BCG).

The report, To Be a Responsible AI Leader, Focus on Being Responsible, was conducted to assess the degree to which organizations are addressing RAI. It is based on a global survey of 1,093 executives from organizations grossing over $100 million annually, from 22 industries and 96 countries, as well as insights gathered from an international panel of more than 25 AI experts. A popular term in media and business, RAI is defined by MIT SMR and BCG as "a framework with principles, policies, tools, and processes to ensure that AI systems are developed and operated in the service of good for individuals and society while still achieving transformative business impact."

Nearly a quarter of survey respondents report that their organization had experienced an AI failure, ranging from mere lapses in technical performance to outcomes that put individuals and communities at risk. RAI initiatives seek to address the technology's risks by proactively addressing the impact on people. Despite the clear necessity for RAI, less than one-quarter of organizations have a fully implemented program.

"Our research reveals a gap between aspirations and reality when it comes to responsible AI, but that gap also presents an opportunity for organizations to become leaders on this issue," said Elizabeth M. Renieris, a senior research associate at Oxford's Institute for Ethics in AI, an MIT SMR guest editor, and a coauthor of the report. "By taking a more expansive view of their stakeholders and viewing RAI as an expression of their deeper corporate culture and values, organizations stand better equipped to ensure that their AI systems promote individual and societal welfare."

"As organizations rush to adopt AI, it can bring with it unintended risks to individuals and communities, highlighting the critical importance of operationalizing responsible practices," said Steven Mills, global GAMMA chief AI ethics officer at BCG and a coauthor of the report. "True leaders in RAI are, at their core, responsible businesses. For these frontrunners, RAI is less about focusing on a particular technology and instead is a natural extension of their purpose-driven culture and focus on corporate responsibility."

How Industry Stakeholders in Africa and China Adopt RAI

BCG and MIT SMR conducted dedicated surveys in Africa and China to understand how industry stakeholders in these key geographies approach RAI. Most respondents in Africa (74%) agree that RAI is on their top management agendas, and 69% agree that their organizations are prepared to address emerging AI-related requirements and regulations. In Africa, 55% of respondents report that their organizations' RAI efforts have been underway for a year or less (with 45% at 6 to 12 months, and 10% at less than six months).

In China, 63% of respondents agree that RAI is a top management agenda item, and the same percentage agree that their organizations are prepared to address emerging AI requirements and regulations. China appears to have longer-standing efforts around RAI, with respondents reporting that their organizations have focused on RAI for one to three years (39%) or more than five years (20%).

Responsible AI Initiatives Often Lag Behind Strategic AI Priorities

The corporate adoption of AI has been rapid and wide-ranging across organizations in all industries and sectors. MIT SMR and BCG's 2019 report on AI and business strategy found that 90% of companies surveyed had made investments in the technology. But the adoption of RAI has been limited, with just over half of the 2022 survey respondents (52%) reporting that their organizations have an RAI program in place. Of those with an RAI program, a majority (79%) report that the program's implementation is limited in scale and scope. More than half of respondents cited a lack of RAI expertise and talent (54%) and a lack of training or knowledge among staff members (53%) as key challenges that limit their organization's ability to implement RAI initiatives.

RAI Leaders Walk the Talk

A small cohort of organizations, representing 16% of survey respondents, have taken a more strategic approach to RAI, investing the time and resources needed to create comprehensive RAI programs. These RAI Leaders have distinct characteristics compared with the remaining 84% of the survey population (who are characterized as Non-Leaders). Three-quarters (74%) of Leaders report that RAI is a part of the organization's top management agenda, as opposed to just 46% of Non-Leaders. This prioritization is reflected in the commitment of 77% of Leaders to invest material resources in their RAI efforts, as opposed to just 39% of Non-Leaders. Leaders are far more likely than Non-Leaders to disagree that RAI is a "check the box" exercise (61% versus 44%, respectively). The survey results show that organizations with a box-checking approach to RAI are more likely to experience AI failures than Leader organizations.

Developers under pressure in race to the cloud

Couchbase has published findings from industry research examining the challenges faced by development teams amid the race to the cloud and to execute on digital transformation initiatives.

The global survey of 650 senior IT decision makers found that development teams are under pressure and under-supported. The findings revealed that 88 percent of respondents are aware of challenges faced by development teams, with the top issues including that deadlines and agility requirements were difficult to meet (42 percent); that they were being asked to do too much in too little time (40 percent); or that they did not have the skills (24 percent) or technology (23 percent) they needed.

"Organizations need to understand that when they are undertaking digital transformation, what they are actually doing is putting developers front and center," said Ravi Mayuram, chief technology officer of Couchbase. "The modern business depends on the developer and development agility more than ever before. Development teams are not assisting the business, they are leading it to new frontiers through digital transformation. That's why they need to be given the right resources: be it cloud-based infrastructure, CI/CD friendly tooling and the right training. This is what will ensure success in these times of product-led transformation and growth." Research from Couchbase found that despite development teams' extensive contributions to digital transformation and innovation initiatives, a lack of resources and communication with IT leaders is still frustrating them. This is preventing businesses from making the most of their potential, and moving with greater velocity.

Additional findings include:

- 86 percent of respondents report obstacles in supporting development teams: The key issues that these enterprises report include difficulty redeploying development teams rapidly to work on new projects when needed (32 percent); ensuring development teams always have the right technology (31 percent); and identifying and solving the problems their teams face (31 percent). Additionally, 40 percent of respondents did not know for certain whether their development teams were behind or ahead of schedule and 27 percent found it challenging to follow the development team's progress to ensure they are meeting their goal.
- Growth of development teams has stagnated, while digital investment is rising: Despite enterprises planning to increase digital transformation spend by 46 percent in 2022, developer teams only grew by an average of three percent in the last year. In order to bridge the gap, organizations will need to invest in growing their teams while making existing teams more efficient. This can explain why 32 percent of IT leaders are specifically investing in new technologies that make developers' jobs easier.
- There's opportunity to further empower developer teams: 30 percent of respondents say that the pandemic has taught them how to empower development teams, yet 24 percent find it difficult to gauge whether development teams are engaged in and enthusiastic about their work. The challenge now is understanding how to get developers excited about their work and demonstrating the results. For example, providing them with their desired technologies and allowing them to build with velocity the way they want to.

Without the right support, development teams aren't able to drive digital transformation as quickly as the business may need them to. 34 percent of respondents said pressure from developers to support agile development and innovation was a driver for digital transformation projects, showing developers' direct impact on the speed that an organization can move. Yet 19 percent said development teams' inability to meet goals set for them had prevented their organization from pursuing new digital transformation projects in the last 12 months.

IT leaders and developers share a similar goal: to build great applications. By increasing transparency and providing the right support and technologies, they can work together to make meaningful progress on digital transformation initiatives.

Artificial Intelligence spending grew 20.7% in 2021

Worldwide revenues for the artificial intelligence (AI) market, including software, hardware, and services for both AI centric and AI non-centric applications, totaled $383.3 billion in 2021, an increase of 20.7% over the prior year, according to the most recent International Data Corporation (IDC) Worldwide Semiannual Artificial Intelligence Tracker. IDC expects the AI market value will reach nearly $450 billion in 2022 and maintain a year-over-year growth rate in the high teens throughout the five-year forecast.

"ACROSS ALL INDUSTRIES and functions, end-user organizations are discovering the benefits of AI technologies, as increasingly powerful AI solutions are enabling better decision-making and higher productivity," said Rasmus Andsbjerg, associate vice president, Data & Analytics at IDC. "The reality is, AI offers solutions to everything we are facing at the moment. AI can be a source for fast-tracking digital transformation journeys, enable cost savings in times of staggering inflation rates and support automation efforts in times of labor shortages."

AI Software again accounted for the largest share the overall AI market in 2021. Combined, the four AI Software categories – AI Applications Delivery & Deployment, AI Applications, AI System Infrastructure Software, and Artificial Intelligence Platforms – delivered more than $340 billion in market value in 2021 with AI Applications representing nearly half the total. Artificial Intelligence Platforms delivered the strongest year-over-year growth at 36.6%, albeit from a smaller baseline.

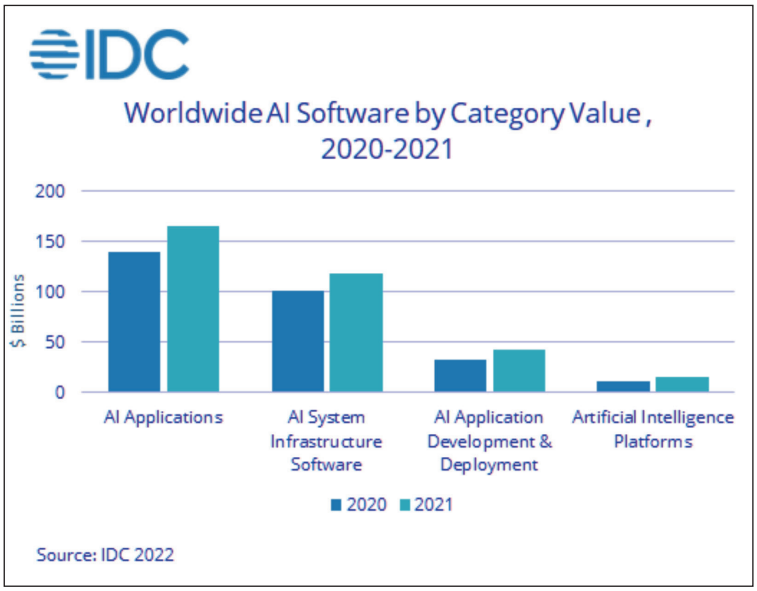
Within the AI Applications category, AI Customer Relationship Management (CRM) Applications and AI Enterprise Resource Management (ERM) Applications each delivered about 16% of the category total. The remainder was delivered by the myriad of other AI Applications available in the market. With nearly 300 companies vying for opportunities to gain share, the AI Applications market remains highly competitive.

IDC's AI Tracker also shows that AI centric applications, in which AI technologies are central and critical to the function of the application, continued to slowly grow its share of the AI Software market. In 2021, AI-centric applications captured 12.9% of the market, up 29.3% year over year.

The remainder of the market was held by AI non-centric applications, where AI technologies are integral to certain workflows of the application, but if those technologies were removed, the application would still be able to function.

Similarly, the deployment of AI Software to the cloud continues to show steady growth. In 2021, 47.3% of AI Software purchases were deployed to the public cloud, an increase of four percentage points over 2020 and 8.4 percentage points over 2019.

IDC expects cloud deployment of newly purchased AI Software to surpass on premises deployments in 2022. The AI Services market saw its total value increase 22.4% year over year to $24 billion in 2021. Client demand for expertise in developing production-grade AI solutions helped the AI IT Services category grow 21.9% year over year to $18.8 billion. The AI Business Services category grew 24.2% year over year as organizations sought assistance on AI governance, business process, and talent strategies. AI Hardware was both the smallest ($18.8 billion) and fastest growing (38.9% year over year growth) segment of the AI market. The hardware growth was driven by efforts to build dedicated AI systems capable of meeting the increased compute and storage demands of AI models and data sets. While both AI Servers and AI Storage delivered strong growth in 2021 – 39.1% and 32.9% respectively – server purchases were notably larger at $15.6 billion.



Worldwide spending on AI-centric systems to pass $300 billion by 2026

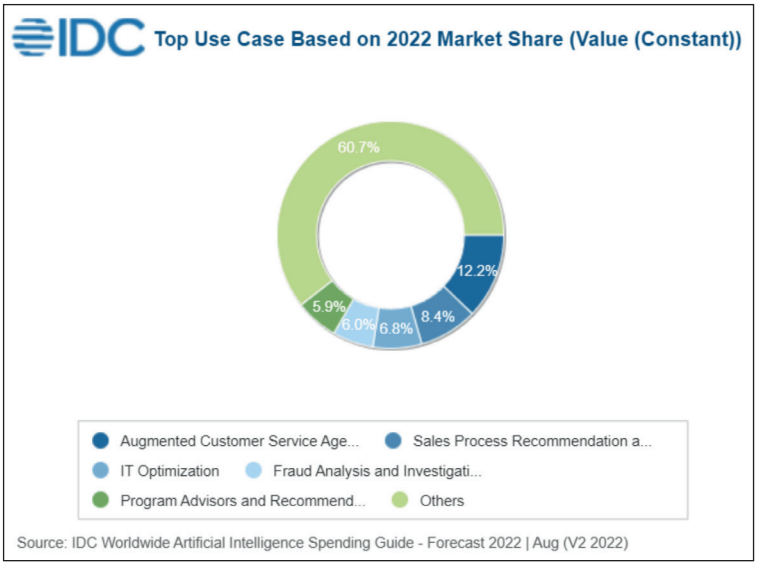
A new forecast from the International Data Corporation (IDC) Worldwide Artificial Intelligence Spending Guide shows that global spending on artificial intelligence (AI), including software, hardware, and services for AI-centric systems*, will reach nearly $118 billion in 2022 and surpass $300 billion in 2026. The ongoing incorporation of AI into a wide range of products will drive a compound annual growth rate (CAGR) of 26.5% over the 2022-2026 forecast. This is more than four times greater than the five-year CAGR of 6.3% for worldwide IT spending over the same period.

The past two difficult years in business accelerated the use of AI in systems, and organizations are now more willing to take advantage of the efficiency benefits and enhanced capabilities that AI systems offer. AI systems can support people-oriented tasks and improve their capabilities through technologies such as Conversational AI and Image Processing, used to interact with clients and potential clients in a way that these people are prepared to accept.

The high and consistent growth seen in the use of AI in all industries demonstrates its importance to future business. “AI is not the future, it is now,” said Mike Glennon, senior market research analyst with IDC’s Customer Insights & Analysis team. “Most IT vendors have adopted AI solutions to supplement their products and are enhancing their products to make AI crucial to their success. Those vendors that are only now considering AI are at a considerable disadvantage to IT vendors that have AI-based products already in production, and AI is becoming crucial to the capabilities of many products.”

Banking and Retail are the two industries that will deliver the largest AI investments over the forecast period. Together, the two industries will account for roughly one quarter of all AI spending worldwide. Professional services will be the next largest industry with more than 10% share of spending, followed by discrete and process manufacturing. Professional services will also be one of the industries with the fastest growth in AI spending (28.7% CAGR), trailing only the Media industry (29.8% CAGR). Among the 30 AI use cases identified by IDC, Augmented Customer Service Agents will see the most spending throughout the forecast, reaching $35.9 billion on 2026. While it is the largest use case in only two industries (Retail and Telecommunications), Augmented Customer Service Agents are an investment area for every industry. Other leading AI use cases include Sales Process Recommendation and Augmentation, Fraud Analysis and Investigation, and Program Advisors and Recommendation Systems. By 2026, these four use cases will represent more than 38% of all AI spending worldwide.

“Three of the leading use cases are customer and sales focused, showing that adopters of AI are



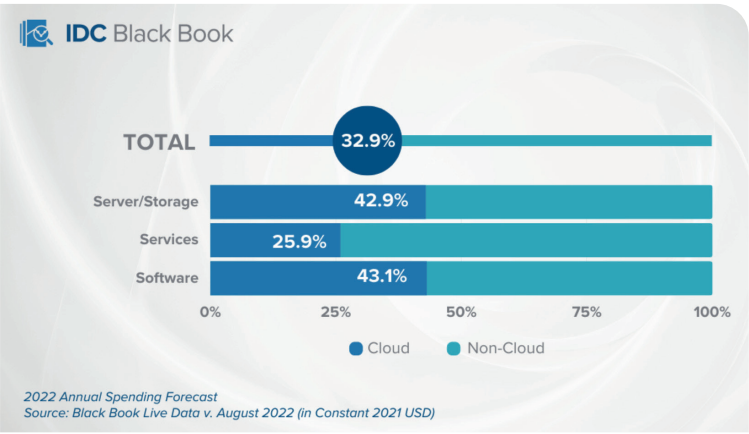
using it to grow their business significantly with a strong customer and sales focus at a time when the economy struggles," Glennon noted. "The use of AI in business is moving away from simple cost saving to being a strong component of business growth, showing the increasing maturity of AI as an IT solution across a wide range of systems." The United States will be the largest geographic market for AI systems, accounting for more than 50% of all AI spending worldwide throughout the forecast. Retail and Banking will the leading industries for AI investments in the U.S. Western Europe will account for more than 20% of worldwide IT spending and will deliver the fastest spending growth with a five-year CAGR of 30.0%. The People's Republic of China will be the third largest AI market with one of the slowest growth rates (21.1% CAGR).

Continued growth forecast for European cloud investments

ACCORDING TO the new Worldwide Black Book Live Edition published by International Data Corporation (IDC), the European ICT market is expected to grow year on year by 4.1% in 2022 in constant currency terms. In current annual value, the market will decrease year on year by 3.2% in 2022, due to exchange rate fluctuations, including the continuous drop of the euro against the U.S. dollar.

This currency value drop was due to the Russia/Ukraine war, which is negatively impacting the overall eurozone economy, with increased prices for oil, gas, and food, as well as suspended natural gas supply from Russia. Growing inflation, supply chain constraints, and geopolitical conflicts will also negatively affect the European PC and tablet markets, which will inhibit overall ICT spending in the region.

In contrast, despite the unfavorable macroeconomic environment, spending on software and security hardware in Europe is expected to stay relatively stable over the next few years. Cloud has emerged as a key technology for helping organizations increase their resiliency, and the latest version of the Black Book Live now includes a cloud spending view of the market., Overall cloud-related spending in Europe is forecast to constitute almost one-third of total technology spending in 2022, and its share will keep increasing over the next five years. Almost 43% of the total spending on server and storage markets in Europe in 2022 is expected to be focused on cloud enablement; this figure will grow rapidly in the next few years, making up half of this infrastructure spending by 2024.



2022 Annual Spending Forecast
Source: Black Book Live Data v. August 2022 (in Constant 2021 USD)

Many companies will continue to invest in modernization of their infrastructure, which entails an accelerated shift to cloud in order to make IT budgets more stable and ensure business continuity, especially in periods of recession or disruption.

Software spending in Europe is expected to stay more or less stable over the coming five years, as organizations rely on software to support their digital transformation initiatives. Investments in cloud software will exceed 40% of total software spending and post a double-digit growth rate to surpass non-cloud software spending in 2024. Cloud migration will become a priority for organizations, with a focus on AI platforms, collaborating applications, and security solutions, and cloud-related spending will surpass spending on traditional software deployment in one to two years.

Many IT services providers will continue to expand the scope of their cloud professional services and managed cloud services, including planning, deployment, implementation, and management of cloud environments in order to assist customers at any stage of their cloud journey.

This will drive cloud-oriented services spending to exceed 25% of the total services spending in Europe in 2022. Cloud-related services spending in Europe will record a growth rate between 16% and 19%. over the next five years.

"European companies are considering cloud adoption to help them overcome the disruptive effects of the worsening economic and geopolitical situation," says Lubomir Dimitrov, research manager for IDC European Data & Analytics. "Business continuity, security, and disaster recovery plans will be the main focus of cloud deployments."

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In what has been, and continues to be, extraordinary times for the business world, it seems doubly important to recognise the projects, innovations and individuals which have made such a huge difference during 2022. Almost overnight, employees switched from office working to working from home, and the new, or next, normal, means that, into the future, what might be called a 'hybrid work' model looks set to evolve, with flexible working very much the order of the day. What was already becoming a trend as part of many organisations' digital transformation programmes, has been accelerated.

The SDC Awards 2022 will celebrate the achievements of end users and the IT community as they have innovated like never before to ensure business continuity in these challenging times. This year more than any other, please do make sure that you enter our SDC Awards. There's no limit to the number of entries, all of which are free of charge, and we'll be promoting all the short-listed entries via Digitalisation World's multi-media platform over the coming months, ahead of the awards ceremony. We really do want to celebrate and recognise the many amazing achievements which have come about in response to the coronavirus.

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Gartner highlights seven disruptions CIOs might not see coming

CIOs must take time to consider "what if" scenarios to avoid being blindsided by social, behavioral and technological disruptions, according to Gartner, Inc.

SPEAKING at the recent Gartner IT Symposium/Xpo in Australia, David Yockelson, VP analyst at Gartner, said many disruptions that seem futuristic may be closer than we think.

"Disruptions are fundamental shifts that create lasting change, and successful organizations will be those that are prepared to address them," Yockelson said. "We need to keep asking "what if" to remain open to opportunities presented by disruptions."
Yockelson highlighted seven key disruptions that technology executives should consider in the next five years.

1. Metaverse Work Experiences
Gartner defines a metaverse as "the next level of interaction in the virtual and physical worlds." Today, organizations are harnessing metaverse technologies to provide better engagement, collaboration and connection to their employees through better immersive workspaces in virtual offices and the use of internal metaverse experiences called intraverses.
Gartner predicts that fully virtual workspaces will account for 30% of the investment growth in metaverse technologies and will reimagine the office experience through 2027.

2. Flying cars
Flying autonomous vehicles, or unmanned aerial vehicles (UAVs), are for carrying passengers, primarily over short distances in urban areas. These encompass self-operating aircrafts that are sometimes referred to as "flying cars" or passenger drones and are designed to operate without a human pilot. Several companies are working on new aircraft piloted by artificial intelligence and designed to create a faster, less expensive, safer, and lower carbon way to execute air travel, primarily in congested areas. The first flying taxi service is scheduled to launch in 2024.

Notwithstanding potential regulatory challenges, CIOs should assess what problems in transportation — moving people and cargo — might be solved by using these vehicles.

3. The Digital Human Economy
From medical care, customer service, virtual influencers and HR training to bringing the deceased "back to life", the possible uses for digital humans are endless. A digital human economy provides the opportunity for a new digital ecosystem, underpinned by technology that brings individuals and organizations together to innovate and interact in new ways.

Gartner predicts that by 2035, the digital human economy will become a $125-billion market and continue to grow.

4. The "Decentralized Autonomous Organization"
Decentralized autonomous organizations (DAOs) represent a new type of organization model emerging in the IT services marketplace. Gartner defines a DAO

as a digital entity, running on a blockchain, which can engage in business interactions with other DAOs, digital and human agents, and corporations, without conventional human management.
Many high-value digital workers will be attracted to working in DAOs. Though in their infancy, DAOs have the potential to be highly disruptive to many current norms of the technology industry.

5. Wireless Electric Vehicle (EV) Charging
As it becomes available, wireless charging will make the most sense for fleet vehicles such as buses and taxis. These vehicles can make effective use of dynamic charging to extend range and reduce costs. Subsequently, residential installations will be the biggest market for wireless vehicle charging, as EV owners enjoy the modest convenience of not having to plug a cable in. However, looking out beyond that time, Gartner expects that private housing estates and campus sites will overtake in-home installations by volume.

6. Graphene Replaces Silicon
During the next seven to 10 years, there is a huge potential for carbon-based field-effect transistors (FETs) to replace silicon in traditional transistors when they reach their minimum size limits. One example is graphene, a one-atom thick material of pure carbon, bonded together in a hexagonal honeycomb lattice. Graphene could displace current silicon devices, especially for wireless communications, where these carbon-based FETs can carry a much higher current in a small area, enabling super quick processing. CIOs should consider new possibilities enabled by graphene-based technologies and start to identify emerging suppliers.

7. Tech Becomes Disposable
What if the technology industry starts to mirror the fashion industry, with "throwaway" applications designed to be made, used and disposed of quickly?

While elements of business composability are already widely practiced, there are opportunities for CIOs to take it to the next level and prepare for the flexibility of disposable technology.

Six trends driving near-term metaverse adoption

SPEAKING at the Gartner IT Symposium/Xpo in Australia, Marty Resnick, VP analyst at Gartner said that while widescale adoption of metaverse technologies is more than 10 years away, there are practical ways organizations are harnessing them now, for example, in employee onboarding, sales enablement, higher education, medical and military training and immersive shopping experiences.

"Today, emergent metaverses are in their infancy. But technology trends, with proven use cases and business outcomes, are just the beginning of the value technology innovation brings to the enterprise," Resnick said. "The longer-term bets are the true differentiators that could disrupt an entire industry, and the metaverse is one of those bets."
Gartner defines a metaverse as "the next level of interaction in the virtual and physical worlds." Metaverse technologies allow people to replicate or enhance their physical activities, by transporting or extending physical activities to a virtual world, or by transforming the physical one.

Despite the hype, the adoption of metaverse technologies is nascent and fragmented. Gartner recommends caution when investing in a specific metaverse, as it is too early to determine which investments will be viable in the long term, and the ethical, financial and reputational risks of early investments are not fully known.
"Use this time for learning, exploring and preparing for a metaverse with limited implementation," Resnick said. "Review these six trends for opportunities that could benefit your organization."

1. Gaming
The gaming industry, specifically video games, has been an innovator in experience and technology for many years. The metaverse will use gaming technologies, methodologies, development tools and even game theory to create experiences for both entertainment and training simulations.

Enterprises will adopt "serious games"– gaming technologies, experiences and storytelling for training and simulation of specific work tasks and functions.

Gartner predicts that by 2025, the serious games market will grow by 25% due to the impact of metaverse technologies.

2. Digital Humans
Digital humans are interactive, AI-driven representations that have some of the characteristics, personality, knowledge and mindset of a human, typically rendered as digital twins, digital avatars, humanoid robots or conversational user interfaces. They can interpret speech, gestures and images, and generate their own speech, tone and body language.

Organizations are already planning on using digital humans to act as identified digital agents within metaverse environments for customer service, support, sales and other interactions with current and potential customers. Gartner predicts that by 2027, a majority of B2C enterprise CMOs will have a dedicated budget for digital humans in metaverse experiences.

3. Virtual Spaces

A virtual space – or virtual world – is a computer-generated environment where groups of people can come together using personal avatars or holograms.

Virtual spaces engage multiple senses and provide participants with the ability to immerse and interact with the space. For example, they can be used to increase reach to customers who are unable or unwilling to join in-person engagements, to provide new alternatives to travel, or to enable collaboration among staff.

Gartner predicts that by 2025, 10% of workers will regularly use virtual spaces (in activities such as sales, onboarding, remote teams), up from 1% in 2022.

4. Shared Experiences

A shared experience brings a group of people together within a virtual space. The metaverse will move shared experiences out of siloed immersive applications and allow for more opportunities to meet, collaborate, interact, participate or otherwise share experiences across applications, consumer events and services. In this sense, the metaverse will democratize immersive experiences.
By 2028, 10% of public events (such as sports and performing arts) will offer participation in metaverse, fueling rapid buildout of commercial metaverse shared experiences, according to Gartner.

5. Tokenized Assets

Tokenized assets offer new business models for content creators. In metaverse experiences, most tokenized assets will use non-fungible token technologies (NFTs). NFTs support new economic models, for example, where content creators perpetually retain most of the revenue from sales of their works. The new features and functionalities enabled by the metaverse will inspire new ways to not only compete and monetize virtual products and services, but also to acquire physical (real-world) goods. Gartner predicts that by 2027, 25% of retail organizations with an e-commerce presence will have completed at least one proof of concept for tokenized assets using metaverse technologies.

6. Spatial Computing

Spatial computing combines physical and digital objects to digitally enhance physical spaces. This allows organizations to get more out of physical and digital assets by surfacing related, “unseen” digital information and content anchored to people, places and things. For example, digital content can augment physical objects or environments, such as digital colorization of Greek and Roman statues or additional product or object information.

Gartner predicts that by 2026, the second and third iterations of spatial computing glasses will arrive, creating a more pervasive metaverse experience connected to the physical world.


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Improved data centre resilience and efficiency is a cool outcome from Schneider Electric upgrade at UCD

AS TOM CANNON, ENTERPRISE ARCHITECTURE MANAGER, UCD, details, the overall effects of installing the new cooling system are 'greater resilience and peace of mind; more efficient use of space for the benefit of the university's main function of teaching; greater efficiency of IT infrastructure and consequently, a more sustainable operation into the future'.

THE FUTURE CAMPUS project at University College Dublin called for space utilised by facility plant and equipment to be given up for development to support the student population. Total Power Solutions, an Elite Partner to Schneider Electric, worked with UCD's IT Services organisation to upgrade its primary data centre cooling system, to provide greater resilience for its HPC operations whilst releasing valuable real estate.

Introduction: Data centres at Ireland's largest university

University College Dublin (UCD) is the largest university in Ireland, with a total student population of about 33,000. It is one of Europe's leading research-intensive universities with faculties of medicine, engineering, and all major sciences as well as a broad range of humanities and other professional departments.

The university's IT infrastructure is essential to its successful operation, for academic, administration and research purposes. The main campus at Belfield, Dublin is served by two on-premises data centres that support all the IT needs of students, faculty and staff, including high-performance computing (HPC) clusters for computationally intensive research. The main data centre in the Daedalus building, hosts all the centralised IT including storage, virtual servers, Identity and Access Management, business systems, networking, and network connectivity in conjunction with a smaller on-premises data centre.

"Security is a major priority, so we don't want researchers having servers under their own desks. We like to keep all applications inside the data centre, both to safeguard against unauthorised access—as universities are desirable targets for hackers – and for ease of management and efficiency."

Challenges: Ageing cooling infrastructure presents downtime threat and reputational damage
Resilience is a key priority for UCD's IT Services. Also, with its campus located close to Dublin's city centre, real estate is at a premium. There are continuing demands for more student facilities and consequently the need to make more efficient use of space by support services such as IT. Finally, there is a pervasive need to maintain services as cost-effectively as possible and to minimise environmental impact in keeping with a general commitment to sustainability. As part of a major strategic development of the university's facilities called Future Campus, the main Daedalus data centre was required to free up some outdoor space taken up by a mechanical plant and make it available for use by another department. The IT Services organisation took this opportunity to revise the data centre cooling architecture to make it more energy and space efficient as well as more resilient and scalable.

"When the data centre was originally built, we had a large number of HPC clusters and consequently a high rack power density," said Tom Cannon, Enterprise Architecture Manager at UCD. "At the time we deployed a chilled-water cooling system as it was the best solution for such a load. However, as the technology of the IT equipment has advanced to provide higher processing capacity per server, the cooling requirement has reduced considerably even though the HPC clusters have greatly increased in computational power."

One challenge with the chilled water system was that it relied upon a single set of pipes to supply the necessary coolant, which therefore represented a single point of failure. Any issues encountered with the pipework, such as leaks, could therefore threaten the entire data centre with downtime. This could create problems at any time in the calendar, however, were it to occur at critical moments such as during exams or registration it would have a big impact on the university community. Reputational damage, both internally and externally, would also be significant.

Solution: Migration to Schneider Electric Uniflair InRow DX Cooling Solution resolves reliability, scalability and space constraints

UCD IT services took the opportunity presented by the Future Campus project to replace the existing chilled water-based cooling system with a new solution utilising Schneider Electric's Uniflair InRow Direct Expansion (DX) technology, utilising a refrigerant vapour expansion and compression cycle. The condensing elements have been located on the roof of the data centre, conveniently freeing up significant ground space on the site formerly used for a cooling plant.

Following on from an open tender, UCD selected Total Power Solutions, a Schneider Electric Elite Partner, to deliver the cooling update project. Total Power Solutions had previously carried out several power and cooling infrastructure installations and upgrades on the campus and is considered a trusted supplier to the university. Working together with Schneider Electric, Total Power Solutions was responsible for the precise design of an optimum solution to meet the data centre's needs and its integration into the existing infrastructure.

A major consideration was to minimise disruption to the data centre layout, keeping in place the Schneider Electric EcoStruxure Row Data Centre System (formerly called a Hot Aisle Containment Solution, or HACS). The containment solution is a valued component of the physical infrastructure, ensuring efficient thermal management of the IT equipment and maximising the efficiency of the cooling effort by minimising the mixing of the cooled supply air and hot return – or exhaust - airstream. The new cooling system provides a highly efficient, close-coupled approach which is particularly suited to high density loads. Each InRow DX unit draws air directly from the hot aisle, taking advantage of higher heat transfer efficiency and discharges room-temperature air directly in front of the cooling load. Placing the unit in the row yielding 100% sensible capacity and significantly reduces the need for humidification.

Cooling efficiency is a critical requirement for operating a low PUE data centre, but the most obvious benefit of the upgraded cooling system is the built-in resilience afforded by the 10 independent DX cooling units. No longer is there a single point of failure; there is currently sufficient redundancy in the system that if one of the units fails, the others can take up the slack and continue delivering cooling with no impairment of the computing equipment in the data centre.

"We calculated that we might just have managed with eight separate cooling units," said Cannon,

"but we wanted the additional resilience and fault tolerance that using ten units gave us." Additional benefits of the new solution include its efficiency – the system is now sized according to the IT load and avoids the overcooling of the data centre both to reduce energy use and improve its PUE.
In addition, the new cooling system is scalable according to the potential requirement to add further HPC clusters or accommodate innovations in IT, such as the introduction of increasingly powerful but power-hungry CPUs and GPUs. "We designed the system to allow for the addition of four more cooling units if we need them in the future," said Cannon. "All of the power and piping needed is already in place, so it will be a simple matter to scale up when that becomes necessary."

Implementation: Upgrading a live environment at UCD

It was essential while installing the new system that the data centre kept running as normal and that there was no downtime. The IT department and Total Power Solutions adopted what Tom Cannon calls a "Lego block" approach; first to consolidate some of the existing servers into fewer racks and then to move the new cooling elements into the freed-up space. The existing chilled-water system continued to function while the new DX-based system was installed, commissioned and tested. Finally, the obsolete cooling equipment was decommissioned and removed.

Despite the fact that the project was implemented at the height of the Covid pandemic with all the restrictions on movement and the negative implications for global supply chains, the project ran to schedule and the new equipment was successfully installed and implemented without any disruption to IT services at UCD.

Results: A cooling boost for assured IT services and space freed for increased student facilities

The new cooling equipment has resulted in an inherently more resilient data centre with ample redundancy to ensure reliable ongoing delivery of all hosted IT services in the event that one of the cooling units fails. It has also freed up much valuable real-estate that the university can deploy for other purposes.

As an example, the building housing the data centre is also home to an Applied Languages department. "They can be in the same building because the noise levels of the new DX system are so much lower than the chilled-water solution," says Tom Cannon. "That is clearly an important issue for that department, but the DX condensers on the roof are so quiet you can't tell that they are there. It's a much more efficient use of space."

With greater virtualisation of servers, the overall power demand for the data centre has been dropping steadily over the years. "We have gone down from a power rating of 300kW to less than 100kW over the past decade," says Tom Cannon. The Daedalus data centre now comprises 300 physical servers but there are a total of 350 virtual servers split over both data centres on campus. To maximise efficiency, the university also uses EcoStruxure IT management software from Schneider Electric, backed up with a remote monitoring service that keeps an eye on all aspects of the data centre's key infrastructure and alerts IT Services if any issues are detected.

The increasing virtualisation has seen the Power Usage Effectiveness (PUE) ratio of the data centre drop steadily over the years. PUE is the ratio of total power consumption to the power used by the IT equipment only and is a well understood metric for electrical efficiency. The closer to 1.0 the PUE rating, the better. "Our initial indications are that we have managed to improve PUE from an average of 1.42 to 1.37," says Tom Cannon.

"However, we're probably overcooling the data centre load currently, as the new cooling infrastructure settles. Once that's happened, we're confident that we can raise temperature set points in the space and optimise the environment in order to make the system more energy efficient, lower the PUE and get the benefit of lower cost of operations." The overall effects of installing the new cooling system are therefore: greater resilience and peace of mind; more efficient use of space for the benefit of the university's main function of teaching; greater efficiency of IT infrastructure and consequently a more sustainable operation into the future.

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Post-pandemic consumer behaviour has defined the new application experience

Today's consumers are looking for the 'total application experience' - and it's up to IT teams to meet this expectation.

BY JAMES HARVEY, EXECUTIVE CTO, EMEAR, CISCO APPDYNAMICS

THE WAYS in which businesses are now delivering customer experience have changed. The pandemic was the tipping point for many organisations, as they rapidly had to transform their digital offerings to help customers and employees adjust to the sudden changes that lockdowns enforced. In particular, consumer needs quickly evolved, with increased use of applications opening their eyes to the benefits that digital services can deliver. These applications made it easier for people to access services and to fit activities in around their other work and life commitments; and, in many cases, digital services have enabled people to try new things that they wouldn't have before.

As a result of this continued increase in digital experiences, customer experience has become more digitally focused, with the future of CX driven by personalised, seamless, digital experiences. Customers have now realised the convenience of applications, with access to incredible digital experiences that many brands are now delivering.

Consequently, expectations have soared sky-high and tolerance for anything less than an optimal experience has hit rock bottom.

The latest Cisco AppDynamics App Attention Index report - 'Who takes the rap for the app?' - found that consumer expectations around digital experience were already at an all-time high before the pandemic – having risen even further since the start of 2020. More than three quarters (76%) say their expectations of digital services have increased over the same period.

These ever-growing customer experience expectations have increased the pressure on application owners, and the technologists behind these services to deliver frictionless, seamless digital experiences at all times. For it to be a reality, it's essential that IT teams have real-time visibility into IT performance up and down the IT stack, from customer-facing applications right through to core infrastructure, so that businesses can continue to deliver exceptional customer experience.

Customer experience is now the digital experience

In this new 'digital first' environment, brands have a massive opportunity to drive customer loyalty by providing consumers with the faultless and engaging digital experiences they have come to expect and rely on over the past two years. Already, we're seeing consumers looking favourably on brands that have innovated at speed to deliver applications that have supported them through the pandemic and enabled them to access the services they love and rely on.

On the other hand, application owners need to consider the implications of delivering anything other than a seamless digital experience. Because, as consumers have become more sophisticated in their use of applications, and been exposed to the very best digital experiences across sectors, they've also come to understand what digital services can and should be like.

They now expect more from their digital experiences. The concern for brands is that consumers are totally unforgiving - should they encounter problems with applications they are no longer happy to try again later or suffer in silence. Perhaps most alarmingly, 57% of people state that brands have only one shot to impress them and if their digital service does not perform, they won't use them again. Brands are now operating in an environment where there are no second choices.

Observability relieves the pressures of seamless application performance

When an application fails, it always hurts the bottom line - whether it's from energy spent to diagnose the root cause of the issue, or lost revenue and damaged brand reputation. Full-stack observability provides IT teams with a single, unified view up and down the IT stack so that they can identify and resolve performance before they impact customers. To ensure applications always perform optimally, application and IT infrastructure teams also need access to the same information so that they can speak the same language. After all, application health is inextricably tied to the health of the underlying infrastructure. With complete visibility into applications, IT infrastructure, and data, IT teams can eliminate wasteful and expensive overprovisioning, avoid the "it must be the network" blame game, and rapidly identify the root causes of application performance issues.

But full-stack observability truly comes into its own when, IT teams can correlate how application performance impacts business outcomes and therefore prioritise their work based on the most critical issues.

Bylinking IT performance data with real-time business metrics technologists can pinpoint the issues that could really damage user experience and prioritise their efforts accordingly. Only with a business lens on full-stack observability can technologists be sure of delivering the seamless digital experiences people are looking for.

The stakes have been raised. Today's consumers are looking for the 'total application experience' – a high-performing, reliable, digital service which is simple, secure, helpful and fun to use. It is personalised to their own individual needs and preferences and it adds real value to their lives. Now it's up to IT teams to meet these demands and deliver exceptional digital customer experiences.

To ensure applications always perform optimally, application and IT infrastructure teams also need access to the same information so that they can speak the same language. After all, application health is inextricably tied to the health of the underlying infrastructure

Data in motion offers the winning formula: In sport and business

When you need data fast to keep a business or event running smoothly, data in motion offers the winning formula no matter the situation.

BY FRED CREHAN, AREA VICE PRESIDENT, EMERGING MARKETS, CITRIX

WHEN YOU'RE WATCHING Formula 1 drivers speeding around the track at Silverstone or Monaco, data is probably one of the last things to come to mind. However, without it, not even the best drivers in the very best cars would make it down the home straight in first place.

In fact, a huge amount of every Formula 1 race revolves around data. From lap times and engine performance, to tyre wear and driver fatigue – the driving teams need all of this information at their disposal to give them the best chance at sneaking an advantage over their opponents.

Of course, this can be big changes made from lessons learned in the previous race, but more often, it's the smaller in-race changes that make all the difference.

The systems to gather this data are available now — they have been for years. However, while collecting, processing and analysing data is relatively straightforward, the challenge comes when you need to do that in real-time to make those reactive in-race tweaks count.

Just imagine how F1 teams need to have confidence that race data is completely free of errors across the whole process – from the compilation and analysis to the transmission. Or coaches in football and rugby being confident that the GPS tracker under player's shirts are up to date so they can make decisions based on facts about fitness levels and performance. And that is where the notion of data in motion comes into play.

Teams of all shapes and sizes, as well as businesses, need a new way to handle data – one that supports collecting a continuous flow of data from across the business, between apps, databases, SaaS layers and cloud providers. Ultimately, data needs to flow efficiently and effectively between all modern and heritage applications.

The base line

Putting it simply, many businesses get their data via traditional batch systems, which typically run nightly to process the data accumulated throughout the day. For a connected business attempting to stay up to date, safe and in line with its competition can't wait for daily batch cycles to analyse and react to data. It needs to offer a well-integrated experience for its customers that siloed applications and databases simply can't offer.

Data in motion works entirely differently. Instead of passively storing data to access later, it allows for real-time, always-on, available-now data in any system as soon as it is generated.

Such real-time data flow and processing is important because it is the foundation of so much – whether you're managing the success of an F1 team or just using modern digital services, to book a taxi or access online banking.

Operating as a whole

Another way of thinking about it is to consider the central nervous system in any living thing. While our bodies all have independent parts that function alone, the nervous system ties them all together to operate as a coherent whole that can react and respond intelligently in real time.

Data in motion creates the "nervous system" in any business, enabling the kinds of customer experience and intelligent operational systems that are required to stay relevant and competitive in the world today. The real-time continuous processing that it offers gives businesses the ability to react and respond immediately, so they can offer the kind of service that their customers expect.

There's also an organisational benefit to be had from using data in motion. Let's look back to sport again and to the 2022 World Cup in Qatar to see how. Such a big event comes with plenty of organisational complexities, but with 1.5 million visitors – half of the country's population – expected in the Gulf State over the competition's duration, it will require a whole set of different capabilities and technologies to keep the experience a good one.

Data in motion works entirely differently. Instead of passively storing data to access later, it allows for real-time, always-on, available-now data in any system as soon as it is generated

It'll place new requirements on the country's infrastructure, security and systems that it won't be used to, which could otherwise be a recipe for disaster. But by using data in motion, the event organisers can plan the event with assurance that it will run smoothly.

This includes having the data to prevent bottlenecks and overcrowding, hiring the right amount of stadium security to keep the event secure, knowing when to lay on additional mass transport at busy times, and being able to offer efficient ticketing. It doesn't just mean organisation at the event either – they also need to ensure fans have somewhere to stay and that food supply chains remain fully stocked for the duration. All of this requires data. Of course, these things aren't a one-time data piece either. They all need to be managed in a real-time, ongoing manner during the tournament to ensure organisational success. When you need data fast to keep a business or event running smoothly, data in motion offers the winning formula no matter the situation.

It's possible to align business and data strategies – here's how

Data is crucial for any business. What it doesn't need however, is more of it. It needs better data that is managed effectively and aligns with business strategy.

BY TOM CHRISTENSEN, GLOBAL TECHNOLOGY ADVISOR & EXECUTIVE ANALYST, HITACHI VANTARA

TODAY, at a time where almost everything is measurable, businesses have access to huge amounts of data. Often, they can be handling more data than they know what to do with. And with it accumulating faster than IT teams can keep up with, it's important that businesses consider ways of addressing the costly resources it takes to maintain the vast volumes of storage.

Today's average enterprise environment is said to include more than eight data lakes. Beyond the cost implications, these huge amounts of data require an investment of IT managers' time and resources which are used to profile, catalog, store data, ensuring that it adheres to the various regulatory requirements governing its use. Often, this process is slow and manually completed, making it susceptible to human error.

In addition to these challenges, data silos can impact the ease at which information is shared across departments. Some businesses may also lack

a culture of collaboration and knowledge sharing, meaning the data they store isn't harnessed to its full potential. In some cases, when data-sharing initiatives are enforced, organisational silos can result in teams ending up with duplicated data. Errors like these can impact data quality, rendering any analytics or insights meaningless. All this results in wasted and unutilised data which, in tandem, is costing businesses a significant amount of money to store.

Harnessing the benefits of DataOps

One way of helping organisations overcome these challenges and get back on track is DataOps, or 'data operations.' By enabling a more agile process for managing data, we've seen an increasing number of organisations adopt, or at least seriously consider, the methodology that is DataOps.

DataOps takes inspiration from Lean Manufacturing, Agile and DevOps, and helps organisations overcome silos and other bureaucratic challenges to deliver insights with speed and agility. This is all without compromising on quality or data governance, particularly in the face of a range of industry regulations.

There's no question that DataOps requires an investment, of both time and cost, but business advantages could soon pay off in the form of greater innovation, faster data analytics, and revenue growth. For example, by automating data quality, compliance, and governance tasks, data teams could easily ascertain whether their data is ready to be consumed, and if valuable insights are possible. Additionally, embedding DataOps into an organisation's digital transformation journey could play an important role in creating a culture of information and knowledge sharing, where people, processes, and technologies are focused on managing data geared towards business and societal outcomes, all while keeping costs under control.

Over time, this culture shift towards greater knowledge sharing throughout an organisation could help break down silos and ensure that businesses are advancing towards shared goals, such as bringing new products to the market.

Is metadata the future?

Metadata – which is known as 'data that provides information about other data' – should be at the core of any successful DataOps strategy. When creating metadata automatically using artificial intelligence (AI) and machine learning (ML) algorithms, organisations could begin to automate arduous and time consuming processes to help reduce manual effort. This would enable staff to spend time on more rewarding tasks. To make this happen, businesses will need data integration technologies to help

onboard the data. In addition, they can establish an effective mechanism to catalog the data and the rules that need to be applied to it, in order to source the valuable insights needed.

When businesses approach such a task, it's important that they don't take a piecemeal approach, where data is passed on from one tool to another, as this could thwart operations. Fortunately, AI and ML technologies could help organisations better understand their data, semantically enrich it, and help identify any issues with its quality. These technologies also enable governance rules to be added to the data.

Achieving a successful transformation

Before businesses embark on their data transformation, it's imperative that they first define their desired outcomes and are clear about their long-term goals. Even if the goal is as simple as figuring out where data is coming from, selecting the best methodology to store and manage it, and then figuring out how to harness it in a way that will deliver the most value to an end customer, then this should be clearly defined and communicated across IT teams. A significant part of this transformation will be cultural, so it's important that businesses have the support and understanding of their teams.

Any successful adoption of DataOps will therefore hinge on overcoming challenges such as organisational silos and involve active encouragement of more collaboration between the technical data and IT teams and their non-technical colleagues, who often define and quantify the success of each data project. This cross-team collaboration will ensure output always aligns with business and financial objectives. As simple as it may sound, these challenges are not trivial. As you review your company's data objectives, I encourage you to consider ways of treating data as a tangible asset that can help realise your company's biggest objectives. To this end, DataOps will put you on the right path.

embedding DataOps into an organisation's digital transformation journey could play an important role in creating a culture of information and knowledge sharing, where people, processes, and technologies are focused on managing data geared towards business and societal outcomes, all while keeping costs under control

Flexibility and agility are key to business resilience in uncertain time

The foundation of resilience is operational maturity.

BY TIM CHINCHEN, SENIOR DIRECTOR, SOLUTIONS CONSULTING, PAGERDUTY

THE NEWS AGENDA is full of conflicting economic indicators and talk of recession for much of the world. We've witnessed stocks dip across Europe, and soaring inflation is putting pressure on central banks to raise interest rates. This is happening at a time when many businesses were still regaining their footings following the pandemic's various economic and social impacts.

Weathering the storm of economic uncertainty requires one foundational strength: Business resiliency. The way to survive tough times is to prepare before they arrive - or, even better, to thrive despite them. This means that they cannot afford for their IT operations to be disrupted from incidents and outages that slow them down, threaten customer care and service provisioning, stop innovation, and cause staff to burn out.

Business resiliency relies on flexibility and agility

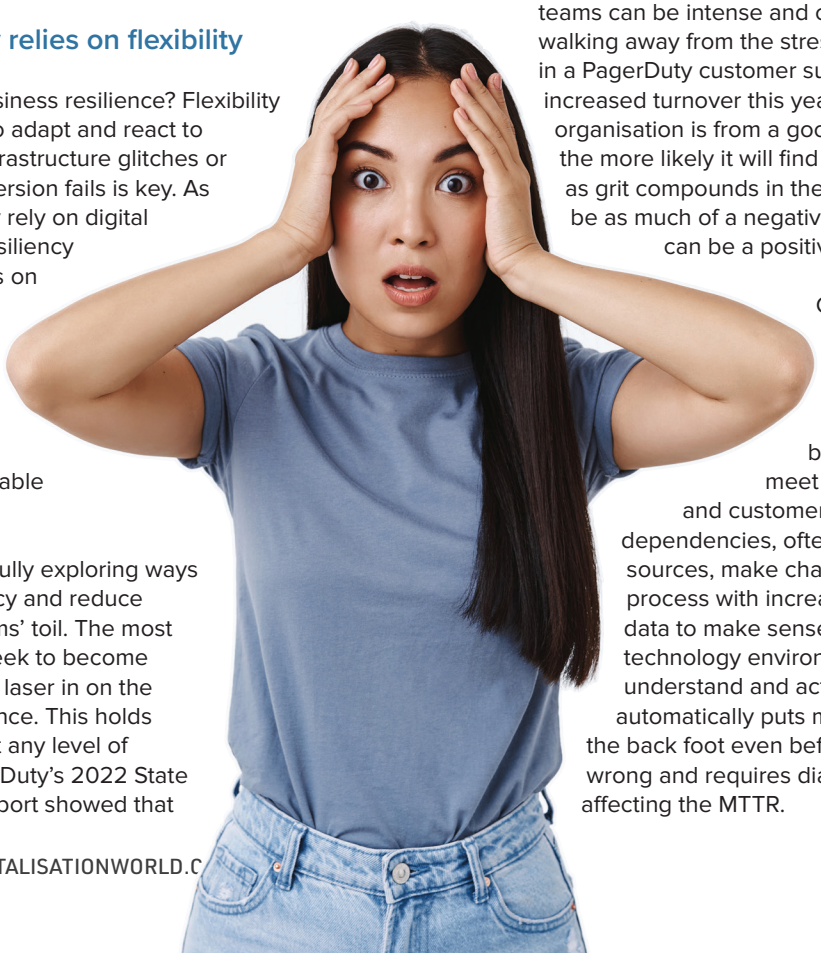
How do we achieve business resilience? Flexibility and agility. The ability to adapt and react to circumstances when infrastructure glitches or an outdated software version fails is key. As businesses increasingly rely on digital operations, business resiliency almost entirely depends on their IT infrastructure and software staying online and functioning as intended. That, or being diagnosable and fixable within an acceptable timeframe.

Organisations are rightfully exploring ways to operate with efficiency and reduce their IT operational teams' toil. The most forward-thinking also seek to become data-driven so they can laser in on the issues impacting resilience. This holds true for organisations at any level of DevOps maturity. PagerDuty's 2022 State of Digital Operations report showed that digital complexity is increasing, and incidents are happening more frequently. The levels of flexibility and agility and differing tolerances for business resilience impact what follows.

Some organisations seek to improve their processes and can devote resources to constant optimisation. Others simply need to have the right person make the best fix available in the moment. Regardless of the starting point, business resiliency is improved when digital operations can move to a proactive stance that solves problems before they negatively disrupt the organisation.

The blockers of flexibility and agility

Manual toil, poor processes, inefficient tech, and their inevitable impact on people all get in the way of smooth operations. The fallout for operational teams can be intense and cause burnout, with staff walking away from the stress. 64% of respondents in a PagerDuty customer survey noted they expect increased turnover this year. The further away an organisation is from a good working experience, the more likely it will find other factors going awry as grit compounds in the system. Inefficiency can be as much of a negative flywheel as innovation can be a positive.



Complexity has become a punishing barrier to efficiency - exactly at the moment digital operations must become more complex to meet the needs of employees and customers. Growing software dependencies, often from third-party sources, make change validation a fraught process with increased risk. The volume of data to make sense of the organisation's technology environment is too much to understand and act on without aid. That automatically puts most organisations on the back foot even before something goes wrong and requires diagnosis and remediation, affecting the MTTR.

This complexity, coupled with the skyrocketing number of systems used within the digital landscape only adds to the problem. Managing these systems' interactions is essential to seeing the big picture. It's unfortunately common for an enterprise tech stack to be composed of many silos, hindering collaboration and slowing down customer service and support.

When something does go wrong and incident response comes into play, then suddenly that system's information, those version changes, and that incident information is needed - immediately. Every moment spent trying to understand the situation is a minute not solving the problem. Every action a responder takes on discovery leaves them with less energy to concentrate on resolution.

The foundation of resilience is operational maturity

Operational maturity cuts two ways. It puts the business on a stronger resilience footing and gives staff a better working experience to be able to predictably and effectively manage incidents and maintenance, without frustration coming into effect when any unexpected issue occurs. With digital operations running smoothly, business operations and team matters can be optimally managed, and incidents can even be predicted and prevented.

PagerDuty's report details five stages of operational maturity and goes into detail regarding the effects on staff attrition and burnout as reported by organisations at differing levels of maturity. We can model customer data to show that those who are merely reactive do regularly witness a greater rate of turnover than those who consider themselves to be at the preventative stage of maturity.

Overcoming these challenges does not require rocket science. There are solutions hinging on easily understood principles, primarily:

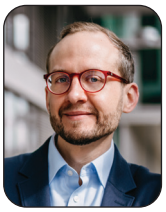
- Technology must be enhanced with automation to dramatically increase efficiency and remove the tedious labour asked of the humans in the loop. This means learning to operationalise machine learning and AI models.
- Processes and technology alike must be flexible enough to manage changing situations and to scale. This requires time planning and realistic marshalling of resources.
- Staff should be given the tools to hold a proactive operational stance, anticipating business and customer requirements and looking at the triggers of possible disruptions.

Operational maturity becomes a veritable revolutionization of business operations. Operational staff aren't caught up with the reactive break-fix grind, they stop faults before they happen and pour time into innovation. The efficiencies gained from this foundational layer impact the whole business structure built on top. There will be an impact at all levels. At the most basic level, those managing the technology stack and on whom the forward progress of the business relies, will stay in their roles, and lend much-needed stability as we enter a time of economic challenge.

Getting your app portfolio in shape: Why observability is essential for running modern apps

It might seem daunting, but getting a clear, accessible grasp on everything that's going on within an application and its infrastructure offers undeniable benefits.

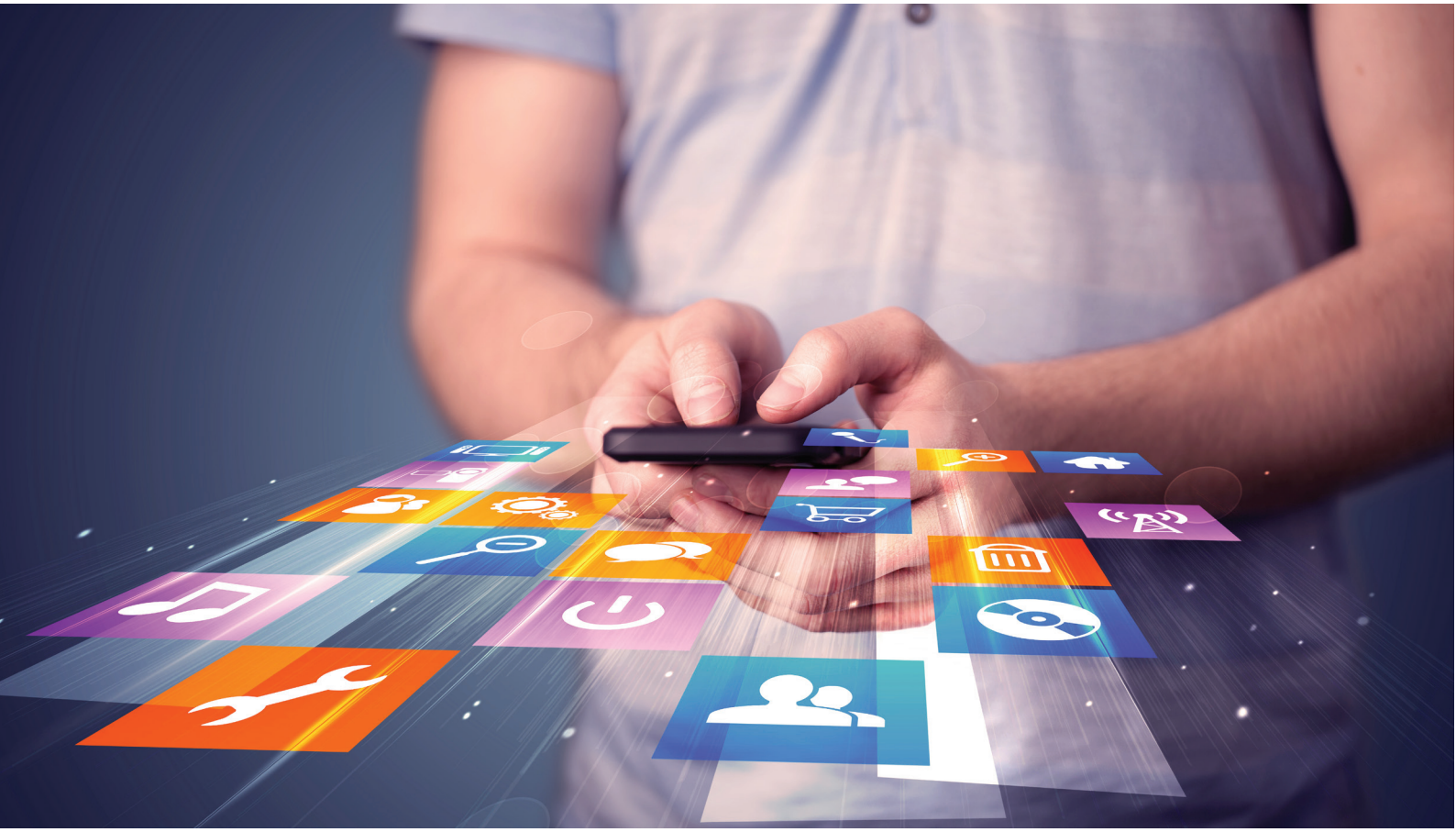
BY MARC ZOTTNER, GLOBAL APPLICATION MODERNISATION LEAD, VMWARE



AS ORGANISATIONS look to become cloud-first to meet the growing demands of the shifts in the ways we do business and consume IT, software architects have evolved their cloud strategies to multi-cloud environments and are adopting more containers, microservices, and a large variety of cloud native technologies.

This, however, is creating more complex, increasingly distributed systems, and making it harder for IT teams to gain a comprehensive view into how systems are performing.

Recent research from VMware's State of Observability report backs this up, showing that 89% agree that today's applications are significantly more complex, and 97% have reported challenges in their ability to monitor cloud application environments, with visibility and insight issues growing from last year.



Visibility issues in complex technical landscapes
It's clear that cloud native applications are growing in complexity – with more than two-thirds of respondents saying they are running multi-cloud apps, and nearly 90% running at least some hybrid apps. But many organisations are still lacking visibility into all the interconnections required across their workloads, and this is holding developer and IT teams back from effectively operating apps at scale. This can be linked to all the complex factors that go into an individual wanting to get fitter – such as their physiology, health, and fitness goals. For better visibility on progress, they might want to monitor and track how they're doing, for example by recording activities with a fitness tracker.

But while interesting, knowing the number of steps taken or workouts completed can't take an individual to the next level – they need to be analysing their performance and updating fitness plans too, based on this data.

Likewise, in a software context – legacy monitoring techniques are falling short, leaving IT teams with an incomplete picture of how modern apps are performing.

Modern business operations are calling out for solutions that can go beyond basic monitoring – to go beyond recording data, to providing answers, alerting issues, and recommending fixes.

Why organisations have to go beyond basic monitoring practices

This is where observability steps in. But what does it offer that basic monitoring can't? Observability is all about being able to understand what is occurring, and what has occurred, within the system throughout the lifetime of an application. Observability brings organisations value by going further, helping developers make better decisions and tackle troubleshooting issues in real-time with suggested solutions too. Beyond alerting, logging, metrics, and tracing capabilities, it provides consolidated business insights on modern software to various roles across silos.

Similarly, a 'digital coach' which can go beyond tracking and into analysis would be far more effective for someone wanting to get fitter: by connecting step data, heart rate, and an individual's physiology, and using this to interpret how specific activity and performance data is doing against these factors to make recommendations and optimise workouts.

Not only this, but by going beyond simple monitoring, a digital coach making these connections across health and activity data could also flag any concerning findings too, such as unusually high or low heart rates during certain types of activity, which could recommend the individual to take it easier and help pinpoint any root underlying problems.

Making observability an essential requirement
Thinking about this analogy for managing modern apps helps to imagine the impact observability can have for businesses in the software world.
Over the last few years, VMware's research has shown uptake in observability tools, and the latest findings now reveal the use of observability is becoming mainstream, with organisations adopting solutions to provide an understanding of critical interdependencies across application workloads and infrastructure.

Just as in a fitness context, observability analysis has become critical for identifying bottlenecks, problem root causes and potential gain as IT teams can see how everything is running and connected across the application stacks. Observability provides foundational capabilities to implement DevOps and Site Reliability Engineering (SRE) practices. It empowers teams to shift the way they observe their apps from causes to symptoms, and to adopt practices like continuous verification (chaos engineering), progressive deployment strategies, and blameless post-mortems.

Likewise, in a software context – legacy monitoring techniques are falling short, leaving IT teams with an incomplete picture of how modern apps are performing

When it comes to choosing and implementing a solution, businesses must also think about using tools that are built for modern reliable apps and multi-cloud at scale. VMware Aria Operations for Applications (formerly VMware Tanzu Observability) was designed to do so, providing critical answers, not only unified data, so software teams can more quickly get to the "why" about the performance of business applications, correlated with underlying cloud infrastructure and end-user experience.

Shaping up your app portfolio

It might seem daunting, but getting a clear, accessible grasp on everything that's going on within an application and its infrastructure offers undeniable benefits. Insights and data gained from observability help IT teams to optimise processes, quickly identify the root cause of issues, improve reliability, and implement solutions at scale with ease. As such, businesses should keep including observability as a first-class requirement to their projects, laying down the foundations for proactive security and software reliability.

How AI enables organizations to move from network monitoring to proactive observability

Executives and boards want their network teams to be proactive. They won't tolerate poor network performance and want any service degradation, however slight, to be swiftly resolved.

BY STEPHEN AMSTUTZ, HEAD OF STRATEGY AND INNOVATION, XALIENT

IN TODAY'S WORLD, the volume of data and network bandwidth requirements are growing relentlessly. So much is happening in real-time as businesses adapt and advance to become more digital, which means the state of the network is constantly evolving. Meanwhile, users have high expectations around applications – quick loading times, look and feel visually advanced, with feature-rich content, video streaming, and multimedia capabilities - all of these devour network bandwidth. With millions of users accessing applications and mobile apps from multiple devices, most companies today generate seemingly unmanageable volumes of data and traffic on their networks.

Networks are dealing with unmanageable volumes of data

In this always-on environment, networks are completely overloaded, but organizations still need to deliver peak performance from their network to users with no degradation in service. But traffic volumes are growing, and this is bursting networks at peak hours, akin to the L.A. 405; no matter how many lanes are added to the freeway, there will always be congestion problems during the busiest periods.

As an example, we're seeing increasing need for rail operator networks to handle video footage from body-worn cameras, in order to cut down on anti-social behavior on trains and at stations.

However, this directly impacts the network, with daily uploads of hundreds of video files consuming bandwidth at a phenomenal rate, yet the operators still need to go about their day-to-day operations while countless hours of video footage are uploaded and processed.

This is a good example of where AI and ML can and is helping organizations take a proactive stance on capacity and analyze whether networks have breached certain thresholds. These technologies enable organizations to 'learn' seasonality and understand when there will be peak times, implementing dynamic thresholds based on the time of day, day of the week, etc., as a result. AI helps to spot abnormal activity on the network, but now this traditional use of AI/ML is starting to advance from 'monitoring' to 'observability'.

So, what is the difference between the two?

Monitoring is more linear in approach. Monitoring informs organizations when thresholds or capacities are being hit, enabling organizations to determine whether networks need upgrading. Whereas observability is more about the correlation of multiple aspects and context gathering and behavioral analysis.

For example, where an organization might monitor 20 different aspects of an application for it to run more efficiently and effectively; observability will take those 20 different signals and analyze the data making diagnostics with various scenarios presented. It will leverage the rich network telemetry and generate contextualised visualizations, automatically initiating predefined playbooks to minimize user disruptions and ensure quick restoration of service. This means the engineer isn't waiting for a call from a customer reporting that an application is running slow. Likewise, the engineer doesn't need to log in and run a host of tests, and painstakingly wade through hundreds of reports, but instead can quickly triage the problem. It also means network engineers can proactively explore different dimensions of these anomalies rather than get bogged down in mundane, repetitive tasks.

This delivers clear benefits to the business by reducing the time teams spend manually sifting through and analyzing realms of data and alerts. It leads to faster debugging, more uptime, better performing services, more time for innovation, and ultimately happier network engineers, end-users and customers. Observability correlation of multiple activities enables applications to operate more efficiently and identify when a site's operations are sub-optimal with this context delivered to the right engineer at the right time. This means a high volume of alerts is transformed into a small volume of actionable insights.

Machines over humans

Automating this process, and using a machine rather than a human, is far more accurate because machines don't care how many datasets they must correlate. Machines build hierarchies, and when something in that hierarchy impacts something else, the machine spots certain behaviors and finds these faults. The more datasets that are added, the more of a picture this starts to build for engineers who can then determine whether any further action is required.

Let's touch on another real-life example. We are currently in discussions with a large management company who own and manage gas station forecourts. They have 40,000 gas stations, and each forecourt has roughly 10 pumps, equating to 400,000 gas pumps across the US. Their current pain point is a lack of visibility into the gas pumps

and EV chargers connected to the network. As a result, when a pump or charger is not working, they might only become aware of this following a customer complaint, which is far from ideal.

The network telemetry that we are gathering, and that behavior analysis, means we are developing business insights, not just network insights. We can see if a gas pump stops creating traffic, which triggers a maintenance request to go and fix the pump. This isn't a network problem, but the network traffic can be leveraged to look for the business problem. This is a use case for gas pumps and EV chargers but imagine how many other network-connected devices there are in factories or production facilities worldwide that could be used in a similar way.

Getting actionable insight quickly

This is where our AIOps solution, Martina, predicts and remediates network faults and security breaches before they occur. Additionally, it helps to automate repetitive and mundane tasks while proactively taking a problem to an organization in a contextualised and meaningful way instead of simply batting it across to the customer to solve. Martina discovers issues with recommendations around tackling the problem, ensuring that organizations always have high-performing resilient networks. In essence, it essentially makes the network invisible to users by providing customers with secure, reliable, and performant connectivity that works. It provides a single view of multiple data sources and easily configurable reporting so organizations can get insights quickly.

Executives and boards want their network teams to be proactive. They won't tolerate poor network performance and want any service degradation, however slight, to be swiftly resolved. This means that teams must act on anomalies, not thresholds, to understand behavior to predict and act ahead of time. They need fast MTTD and MTTR because poor-performing networks and downtime impact brand reputation and ultimately cost money! This is where proactive AI/ML observability really comes into its own.

Oversight above IT transformation

In the IT space, everyone is talking about transformation, but do professionals have complete visibility as to which devices, systems and applications are undergoing this process?

BY MAT CLOTHIER, CEO AT CLOUDHOUSE

DIGITAL TRANSFORMATION is nothing new, but we are living through a period of particularly rapid change. Internal and external factors have combined to accelerate this trend. The Covid pandemic brought with it a seismic shift in the way people work, and the way people consume products, and this change is here to stay.

Enterprises are busy making positive changes driven by a desire to provide best levels of service to customers and ensure the business remains fully compliant and resilient in the face of change.

Complexities of the Cloud

Arguably the biggest transformation still playing out in the IT industry is moving to the cloud, with predictions that the global cloud computing market will continue to grow at pace to the end of 2028, as small and medium enterprises make their migration and businesses seek to improve efficiency with the adoption of advanced technologies such as big data, AI and machine learning.

Using multiple cloud providers has become the standard for many organisations, with 80% using both public and private clouds in a hybrid model. The hybrid model offers agility and competitive advantage, but having your IT estate spread out in

this way can create its own problems. Maintaining oversight of all parts of the estate is essential for resilience but can prove complex and time consuming in practice.

While human resources in the business are busy working on positive change, it's as crucial to ensure that technology can enable monitoring of those developments.

With so much at stake, monitoring is essential to minimise disruption and ensure a seamless customer experience. It is also an important element in making sure regulatory standards and compliance are maintained. The risks of breaching regulatory compliance, with the potential consequences of legal action and fines, as well as reputational damage, are well documented.

For example, data for 2021 shows that data breach costs rose to an average total of $4.24 million, the highest ever recorded – but the same report noted that costs were significantly higher for organisations that lagged in areas such as security AI and automation and cloud security.

And the costs are not just financial: there is huge potential for reputational damage. For those operating in highly regulated industries, such as finance and healthcare, the consequences of breaching regulatory compliance can be even more severe.

Oversight Toolkit

CTOs and CIOs now, more than ever, need to keep on top of their IT transformation, monitor change and have full oversight of their estates. Being across so many things at once can be daunting and laborious, especially for those working with a matrix management structure. So how can they best achieve oversight?

This is where configuration management tools come to the fore. These tools give a top-level overview, a clear and unambiguous assessment of every element of the full suite, all in one place. Find and fix compliance and change management issues quickly. They allow omnipresence facilitating best practice oversight over even the most complex transformation projects.

Having all this information in one easy-to-access place also makes it easier to bring teams together - particularly beneficial for those working with a matrix management structure. You won't miss a thing.

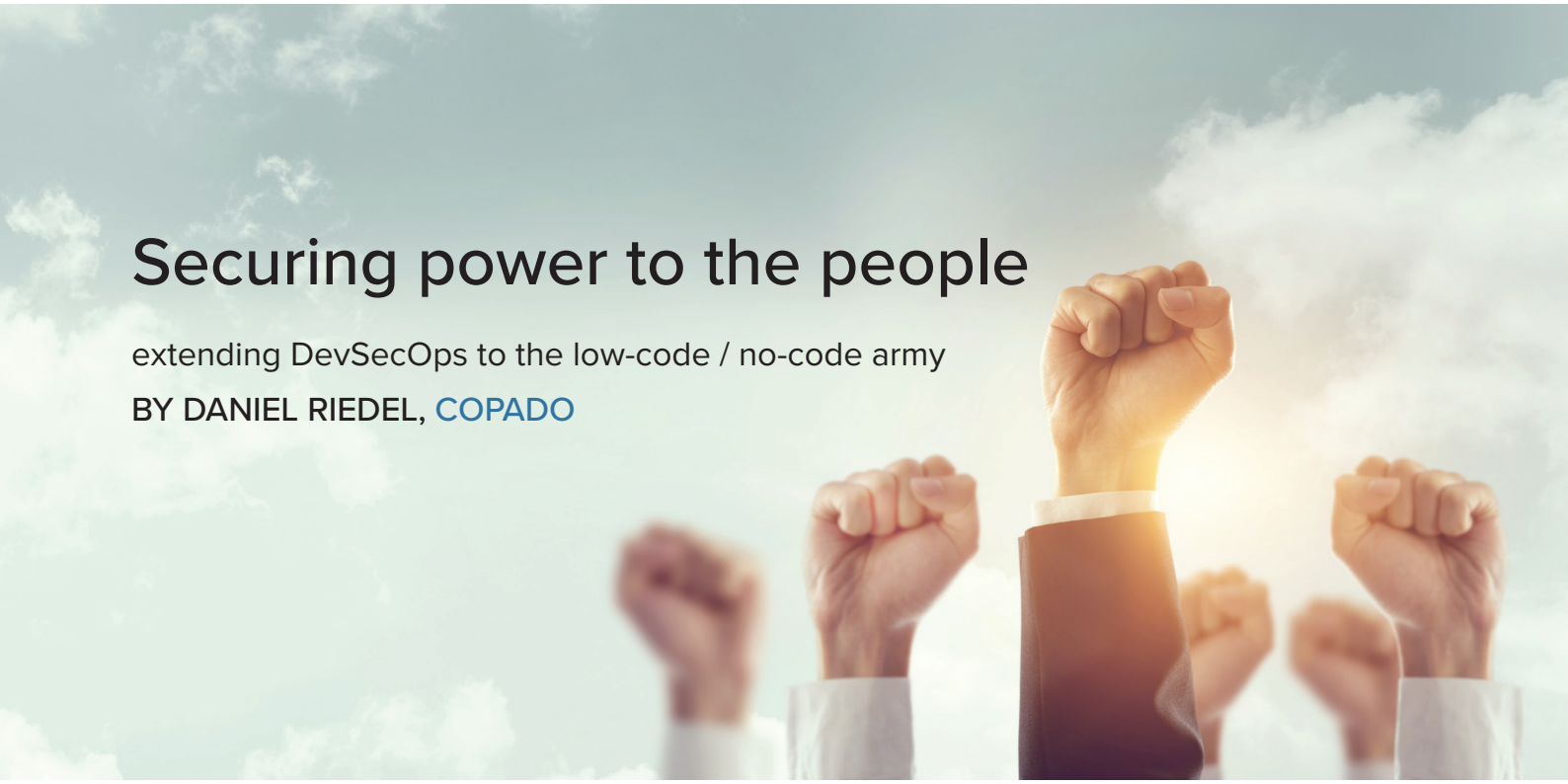
Change management is made simple as the tools look at the different environments across the estate and compare them, giving full transparency on where you are on the journey to migration. They allow oversight of the tracking, testing, and deployment of updates, pre-empting issues before they arise.

They work across server, desktop, and network and across multiple vendors, making them ideal for those working with hybrid cloud systems, giving full peace of mind.

Management tools not only identify issues when they happen: they can also provide a further layer of protection by allowing CTOs and CIOs to take full control by setting policies and permissions to pre-empt compliance problems before they occur. Policies can be created or selected from the Center for Internet Security's 20 critical security controls, which satisfy regulatory requirements like PCI and SOX. This means companies can automatically achieve compliance by setting policies according to best practice configuration.

The automated health checks offered by configuration management tools act as an early warning system, building a company's resilience by allowing them to act fast not just when problems crop up, but by catching misconfigurations before they can be exploited.

Configuration management tools are a powerful addition to the CTO and CIO toolkit.



Securing power to the people

extending DevSecOps to the low-code / no-code army

BY DANIEL RIEDEL, COPADO

IT FEELS like low-code / no-code has been one of the hottest topics within software, since forever. Every media outlet, every LinkedIn post, every forum discussion has some reference, somewhere. This is not surprising. Gartner predicts that by 2025, 70% of new applications developed by enterprises will use low-code or no-code technologies — up from less than 25% in 2020. That is a phenomenal amount of growth and cannot be ignored.

A huge part of this growth has been due to non-IT personnel being empowered to develop applications for specific challenges, quickly and easily. These citizen developers originally worked in an environment that was sanctioned and even controlled by corporate IT; but part of the low-code / no-code revolution has been the disintegration of this oversight.

Again, this is not necessarily surprising – it is a simple numbers game. Morgan Stanley has predicted a global shortage of 12 million professional software developers by 2024 and, almost in response, Gartner predicts that by 2023, the number of active citizen developers at large enterprises will be at least four times the number of professional developers. That is a huge increase in the amount of risk a business can be exposed as business users take control of their own technology development.

The risks of low-code / no-code

The shift in power is undeniable. And with that shift comes a substantial set of risks – especially when it comes to the security of application development. The Open Web Application Security Project (OWASP) foundation recently unveiled a list of the most potent threats posed by low-code / no-code, with identity misuse topping the list. As part of that report, OWASPS notes:

“As low-code / no-code platforms proliferate and become widely used by organisations, there is a clear and immediate need to create awareness around security and privacy risks related to applications developed on such platforms.”
In response to security threats, professional developers have been moving towards DevSecOps for quite some time. But for this army of citizen developers, the idea of embedding and integrating security as a shared responsibility throughout the entire application lifecycle, simply does not occur.

Partly this is because a substantial misunderstanding has arisen and has yet to be checked. Vendors reassure business users that the technology is secure because it is. But this has somehow mutated to create a false expectation in these business users that because the technology itself is secure, everything to do with it, will also be safe.

Businesses must understand that whilst the security within the technology may protect their platform, it will not protect automatically not the logic and applications that are built on top of that platform. The second a user factors in an ‘if/or’ statement to drive a path of logic in how the technology is being used it opens the potential for holes to arise.

Consider a simple example of a health record. A user in finance builds a quick application that recognises that the updates to a health record are

complete and then sends a copy to relevant parties, such as doctors. The path of logic would look something like:

"IF record 'X' is complete, THEN send to recipient(s) 1, 2 and 3"

This seems quite tight as a process but there is already plenty of room for error. Recipients may change, for example. And as soon as the definition of 'complete' become sophisticated – for example delineating between surgical updates that need to go to the medical team, and billing details that need to go to a finance department, this threat grows exponentially. And that risk is all the greater with citizen developers who may not have an awareness of these issues with logic.

This is because enterprises so often overlook the human elements and the integration between apps – both of which represent huge holes in the security and integrity of the use of the application. It strikes me that the main issue is one of awareness: specifically, being aware of the difference of the technology itself and the technology in use.

Looking the wrong way crossing the road: the cost of a lack of awareness

The OWASPs list provides a series of examples of this neglect in action. Each occasion is easily reached, simple to exploit, and as powerful as low-code / no-code itself when it comes to the impact on the business.

For example:
"A maker creates a simple application to view records from a database. They use their own identity to log into the database, which creates a connection embedded within the application. Every action performed by users in the app ends up querying the database with the maker's identity. A malicious user takes advantage of this, and uses the application to view, modify or delete records they should not have access to. Database logs indicate that all querying were made by a single user, the app maker."1

The fall out from such a situation could easily cost thousands and – in the hands of a particularly determined user – shut down a company. And there are many other possible threats – credential sharing, data leakage, even malicious configuration of security protocols themselves.

It will take a high-profile event such as a data breach to truly highlight these risks, with the inevitable follow up investigation highlighting the blind spot that low-code / no-code has created. But by then, the horse will have bolted.

Embedding DevSecOps into Citizen Developers

Thus, the issue becomes one of prevention and ensuring that DevSecOps is extended to these citizen developers. Specifically, these developers need to include application and infrastructure security from the start and then automate the testing and security of their application.

The trick is that they need to do this with no additional effort, as part of their low-code / no-code experience. The security needs to be an embedded, integrated part of the process. The evolution from low-code / no-code use to secure low-code / no-code based applications in use, must be completely painless and without friction. Another way of looking at it would be to say that these users cannot be enabled to make a mistake.

The first step here is for a CISO figure in a business to identify the level of exposure the company has to low-code / no-code development, how critical those applications are to ongoing profitable operation, and consequently, the level of risk presented.

From here, a DevSecOps programme can be implemented to improve the security and integrity of the applications developed. Broadly speaking, this needs to include an audit of the capabilities of the likely citizen developers within an enterprise, a clear set of goals and boundaries that also specifies IT department support, governance frameworks and any necessary training.

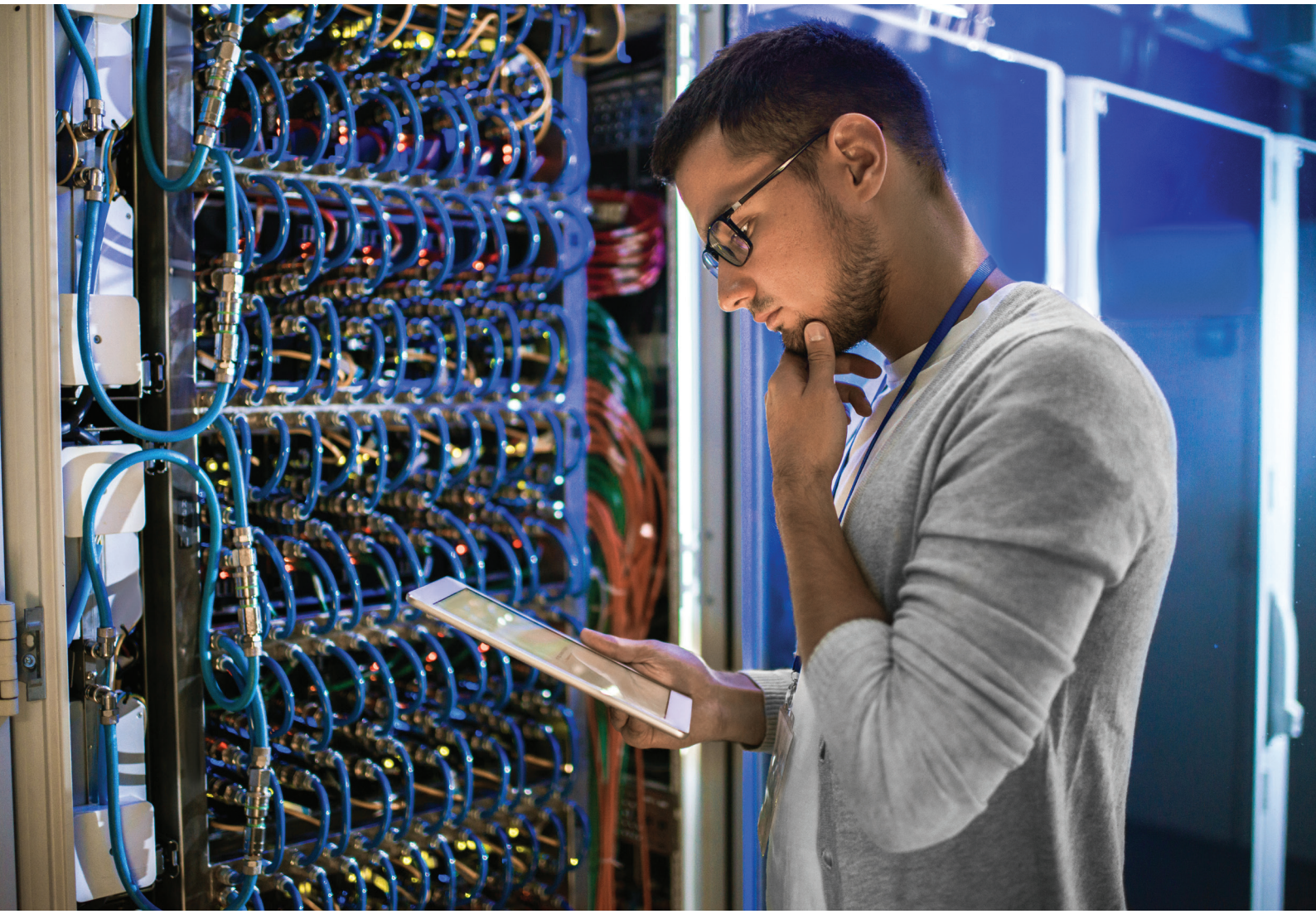
This is put into practice by using DevSecOps to build the automation around the citizen developers so they can thrive without having to continually bring security to the forefront of their thinking.
Given the sheer number of these potential citizen developers, businesses need to educate them, so they know to build - or reach out for help to build - those guardrails. Awareness and a blameless culture that encourages business users to simply ask 'Will this application increase our exposure to risk?" without fear of a negative response, is critical.

This must go hand in hand with a 'test-first' approach that means when these citizen developers DO create innovative technology, they can only do so within the confines of their role and having 'put on the seatbelt' before they drive the low-code / no-code vehicle. This testing and automation are paramount to ensure a business build as much resilience into its application development as possible.

We need to teach the world just like we taught the professional coders. This is not about dumbing down DevSecOps but rather, extending best practice to the business users so that they can continue to innovate quickly at the point of need, whilst remaining within the safety net of approved IT.

FURTHER READING

- 1 Taken from https://owasp.org/www-project-top-10-low-code-no-code-security-risks/



It's time for a new job category - Performance Management Engineers

The value of performance management engineers is self-evident but making them a common fixture in every business' IT team will require a change in approach by both companies and universities.

BY CHARBEL KHNEISSER, VP SOLUTIONS ENGINEERING, EMEA, AT RIVERBED TECHNOLOGY

TODAY, we no longer have the luxury of broad expertise. Even within the same domain, knowledge has become specific to technology, and indeed versions of that technology. Given the wide range of systems now used by organisations, the lack of experts with a top-line understanding across all of these means insight is falling between the gaps. And with it the potential for businesses to maximise use of their IT and improve operations.

This is nowhere more evident than in performance management. An increasing number of companies have invested in technology that offers them data on how their networks and applications are performing, with the potential for end-user experiences to be optimised and better services to be delivered to customers. The challenge is that many of these organisations are unable to consume the telemetry properly and turn it into actionable insights because

they lack the expertise to analyse the input. The solution? Introducing a new class of employee.

Introducing the performance management engineer

In today's complex technological world, it's clear that the need has never been greater for employees capable of, and dedicated to, reading, understanding, and improving performance management. And analysing it as it relates to the end-user, independent of understanding the systems themselves.

With a new kind of IT employee in place – performance management engineers – companies will be empowered to transform their operations. For example, traditionally, IT staff were assigned to conducting network analysis when there was a specific issue that needed to be resolved. However, with dedicated experts carrying out ongoing monitoring, businesses can minimise time to resolution when challenges emerge, by shifting from a reactive to proactive approach.

This is because time to resolution is made up of four key factors – mean time to know there's an issue, mean time to identify where the problem is coming from, mean time to fix it, and mean time to verify the fix. To date, organisations have had the talent to address the third factor – resolving the problem – but not to tackle the other three elements. With performance management engineers in place, capable of reading telemetry across the whole network in real-time, this will no longer be the case as they will have the expertise to deliver on all four areas. Not only will this reduce downtime, with positive knock-on effects for staff and customers, but it will also save money. The time to resolve an issue is fixed, but the mean times to know, locate and verify can be reduced, unlocking efficiency with its cost-saving benefits. What's more, if you can eliminate the time to know there's a problem, you're able to take a preventative approach, meaning the entire issue could be avoided and the cost of impact brought down to zero.

The role of universities and companies

The value of performance management engineers is self-evident but making them a common fixture in every business' IT team will require a change in approach by both companies and universities. To build the talent pipeline, it will be essential for universities to update their courses to include a focus on performance management, rather than continuing to bill everything around technology topics on specific domains. In practice, this will mean giving students the right foundation to understand key concepts across the board so they can be polished from a performance perspective.

For instance, arming them with the ability to understand the basics of coding (without having to be an expert) and giving them the analytical skills to assimilate knowledge and understand the outcomes so they can effectively analyse application performance problems.

In tandem, organisations need to evolve their mindsets to appreciate that what employees need is the right knowledge base to evolve from, as the specific skills their staff require will constantly change. With this understanding in place, the value of introducing performance management engineers can be truly appreciated.

With performance management engineers in place, capable of reading telemetry across the whole network in real-time, this will no longer be the case as they will have the expertise to deliver on all four areas

Tackling the great resignation

Beyond improving network and application performance, introducing a new category of employee could help businesses stave off the impacts of the great resignation. Notably, by offering staff the intellectual growth and strong financial remuneration to keep them motivated and retained. To dive deeper into the first element, it's undeniable that in the last couple of years there's been a boom in innovation. However, IT staff have not been equipped with the skills needed to keep pace with this, due to a lack of time and investment being dedicated to training, as they were focused on firefighting issues instead. By offering IT employees the opportunity and training to become performance management engineers, companies will provide them with new career opportunties. What's more, moving into this role will turn staff into a more highly valuable resource with an attached monetary benefit for them.

The investment will be worth the payoff

Introducing a new category of employee dedicated to performance management will never be an overnight job. It will require universities and organisations to take active steps to cultivate this new group and prepare for their introduction to the workforce. Furthermore, if this effort is made, companies will be empowered to dramatically improve their network and application performance and achieve significant business benefits. These will range from greater employee and customer experiences, to reduced IT costs and an even better retention of employees. With this in mind, it's time we pushed the button on introducing performance management engineers.

Boosting value of DataOps through enhanced monitoring

Many businesses have finally woken up to the need for DataOps, but without observability, DataOps will always be hamstrung.

BY THIBAUT GOURDEL, TECHNICAL PRODUCT MARKETING MANAGER, TALEND

AS THE business landscape changes, data availability and an enterprise's data needs change along with it. The ability to respond swiftly and decisively to problems and opportunities is critical to success, and data observability is a key part of this capability that must not be overlooked. According to Gartner research, bad, inaccurate or obfuscating data costs businesses an average of $12.9 million every year.

To understand the importance of data observability, we must first understand DataOps. DataOps is vital to any modern business of any size, even if smaller companies take a less formal approach. Whichever way DataOps fits into the organisation, a proactive and hands-on approach to the data best practices is key to maximising data ROI.

The field of DataOps is parallel to DevOps; the integration and streamlining of disparate teams and groups within software development pipelines. DevOps improves efficiency and responsiveness within the development process and maximizes the quality of the final product. DataOps brings this approach to an enterprise's means of gathering, selecting, monitoring and using data. DevOps and DataOps both seek to remove the silo effect; teams operating without open intercommunication, leaving different aspects of the business unable to coordinate effectively. DataOps improves the visibility, reliability and actionability of data across the whole organisation.

Every company depends on detailed and reliable data to make important business decisions. Market statistics, resource monitoring and internal performance information are all sources of data that can show where a company needs to improve, which strengths to focus on and which threats need to be addressed. Although there is no such thing as too much good data, there are such things as inaccurate data, untimely data, superfluous data, misleading data or badly presented data.

DataOps sifts good data from bad, starting with the initial discovery of sources and the process of gathering data. The next step is to select data from these sources, prioritize it, and find the most effective way of presenting that data to the people who need to see it. Thus, we can see DataOps has well-defined data processes, just as DevOps does. Managing these processes and unlocking the full potential of DataOps relies on data observability.

Data observability in DataOps

Data observability gives data teams the resources to monitor and manage the business' data and processes. Workplace culture, best practices and technological solutions such as automated monitoring systems and dashboards all play a role in this. The role of DataOps is to select the most useful data and maintain reliable sources, but with an ever-increasing surfeit of data available today, analysts effectively need data about the DataOps infrastructure itself.

Good data observability empowers DataOps to monitor the flow, the quality and the presentation of data for quick and effective responses to emerging issues, from source to point of use. Leadership and data technicians will have insight into data quality, accuracy and relevance; the lineage of the data from its original source through the DataOps pipeline; and how it is stored, moved and used within the organization. Observability facilitates truly effective data monitoring and provides team leaders awareness of uptime and issues in the data pipeline.

Most importantly, good data observability includes automatic notifications to all relevant staff when a problem begins to emerge, and guidance towards the best course of action. A trust score and other detailed metrics can allow for more effective automation and notification in data monitoring. Even ten minutes of downtime in the data pipeline can be devastating to an enterprise, and observability is the key to minimizing damage and preventing data disasters.

The importance of data observability today

Data operatives cannot afford to take a laissez-faire or reactive approach to monitoring data pipelines. If data professionals wait for a problem to present itself before taking any action, the damage has already been done. Proactive monitoring of the data flow will allow technicians to respond to emerging problems swiftly, fixing many issues before they can cause any damage to the company. Typical alerts issued by data observability could be that data has not arrived at the intended destination, such as Snowflake, or that data schema drift has been detected.

This can only be achieved in real-time with excellent data observability. While an enterprise may once have had hours or even days to respond to a fault in its data infrastructure, today's businesses live and die by their ability to stay ahead of the competition. Every second of downtime in any business process can be costly, and losing access to data – or worse, relying on flawed data – can be catastrophic.

For example, data observability can manage schema drifts where changes are operated within the data sources that drive errors in the pipelines. Data observability enables data teams to monitor the schema and detect the changes when they happen so that they can prevent the impact on the business with data fed through the BI dashboards or visualisation tools. We can take the example of a change happening in a reference product series in the retail industry; if not monitored properly the change will impact the inventory and sales dashboards.

The big advantage of data observability is its ability to monitor data and infrastructures at the same time. Historically, data and IT teams were monitoring either the data or the infrastructure; however, now that data has become such critical in the processes, the entire environment will be monitored – data, processes and machines, guaranteeing a service level agreement of 99%.

In conclusion

Businesses have always needed data to inform decisions at every level of the organisation. External data – demographics, resources, trends and obstacles – gives leadership the information to determine long-term vision and business strategy. Internal data – employee productivity and wellbeing, the health of the company's infrastructure and performance metrics – allows the organization to address its flaws, capitalize on its strengths and operate at its best.

DataOps is a relatively young field in business, and data observability is an even newer aspect of that field, but neither can be dismissed as a trend or buzzword. DataOps arose to answer a clear need for businesses to take a more collaborative approach to managing their data and to think more holistically about how data is communicated within the company. In turn, data observability is a response to the growing and urgent need for proactive management and monitoring within DataOps.

Today data observability is more deployed and adopted by young organisations on modern data stacks. Digital natives are also early adopters of data observability as they run business on data and with data. Larger organisations tend to do more traditional data quality monitoring but the market is evolving where more and more data players are adding data observability to their capabilities.

Every business must understand this need, even if the organisation is not yet able to quantify it. A Gartner survey found that at least 60% of businesses don't measure exactly how much they lose due to bad or misused data, leaving management in the dark about what DataOps can really offer. Research by Forrester indicates that 40% of a data analyst's time goes to dealing with data issues. Many businesses have finally woken up to the need for DataOps, but without observability,

DataOps will always be hamstrung. The key to a business' success is well-informed decision-making; the key to making decisions is DataOps; the key to accurate DataOps is data observability.

Digital transformation moves businesses into the fast lane – from the racetrack to the boardroom

Ultimately, the same intelligence that wins Formula E races helps businesses across all industries thrive and fight climate change.

BY SANJAY SRIVASTAVA, CHIEF DIGITAL STRATEGIST AT GENPACT

THE SPORTING WORLD is increasingly data-driven, especially in the FIA Formula E World Championship, where a hundredth of a second can be the difference between winning and losing. In the world's most disruptive motorsport series, drivers race innovative electric vehicles to razor-thin victories. And Envision Racing – one of the series' founding teams – finds that competitive edge by combining engineering expertise with software and data science.

That same peak-performance mentality can help businesses manage large-scale change initiatives. Companies can enhance the customer experience, accelerate environmental sustainability initiatives, and reduce costs, all by capturing and analysing data with agility and at scale.

Train for race day

The volume of data Envision Racing generates is enormous. The challenge is to collect, analyse, and extract the right insights to sharpen the team's strategies and create immediate impact. And to do all that, it must have the correct infrastructure in place to process the data in a meaningful way.
To help Envision Racing prepare for each race, the team created Augmented Race Intelligence (ARI). The solution ingests data from the thousands of hours the drivers spend in the simulator and from practice runs, qualifying, and actual races on the track. ARI captures vehicle speed, braking habits, acceleration, energy consumption, use of attack mode – a temporary extra boost of power all drivers must take – and much more.

With reports and visualisations tailored to each user's preferences, ARI provides easily consumable visuals to the drivers, who need quick, snappy insights on areas of improvement. The engineers in the pit lane get a greater level of granularity so they can dive into the details and enhance overall performance. In a similar fashion, an insurance company can use machine learning to enhance its claims-adjusting process, which can often be complex and costly due to lengthy reporting and manual processes. They can then process vast amounts of data – in this case photos of auto accidents, home damage, or other insurable losses – to drive a faster, more accurate understanding of the potential liability and the size of an insurance pay-out. By accelerating claims management, people can get back on their feet quicker.

Put the pedal to the metal

When capturing data, it's not just about increasing the volume of insights but also accuracy and timing so that a team (or business) can make the

right decisions at the exact right moment. In an environment where every split second counts, data is essential to create the real-time insights that guide lightning-fast decisions on the track.

Radio conversations between all drivers and their engineers during a race have the potential to yield game-changing insights. But not all the chatter is valuable, making it difficult to get this intelligence when processing it manually. Envision Racing's Radio Analytics Engine (RAE) addresses this challenge by analysing and organising all race-day radio communication during a race. RAE quickly separates the message from the noise and classifies competitive insights. The team can then quickly react to and reap the benefits of this crucial information.

This same approach can be used in Fortune 500 firms too. Live conversations between banks and their customers are still essential to their relationships. Yet financial institutions have limited insight into these important contacts, which can result in missed opportunities or compliance failures. Speech analytics can examine conversations with customers to help representatives have more productive discussions. The technology can uncover emotional subtext behind the words, shedding light on customer sentiment and helping banks refine sales messages or improve service quality and the customer experience. A win for parties on both ends of the line.

Employ the right pit crew

When thinking about the racetrack, most people imagine fast drivers and quick mechanics fine-tuning the car. However, it's not just the drivers and mechanics that take the checkered flag anymore. Case in point, Envision Racing has more software and data engineers than anyone would expect. Data engineers can make the car faster without ever laying a finger on it by examining speed, regeneration energy, power, and more. When Envision Racing needs to gain the competitive edge, it combines its motorsport knowledge with data-powered insights.

From the racetrack to the boardroom, sharp technology skills are a must-have for businesses. Data scientists help businesses push the boundaries of what's possible across all sectors. They can create different models using existing data that display a variety of possibilities. As a result, businesses can decide which path will lead to the best outcome.

Take a consumer goods company, for example. When data scientists unearth accurate predictions of market demand, they can make real-time decisions that reduce costly stockpiles and delivery delays. Such an agile supply chain can adapt to every scenario.

Accelerate climate action

For Envision Racing, its mission is to accelerate the transition to renewable and sustainable mobility through the Race Against Climate Change. As the problems of congestion, pollution, and climate change continue to grow, Formula E is working hard to raise awareness of their threats and the solutions. This type of thinking is good for business – according to a recent Genpact survey, companies that have embedded sustainable climate-related practices into their organisations see better business performance than those who have not.

Envision Racing became the first Formula E team to be certified carbon-neutral by the Carbon Trust in 2020. But collecting and analysing the carbon-emissions data required to report on and maintain its carbon-neutral status was time consuming and error prone. However, with intelligent automation, the team has transformed this tedious process, which has cut the time spent on carbon reporting by 50% and enables the team to live up to its title as "the greenest team on the greenest grid."

Envision Racing employees also have a custom-built carbon calculator, which will empower everyone to make greener travel decisions. It will gather data such as the distance between two locations and then use a machine-learning model to predict the journey's emissions based on carbon output so each employee can make the right choices.

All businesses, just like motorsport teams, must use every source of advantage to win. Advanced data-led analytics helps teams make fast, accurate decisions, whether you are overtaking the competition in an exciting Formula E race or engaging in a critical customer conversation over the phone. Businesses that embed data literacy as a core part of their company's culture will be better prepared for today's fast-paced digital world than those that don't. And meeting environmental, social and governance goals is a large-scale transformation challenge – one that is only successful if it is underpinned by data, analytics and digital technologies. Ultimately, the same intelligence that wins Formula E races helps businesses across all industries thrive and fight climate change.

Making up for the lost decade through digitisation

Ultimately, Industry 4.0 technologies are worthless unless they deliver actionable intelligence from the factory floor to the top floor.

BY TERRI GHIO, PRESIDENT OF NORTH AMERICAN OPERATIONS AT FACTORYEYE

THE FIRST DECADE of the 2000s is often referred to as the "Lost Decade" for the manufacturing sector in the United States as the country experienced a loss of 5.8 million jobs, a rate of decline that outpaced that of the Great Depression. The lost decade not only resulted in a tremendous loss of manufacturing jobs, it also left mid-sized manufacturers behind larger counterparts in technological innovations.

If mid-sized manufacturers haven't heard of the Industrial Internet of Things (IIoT) or Industry 4.0, they are already significantly behind technology sophisticated manufacturers when it comes to smart factory status. While the technology and its jargon can seem like a barrier to even beginning the journey to digitization, practical and achievable cost-savings and business benefits can be obtained by embracing Industry 4.0. With Industry 4.0 technologies, organizations can fully integrate business processes with a centralized, advanced platform without the need to rip and replace existing systems like ERP, CRM, PLM, MES, WMS, and SCMs.

Industry 4.0 technologies are at the forefront of digital transformation initiatives and help manufacturers reduce costs, increase efficiencies, and better prepare for the future. Converting traditionally analogue manufacturing businesses into modern, digital organizations is necessary to compete in the Fourth Industrial Revolution. Essentially, in addition to providing real-time access to the industrial internet, the IIoT utilizes connected machine-to-machine (M2M) sensors and smart devices on the factory floor that collects data. Industry 4.0 then delivers real-time data providing organizations with actionable business intelligence. With continued uncertainties surrounding the global supply chain, transforming manufacturing operations to be as lean as possible is the key to prolonged success.

Investing in Digitization

The World Economic Forum identified three key barriers that traditionally have prevented mid-sized manufacturers from investing in digitization technologies such as or including a shortage of skilled labor, a lack of access to capital, and unclear returns on investments. Larger businesses with more access to skilled labor and capital are already embracing digitization advancements, but mid-sized manufacturers have a highly concentrated concern, and rightfully so, on the payback of investing in digitization.

However, there are four major areas where mid-sized manufacturers will see ROI: product quality, machine availability, operations efficiencies, and energy consumption. Setting up key performance indicators (KPIs) in each category before, during, and after any IIoT trial or deployment on the factory floor helps demonstrate ROI and display the benefits of continuous improvement.

A Roadmap for Lost Time

While it is impossible to go back in time and regain the lost decade, it is possible to close the education and technology gap that was neglected over the time period. By proving strategic to directors, investors, and other stakeholders and key decision-makers, the numerous benefits of Industry 4.0 for mid-sized manufacturers becomes clear. ROI demonstration enables organizational decision-makers to lay out a clear roadmap that is understandable, affordable, and in-step with the company's overall long- and short-term business objectives.

Mid-sized manufacturers like to see results in overall equipment effectiveness (OEE) from new technology investments within weeks. This is why the first step of a digitization roadmap should include helping decision-makers connect and visualize legacy manufacturing equipment on the factory floor. Mid-sized manufacturers must always be focused on continuous improvement of the skills, technologies, and infrastructure that is already on the factory floor and give less attention to the wholesale replacement of machines, technologies, and processes. When organization decision-makers obtain a comprehensive and holistic understanding, they are positioning themselves to join their more advanced counterparts in making the most out of the IIoT and Industry 4.0, effectively closing efficiency and education gaps lost in the 10 year void.

Actionable Business Intelligence

Utilizing IIoT and connecting various legacy manufacturing processes, devices, and systems that have historically developed over time (like MES, PLM, QM, MM, ERP, and CRM) enables creation of value. Organizations can boost their efficiency, productivity, and safety. However, transforming oceans of data produced from IIoT sensors and devices into real-world business benefits is no easy task to undertake alone. Decision-makers need clear, actionable business intelligence from data generated by any new IIoT implementations on the factory floor.

The first step in any IIoT strategy should be to connect and obtain real-time data from legacy systems and machines, though it should be noted that IIoT adoption doesn't need to be a wholesale transformation. When contemplating the adoption of new technologies, many decision-makers become overwhelmed believing that every aspect of the manufacturing process should be accounted for right away, and this doesn't need to be the case. Digitization adoption can be deployed incrementally.

To minimize disruption of day-to-day operations, technology rollouts must be carefully planned based on an organization's unique requirements and goals. Though a gradual process, Industry 4.0 adoption from the factory floor to the C-Suite is obtainable for mid-sized manufacturers who want to follow a rationalized roadmap. Mid-sized manufacturers can witness the real value of IIoT by eliminating data silos. Consolidating data from previously siloed sources into a single closed feedback loop allows for employees on the factory floor to make smarter and faster decisions.

IIoT for Smart Factory Success

Ultimately, 4.0 technologies are worthless unless they deliver actionable intelligence from the factory floor to the top floor, this requires that mid-sized manufacturers unify, integrate, and analyze disparate data collected from all internal systems including newly-connected legacy systems. This interconnectivity of legacy systems through Industry 4.0 presents analytics in a simple and easily understood visual dashboards that enable immediate results and continuous improvement across the entire manufacturing process.

The need for speed

Hybrid data centres deliver next-generation gaming.

BY ALEX BREARY, HEAD OF MARKETING, CUSTODIAN DATA CENTRES

GAMING has been moving through a period of revolution. As broadband performance has improved, hosted multi-player games have become highly popular, with console and mobile gaming also seeing massive expansion. With fully-immersive gaming just around the corner, robust, integrated, and decentralized data centres are at the foundation of this renaissance in gaming.

According to research from GWI, over three-quarters (76%) of gamers use their smartphones, 46% laptops, and 37% consoles, so it's evident that the digital gaming world is rapidly evolving across these multiple platforms. It is also telling that the connected consoles, including Nintendo Switch and Playstation Now, manifest the continued expansion of entertainment subscription services, offering players the opportunity to play new and archived games all under one subscription.

Passive gaming still exists, but gamers are now connecting with large global online communities. The rise in Twitch, a popular gaming streaming platform, illustrates how the gaming ecosystem has evolved and how gamers want to connect with their fellow players, inside and outside of gameplay. "Gaming engagement doesn't just include playing games; it encompasses much more from viewing gaming content or esports to socializing and hanging out in game worlds or through communities," States Newoo in their report on how consumers interact with games. "It also includes following streamers, creating gaming content, and keeping up-to-date with gaming news via blogs, websites or podcasts, and any other gaming-related activity."

The development and expansion of the gaming space has connectivity at its centre. Without reliable,

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fast, and low latency connections, the gaming ecosystem as we know it today could not function.

Gamer expectations

The consumer experiences of entertainment media streaming services delivered via CDNs (Content Delivery Networks) and their intolerance for slow connections, which interrupt their viewing, are even more pronounced in the gaming community. Mass online gaming is reliant on low-latency connectivity for advanced immersive gaming spaces to function and deliver a great experience to players.

Research from Edgegap is telling as it concluded that nearly half (42%) of the gamers they spoke to stated that latency issues would stop them from playing a game or shortened the time they played a game, food for thought as games developers, network infrastructure providers and data centre services look to expand into the online gaming sector.

Connectivity infrastructure has rapidly evolved to deliver these advanced gaming experiences to players. Large data centres are being joined by OOC (Out-Of-City) facilities that move data to the network's edge, to help to provide low-latency connectivity to all players no matter their location. TechUK forecast that 75% of data will be processed at the edge in three years, which provides great insight into the future of media and online streaming industries. No discussion of immersive gaming environments is complete without considering the Metaverse. "The key to a successful Metaverse is rooted in expression; gamers will stretch gameplay mechanics in their own way," says GWI. "In Minecraft, for example, fans have successfully built functioning computers, all within the game – far beyond the original 'survival' concept." As the Metaverse develops, its insatiable appetite for data and bandwidth will mean colocation services will continue to expand and diversify. Only those hybrid data centre environment providers will be able to meet the gaming community's strict needs that continue to proliferate.

Connected infrastructure

A hybrid approach to data centre deployments is taking shape to fully support today's gamers and the rapid development of the ecosystems that players now connect with. High compute capabilities, intensive GPU performance, and the ability to quickly expand services when they are needed are driving how hybrid colocation hosting environments are being designed.

Location has become critical when designing the data centre network so that it can support today's diverse gaming space. The specific needs of gaming, especially those in hosted virtual gaming spaces, need a hybrid approach that only dynamic data centre service providers can deliver. The shift to OOC data centre services illustrates how highly focused data centre service providers are and how they are the perfect choice for game developers.

Gaming has evolved from a console-based activity to an immersive global community of players, who want to connect across a wide range of devices and maintain a great gaming experience. This level of integrated gaming is built upon reliable connectivity that can evolve as the gaming space continues to expand. Advanced colocation service providers are at the vanguard of this as gaming enters its next age.

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Contact: Jackie Cannon
jackie.cannon@angelbc.com

ANGEL EVENTS

The Metaverse reality check that your business needs

From virtual meetings to immersive 3D customer experiences or even property tours, the Metaverse will transform the way that companies operate.

BY DERYCK MITCHELSON, FIELD CISO EMEA AT CHECK POINT SOFTWARE

GARTNER PREDICTS that by 2026, a quarter of us will spend at least one hour a day in the Metaverse for work, shopping, education, social media and/or entertainment.

Some brands are already there today, such as Nike and Coca-Cola, who are using it to drive brand awareness and the purchase of physical products. With so much buzz around the Metaverse, it's easy to see why more and more companies will start to do business there. But are they thinking about the risks? We will certainly need a different approach to security in a virtual world compared to the physical, but what will that entail? Let's take a look at what the risks are and how to start getting prepared (because you do need to start now).

The biggest hurdle to the Metaverse being a secure environment is in its foundations. The Metaverse is built on blockchain technology and we have already seen serious security gaps in NFT marketplaces and blockchain platforms such as OpenSea, Rarible and Everscale. Due to the sheer amount of malicious activity that we already see exploiting services based on the blockchain, we believe it won't be long before we start to see initial attacks in the Metaverse too. It will likely be based on authorization, and user accounts will get hijacked, so we expect that identity and authentication will sit at the heart of everything we want to do.

It is tricky though, as people might want to have multiple identities within the Metaverse, perhaps one for transacting work conversations and another for personal shopping and entertainment. This adds another layer of complexity because there's then no single identity that says it's definitely you. The answer could be in chained identity so, will blockchain then help us understand where we're transacting and who with? This is a major challenge. And since blockchain technologies are decentralized and unregulated, this makes things like policing the theft of virtual assets or preventing money laundering, very difficult indeed.

Redefining reality

Another key security challenge is in the safe spaces needed to conduct business. Imagine you're on a Zoom or Teams call. It's a private meeting space, right? But what will that be like in the Metaverse? How do we know that a chair someone is sitting on isn't actually an avatar and we have an impostor in our midst? You may think that can't possibly

happen, but it's a virtual world. Of course it can. We need to be able to discern between what's real and what's fake, and having a safe space to meet and transact will be crucial.

When the Internet first came out, threat actors exploited the average human's unfamiliarity with the tech by creating malicious sites that impersonated banks to obtain financial details. Phishing scams like this still occur, albeit we now see more sophisticated forms of social engineering. The Metaverse is like a whole new Internet, and you can guarantee that people's unfamiliarity with it, both businesses and consumers, will be exploited. Interestingly, every transaction that happens on the blockchain is fully traceable, so this will become far more important, especially when it comes to having an audit trail of what has been discussed and any decisions made in a business context. But that leaves a question over how that information is taken from the virtual world to the physical. Are contracts going to be legally binding in the Metaverse? Or will they need to be brought into the physical world to be signed and then pushed back in? How will that be done securely?

Researchers have discovered security gaps within blockchain and crypto projects which are part of the Metaverse. The vulnerabilities that been exploited by cyber crime are focused on vulnerabilities with smart contracts that allows hackers to exploit and drain crypto platforms and around application vulnerabilities inside blockchain platforms that allows hackers to attack through the platforms and hijack users' wallets balance. There is a danger that we rush headlong into the Metaverse without considering these types of implications.

A lot of the concerns around security in the Metaverse are exacerbated by the huge skills shortage in the cybersecurity sector. According to the 2021 $(ISC)^2$ Cybersecurity Workforce Study, we are lacking almost 3 million cybersecurity professionals and the current global cyber workforce needs to grow by 65% to effectively defend organizations' critical assets. That percentage is likely to be a lot higher if we also consider the new virtual world.

Is it worth it?

Other cybersecurity risks within the Metaverse abounds such as cyberattacks via the use of vulnerable AR/VR devices, as an entryway for evolving malwares and data breaches. These devices inherently collect large amounts of user data and information such as biometrics, making it attractive to hackers. Concerns around data privacy are also a growing voice amongst Metaverse sceptics, with additional data being collected through avenues like Second Life, potentially violating user privacy.

You might be reading this thinking well, why bother if there are so many risks involved? But

it is absolutely worth putting the time in now, to get ready for moving across to the Metaverse. Unfortunately, any company (no matter the size) that doesn't, may find itself in a place where it's playing catch up and potentially losing out on business or engaging in processes that put the business at risk. You can transition slowly, just like many have done with cloud migration.

Organizations will need to be much more reliant on their partners around the world to help mitigate risk, as this is very much a global phenomenon. But there will always be some risk and for those that take them and get it right, there will be huge rewards. At the end of the day though, businesses won't be able to do it themselves, it will take a great deal of partnering with organizations that work within that space. The Metaverse will hit everyone, and there's no denying that mistakes will be made, similar to those that were made in the early days of the Internet.

Top Metaverse security considerations right now:

It's coming. You can't put your head in the sand and pretend that it isn't. Business leaders and security professionals need to talk about it and understand what it might mean for them. Understand the landscape by looking at what competitors are doing in that space.

Have a look at how you are currently running services now in the physical world and understand if these services map in any way to the Metaverse. You may find that some of them don't and aren't even secure in this world, such as mobile devices, tablets, cloud and multi-cloud.

Understand how to get your identification and authentication done correctly. The answer to that isn't just having a password or two factor authentication. Companies need to really start upping their game around these two issues. People tend to do things without thinking about security, whereas they should be thinking of security first.

How CIOs can harness the value of technology by having strong data foundations

In today's fast-paced and volatile economy, businesses need to be smart with their data.

BY HARVEY LEWIS, ASSOCIATE PARTNER, CLIENT TECHNOLOGY & INNOVATION AT EY

ACROSS INDUSTRIES, data provides the digital fuel for every business – having the talent and infrastructure to use it effectively and ethically is critical. The UK government recently published its UK Digital Strategy which highlights why data is central to the digital economy. This strategy will help the UK to strengthen its position as a global science and technology superpower if data is made a priority by business and technology leaders, who need to start laying the right foundations now.

However, EY research for The Department of Culture, Media, and Sport (DCMS) has identified a significant gap between data's potential and its actual ability to drive short-term economic and long-term social value in the UK. This gap is caused by a number of factors. These include consumers who lack trust in sharing their data; limited access by technology leaders to the relevant skills needed in their workforce to store and use data effectively and ethically; as well as challenges with legacy IT infrastructure.

To support the government's goals to boost the digital economy, and unlock growth opportunities for their business, CIOs need to be clear about the value of harnessing data and how to use it effectively. These goals can only be achieved with solid data foundations.

Use your data – and use it wisely

Today, data is power and unlocking its value is essential for the success of individual companies bouncing back from the COVID-19 pandemic, as well as to create long-term value and prosperity across the global economy.

Among the positive signs we are seeing, businesses have recognised the value of data. EY's survey found that almost all organisations (80%) consider data to be important to their success and believe that improving data foundations can deliver significant value through increased productivity.

While data's value is often assessed in terms of inputs (for example, how much data do we collect and what is the cost of collection?), its true value is only obtained through its outputs and impact, such as business intelligence, identifying new product development opportunities, and market insights that fuel innovation.

Data-driven customer-centricity can increase the effectiveness of pricing decisions and improve customer retention and acquisition – all of which have clear and measurable business value. While the cost-of-living crisis and inflationary pressures might cause businesses to be cautious when it comes to new investments, activating data will provide immense value to their overall business now and for years to come.

Harnessing data effectively

The first step to obtaining value from data is through laying the right foundations. This means ensuring that the organisation's data is fit for purpose, recorded in standardised formats on modern systems and stored efficiently. These actions also help organisations comply with ever-changing data regulations and compliance requirements.

If data foundations are not properly laid down then efforts made by businesses to build new services and products, or to transform their processes and ways of working, will inevitably be undermined. It could be that a system prompts a call-centre agent to recommend the wrong product or refuse a loan for an eligible customer. Or businesses also run the risk of compromising trust in data – whether it's via a lack of adequate protection for their data against cyber-criminals or by not being able to locate customer data quickly when requested.

Solid data foundations are crucial to business success because they allow the benefits of data to be unlocked and businesses to be transformed as a result.

Overcoming challenges

In addition to this, businesses should also look at their workforce to ensure that employees have data skills in areas such as governance, architecture, analytics, cybersecurity and ethics. Currently, existing workforces in many businesses lack appropriate digital skills, with 62% of UK employers admitting that their workforce only has some of the required digital skills or face severe shortages.

This shortage of talent means that businesses cannot use or analyse data effectively. It can also be difficult for them to find employees that possess deep technical skills alongside commercial and entrepreneurial expertise to maximise its value.

There are ways to ease this pressure, whether by developing apprenticeship opportunities or building training programmes to upskill existing employees. Secondly, challenges with existing IT infrastructure can prevent organisations from understanding the full benefits their data can provide them. In many cases, disparate legacy technologies can't enable the wide access and sophisticated analysis needs of data today, such as the use of artificial intelligence. Older infrastructure may also make data sharing between different areas of the business more challenging.

While there are no shortcuts to improving data foundations, legacy infrastructure does not help the business use insights as effectively or as ethically as it could. Even when companies invest heavily in the latest technology and tools, if this isn't supported by a flexible underlying infrastructure, the ability to capitalise on the data they have, tap into new commercial opportunities or serve customers better will simply not improve.

The power of a strong data foundation

Whether we notice it or not, data facilitates almost every aspect of modern daily life, in both personal and business worlds, and we can only expect to see this increase in the future as customers want more personalisation, and businesses find new ways to gather and process data. Organisations need to make sure that they are moving rapidly to achieve digital maturity; success will rely on making sure that data foundations are established and scaled in the right way.

The DCA Workforce Capability and Development SIG

BY STEVE HONE DCA CEO

AS THE TRADE ASSOCIATION to the Data Centre sector The DCA understands that it is imperative that key issues affecting the sector have a point of focus. The DCA SIG's (Special Interest Groups) / Working Groups regularly come together over shared interests to discuss issues, resolve problems and make recommendations.

Outcomes result in best practice guides, collaboration between group members, participation in research projects, this includes clarification and guidance for decision and policy makers. Members find these groups are a great way to ensure their opinions and views are considered in a positive and cooperative environment.

The DCA currently facilitates nine Special Interest or Working Groups. DCA members (non-members are allowed at the discretion of the Chair) can join any of the groups and contribute, find out more here: https://dca-global.org/groups

The DCA Workforce Capability & Development SIG is co-chaired by Steve Bowes-Phipps PTS Consulting / DCA Advisory Board and supported by Adelle Desouza Higher Hire / DCA Advisory Board.

About the SIG

As reliance on digital services continues to grow our industry needs to become far more effective at promoting Data Centres as a career destination.

It is simply not just engineers at the coal face which are needed but a talent pool across the full supply chain; if we are to stand any chance of having the resources needed to match future demand in our sector.

The DCA's Workforce Capability & Development Special Interest Group was formed to provide a collaborative forum for the exchange of ideas and strategies on how the data centre sector can broaden its appeal and attract the skill set it needs.

It you would like to contribute by becoming a part of this Group please get in contact.

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

What role does talent play when it comes to building a sustainable data centre industry?

ADELLE DESOUZA – DCA ADVISORY BOARD MEMBER AND HIREHIGHER

ATTENDING The DCA's Datacentre Transformation Conference was a breath of fresh air (excuse the environmental pun). Not only was it 'in-person' but the desire for the industry to evolve was palpable amongst the delegation. Industry professionals gathered with like-minded academics and local students to discuss, debate and deliberate on what change the UK data centre industry must undergo to future proof itself.

Sustainability was on everyone's minds and this was reflected within the programme. From open discussions on the measures organisations could adopt to debating whether the government needed to step in, I am convinced it was an event that will produce change.

One area that piqued my interest was the understanding and agreement that talent had a role to play. With 85% of delegates stating that their organisation would be the perfect environment to welcome young talent - is young talent the answer to our prayers? The introduction of diversity of thought, from those with fresh ideas and a different outlook when it comes to sustainability, a generation starkly aware of our environmental commitment to the planet.

Now if the answer is yes, with less than half of the companies present offering opportunities for those in their early careers, questions quickly turned to barriers and more importantly how to overcome them.

What is preventing young people from joining the data centre industry?

One in three cite awareness as the main barrier to young people joining our industry. So the question becomes who's role is it to promote the industry. With calls for subject matter to feature within the national curriculum.

The department of education regularly engages with industry professionals and research academics to ensure a modern and relevant programme of study is available, but how often can we expect this to happen? If we are being honest with ourselves, our industry changes so much in a 5-year period.

Having said that highlighting the impact our industry has on the modern world in a classroom setting does create instant awareness, so much so that without it students who joined us just last month, only found out due to a guest lecturer on campus.

With almost every secondary school in the UK engaging with the gatsby benchmarks in line with their OFSTED assessments, could this be the way to start the revolution when it comes to careers education. If so, we must standardise our story to deliver an on-brand message to the absorbent yet inquisitive minds of the next generation.
In defining our story and what it is we want to be known for as a workplace for the future generations, we do have to look inward and ask are we realistic in our expectations? Ranging from career progression and development right through to remuneration and compensation packages.

Today's generation are facing a cost of living crisis like no others in recent times, yet more and more companies are offsetting low starting salaries for the promise of training and career progression. May I remind you of Maslow's basic hierarchy of needs, career progression promises do not pay this month's rent, and even if they did, often they do not materialise. The other factors discussed at the annual event organised by The DCA, gave weight to the role of mentoring, coaching and the prevalence of unconscious biases, of which the former gained 22% of the audience's recognition as a barrier to entry.

We need to create a sustainable recruitment and retention strategy across our industry and in doing so we will produce an industry brand reputation that is like no other. We have a USP, the daily lives of every young person in the UK today relies on the existence of our industry. Without data centres, there is no social media, no online banking, no remote learning and no streaming services. In preparing our brand for the audience we wish to attract we must act now.

Einstein famously said that the definition of insanity was doing the same thing over and over again expecting different results. Now is the time to stop just talking about the demographic disparity our industry possesses but rather to act, otherwise things will not change. The talent is out there, leaving school or graduating from university every 12 months.

So, ladies and gentlemen this is a call to arms, for all of those who are members of the Trade Association to let The DCA know if you offer early careers opportunities. You are ahead of the curve, and we want to celebrate and promote that. We have taken your feedback on board, and we will be making moves to connect with the educational institutions and sharing your vacancies to the next generation, awareness is just the beginning. Be part of the change.

Threats To The Industry – Skills Shortage Continues

BY JAMES HART, CEO AT BCS (BUSINESS CRITICAL SOLUTIONS)

AS THE total amount of data created, captured and consumed in the world is forecast to continue to increase exponentially, few would argue against the importance of the need for a secure, flexible and efficient data centre infrastructure platform to house it.

However, once again, a potential threat to the delivery of sufficient new stock is a lack of sufficiently qualified professionals available to the industry, particularly in the fields of design and build. This has been likely amplified by the effects of international lockdown on the movement of a skilled labour force to areas of demand.

In this year's BCS Summer report, which contains the views of over 3,000 senior level data centre professionals across Europe, we have sought to understand who is in short supply and what the likely impact is on the sector moving forward.

All our respondent groups are in agreement

Across all of our respondent groups there remains real concern over a skills shortage in the data centre industry. Over 90% of respondents believe that the coming year will see a decline in supply of staff, around the same amount (93%) reporting this in Winter 2020, arguably at the height of the COVID-19 crisis across Europe. To further exacerbate the problem, some 70% believe that this will be accompanied by a rise in demand for such staff. For the second survey in a row there is near universal agreement amongst our developer respondents, that the coming 12-month period will see a fall in supply of staff whilst the demand for those skill sets rises; the highest degree of assent amongst all our respondent's groups.

In addition, Design, Engineering and Construction (DEC) respondents share an almost identical response profile – a universal belief that the next year will be characterised by a fall in supply of staff whilst the demand for those skill sets rises. This reflects a hardening of attitude on this issue contrasted with the 72% reporting this just six months ago.

In contrast, colocation providers have

maintained the same level of concern since our last survey, with nearly 90% predicting increasing demand levels for skilled workers against a falling supply in the next 12 months. Integrators and carriers also expressed a similar degree of concern compared with six months ago. Where they differ is in the degree of concern with 19% of carriers couching their agreement in the strongest possible terms.

Corporate respondents also registered a higher degree of concern over a potential skills gap, albeit more muted than our supplier sections. Amongst end-users, 62% believe that rising supply of skilled staff would be met with falling demand - up from the 40% who shared this view six months ago.

So, who is in short supply?

Over the last six months, we have noted an increase in the number of respondents concerned about potential problems arising from shortages specifically amongst design professionals; from 74% to over 84%.

Within this we have seen a more pronounced rise in the number of respondents expressing their belief in the strongest terms – up from 25% to 37%. It should be noted that this level of concern is the highest we have recorded in the last six years, a period where we have seen a slow rise in the overall trend in concern amongst stakeholders in the European data centre industry.

At the build stage, the problem appears to be just as acute, with this survey registering an increase in those that both agreed and agreed strongly. Indeed, nearly 80% of the segmented supply specialists expressed their concerns that a shortage of sufficiently skilled build contractors existed, an increase on the 69% who suggested the same in the second half of 2020. According to our respondents the difficulties in sourcing operational staff are slightly less pronounced than at the design and build stages. Around three-quarters expressed their agreement when asked about the shortages of sufficiently skilled operations staff, an increase on the 69% reporting it in the previous survey.

The strength of agreement does vary amongst the groupings, albeit not as pronounced as in other categories. Perhaps not surprisingly our DEC respondents expressed their concern over skills shortages in the most robust terms, with almost universal agreement that shortages exist at both the design (98%) and build (92%) stages.

Amongst our service providers the strength of belief in design and build skill shortages is slightly less pronounced, nevertheless, over 90% of these respondents agreed that shortages are problematic.

For end-user respondents, a belief in shortages of skilled operational staff pose the biggest problem – 72% compared with just 22% for design professionals and 17% for build professionals. Many end-users adopt neutral position on these categories, perhaps not surprising given the increasing popularity of outsourcing solutions meaning many of these are not exposed to the early stages of data centre delivery and as such have limited direct experience of the problems associated with it.

The problem is widespread

In terms of job shortage concerns, there appears to be widespread agreement that these are spread across a variety of specific job roles. Indeed, most respondents identified multiple roles as areas of concern. In the construction sector almost two-thirds of respondents stated that they had experienced shortages of quantity surveyors, site managers and site engineers within the past year.

Within the operational sphere, around 70% of respondents stated that they have had direct experience of shortages amongst operations and network engineers/technicians over the last 12 months, with a slightly lower proportion – around two-thirds - seeing a shortage of infrastructure specialists over that period. Also worthy of note, Mechanical & Electrical project managers were also highlighted as an area of concern around the availability of skilled workforce – just over 60% cited shortages amongst this skill set as problematic.

What is the impact of these shortages?

The skills shortage debate is set within the context of the potential impact for the delivery of stock to the end user. Evidence from this survey suggests that these shortages have already had real consequences and directly impacted on respondents. When questioned about what impacts they had experienced because of these shortages in the past year, most respondents cited multiple factors.

The most cited impact is that these skills shortages have placed a greater workload on existing staff, nearly nine-out-of- ten cited this as the case, an uplift from the eight-out-of-ten recorded six months ago.

The shortage of staff has also inevitably led to increasing operating/labour costs recorded by 86%, a rise from the 70% who cited the same factor in

Winter 2020. Such shortages also can be seen as a contributory factor in the increasingly popularity of the use of outsourcing options, with around 60% citing it as such.

Encouragingly, it appears that fewer respondents are finding it difficult to resource existing work this year than was the case in 2020, with just over 40% stating that they had experienced difficulties in meeting deadlines or client objectives, down from 51% six months ago and some 70% who cited it as factor at the beginning of the pandemic 12 months ago.

However, the more extreme consequence of skills shortages is lost orders, with a quarter of respondents still believing that this happened, although this is a fall on the one-third identified six months ago. In addition, around a third stated that shortages had led to delays to developing new products/innovations, marginally down on the 39% recording this in our last survey, whilst the proportion that noted they had ceased offering certain products or services has fallen positively to 10% from 14%.

In conclusion, there is no doubt that the skills shortage is continuing to have a negative effect on the industry – and in my experience has been for over a decade. The question is how long it is sustainable and will the industry respond and find a solution. I hope so.

Reskilling the Data Centre Workforce

BY PETER HANNAFORD, SENIOR PARTNER, PORTMAN PARTNERS

THE DIGITAL WORLD is expanding rapidly, requiring various technology-related skills in the DC sector. Can we use a reskilling/training strategy to fill the gap?

The Global COVID-19 pandemic has increased worldwide internet traffic to record levels. As a result, in every region of the world, data center capacity is being dramatically expanded in a buildout of extraordinary proportions. In the recently published, "The people challenge: Global data center staffing forecast 2021-2025," Uptime Institute reported that as data centre capacity expands, the availability and potential lack of specialist staff will be an increasing concern for all types of data centers, from mega-growth hyperscalers to small, private enterprise facilities. As a result, we need greater investment, more training, and more creative approaches to employment.

However, they also noted that "although data center recruitment needs are expected to rise steadily to 2025, the growth in demand does not need to represent a crisis. Individual employers can take steps to address the issue, and the sector can act together to raise the profile of opportunities and improve recruitment and training."

So, in the immortal words of Lance Corporal Jones in the British sitcom Dad's Army, "Don't Panic!" Instead, we need a plan.

According to the report, data center staff requirements are predicted to grow globally from about 2.0 million full-time employee equivalents in 2019 to nearly 2.3 million in 2025. This Uptime Institute estimate covers more than 230 specialist job roles for different types and sizes of data centers, from design through operations and across all regions, primarily in the Asia-Pacific, followed by North America, Europe, the Middle East, and Africa. While this estimate of absolute growth equates to around 3% per annum, it doesn't consider the number of older, experienced employees retiring during this timescale.

The relative "newness" of the industry, given that data centres as we know them didn't really exist before the mid-1990s, means that traditional paths haven't existed as they have for other professions. Additionally, the nature of the business means that a large number of jobs in the sector demand mobility, and we really have no idea what impact AI and Machine Learning will have on certain roles, especially those in design, engineering, operations, and maintenance, so hiring people with specific skills and experience could be shortsighted.

The CV only tells you what a candidate has done, not what they are capable of doing. More critical are characteristics such as intellect, personality, and motivation. Therefore taking talent from other industries and reskilling and training them should result in more well-rounded employees who are more adaptable and able to change in a constantly moving market.

Data centres are mission-critical facilities, meaning that the applications, networks, and services they support should never fail. A datacentre with "5-nines'' availability was always considered the gold standard. That's 99.999% uptime, Or expressed another way, 001% downtime. That's five minutes each year, but no company should aim for that. "Always-on" should be the mantra. A recent Facebook outage is estimated to have cost the company $100m, and at least 80% of failures are due to human error, either in operation, design, or construction. But data centres aren't the only sector that can't tolerate failures.

Failures in the pharmaceutical or wafer fabrication process can be very costly, and failures in space exploration, aircraft navigation and operation, and nuclear industries can be fatal. Employees in these sectors are desirable candidates for recruiters in the data centre industry, and nuclear submariners are in very high demand.

Another item on the "must-have" list for recruiters is academic qualifications, as is the requirement for 'diverse' candidates, but this can present difficulties. For example, some companies are trying to attain a 50/50 gender balance, but if you're seeking qualified engineers, you have a problem in the UK, where just 11% of the UK engineering workforce are women, one of the lowest percentages in Europe.

Meanwhile, Latvia, Bulgaria, and Cyprus lead with nearly 30%, potentially influencing where European talent is employed, especially for international operators. But because diversity should not simply be a matter of ticking boxes, what's really required is a diversity of thinking – "cognitive" diversity. This type of diversity includes people with different problem-solving styles and can offer unique perspectives because they think differently. Often their viewpoints are informed by their gender, their different experiences, cultural backgrounds, and gender identities they bring to the workplace.

a hospital with an urgent requirement for a brain surgeon wouldn't hire a newer med school graduate who'd never operated before. Likewise, pilots, surgeons, and nuclear submarine captains need time and years of training before being let loose

Of course, there are some jobs where specific experience is necessary. For example, a hospital with an urgent requirement for a brain surgeon wouldn't hire a newer med school graduate who'd never operated before. Likewise, pilots, surgeons, and nuclear submarine captains need time and years of training before being let loose. Therefore, getting the right people on board first is of paramount importance – people with the right intellect, behaviours, and values who, with the appropriate reskilling and training, can fill the ever-widening gap in the industry today.

About Peter Hannaford:
Peter's career accomplishments span decades and was recognized when in 2018 he received the Datacloud Congress Lifetime Achievement Award for "outstanding achievement spanning one's entire career." Peter began his pioneering work in Nigeria in the 1970's implementing that country's first on-line banking system, and went on to develop foreign exchange systems for international banks in the 1980s.

In the 1990s, Peter started one of Europe's first datacenter construction firms and founded the company that developed the first water-cooled rack for high-density servers. The company was sold to APC in 2003 leading to APC's development of In-Row Cooling and Containment, which dominated the datacenter market in the 2000's.

In 2010 Peter founded Datacenter People, the first global recruitment firm dedicated to the datacenter sector, and, in 2018 he founded Portman Partners where he currently works. Peter's considerable personal network and reputation helps firms in the digital infrastructure space find leadership talent around the world. He was recognized again in 2019 when he was included in the Power 200 list of personalities around the world who "are leading the datacenter and cloud and sectors through charting new innovations or technological breakthroughs, investment or business acumen or exceptional entrepreneurial skill sets."

About Portman Partners:
Founded in 2018 by industry veteran and Data Center People founder Peter Hannaford, UK-based Portman Partners is a strategic advisory consultancy and the leading executive search firm working exclusively in the digital infrastructure sector. Portman works with clients to identify and place the senior-level talent needed to execute value-driven strategies in the new, accelerating digital economy covering EMEA, APAC, and North America.

For further information, visit **www.portmanpartners.com**

Ways to improve cognitive diversity within organisations

BY TERRI SIMPKIN, PORTMAN PARTNERS ASSOCIATE, ASSOCIATE PROFESSOR AND MBA DIRECTOR AT THE UNIVERSITY OF TASMANIA

INNOVATION, be it technical, system, or product, is fundamentally reliant on diversity, but diversity is not simply 'box-ticking' surface-level diversity.

Instead, it's strategically driven cognitive diversity. Cognitive diversity goes beyond the common understanding of diversity, which often drives over-indexing on recruitment of under-represented groups (e.g., getting more women in data centres). Cognitive diversity refers to the underpinning notion of diversity of thinking – different perspectives and information processing styles; how people think and make sense of their context, seeing alternatives because they view the world through a different lens.

While cognitive diversity can be related to differences in gender, social background, or age, contrary to popular belief, it's not automatically generated from or calculated by these factors.

So, for example, a product or technical team could be comprised of people from different genders and nationalities, but if they've had a similar upbringing and think in similar ways, the team may not deliver better or more creative outcomes than a team that looks, on the surface, more homogenous, but whose members come from different socio-economic backgrounds, cultures or industrial sectors, and who process information differently.

Cognitive diversity is more nuanced and complex to achieve, but research indicates it can improve outcomes where teams and individuals are charged with delivering innovative responses to new or emerging complex challenges in ambiguous circumstances. Cognitive diversity is the secret sauce that, while challenging to identify, adds that special, irreplicable zing of creativity and inspiration to a workplace.

So, if hiring more women and people from international backgrounds will not necessarily deliver cognitive diversity, what will?

First, it's important to note that the drive to populate the digital infrastructure sector with a less homogenous workforce is vitally essential for a raft of reasons. Access to talent, developing a more broadly based pool of potential employees, and generating a more inclusive culture to retain a heterogeneous workforce are all imperative to a robust, vibrant, and thriving industry. And, without a workforce population that includes different genders, cultures, socio-economic backgrounds, neurodiversity, and vocational backgrounds, cognitive diversity is less likely to be achieved. Second, while it's not easily identified from the outside, there are ways to improve cognitive diversity within organisations. It's well-documented that people often surround themselves with people who reflect their own image, which is not limited to characteristics like gender, age, or cultural background. Nor is it confined to the recruitment process.

Often people are drawn to team members who think along similar lines,

express similar views, and communicate in a similar manner. Thus, teams often find themselves unwittingly becoming more and more homogenous in their thinking, behaviours, and ways of working. Consequently, the capacity for innovation, which thrives on differences of opinion, creative disruption, and positive conflict, is diminished.

So, to diminish strongly homogenous cultures (often found in data centres, for example), organisations can recruit for differences of thinking, drawing on people from outside the usual pool of candidates. Doing so not only expands the landscape from which talented individuals can be found but offers the opportunity to invite in people who see the world and the challenges within it differently.

Moreover, as the digital infrastructure sector continues to experience labour and talent shortages as well as skills wastage, looking outside the sector for transferable capabilities brought by people from non-traditional backgrounds is one of the smartest ways to generate the capacity for innovation.

That's not the end of the story, however. It's one thing to recruit for cognitive diversity; it's another to keep those people in the business. So often, people are brought into an organisation with all the best intentions to develop a more diverse workforce, but the culture, systems, and ways of working work against the value that difference brings. Instead, people feel pressured to fit in, not make waves, work to type, and replicate the 'way we do things around here.' This implicit lack of support for diversity (in all forms, not just cognitive diversity) negates the value of alternative ideas and increases turnover risk – people leave and look elsewhere for a role where their capacities will be valued.

While different tests can offer an indication of how people think and how they might resist, tolerate or expedite change, and how creative or innovative they might be, fundamentally, leveraging the value of cognitive diversity comes down to culture and leadership. Encouraging an environment that feels safe goes beyond simple notions of diversity to true belonging and manages differences of ideas, ways of working, and a multiplicity of views is key to innovation. Leadership has been tilting toward authenticity (i.e., being human and allowing oneself to be vulnerable and authentic) for some time now. This change is welcome, but more importantly, to support creativity, diversity of thought, and innovation, leaders must create a culture of belonging and maintain systems that flex to accommodate differences and modes of operation that build trust. Most crucially, leaders must encourage their teams to bring their authentic selves and divergent ideas to work.

About Terri Simpkin

Terri Simpkin, a Portman Partners Associate and Associate Professor and MBA Director at the University of Tasmania, was named one of the 50 most influential women in the data economy. In 2020, she received the IMasons 100 Awards for her work in the digital infrastructure sector, and was awarded the Global Women in Telco and Tech's Brynn Fowler Agent of Change for her commitment to advancing diversity, equity and inclusion initiatives.