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AUGUST 2020

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When the going gets tough

MANY SUCCESSFUL INDIVIDUALS are proud to explain just how clever they have been in spotting a market opportunity, or several, building a business and making large amounts of money. Rather fewer recognise the substantial part that luck plays in the process.

Every news programme I watch seems to include an interview with a café owner, who recently opened up in a strategic location to catch the commuter and/or work traffic which came past the front door, and who know faces a grim future.

Ok, so maybe opening a café isn't the fast track to success and riches (although I'm guessing even the massive coffee shop chains started small some time and place), but the business plan which relied on a certain number of customers has been blown to shreds by the coronavirus. And so it is across many industry sectors. Yes, there have been some upsides as well, but, sadly, rather more down sides.

Our own industry – events – has taken a major pasting. Everyone has moved into the world of virtual events, with varying degrees of success. We've been lucky in so far as we've had the option to adapt our business. Back to our café owners, and it's not so obvious how they can adapt to the complete absence of customers.

And this is the problem that faces organisations and governments across the globe. How do you re-start an economy, when people's behaviours have changed so dramatically and, potentially, so permanently? As I've written previously, digital transformation was already impacting the world of work and leisure. And, with AI just around the corner, further major disruption was on the horizon. But all this change, which might have been managed over a number of years, seems to have been accelerated and shoehorned into a matter of weeks. And, no matter how smart a business person you might be, the consequences are proving devastating for many.

Integrated, intelligent solutions are required, whereby individuals, the organisations for which they work, and the governments which make many of the business rules, all work together to understand what is going on, what changes are likely to be permanent and which ones might only be temporary. Once this debate has occurred, decisions can be made and the current catastrophic business conditions for many can be used as a catalyst for some positive changes.

Homeworking or, more accurately, hybrid working, is just one example of this. Our city centre café owner might never see potential customer levels return to pre-Covid levels, but it just might be that, by relocating the business to a smaller town, where those unable or unwilling to home work, but who don't want to commute many miles to large city centres, are attending office hub locations, the chance to sell food and drinks is still there.

Flexibility and agility are key building blocks for digital transformation. And for digital transformation, post-lockdown, they have only increased in importance.

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NEWS

One in three organisations still lack a clear path to digital transformation

NEW REPORT from PFU (EMEA) Limited highlights the challenges organisations face on their digital transformation journeys.

PFU (EMEA) Limited has unveiled the findings of the Fujitsu Image Scanner Organisational Intelligence Survey 2020, a landmark research project into the state of digital transformation in Europe. The study, which examines the level to which organisations are forging a path to digital transformation projects shows that 35% do not yet have a clear plan in place, hampering their ability to operate in increasingly competitive environments. The research also finds:

- Digital transformation is a challenge for 50% of organisations
- 61% believe it is impossible to become completely paperless
- 86% say managing the amount of information in their business is a challenge, highlighting the imperative need to digitally transform
- 80% turn to external experts for support along the digital transformation journey
- Almost a quarter (24%) said they have lost important documents. and 23% said they have experienced inaccurate decision-making because of how information is organised

Despite many not having a clear path to digital transformation, 86% say that managing the amount of information in their business poses a challenge. Coupled with almost a quarter citing inaccurate decision-making and lost documents as a result of the information overload, the study indicates a disconnect between the problems organisations want to overcome and the path to achieving success.

A promising sign is that organisations are now recognising that they need to do more to better manage their information as part of their digital transformation journeys, with 80% turning to external experts to help them do so. This creates clear opportunities for resellers who provide information capture solutions that will enable organisations to ingest data and use it to make intelligent decisions



that will allow them to remain competitive, especially as 61% believe the paperless office is an impossible dream.

Spanning 1,000 IT and business decision makers across France, Germany, Italy, Spain and the UK, the research also suggests that of those initiating digital transformation projects, the majority have a clear goal in mind. Over half (51%) said their goal for driving technology innovation was to accelerate business growth or remain competitive in a disruptive environment. However, many are facing internal and external barriers to delivering successful projects, including security risks (34%) and regulatory compliance (24%).

"Viewing the organisation as a single interconnected system of knowledge flows that can complement each other, opens up opportunities for a business to gain maximum value from the information it has access to and increase organisational intelligence," said John Mancini, past President of AIIM. "It's reassuring to see that, despite the challenges businesses face, many are actively navigating their digital transformation journey to unlock their full potential."

"Digital transformation is no longer a 'nice to have' for organisations, it's a business imperative as more accelerate their technology investments to be able to thrive in today's highly-dynamic workplace," said Mike Nelson, Senior Vice President, PFU (EMEA) Limited. "However, without the capacity to gain valuable insight from the information they hold, organisations will not unlock the full capabilities that digital transformation can enable. Through our Organisational Intelligence report, we hope to highlight where the pain points still exist and support organisations in building a successful path to transformation projects that drive growth."

Pandemic speeds up digital transformation efforts by five years or more

TWILIO has published the results of a global survey measuring the impact and outlook of the COVID-19 pandemic on businesses' digital engagement strategies.

Twilio powers communications technology for organisations across a range of sectors, giving it first-hand insight into the ways in which the pandemic has impacted customer and business communications. To better understand this impact, Twilio surveyed over 2,500 enterprise decision makers globally to gauge the effect on their company's digital transformation and communication roadmap.

The COVID-19 Digital Engagement Report is a snapshot of how businesses have addressed the complex challenges posed by this crisis and how they will continue to evolve moving forward.

"Over the last few months, we've seen years-long digital transformation roadmaps compressed into days and weeks in order to adapt to the new normal as a result of COVID-19. Our customers in nearly every industry have had to identify new ways to communicate with their customers and stakeholders – from patients, to students, to shoppers, and even employees – essentially overnight," said Glenn Weinstein, Chief Customer Officer at Twilio. "Cloud scale, speed, and agility are enabling organizations to innovate faster than ever. We believe the solutions being built today will be the standard for digital engagement in the future."

Key findings of the COVID-19 Digital Engagement Report include:

- COVID-19 was the digital accelerant of the decade. COVID-19 accelerated companies' digital communications strategy by a global average of 6 years, with 5.3 years the UK average.
 96% of UK enterprise decision makers believe the pandemic sped up their company's digital transformation, and of these 66% said it did so 'a great deal'.
- Previous inhibitors to innovation have been broken down. Almost four in five (77%) UK respondents say that COVID-19 increased their budget for digital transformation, of which 36%, more than any other country surveyed, said that it increased 'dramatically'. UK companies report easing of barrierssuch as: lack of clear strategy (37%), getting executive approval (35%), reluctance to replace legacy software (35%), and lack of time (33%).
- COVID-19 propelled some industries further than others. Those accelerating their digital transformation most significantly in response to COVID-19 were tech companies (78%), followed by energy (77%), healthcare (74%), construction (71%) and retail (70%). Notably, however, the greatest acceleration in

digital communications has been seen by construction businesses (8.1 years) and energy (7.2 years), while retail and e-commerce organisations report an average acceleration of 6.1 years.

- Digital technologies have opened up 'definite' future remote work opportunities. Almost all (99%) of businesses surveyed agreed that digital technologies will open up a future of continued remote work.
 Four in five tech companies answered 'definitely yes' (80%), while for retail and healthcare businesses it was 69%, energy 68%, construction 65%, manufacturing and automotive 63% and professional services 62%.
 Finance was the least definite on this move, at 60%.
- Digital communication is the new lifeblood for business. Almost all global companies (95%) are seeking new ways of engaging customers as a result of COVID-19. 92% say transforming digital communications is extremely or very critical to address current business challenges.
- Omnichannel communication is taking on new importance. 92% of UK businesses say their organisation is very or somewhat likely to expand digital communication channels as the world reopens, with almost two thirds (60%) very likely. On average the UK saw 5.9 different channels increase in usage dramatically during the pandemic.



NEWS

Majority of IT professionals face digital challenges during a crisis

PANDEMIC ACCELERATES business continuity investments in cloud migration, productivity tools 94 percent of IT leaders say IT automation a priority going forward.

A new global study from LogicMonitor examines how IT departments are evolving in a time of crisis to maintain business continuity and best meet the needs of their customers. LogicMonitor, the leading cloud-based provider of IT infrastructure monitoring, intelligence and observability, has released its Evolution of ITreport, which is the result of a survey of 500 IT decision makers from across North America, the United Kingdom, Australia and New Zealand during the COVID-19 pandemic. The report reveals a number of important trends, and identifies several IT challenges faced as countries and enterprises shut down physical offices and move operations online.

For example, the study found that 84 percent of global IT leaders are responsible for ensuring their customers' digital experience, but nearly two-thirds (61 percent) do not have high confidence in their ability to do so. LogicMonitor's research found that more than half (54 percent) of IT leaders experienced initial IT disruptions or outages with their existing software, productivity, or collaboration tools as a result of shifting to remote work in the first half of 2020. Within the Education sector, nearly a quarter (24 percent) of IT professionals stated that their employer did not have a business continuity plan in place to deal with the current crisis.

Overall, 70 percent of IT professionals are finding it challenging to adapt to their new responsibilities of supporting a remote workforce. Respondents report significant concerns relating to security and stability; specific challenges experienced include the struggle to deal with outages remotely, and the network strain from the increase in remote employees using IT systems. These concerns represent a serious threat to the ability to deliver seamless digital experiences that consumers increasingly demand. "Maintaining business continuity is both more difficult and more important than ever in the era of COVID-19," said Kevin McGibben, CEO and president of LogicMonitor. "IT teams are being asked to do whatever it takes – from accelerating digital transformation plans to expanding cloud services – to keep people connected and businesses running as many offices and storefronts pause in-person operations. Our research confirms that the time is now for modern enterprises to build automation into their IT systems and shift workloads to the cloud to safeguard IT resiliency."

IT teams lack confidence in their infrastructure's resilience

Business continuity plans are integral to companies' ability to withstand an unanticipated crisis. While LogicMonitor's new study found that 86 percent of companies have a business continuity plan in place prior to COVID-19, 12 percent of respondents have minimal or no confidence at all in their organisation's plan to withstand an unanticipated crisis. Only 35 percent of respondents feel very confident in their plan.

IT decision makers also expressed overall reservations about their IT infrastructure's resilience in the face of a crisis. Globally, only 36 percent of IT decision makers feel that their infrastructure is very prepared to withstand a crisis. And while a majority of respondents (53 percent) are at least somewhat prepared to take on an unexpected IT emergency, 11 percent feel they are minimally prepared or believe their infrastructure will collapse under pressure. Learning from this crisis, IT decision makers report they're investing in productivity tools and expanding the use of cloud-based solutions and platforms to maintain business continuity and serve customers during the global pandemic and into the future.

Overall, 35 percent of organisations are investing additional funds in IT infrastructure monitoring, and 23 percent are investing in artificial intelligence and machine learning as ways to better cope with company-wide remote work policies.

COVID-19 is dramatically accelerating cloud adoption

The survey identified that 91 percent of respondents are working remotely and a full 78% said their entire company is working remotely. Indeed, 87 percent of IT leaders report COVID-19 is driving the need to work from home, which in turn is accelerating their migration to the cloud. Prior to COVID-19, IT professionals said 65 percent of their workload was in the cloud. However, just six months later, that number increased to 78 percent. With this in mind, 74 percent think it will take five years or less for more than 95 percent of all workloads to run in public, private, and hybrid cloud environments. While cloud migrations and usage soars, on-premises IT workloads are experiencing a substantial decline due perhaps in part to the global pandemic. Pre-COVID-19, 35 percent of workloads were housed on-premises. Now, IT professionals expect on-premises workloads to decrease to 22 percent by 2025.

IT leaders are embracing automation

The benefits of IT automation have become increasingly clear in the first half of 2020: 50 percent of IT leaders who have a "great deal of automation" within their IT department also say they're very confident in their ability to maintain continuous uptime and availability during a crisis.

While the vast majority of IT decision makers (88 percent) say there has been a greater focus on automation in their department over the past three years, an even greater majority, 94 percent, say they expect this focus on automation to increase in the coming three years. In more normal times, IT leaders see automation as a business enabler that allows them to operate more efficiently and focus on innovating rather than keeping the lights on. 74 percent of IT leaders say they employ intelligent systems like artificial intelligence and machine learning to provide insight into the performance of their IT infrastructure. And 93 percent of IT leaders say automation is worthwhile because it allows IT leaders and their teams to focus on more strategic tasks and initiatives.

IT leaders not equipped to handle post-pandemic workplace

PREDICTED rise in spending on technology as decision makers focus on digital collaboration tools.

Over half of IT leaders (55%) say their current IT systems are not fully equipped to handle the new post-pandemic requirements, according to a survey of enterprise professionals conducted by 451 Research and commissioned by Smartsheet. As a result, many decision makers expect technology spending to increase across the board over the next six months, with top areas of focus being team collaboration tools, digital workspace, content storage and sharing tools.

Digital transformation has been top of mind for many IT leaders but the pandemic is pushing many of these leaders to jumpstart their efforts by re-evaluating the tools they currently use to meet the needs of a distributed workforce. This "new work norm" is revealing the struggles many companies are facing due to technologies and apps that do not seamlessly integrate, or the use of a platform that requires IT support in order to run effectively. "As the COVID-19 crisis continues and the shift to remote work lasts longer than many leaders anticipated, executives are finding that they need better technology to fuel employee productivity," said Gene Farrell, Chief Product Officer of Smartsheet. "As IT leaders think of how to remedy this in the long-term, many will invest in no-code collaboration tools that integrate with other widely used solutions to provide their employees with a single platform to get work done."

The survey also looked to identify some of the blockers that IT leaders feel are impeding workforce productivity and uncovered the following:

Integration is key to centralized collaboration and productivity: With 82% of employees feeling less productive since going remote, more than three-fourths (80%) of respondents say employee productivity and collaboration is a higher priority than pre-pandemic. Nearly half (43%) of leaders believe integrations across their key systems would strongly improve productivity.

 Capabilities are becoming increasingly critical: Decision makers see the following becoming more important going forward: tools supporting cross-functional collaboration (37%), tools that easily and widely integrate with other apps (35%), and tools to quickly build and adapt a new business workflow or project design (34%). These are followed by visibility around workloads to more effectively manage resources (30%) and better reporting of the status and progress of important projects and work (30%).

"Whether it's in no-code workflow automation, easier synthesis of data across different business systems by nontechnical users, new and more flexible digital workspace canvases, or other capabilities, one of the key consequences of the pandemic will be more empowerment at the edge of the workforce," said Chris Marsh, a research director at 451 Research. "As businesses adjust to the impacts of the pandemic, having more employees more empowered than they traditionally have been to create increased agility across the long tail of their workforce processes will be critical to getting on the front foot."



NEWS

IT departments have seen increased focus and funding in 2020

43% of IT decision makers feel their relationship with business leaders has improved since the start of the pandemic. New research from hybrid IT services provider, Ensono, has found that the relationship between IT decision makers and business leaders has improved since the start of the pandemic. 43% of the 153 IT decision makers studied across the US and UK revealed that IT now commands more respect from the business.

With this increased respect, businesses have also grown hungrier for innovation, and consequently 1 in 3 (32%) IT decision makers are seeing IT budgets increase. 33% have been given more scope to define IT spend since the beginning of the coronavirus pandemic, versus just 5% who feel they have been given less scope to define IT spend.

Along with an uptick in funding, more organizations are looking to digitally transform due to pressures from COVID-19. In fact, 56% of IT decision makers have witnessed a greater urgency for digital transformation over the next few years. And almost 1 in 4 organizations surveyed have been forced to begin digitally transforming now. When asked whether the coronavirus has changed their business' view of IT, 38% of respondents confirmed the pandemic has helped improve understanding of IT. 30% of IT decision makers now have more control over business decisions, versus just 4% who stated they have less control now. Only 10% felt the pandemic had not changed their relationship in any way with the business.

Paola Doebel, Senior VP, Managing Director of North America, Ensono said: "As businesses have had to quickly adapt to the new working realities brought on by the COVID-19 pandemic, IT departments too have had to adjust their priorities to keep pace with the speed of change created by COVID. The IT department has been trusted to act fast and deliver so businesses can continue to move forward and safely address the needs of their team members and customers."

Despite the major disruption the pandemic brought to businesses, both in terms of working from home due to social distancing and increases in digital service demand, the IT department has been able to prove its value by keeping businesses running with 1 in 4 having faced no issues with downtime versus just 2% having recorded between 24 and 48 hours of downtime. The research also found that 1 in 5 (20%) have found their scope of work has increased to include areas outside of IT, versus 4% who feel they have been relegated to IT and ignored by the rest of the business.

One respondent stated: "While some plans were put on hold, for example those that focused on reducing technical debt, others have been expedited. Those transformation projects include supporting innovations that lead to new revenue streams."

Barney Taylor, Managing Director, Europe, Ensono said: "It's important that digital transformation happening now and into the future continues to deliver to the business. CIOs need to ensure they are not innovating in a vacuum and are taking the necessary steps to ensure they are delivering not only to the business and shareholders, but ultimately to their end users."

Cost control is crucial

APPTIO has revealed survey data detailing significant cuts to IT budgets and shifting business priorities in the wake of the COVID-19 pandemic and subsequent economic fallout. Across all sectors, companies have had to re-plan budgets, while some sectors, including healthcare and financial services, are seeing even more remarkable shifts. Apptio's data shows that:

• IT is being asked to do more with less: While the majority of organizations feel pressure to reduce IT spend, 63% report an increase in demand for new IT capabilities. In healthcare, the demand is even higher at 93%. Half of financial services leaders and 64% of government organizations are experiencing a demand for new capabilities.

O Cost optimization has surged in

priority: 72% of CIOs say the disruption caused by COVID-19 has changed their business priorities. Across sectors, organizations have shifted from prioritizing operational excellence and revenue growth to reducing IT spend. Two-thirds of healthcare organizations say optimizing costs is now the number one priority.

• CIOs must deliver faster business decisions: Three out of four CIOs say the ability to rapidly re-plan is a critical capability during the pandemic. Yet 39% of organizations have a quarterly forecast cadence. Ongoing uncertainty surrounding the pandemic means organizations cannot afford to wait to respond every three months.

"Leaders are facing some of the most

difficult decisions of their careers. We are seeing organizations from all industries impacted, some harder than others. In all cases, these organizations have had to look at how technology will enable them to come out of this disruption stronger than when they went in," said Jarod Greene, GM of the Technology Business Management Council.

"But they have to balance the need to manage costs and accelerate innovation, particularly in an environment where cash is king and plans can change on a daily basis. With financial management software, organizations can automate these processes, surface insights they would not have otherwise found in their data and make collaborative, informed decisions that take into account the business impact of their choices." A very special issue of DCS Magazine dedicated to the data centre industry's visionary leaders and technology innovators

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Worldwide 5G network infrastructure spending to almost double in 2020

Worldwide 5G network infrastructure market revenue will almost double in 2020 to reach \$8.1 billion, according to the latest forecast by Gartner, Inc.

TOTAL WIRELESS INFRASTRUCTURE revenue is expected to decline 4.4% to \$38.1 billion in 2020. Investment by communications service providers (CSPs) in 5G network infrastructure accounted for 10.4% of total wireless infrastructure revenue in 2019. This figure will reach 21.3% in 2020 (see Table 1).

"Investment in wireless infrastructure continues to gain momentum, as a growing number of CSPs are prioritizing 5G projects by reusing current assets including radio spectrum bandwidths, base stations, core network and transport network, and transitioning LTE/4G spend to maintenance mode," said Kosei Takiishi, senior research director at Gartner. "Early 5G adopters are driving greater competition among CSPs. In addition, governments and regulators are fostering mobile network development and betting that it will be a catalyst and multiplier for widespread economic growth across many industries." Rising competition among CSPs is causing the pace of 5G adoption to accelerate. New O-RAN (open radio access network) and vRAN (virtualized RAN) ecosystem could disrupt current vendor-lock-in and promote 5G adoption by providing cost-efficient and agile 5G products in the future. Gartner predicts that CSPs in Greater China (China, Taiwan and Hong Kong), mature Asia/Pacific, North America and Japan will reach 5G coverage across 95% of national populations by 2023.

"Despite investment growth rates in 5G being slightly lower in 2020 due to the COVID-19 crisis (excluding Greater China and Japan), CSPs in all regions are quickly pivoting new and discretionary spend to build out the 5G network and 5G as a platform," said Mr. Takiishi.

Over the short-term, Greater China leads the world in 5G development, with 49.4% of worldwide investment

Segment	2019	2019 Growth (%)	2020	2020 Growth (%)
5G	4,146.6	576.6	8,127.3	96.0
LTE and 4G	20,693.2	1.2	16,402.0	-20.8
3G	4,146.6	-25.7	2,608.4	-37.1
2G	797.4	-46.9	472.2	-40.8
Small Cells	5,342.7	11.6	5,736.6	7.4
Mobile Core	4,744.7	3.2	4,780.3	0.3
Total	39,871.2	6.2	38,126.7	-4.4

Wireless Infrastructure Spending Forecast, Worldwide, 2019-2020 (Millions of U.S. Dollars)

Due to rounding, some figures may not add up precisely to the totals shown. Source: Gartner (July 2020)

Company	2019 Revenue	2019 Market Share (%)	2018 Revenue	2018 Market Share (%)	2018-2019 Growth (%)
Amazon	19,990.4	45.0	15,495.0	47.9	29.0
Microsoft	7,949.6	7.9	5,037.8	15.6	57.8
Alibaba	4,060.0	9.1	2,499.3	7.7	62.4
Google	2,365.5	5.3	1,313.8	4.1	80.1
Tencent	1,232.9	2.8	611.8	1.9	101.5
Others	8,858	19.9	7,425	22.9	19.3
Total	44,456.6	100.0	32,382.2	100.0	37.3

Table 1. Worldwide IaaS Public Cloud Services Market Share, 2018-2019 (Millions of U.S. Dollars)

Source: Gartner (August 2020)

in 2020 attributed to the region. Cost effective infrastructure manufactured in China coupled with state sponsorship and reduced regulatory barriers is paving the way for major CSPs in China to quickly build 5G coverage. "However, other early adopting and technologically adept nations are not far behind," said Mr. Takiishi.

Gartner expects that 5G investment will rebound modestly in 2021 as CSPs seek to capitalize on changed behaviors sparked by populations' elevated reliance on communication networks. 5G investment will exceed LTE/4G in 2022.

CSPs will gradually add stand-alone (SA) capabilities to their non-stand-alone (NSA) 5G networks, and Gartner predicts by 2023, 15% of CSPs worldwide will operate stand-alone 5G networks that do not rely on 4G network infrastructure. This will rapidly divert wireless investment away from LTE/4G and spending on legacy RAN infrastructure will rapidly decline.

Significant growth in IaaS Public Cloud Services

The worldwide infrastructure as a service (laaS) market grew 37.3% in 2019 to total \$44.5 billion, up from \$32.4 billion in 2018, according to Gartner, Inc. Amazon retained the No. 1 position in the laaS market in 2019, followed by Microsoft, Alibaba, Google and Tencent.

"Cloud underpins the push to digital business, which remains at the top of CIOs' agendas," said Sid Nag, research vice president at Gartner. "It enables technologies such as the edge, AI, machine learning and 5G, among others. At the end of the day, each of these technologies require a scalable, elastic and high-capacity infrastructure platform like public cloud laaS, which is why the market witnessed strong growth."

In 2019, the top five laaS providers accounted for 80% of the market, up from 77% in 2018. Three-quarters of all laaS providers exhibited growth in 2018.

Amazon continued to lead the worldwide laaS market with an estimated \$20 billion of revenue in 2019 and 45% of the total market (see Table 1). Amazon leveraged its No.1 spot in 2018 to build out its capabilities beyond the laaS layer in the cloud stack and maintain its top position in 2019.

Microsoft remained in the No. 2 position in the laaS market with more than half of its nearly \$8 billion in revenue coming from North America. Microsoft's laaS offering grew 57.8% in 2019, as the company leveraged its sales reach and ability to co-sell its Azure offerings with other Microsoft products and services in order to drive adoption.

The dominant laaS provider in China, Alibaba Cloud, grew 62.4% in 2019 with revenue surpassing \$4 billion, up from \$2.5 billion in 2018. Alibaba Group will continue to expand its cloud infrastructure business in the coming years and aim to offer cloud-based intelligent solutions to its customers to support their digital transformation process.

China-based Tencent grew its IaaS offering by over 100% in 2019. It is the second largest provider of cloud services in China, after Alibaba. "As the cloud market matures, and its leaders experience natural market share erosion as a result, China-based providers such as Alibaba, Tencent and Huawei will start to gain more traction. It will also be hard for other providers, such as the North America based cloud providers, to enter the China market given the country's highly regulated market," said Mr. Nag. Google's IaaS revenue grew from \$1.3 billion in 2018 to \$2.4 billion in 2019, experiencing 80.1% growth.

Google's cloud services focused on providing organizations with industry specific solutions on robust computing infrastructure. North America accounts for nearly half of Google's laaS revenue. Moving forward, Gartner will be combining the laaS and platform as a service (PaaS) segments into a single, complementary platform offering, cloud infrastructure and platform services (CIPS). The

		,	,	
	2019	2020	2021	2022
Cloud Business Process Services (BPaaS)	45,212	43,438	46,287	49,509
Cloud Application Infrastructure Services (PaaS)	37,512	43,498	57,337	72,022
Cloud Application Services (SaaS)	102,064	104,672	120,990	140,629
Cloud Management and Security Services	12,836	14,663	16,089	18,387
Cloud System Infrastructure Services (IaaS)	44,457	50,393	64,294	80,980
Desktop as a Service (DaaS)	616	1,203	1,951	2,535
Total Market	242,697	257,867	306,948	364,062

Table 1. Worldwide Public Cloud Service Revenue Forecast (Millions of U.S. Dollars)

BPaaS = business process as a service; laaS = infrastructure as a service; PaaS = platform as a service; SaaS = software as a service

Note: Totals may not add up due to rounding. Source: Gartner (July 2020) Source: Gartner (August 2020)

> worldwide CIPS market grew 42.3% in 2019 to total \$63.4 billion, up from \$44.6 billion in 2018. Amazon, Microsoft and Alibaba secured the top three positions in the CIPS market in 2019, while Tencent and Oracle were in a virtual tie for the No. 5 position with 2.8% of the market each.

> "There will be a continued push of cloud spending as an outcome of the coronavirus pandemic," said Mr. Nag. "When enterprises were compelled to move their applications to the public cloud as a result of the pandemic, they realized the true benefits of public cloud and it is unlikely that they will change course. In the recovery and rebound phase, CIOs are recognizing that they don't need to bring workloads back on premises, which will further increase cloud spending and drive new applications around cloudhosted collaboration that incorporate emerging technologies such as virtual reality and immersive video experiences."

Worldwide Public Cloud revenue to grow 6.3% in 2020

The worldwide public cloud services market is forecast to grow 6.3% in 2020 to total \$257.9 billion, up from \$242.7 billion in 2019, according to Gartner, Inc. Desktop as a service (DaaS) is expected to have the most significant growth in 2020, increasing 95.4% to \$1.2 billion. DaaS offers an inexpensive option for enterprises that are supporting the surge of remote workers and their need to securely access enterprise applications from multiple devices and locations.

"When the COVID-19 pandemic hit, there were a few initial hiccups but cloud ultimately delivered exactly what it was supposed to," said Sid Nag, research vice president at Gartner. "It responded to increased demand and catered to customers' preference of elastic, pay-as-you-go consumption models." Software as a service (SaaS) remains the largest market segment and is forecast to grow to \$104.7 billion in 2020 (see Table 1). The continued shift from on-premises license software to subscription-based SaaS models, in conjunction with the increased need for new software collaboration tools during COVID-19, is driving SaaS growth.

The second-largest market segment is cloud system infrastructure services, or infrastructure as a service (laaS), which is forecast to grow 13.4% to \$50.4 billion in 2020. The effects of the global economic downturn are intensifying organizations' urgency to move off of legacy infrastructure operating models.

Public cloud services serve as the one bright spot in the outlook for IT spending in 2020. Cloud spending in many regions is expected to grow rapidly as economies reopen and more normal economic activity resumes, with regions such as North America expecting to return to higher spending levels as early as 2022.

"The use of public cloud services offer ClOs two distinct advantages during the COVID-19 pandemic: cost scale with use and deferred spending," said Mr. Nag. "ClOs can invest significantly less cash upfront by utilizing cloud technology rather than scaling up on-premises data center capacity or acquiring traditional licensed software."

"Any debate around the utility of public cloud has been put aside since the onset of COVID-19. For the remainder of 2020, organizations that expand remote work functionality will prioritize collaboration software, mobile device management, distance learning educational solutions and security, as well as the infrastructure to scale to support increased capacity."

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Worldwide enterprise applications revenue reaches \$225 billion

Fuelled by ongoing digital transformation investment, a new report from International Data Corporation (IDC) shows that worldwide revenue in the enterprise applications market grew 7.5% year over year in 2019 to \$224.6 billion.

THE TOP 5 enterprise applications vendors in 2019 were SAP (7.7% revenue share), Oracle (5.1% share), Salesforce (5.0% share), Intuit (3.0% share), and Microsoft (2.1% share).

As businesses undergo digital transformation to meet the challenges of the digital economy, modern software with its properties of automation, connectivity, and visibility has become critical to achieving competitive advantage. Enterprise applications are the engine of the business, providing the data, intelligence, and computational tools necessary to function in the digital economy and every line of business within an organization depends on multiple software applications to function.

"Digital transformation initiatives are bringing impactful changes to organizations such as the ability to work anywhere and anytime, identifying new insights because of cognitive and predictive processes, and reshaping the enterprise experience using modern and cloud-based enterprise applications," said Mickey North Rizza, program vice president, Enterprise Applications and Digital Commerce at IDC, "Enterprise applications are the foundation of business processes, employee engagement, and customer experience." Several trends currently impacting the enterprise applications market include:

• IDC expects the worldwide enterprise applications market to have a five year compound annual growth rate (CAGR) of 3.4% with revenues reaching \$265.7 billion by 2024.

- The share of public cloud software revenue is forecast to grow from 40.3% in 2019 to 56.8% in 2024, as growth opportunities move heavily in favor of cloud applications.
- Enterprise application vendors are enabling new use cases for enterprise applications by utilizing big data/analytics and machine learning to bring more actionable insights across a broader workstream.
- Vendors are also working to automate lower-level tasks within the applications. IDC expects this trend

to continue and to be a key factor in determining market positioning among enterprise application vendors in the future.

The enterprise applications market consists of the following secondary markets: enterprise resource management, customer relationship management, engineering applications, supply chain applications, and production applications. Each of these secondary markets consists of multiple functional markets. IDC's software market sizing and forecasts are presented in terms of commercial software revenue. The term commercial software is used to distinguish commercially available software from custom software.

Commercial software revenue typically includes fees for initial and continued right-to-use commercial software licenses. These fees may include, as part of the license contract, access to product support and/or other services that are inseparable from the right-to-use license fee structure, or this support may be priced separately. Upgrades may be included in the continuing right of use or may be priced separately. Commercial software revenue excludes service revenue derived from training, consulting, and systems integration that is separate (or unbundled) from the right-to-use license but does include the implicit value of software included in a service that offers software functionality by a different pricing scheme.

AR/VR's long-term outlook is positive

Growth in worldwide and European* AR/VR spend will decline in 2020 compared to the pre-COVID-19 forecast scenario according to the June release of the International Data Corporation (IDC) Worldwide Augmented Reality (AR) and Virtual Reality (VR) Spending Guide. Marked reductions in IT spend and an economic downturn due to the pandemic will slow worldwide AR/VR spend to \$10.7 billion — a tempered 35.3% growth from the \$7.9 billion spent in 2019. But the long-term outlook remains strongly positive — IDC estimates a five-year compound annual growth rate



Source: IDC's Worldwide Semiannual Augmented and Virtual Reality Spending Guide 2020, June (V1, 2020)

(CAGR) in AR/VR spending of 76.9% worldwide in 2019–2024 to reach \$136.9 billion by 2024.

"The latest release of the AR/VR Spending Guide was adjusted for the impact of COVID-19," said Marcus Torchia, research director, IDC Customer Insights & Analysis. "Supply chain disruptions, store closures, and delayed enterprise implementations cast shadows on the short-term outlook for the coming quarters into 2021. However, the longer-term growth opportunities for AR/VR may emerge even stronger. Remote working requirements, contactless business processes, augmented meeting places, and virtual social togetherness portend an updraft in expected demand for the enabling of AR and VR technologies."

Europe accounts for roughly 15% of worldwide AR/VR spend, with European spending forecast to be \$1.6 billion in 2020. Europe is among the regions hardest hit by the pandemic, showing a 58 percentage point reduction in 2020 AR/VR spending compared to the pre-COVID scenario, against a 43 percentage point worldwide average decline.

"The pandemic and containment measures are heavily impacting the European economy, with GDP expected to decrease 8% in 2020, before bouncing back in 2021," said Giulia Carosella, senior research analyst, IDC European Customer Insights & Analysis. "In verticals that have been highly impacted, such as retail, the strong focus on cash preservation has led to the pushing back of some large AR/VR deployments until the return to growth. But elsewhere the shift in priorities, with a greater focus on ROI optimization and productivity and efficiency gains, will continue to ramp up interest in AR and VR led by the 'remote everything' digital trajectory." The impact of the pandemic and related spending reduction varies across industries. Commercial use cases will account for nearly half of all AR/VR spending in 2020, led by training (\$1.3 billion) for virtual reality and industrial maintenance (\$375.7 million) for augmented reality. The AR/VR use cases forecast to see the fastest spending growth in 2019–2024 are lab and field (post-secondary, 133.9% CAGR), lab and field (K-12, 127.0% CAGR), and public infrastructure maintenance (111.4% CAGR). On the consumer side, spend will be led by two large use cases: VR games (\$3.0 billion) and VR feature viewing (\$1.2 billion).

"The COVID-19 pandemic has created a shift in mindset. With so many employees working remotely, augmented and virtual reality are being considered as necessary tools to engage with consumers and drive business processes within and across organizations," said Stacey Soohoo, research manager, IDC Customer Insights & Analysis. "Unsurprisingly, faceto-face industries such as retail are expected to be the most negatively impacted due to the pandemic, along with education, discrete manufacturing, and process manufacturing. Despite a moderate decline in growth, there is an uptick in demand for innovative technologies as retailers shift their focus from selling the product to creating a personalized, immersive customer experience. In other industries, enterprises are focusing on knowledge capture and transfer initiatives, enabling front-line workers to be more efficient and collaborative while keeping safety in mind."

Though commercial AR/VR spending is expected to surpass consumer spend next year in Europe, the latter will still lead the market in 2020. Virtual reality games and video/feature viewing (VR) together will

account for more than half of all AR/VR spending in this segment. On the AR side, the most severe contraction is expected to be seen in retail and media, but also in the finance sector. Healthcare and government are expected to be the most resilient in 2020, showing interesting pockets of growth related to monitoring of social distance compliance, anatomy diagnostics, and emergency response.

Due to the expected high demand of industrial AR/ VR solutions, industrial maintenance will be the fastest growing use case in terms of CAGR over the forecast (2019-2024). On the VR side, consumer spending will be the most resilient in 2020, driven by demand for at-home entertainment. Remote training and collaboration will also sustain demand in the commercial space. Training and industrial maintenance will be the main AR/VR commercial applications in Europe, and together will garner around 46.3% market share.

Spending in VR solutions will be greater than that for AR solutions initially. However, strong growth in AR hardware, software, and services spending (184.5% CAGR) will push overall AR spending well ahead of VR by the end of the forecast. Hardware will account for nearly three-quarters of all AR/VR spending throughout the forecast, followed by software and services.

In Europe, hardware is expected to be the largest technology category in 2020, with more than 60% market share. Software spending will maintain its second largest share. AR/VR services-related spending will stay with the lowest share in the following years at under 10%, but will see the fastest growth, registering a CAGR of 126.2%, driven mainly by consulting services and system integration. From a reality type perspective, VR solutions will have the largest portion of spending in 2020, achieving more than 70% share, but AR spending will overtake it by the end of the forecast due to increased demand and strong growth in all AR technologies (176.8% CAGR).

"AR and VR investments have slowed due to the pandemic, which has required companies to review their road maps," said Lubomir Dimitrov, senior research analyst, IDC European Customer Insights & Analysis. "However, as companies progress along their road to recovery, spending on AR/VR will accelerate quickly, with a focus on targeted investments that can bring European companies clear benefits, including the ability to address many of the challenges associated with COVID-19." Slight rebound in European ICT spending According to the June update of the Worldwide Black Book Live Edition published by International Data Corporation (IDC), European ICT spending will decline by 3.7% year on year in 2020 to total \$897.08 billion. However, slight recovery of the ICT market is expected in 2021, when ICT spending in Europe will increase by 1.9% year on year, in line with the gradual recovery in macroeconomic conditions and consumer confidence. All hardware markets will continue on a negative trajectory in 2020, with overall hardware spending declining by 4.07% year on year. Spending on infrastructure will be most affected, due to reduced business activity, focus on capital preservation, and expense reduction.

"During the Covid-19 crisis, there has been a boost in adoption of OPEX-based consuption models, which will drive spending on IaaS. The market is forecast to grow in the double-digits in both the short and long term," says Lubomir Dimitrov, senior research analyst with IDC's Customer Insights & Analysis team.

Although demand in the PC market increased during the second quarter of 2020, annual spending in the overall hardware market will decline due to the global economic challenges among both consumers and businesses, resulting from the impact of the pandemic. In 2020, the European IT services market is expected to decline by 4.2% year on year, as the current economic uncertainty is causing delays or reductions in existing projects, and investments planned pre-crisis are being postponed. Next year, the services market is expected to rebound slightly, with negligible annual growth of around 1%.

Spending on software in Europe is expected to slow down in 2020, declining by 2.61% year on year, as organizations try to limit their resources and place any projects on hold that are not crucial for maintaining core business activities. On the other hand, the increased adoption of the remote working/work from home model among public and private organizations gave a boost to spending on collaborative and communication tools, as well as on software security spending, as protecting devices and expanded networks became an urgent need.

The European software market will rebound slightly next year, with companies renewing some previously delayed digital transformation initiatives, particularly those relating to AI, analytics, and automation of business processes.

Spending in VR solutions will be greater than that for AR solutions initially. However, strong growth in AR hardware, software, and services spending (184.5% CAGR) will push overall AR spending well ahead of VR by the end of the forecast

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The cases for **DevOps**

To understand the impact of DevOps you need to think about how software was traditionally built and run.

BY ANDREW DAVIS, SENIOR DIRECTOR PRODUCT MARKETING, COPADO.



ORGANISATIONS continually hold in tension innovation and stability. Every business needs to innovate and develop new functionality for their customers and employees. To do this, they build and customise applications. This is the role of the Development team (Dev).

Those same organisations also need existing systems to be stable, reliable, and secure. This is the role of the Operations team (Ops), which might consist of system, database and website admins. Their main job is to make sure servers are up and running, service level agreements are being met, the application is performing as expected and so on.

Working with a cloud platform like Salesforce makes it a lot simpler to build applications. Instead of needing an 'Operations' team to keep production systems running, the platform takes care of this aspect. However, there's a natural tension. Developers want and need to keep changing the system, while Operations wants and needs the system to remain as stable as possible so they can optimize performance and reduce risk. satisfaction, but specific goals for 'Devs' include quickly delivering features and bug fixes. Whereas for 'Ops' the goal might be to maintain 99.99% server up-times.

These goals can often be in conflict, leading to inefficiency and finger pointing when things go wrong.

Breaking down silos

DevOps was born to alleviate conflict between the Dev and Ops teams. It focuses on using tools and techniques that enable everyone to work together more smoothly. It's about collaboration, working towards the shared goal of benefitting end users. It is born out of a recognition that the whole team needs to work together to build trust while delivering innovation. Because delivering an application is only the beginning. Once it's running in production,

Compounding the issue, in large organisations, Dev and Ops teams historically work in silos. The end goal for both teams is customer businesses need a way to ensure it's working, and to gather feedback to make improvements.

Historically, development was thought of as an assembly line, beginning with development and ending in production. But DevOps teams prefer to use a circle or an infinity loop to indicate that this is an ongoing process.

In The DevOps Handbook Gene Kim and coauthors describe "three ways" of DevOps: Flow, Feedback, and Continuous Improvement. Flow refers to the "left-to-right" movement of changes from development to production. The goal of this flow is early and continuous delivery of value to end users. Developers can then monitor how the app is running in production, and get input from end users, leading to the "right-to-left" movement of Feedback back to development.

However, just like learning, DevOps is not a journey you ever finish, thus the third way is Continuous Improvement, striving to always improve both our work and the way we work.

Focusing on the customer - DevOps in practice

The purpose of every task in business is to deliver value. That might be a person who pays for a service or someone in the same organisation. Although that might sound obvious, it's important to understand the value that a given team delivers, so that the business can focus on activities that bring value and avoid things that don't.

One great example of this is waiting time. Imagine that it takes one hour to build a great new feature for an application. Clearly, that's an action that brings value. But imagine that the team only releases once per week, so that feature needs to wait for a week before it can be released. That waiting time does not bring any value to the customer. If there is a way to reduce that waiting time, it's beneficial for the customer.

The modern world has gotten a lot faster compared to previous generations. Many of the changes we have seen are designed to bring benefit to customers more quickly and more efficiently. For example, manufacturing has been transformed over the last century to reduce the amount of non-value adding steps in a process, and to optimize for quick delivery.

DevOps aims to bring similar benefits to the process of developing IT applications. DevOps focuses on closing the gap between creative people like developers and those who can benefit from the end result.

The Research on DevOps

There is increasing research to back up these claims. The Accelerate State of DevOps Report is the largest and longest-running research of its kind, and provides independent scientific evidence of the effectiveness of the practices that fall under the DevOps heading. The State of DevOps Report points to four key metrics that can be used to measure the effectiveness of a development process:

- Lead time (the time to deliver completed work to end users)
- Deployment Frequency (how often a business updates production)
- Change Fail Percentage (how often those updates negatively impact end users)
- Time to Restore (how quickly a business can recover from those negative impacts)

The first two measure the speed of innovation, and the last two measure the degree of reliability provided. Measuring both innovation and reliability allows a business to assess these dual goals of DevOps. The research discerned that some organisations performed far better than others on all four of these metrics.

Based on these metrics, they categorized respondents into Elite, High, Medium, and Low performers. They found that Elite performers had 106x faster lead time than Low performers, deployed 208x more frequently, had 7x lower change failure rate, and 2,605x faster time to restore!

Importantly, Elite and High performers were both faster and more stable, and low performers suffered from both low rates of innovation and high rates of failures. That indicates that an ability to innovate quickly and the ability to do so safely are related, just as better brakes enable a racecar to go faster.

Performance on these four key metrics is called "software delivery performance". This performance doesn't just impact the development team, it has an impact on the whole business. Organisations with elite software delivery performance are twice as likely to meet their overall goals, both commercial and noncommercial.

Copado conducted a similar survey called the State of Salesforce DevOps Report. For organisations that had more than 25 admins or developers contributing to Salesforce customizations, the same trend appeared: teams that were able to release innovation more quickly and reliably to Salesforce performed better as a company!

Why doDevOps practices have such a big impact? It is because a development team may be only a small part of the overall organisation, but they have an outsized impact. By building the systems a company uses, they enable the whole organisation to succeed.

DevOps is - like all new terminology - a little shrouded in mystery, but by bringing these teams together and making collaboration the cornerstone of ALL activity, it is set to delvier huge benefits to enterprises.

Management to cover all bases: product vs project

The four questions (and answers) that lead to success.

BY JEFF KEYES, VP OF PRODUCT AT PLUTORA.

case, particularly for software

development.



ALMOST ALL BUSINESSES TODAY will rely on project management to ensure tasks are completed on time and all employees are meeting their targets. Ultimately, this is what makes a business successful. Its necessity is recognised across multiple industries and so many team leaders may believe there's no need to justify its worth. But this isn't always the

Another vital management role to be considered is product management - after all, the focus here tends to be on the product that is created. But for those more used to working with project management, and potentially questioning the value of both approaches, it's important to understand the similarities and differences between the two, and what managers in these areas can each contribute.

The key to this starts with the descriptive writing mantra that everyone learned back in school: the 5 W's (and 1 H), otherwise known as who, what, when, where, why, and how. Though the "who" and "where"

are fairly self-explanatory, one way to understand the difference between product management and project management is by understanding which of the other four questions each job resolves. It's useful to note: both positions fulfill critical roles in effective product delivery.

Product Management: The foundations of the job The answers to "what" and "why" are typically found in product management. For every

> single product being delivered, these questions require solid, confident answers.

"What are we building?"

Many enterprises have a product range that spans dozens of different markets. Though this is great for the business and investors, it's not an effective way for a team to work. When you ask a team to build or support a product, they need a clear vision of what that product needs to do. This is especially true for software products because it's easy for them to lose their identity if they attempt to cover too many functions.

In a large enterprise, a "do everything" mentality can cost more over time. Chances are there are many software teams, with each one building software that's designed to suit a specific part of the market. When those teams spend time implementing software that duplicates some functionality already provided by

your business, that's time and effort being wasted. This is where a good product manager is valuable. They help keep software teams focused on what they're building and rein in the desire (by developers and executives alike) to expand the software outside the specific job it needs to do.

"Why are we building this?"

For developers, "why" tends to be more important than "what". Work is almost always interconnected between different teams. When they understand why they're building something, it's much easier to understand how those connections should work. It also gives developers information about which compromises they should make when implementing a particular feature, such as simplicity and usability versus speed.

The product manager is responsible for understanding and conveying the "why" of the product. They do this by conversing with executives and project stakeholders to understand how the product fits into the overall business need.

Project Management: Getting the product over the line

In contrast, project management has a different focus. Here the biggest concerns are the "how" and "when".

"How will we build this?"

Large software projects are typically complicated, with multiple interdependent and interlocking pieces. The most effective software project managers will understand these interdependent requirements and plan for them accordingly. They organise the individual actions so that by the time someone is ready to work on one piece, its dependencies have already finished. Thanks to this efficiency, developer downtime is minimised and those developers can focus only on the problems they need to solve for each task. This management is arguably the most valuable thing that project managers do for their software developers, though it can often be missed by executives more focused on the second project management question: "when?"

"When will the project be finished?"

For external stakeholders, the "how" or "why" doesn't matter, and they usually only care about the "what" when the final product isn't what they expected. However, "when" is a question that's always top of mind for every team leader waiting for a software project to be finished.

It's also the trickiest question to answer. It's almost impossible to reliably predict how long it will take to deliver a single feature, let alone a whole project. Something that initially seems simple can turn out to be much more complicated than anticipated. Alternatively, sometimes something you think might take a few weeks instead takes only a day or two. For developers, "why" tends to be more important than "what". Work is almost always interconnected between different teams. When they understand why they're building something, it's much easier to understand how those connections should work. It also gives developers information about which compromises they should make when implementing a particular feature, such as simplicity and usability versus speed

Striking a balance between the two

In many traditional software organisations, both roles are equally as important for the efficient delivery of software releases. However, many enterprises are changing their deployment infrastructure towards a continuous delivery model with DevOps principles. Teams practicing continuous delivery may find that the question of when something is going to be completed can feel less important. Additionally, implementing agile software principles makes the collective software team responsible for the question of "how". Third party planning tools can also make it easier for software teams to answer the "how" and "when" questions for themselves.

For this reason, dedicated project managers are becoming less common in some organisations. Instead, much of that responsibility is moved to the teams who then focus their planning efforts on the product itself. However, the most successful projects are those that answer all four questions. When an answer to one or more of these questions is unknown, the project can end up stressful and frustrating.

Different job roles come and go frequently enough in the technology sector, as advancements are made so regularly that staff roles have to change to keep up. The main point to take on board when it comes to product management vs project management is that there should be at least a few people in an organisation that are responsible for answering these four questions, and ensuring that their teams work to these guidelines. Doing so keeps the pipeline moving and keeps customers happy, which is the ultimate goal.

How real-time APIs power our lives

APIs play a central role in both enabling digital business and powering modern, microservices-based application architectures.

BY MICHEÁL KINGSTON, TECHNICAL SOLUTIONS ARCHITECT, NGINX AT F5.

THE OTHER DAY I went to dinner and it made me appreciate the need for fast application programming interfaces (APIs). Confused? Let me explain.

To get to dinner I used an app to hail a car from my smartphone. While you're waiting for the driver to pick you up, the map updates in real time to indicate the location of the car on approach. But on that day, the app did not update the map. After 10 minutes, I got frustrated and switched to an alternative ridehailing app! This time I was successful and watched in real time as my driver approached and picked me up.

Let's look at another example. I recently checked out an Amazon Go store in San Francisco. With the Go app downloaded, you just approach the door and it unlocks automatically. As you walk around the store, any item you pick up is automatically added to your virtual cart, and automatically removed if you put it back on the shelf. When you are done, you just walk out!

Yet again, we see realtime information is critical to a good experience.

APIs are the connective tissue of good digital experiences

What's the technology powering such convenient, and thus satisfying, consumer experiences? APIs! Specifically, realtime APIs. There's a lot riding (pun intended) on consumers having good, realtime experiences. The barrier to switching to a competitor in the digital world is very low.

What does "Real Time" mean?

Research suggests realtime must be less than 30 milliseconds (ms). Consider these proofpoints:

- 13 ms for humans to process images. According to a study by neuroscientists at MIT, the human eye can process and identify entire images in as little as 13 ms.
- 20 ms to synchronise video. An IEEE paper about using 'Media fingerprinting' technology to prevent loss of synchronisation between image and sound when delivering video content states that the tolerable limit for latency is between 6 and 20 ms.
- 30 ms to deliver wireless data. Ubiquitous connectivity is on the horizon with the introduction of 5G technologies, which promises peak speeds of up to 1 Gbps and latency of less than 30 ms. Why such low latency? Because 5G needs to be that fast to replace inhome WiFi and wireline broadband like fiber and cable modems.

Real-Time experiences require RealTime APIs

Realtime experiences rely on API connectivity. Uber retrieves Google Map data via an API call. Amazon connects instore Go infrastructure with

> sensor, vision, and analytics capabilities via API calls. That means your API infrastructure needs to process API calls in 30 ms or less. For some use cases, you need as little as 6 ms! That might not sound difficult, but let's

consider that API infrastructure has to:
Route APIs. Ensure the API consumer – like your ridehailing app – is correctly directed to the right



backend resource, like the mapping service.

- Authenticate APIs. Is this API consumer a valid user allowed to access this backend resource? You have to authenticate the user to ensure it is.
- Secure APIs. APIs are arguably the gateway to your most critical application capital, so they better be secure.
- Shape APIs. Not all API calls are equal. You need a way to shape the traffic to avoid resource contention, provide proper bandwidth, and prioritise certain API calls.
- Cache APIs. Many companies process billions of API calls per day. How do you handle that volume? Caching API responses is one way to boost performance.

Everyday use cases for RealTime APIs

There are plenty of activities in the digital world that harness the benefits of realtime APIs, including:

- Fraud detection. The financial services sector employs fraud detection technologies on credit card transactions at the point of sale. These enterprises process large amounts of data and use predictive/forensic analytics to detect any outliers. All this needs to happen in real time, when the customer is at the point of sale.
- Chat. Low latency for your chat apps is a crucial factor in the customer experience. Without realtime API calls you will lower customer satisfaction, which can impact revenue and decrease your net promoter score (NPS).
- IoT. IoT is changing our lives at incredible speeds! Let me illustrate a few examples where APIs are used in our everyday lives, and must be done in real time:
 - Home automation: Do you have a remote that you can talk to? What about a homeautomation device powered by Alexa or Siri? A good experience requires realtime voice calls to control everything from

streaming video to smart blinds that automatically adjust for optimal sunlight and privacy depending on the time of day.

- Medical device monitoring: IoT is increasingly being used to monitor patient health – from cancer to diabetes. A variety of vital parameters such as glucose levels or blood pressure are recorded on a daily basis. Updates are then sent to the patients' physician who administers appropriate treatment. Accomplishing this in realtime is paramount for improving patient outcomes.
- Driverless cars: They're coming! This technology uses a variety of sensors and software to control, navigate, and drive the vehicle. Key decisions about the best route to take and when and where to stop to avoid or minimize collisions all have to be taken in an instant by analysing large amounts of data collected by the sensors.

Managing APIs

A lack of realtime APIs can prevent adoption of disruptive services like voicecontrolled smart devices, inhome medical care, and driverless cars. Preventing these new services from reaching potential stalls revenue and market expansion. Delivering transformative experiences inevitably requires a highperformance API management solution. This will enable infrastructure, operations and DevOps teams to define, publish, secure, monitor, and analyse APIs, without compromising performance.

Ultimately, APIs play a central role in both enabling digital business and powering modern, microservicesbased application architectures. No organisation can afford to ignore their pivotal role APIs in application and business modernisation. Indeed, those delaying on placing APIs at the core of their IT strategy will soon face substantial challenges to transform their technology and business foundations.

The cluster sprawl just over the horizon

In recent years, Kubernetes has exploded in popularity among organisations trying to harness the power of cloud native. And it's been hugely successful, with project teams able to adopt new Kubernetes infrastructure – or clusters – at an incredible pace.

BY TOBI KNAUP, CO-CEO & CO-FOUNDER AT D2I

For a few years, all has been going well but many organisations more advanced in their Kubernetes journey are now running into a problem. Clustersprawl. The ease of spinning up new environments with Kubernetes means disparate clusters exist across the organisation, with little standardisation and, as a result, significant waste and risk.

While the problem of sprawl in IT isn't a new one (a similar problem occurs with virtual machines, for example), the lack of maturity in the Kubernetes market means it's one most aren't aware they need to act on. Understanding how to manage cluster sprawl – and how to avoid it in the first place – will be important for businesses scaling their cloud native infrastructure.



Not too long ago, applications were simple and limited. Developer teams knew where an application resided because they were typically monolithic, connected to simple middleware and backend data sources, and all components were manually assigned to on-site systems which often had pet names to make them easy to remember. Today it isn't quite so simple.

To keep pace with the ever-changing digital landscape, organisations are adopting open source and cloud native technologies quickly, and that means more clusters. One team may be building a stack on one cloud provider using their favorite set of tools, while another team is building a different stack on





a different cloud provider, using that team's favorite tools. And, if they're provisioning and using clusters with different policies, roles, and configurations, you can quickly lose sight of where those clusters exist and how they are being managed. This is cluster sprawl.

Finding yourself in the midst of cluster sprawl is not only a headache from the point of view of managing your infrastructure, it can also lead to security issues and a huge amount of waste. With no centralised governance or visibility into clusters deployed across the organisation, security controls may be inconsistent, increasing the risk of vulnerabilities within applications and making them more difficult to support – as well as lead to compliance, regulatory and IP challenges down the line.

In addition, cluster sprawl leads to waste in resources as with each new added cluster comes new overhead to manage a separate set of configurations. When it comes to patching security issues or upgrading versions, a team is doing multiple times the amount of work, deploying services and applications repeatedly within and across clusters. On top of that, all configuration and policy management, such as roles and secrets, are repeated, wasting time and creating a greater opportunity for mistakes.

Visibility brings everything together

One of the reasons Kubernetes has become so popular amongst developers is because it allows them to spin up their own environments with ease, enabling them to rapidly deploy code at scale. Exactly the issue that leads to cluster sprawl. As such, they tend to lose that flexibility when their platforms are brought into IT operations, who need consistent ways of administering, standardised user interfaces, and the ability to manage and obtain insights about their infrastructure. So, dealing with cluster sprawl (and preventing it occurring at all) requires a careful balance between developer flexibility and the need for IT governance.

The first step on this journey is visibility. Organisations need to have a clear view of all their clusters and workloads at once, so they know what they are dealing with through a centralised control-plane. Not only does this provide an understanding of where clusters are, it also allows IT teams to obtain insights and troubleshoot problems much more quickly. It will provide centralised governance to ensure consistency, security, and performance across the business's digital footprint - key in the long term and as the number of deployments grows.

With centralised visibility, mission-critical cluster information can be viewed at a glance and any issues arising within applications monitored in one place, and without valuable time and resources being lost to troubleshooting problems. Ideally, this visibility will be in place from the very start of an organisation's Kubernetes journey however, as a nascent technology, many organisations may suddenly find themselves in the weeds. Visibility can, and should, still be achieved with a control-plane that offers a birds-eye view of the cluster landscape.

Maintaining governance

While visibility initially provides the insight into what you are dealing with, in order to ensure everything continues to run smoothly it has to be combined with the creation of policies. All organisations will have unique governance and access control requirements based on the type of business they are in, but policies allow admins to assert control over how clusters are being created and run, reducing risk in the environment. For example, organisations need to be able to govern the usage of sanctioned software and which versions can be used within which projects. This type of version control reduces the potential vulnerability surface area and also helps to more effectively deliver support by providing a catalogue of software that has been approved by the organisation for when they are needed. Policies are also critical for access control.

On the Kubernetes journey, staff may change their roles and responsibilities and that makes it difficult to manage individual logins, account privileges, assess governance risk, and perform compliance checks against industry models and in-house policies. Admins need a simple way to provision Role-Based Access Control (RBAC) that provides flexibility in configuring access as users' roles within an organisation change. This also balances the need for developer flexibility and IT control by empowering division of labour across developers, operations and any other necessary roles across the business.

Of course, very few organisations will move to the cloud in one quick sprint and, as such, many will maintain a combination of on-premise and cloudbased infrastructure. As such, any governance framework has to extend to all aspects of cloud use and all processes must be standardised across the whole infrastructure, whether it's on-premise or in the public cloud.

A smoother journey to cloud native

Without intervention, many organisations are going to find themselves dealing with cluster sprawl at some point on their Kubernetes journey. However, with a centralised control plane, oversight can be regained, and cluster sprawl eased. With governance over, and lifecycle management of, disparate Kubernetes clusters, admins will be able to maintain multi-cluster health, manage distributed operations, leverage operational insights and retain control of policies without interfering with the development process. Organisations that are able to contain cluster sprawl to increase the security, manageability and governance for enterprise-grade Day 2 operations will find themselves on a much smoother cloud native journey.

Importance of testing in DevOps in the age of continuous delivery

Getting a DevOps strategy correct requires having a progressive shared mindset that can learn from previous delivery cycles and has support from the business to embed those learnings into future delivery cycles.

BY MATT SAUNDERS, HEAD OF DEVOPS, ADAPTAVIST.



FUNDAMENTALLY, DevOps helps shorten the time between an idea being coded and it being productionready, and to do this consistently and quickly you need to carefully define and automate your testing. You must put the right processes and tools in place to make testing an integral part of the cycle.

As continuous delivery becomes the norm, expectations have increased amongst those not doing it. The ability to release good quality code quickly and support continuous feedback during delivery is absolutely critical. The role of testing is often overlooked in the DevOps process, and many underestimate the benefits automation and putting the right test tooling in place can provide. When thinking about all of these aspects, companies can more effectively release quality software in today's age of continuous delivery. Continuous delivery is about being able to efficiently release code quickly and with a high degree of certainty that things are going to work. And work securely.

How can companies get DevOps working well?

One of the ways to get DevOps working well is to focus on automating testing. The path of testing units of code is already well-defined, though also looking at end-to-end user testing gets you further down the path. This takes away repetitive error-prone manual browser-based testing steps where people are examining a web site or application and trying to decide "does that look right?" or "has that regressed since last time?" or "has the associated change had the correct effect?" Instead of making a subjective judgement, you can use tools that look to automate those tests to a high degree of certainty.

According to Alex Zavorski, VP of Atlassian Products at SmartBear: "Another key component of modern software delivery workflows is continuous testing. The antiquated approach of leaving testing in a time-boxed, late-stage of your delivery lifecycle is impossible in true agile and DevOps at scale. Testing



must be performed not just earlier, but continuously throughout the entire software delivery lifecycle." Below are three guiding principles for successful DevOps which are worth bearing in mind when thinking about the role and importance of testing:

- Flow Feedback Learning
- Enable rapid flow of ideas, code
- and design through the system Find problems quickly, validate ideas rapidly, let the system take the work Provide a culture where we can learn and experiment, and fail fast

PLAN

BUILD

The role of testing

A key achievement in getting teams to work in an agile way is having your developers able to work in a culture of innovation. So, in development and in testing they might be saying "let's try this, let's test it and let's get some rapid feedback so that we can decide whether this was the right thing to do or not". The DevOps angle on this is in enabling the team to get that work deployed and tested effectively. It's the same agile mindset, but at an operational level. Ultimately, the cycle should move fast, so that code can be written and quickly put in an environment where the presumptions on which they were first written are rapidly validated or invalidated. Perhaps this involves testing out different hypotheses on different groups of users, or perhaps it's just delivering a new feature or fix quickly. The key point is getting frequent flow into the system so you can learn as much as you can and then move to the next thing.

Benefits of automation

Companies often come from a scenario where a release manager is responsible for releases and they do their work manually. Every time they do a release, they follow a document which describes how to deploy the code in a sequence of commands and manual steps. Pre-release environments may also look different from production, thus leading to complex human decisions being made during releases. This is error-prone and time-consuming and doesn't scale well when a company tries to increase the frequency of software releases.

Automation becomes essential when this time comes, and this, in turn, frees people up to do more creative and more knowledge-intensive work. It also lets you scale whatever you're trying to automate much faster than you could without it, without just hiring additional engineers to run more tests. once you've adopted a mentality of automating

Putting the right

automating testing, you can begin unlocking all the automation potential in your organisation by getting people to use the right tools. And using the technology for

the purpose it's supposed to be used. The above diagram shows examples of tools for the various parts of the DevOps process.

DEPLOY

OPERATE

INTEGRATION

CONTINUOUS FEEDBACH

continuo

Examples of testing tools include Kitchen Cl to test infrastructure - making sure that files and packages are in the right place and have the correct permissions, and Cucumber for acceptance testing to ensure that the code is working before it's sent out.

We also saw that the coronavirus pandemic accelerated the growth of tools such as Slack acting as an information hub, making it easier for people to find the data that they need. According to Stewart Butterfield, the CEO of Slack, this is "a shift that's inevitable over the next decade. And I think it just accelerated by a couple of years because there were also people who thought Slack was great and really enjoyed it, but essentially just used it in the way that they might have used AIM or Yahoo messenger or something like that 20 years ago. It was essentially for direct messaging. Who suddenly are beginning, depending on what they do, bringing in integrations with Salesforce, or marketing automation tools, or their HR system." Finally, the COVID-19 pandemic highlighted the importance of tools that work remotely, especially when enabling more nuanced collaboration. DevOps teams are often distributed across multiple time zones - there is no 9 to 5 anymore and people are having to work remotely. This means that more than ever, having centralised, consistent and automated processes are vital for visibility; with testing the area where there is the most to lose by not making test data consistent and visible.

In conclusion

Increasingly in today's remote working environment, the ability to integrate testing and ensure quality is critical to any business' DevOps strategy and combining the right tools and automation to decrease time to market is increasingly important. Implementing effective testing into your DevOps strategy gives you the confidence that you can release quickly, leaving you confident that your customers are getting the value they need from you.



Unravelling the misconceptions around app development

App development isn't as long and complex a process as many would imagine, and it can provide huge long-term benefits to your business.

BY RITAM GANDHI, FOUNDER AND DIRECTOR, STUDIO GRAPHENE.

For businesses that previously enjoyed meeting their customers and clients face-to-face, the obstacles posed by coronavirus have been devastating. A company may have invested thousands into ensuring that their premises signal the highest quality offerings possible, be it through a contemporary high-street store or luxurious client meeting room, but now find themselves denied full use of those very same spaces due to COVID-19.



Fear not – it is still possible to ensure that anyone engaging with your business can have a fantastic experience. App-based solutions mean that anyone wishing to utilise your services, buy your products, or simply speak to your staff can enjoy the same level of care and attention that they would have enjoyed in person. SMEs that previously conducted most business affairs on-site might initially overestimate the effort developing an app requires, while underestimating the huge benefits it may bring.

In a world of social distancing, increasing your online presence has the potential to offer a new and engaging customer experience while at the same time building brand loyalty. Importantly, developing a sleek mobile app is not the large undertaking it may have been when smartphones first entered the market. It is now an option that is accessible to businesses of all sizes and should be considered by anyone who wants their services to be accessible by as many means possible. To emphasise this point, I want to dispel the three main misconceptions I believe decision makers may have about mobile app development.

You don't have to start from scratch

As anyone who has ordered food delivery online will know, apps use a variety of pre-existing resources to build a high-quality product. The maps displayed on such apps are rarely designed by, for example, Deliveroo or Just Eat. Rather, these popular applications function on Apple, Google, and Bing map services which have been integrated into the software. Similarly, developers don't need to spend weeks designing a fraud-proof online payment system as there are established companies who have ready-made solutions that can be used to facilitate payments.

Stripe is an example of an American company that you have probably already used to pay for a service or product online. If you've ever used Booking.com, Lyft, or Shopify, you've already paid through their system without even knowing it.

This goes to show just how seamless it can be to incorporate pre-existing digital solutions into your own app. There's also one significant advantage to relying on trusted technologies: they have already been proven to work, so you don't have to invest too heavily in ironing out potential issues that may crop up.

When you are building something completely new, every aspect of the build becomes more complicated and, by extension, development becomes more timeconsuming generally. Integrating existing solutions into your app and conducting a test-run before launch will tell you whether these ready-made resources could be a good fit for your app, and if they will enable you to seamlessly deliver your intended services. Before you launch to market, it is therefore worthwhile to lead with an MVP (minimum viable product), which will allow you to test the functionality of the app and better understand the user experience. Not only is this a way of testing market demand for the product, but it will also enable you to gather feedback in the shortest time possible. If the integrated services are proven effective, this will save you time and money developing the core features and allow you to focus instead on tailoring the customer experience. Of course, it may prove difficult judging which technologies are best to include in your company's application - every one of the solutions mentioned above have their own unique qualities, drawbacks and competitors. Thankfully, such decisions can be outsourced to experts; third party organisations can

cut through technical jargon and assist to whatever degree you need. Whether it's taking on the entire task of creating your app or just choosing which specific tech to use in powering an aspect (payments, map display, etc) of the product, remember that such tasks don't need to be taken alone and that there are a multitude of agencies available to help.

Complexity is not necessary

If you're a company that delivers one service or one product in your local area, there's no reason that your app has to be capable of anything besides that. Simplicity is key, and the best apps are those that recognise this and don't bog down their users in unnecessary features.

Decision makers should remember this when thinking about how to proceed with their app, if they choose to do so. While it might be attractive to try and replicate the features you may have seen on other company's apps, doing so risks alienating the customers who are seeking simplicity and functionality above all else. Instead, you should define what exactly your app needs to do and work from there. Don't be afraid to pick one feature and nail it. Many developers make the mistake of masking the primary purpose of their app by integrating unnecessary features and overcomplicating the user experience.

Take time to establish the difference between 'must have' features, which are instrumental to the functionality of the app, and 'nice to have' features – those which could make the user experience more enjoyable, but are not strictly necessary in order to deliver the app's core offering. While it may be tempting to try to include extra features, beware of overload: have a clear vision that steers the design process and brings value in the long run. This will ensure your product is clean, easy-to-use and serves its primary purpose.

Once you've established the necessary core functionalities needed, you can then plan out your UI (user interface) accordingly, which will help you discover the features that will be essential, those which may be desirable, and those which will simply clutter the display of the user's phone. The design process should not be overlooked; the UI is arguably the most important part of your app, as people are naturally attracted to visually appealing designs and apps that have a logical flow.

Take time to establish the difference between 'must have' features, which are instrumental to the functionality of the app, and 'nice to have' features – those which could make the user experience more enjoyable, but are not strictly necessary in order to deliver the app's core offering



App development is an ongoing process, even after launch

If you are preparing to embark on the development of a new app, keep the following consideration in mind: app infrastructure must be constantly updated to meet the evolving needs of users and their devices. Constant software updates will undoubtedly be needed to ensure the app's full functionality at all times and for all users, regardless of the model of phone that they are using or the strength of their internet connection.

A robust, high-quality app should not encounter many problems with bugs or glitches, however it is still something worth bearing in mind: indeed, even the world's most popular and established apps like Instagram and Twitter occasionally experience technical issues that need to be ironed out. To minimise the risk of bugs cropping up, apps will need to go through a stringent round (and ideally, multiple rounds) of testing. It might be helpful to think of the 'beta test' phase as a soft launch for the app, whereby the product can get real-life exposure in the hands of early users. This quality assurance (QA) testing is a process of ensuring that your product is of the highest possible quality before it becomes available to the end-users.

Ideally, manual tests should be performed by highly skilled and experienced testers – again, a 3rd party company can help here. An extra pair of eyes is always helpful, as specialists will be able to spot issues that the developer may not have noticed. After all, you wouldn't expect an author to proof his own work. Once any glitches and issues are flagged and addressed, you can be confident that your app will work flawlessly once it launches to market. When this time comes, user feedback becomes key to continuously improve the functionality and appeal of the app. Indeed, the user should be at the heart of your long-term strategy, and seeking regular feedback from your customers will help to pinpoint what is working well, what needs improvement, and how the app should progress with time.

In-app feedback can provide insight into ways you can improve the usability of a particular feature, and generate new ideas for product improvements. Could the app benefit from new features, or is it time to remove an existing feature from which users are not deriving any real value? You need to know everything about how your app is performing both from an operational and user perspective. Don't shy away from the critics; rather, seek out constructive criticism that will allow you to fine-tune your app and make tweaks where they're needed. In summary, then, companies of all sizes should consider building an app. It's always a good idea to be present on as many digital frontiers possible; it increases the accessibility consumers have to your business and allows for an easy transition when in-person footfall becomes unavailable as a means to attract customers, as it has during the current pandemic. App development isn't as long and complex a process as many would imagine, and it can provide huge long-term benefits to your business.

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



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THE EDGE



Building resilient industrial edge computing systems



Today, increased levels of automation, advanced robotics, Al and machine learning are driving unprecedented change inside factory environments. With

growing levels of complexity, these applications demand secure, on-site computing systems that offer the user highlevels of resiliency, security and ultra-fast connectivity.

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

AS SUCH, Smart manufacturing is driving a new wave of IT technologies into industrial spaces, which requires edge computing solutions that ensure privacy and data security, and address bandwidth requirements that have become crucial to operations. Identifying the right type of edge application For Industry 4.0, edge computing squares the circle between the benefits of the Cloud and on-premise infrastructure. The traditional drawback of the cloud has been high levels of latency or low response times, caused by the distance between the data centre supporting the cloud and the location of the application.

Edge computing offers the best of both worlds by shifting the data centre closer to the point of use, combining the benefits of Cloud Computing with the fast response times required by on-site IT equipment. Applications that benefit from edge computing can, in general, be subdivided into three broad categories

THE EDGE

each with their own specific designs and benefits.
They include, IT facilities; Commercial and regional offices; and Industrial or harsh environments.
The latter comprises ruggedised data centres deployed in indoor or outdoor locations, where ambient environmental conditions are difficult to control. Challenges include a wide range of temperature or humidity conditions, water hazards, the presence of dust or other contaminants, and the need to protect computer systems from collisions and vibrations, as well as the obvious need for physical security to guard against unauthorised access.

What is the Industrial Edge?

For industrial operators to capture the benefits of increased automation, they cannot rely on cloud-technology alone. According to McKinsey, Industry 4.0 is a general term referring to the increased digitisation of the manufacturing sector driven by "the rise in data volumes, computational power and connectivity; ...analytics and business intelligence capabilities, new forms of human-machine interfaces [including] augmented reality systems; and improvements in ... advanced robotics and 3-D printing."1

Industrial edge data centres are IT infrastructure systems distributed across a number of geographical locations to enable endpoints on the network. When in industrial environments such as a manufacturing plant or distribution centre, this application is referred to as the "industrial edge."

Given the increasing importance of computing to factory and industrial automation systems, it is inevitable that greater numbers of edge computing systems are going to be installed in these harsh and industrialised environments.

To achieve the shortest possible ROI and gain both the resiliency and speed demanded by AI, HD cameras and other Industry 4.0 technologies, manufacturers must properly measure asset performance, rapidly identify any problem areas, and make any crucial changes in real-time that will drastically improve their operations.

This is also where on-premise IT becomes critical and is where the majority of the data capture occurs. Industry 4.0 requires that computing systems are tightly integrated into the manufacturing process, but it also means that resilience and high availability become key design concerns for the accompanying edge infrastructure.

Building a resilient Industrial Edge

Downtime is the curse of any manufacturing operation and any integrated IT systems cannot afford to add to the risk of lost production. A 2016 study by Aberdeen Group, found that 82% of companies had experienced unplanned downtime in the previous three years, which could cost an average of \$260,000 per hour! Industrial Edge systems, therefore, must be built to the highest standards of availability, if necessary, to Tier 3, which promises an uptime of 99.98% or an average of 1.58hr of downtime per year.

Tier 1 level data centres, with 99.67% uptime, for example, can be down for 28.82hr per year. In the example above, such a difference in downtime could cost in upwards of \$7m per year! Clearly, an investment in improved uptime delivers clear benefits to the bottom line.

Given the noisy, industrialised environment in which many manufacturing operations take place, and the high level of potential contaminants, particular attention must be paid to the enclosures, which must remain robust to protect the IT equipment from downtime. Space is likely to be at a premium too, so care must be taken to ensure that the system can be deployed as flexibly as possible.

Ruggedised IT enclosures, made of durable materials such as stainless steel or aluminium and fitted with thermal insulation and robust cable fittings, provide optimum performance in harsh manufacturing environments. Some come in wall-mounted designs to make the best use of space, leaving the factory floor clear for manufacturing equipment

Ruggedised IT enclosures, made of durable materials such as stainless steel or aluminium and fitted with thermal insulation and robust cable fittings, provide optimum performance in harsh manufacturing environments. Some come in wall-mounted designs to make the best use of space, leaving the factory floor clear for manufacturing equipment.

Careful consideration of UPS (uninterruptible power supply) system design will safeguard against disruptions to mains power, while lithium-lon (li-ion) batteries can provide an energy efficient backup source, which not only frees up more physical space because of their smaller size compared to VRLA cells, but offers users a longer operating life. They are also able to operate over a broader temperature range and offer ease of monitoring thanks to built-in sensors

THE EDGE



that can further help to reduce operating costs. Cooling is essential for operational reliability in any IT environment. In industrial spaces, self-contained air conditioners can be fitted to ruggedised enclosures to regulate internal temperature and humidity without incurring the risk of environmental contamination. No matter how reliable and rugged the hardware equipment is, the key to minimising downtime in any environment is continuous monitoring and management so that any faults can be proactively anticipated, or at worst, repaired and downtime rectified as soon as it occurs.

Software drives resiliency

To ensure high levels of resilience in industrial edge applications, software and security are crucial. The latter can take many forms including physical security to protect against unauthorised access on-site, as well as complex software systems offering advanced protection from cyber attack. For many operators though, the ability to leverage a software platform that brings together disparate systems including edge,

Further reading

1 McKinsey https://www.mckinsey.com/business-functions/ operations/our-insights/manufacturings-next-act 2 https://www. stratus.com/assets/aberdeen-maintaining-virtual-systems-uptime.pdf building control and industrial process within a single pane glass of view, offers many benefits to the user, including end-to-end visibility.

At the edge, next-generation Data Centre Infrastructure Management (DCIM) software leverages AI, data analytics, cloud and secure mobile applications to monitor the IT systems in real-time, enabling the user to quickly dispatch service personnel to respond to any concerns and mitigate downtime. The beauty of such management systems is that they can be used by third-party service organisations and partners to provide support where dedicated technical personnel aren't located on site, thereby offering increased levels of resilience in smart manufacturing.

Today the growth of IT in industrial automation is driving new innovation that allows manufacturers to introduce new products more quickly and with greater reliability. This enables Industrial organisations to execute their business strategies more successfully, drive productivity and deliver improved services to their customers.

Data centre vendors are likewise innovating their products and services to minimise the risk of downtime in industrial environments, and as smart manufacturing increases via highly automated and technologically advanced systems, there is undoubtedly a need for resilient edge computing. A very special issue of DCS Magazine dedicated to the data centre industry's visionary leaders and technology innovators

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BIG DATA



The pursuit of happiness

How Big Data use enables big benefits

BY GARY LAFEVER, CEO AND GENERAL COUNSEL, ANONOS.



DATA-DRIVEN decision-making is a major part of economic and societal development. How can we go through a journey of improvement if we aren't sure where we are going, how to get there, or how far along the pathway we are? We need data to make decisions about where to head, the path to follow, and to see how much progress we have made along the way.

The use of data for analysis, gaining insights and making good decisions is critical, not just in business or technological success, but in everything we do. For example, in the current COVID-19 pandemic, we cannot know whether or not the virus is under control if we don't have adequate testing systems in place. Those testing systems show us how many cases there are and where those cases are, and with this information we can make better decisions about how to tackle the problem.

However, data collection and use is not so simple. Throw in the complications of increasingly prevalent AI processing and the 'garbage in garbage out' principle, and the value in collection, use, and analysis of good quality data becomes abundantly clear. So, what's the problem with just going ahead and doing it? This issue is multifaceted. Firstly, determining what 'good quality' data is, is actually quite hard. With the proliferation of cloud computing, IoT, and social networking, as well as mass media, we are now working within a world of Big Data whether we like it or not.

This world of Big Data runs into big problems. Biases

BIG DATA

are perpetuated in data sets and spat out through machine learning tools; large data sets can take a long time to process; and undefined data sets can create results that are not useful for the task at hand. When you add issues such as generalised data sets, masking techniques, and approaches that make data even less accurate, these problems are magnified. Data becomes lower quality, lower utility, and its decision-making power is diminished.

The second aspect of the issue is that we are not always just collecting, using, and analysing data from the environment. Often, (in fact usually) we want data from people. With this, another problem arises: we need to get them to give it to us, and to trust us to do the right thing with it.

Privacy laws and regulations are in place to create a framework around ethical and unethical approaches to data use. However, these laws are part of a slow and bureaucratic regulatory process, and the development of technology usually far outpaces regulations and what they capture. This leaves a big void in the middle between what technology really does, and what regulations actually cover.

A simple example is shown in the regulation of data privacy with regard to consent. When consenting to observed and inferred data collection through the internet, as well as to AI and machine learning processes being performed on data, on the whole people simply don't know what they are agreeing to. Technology has moved so fast that regulatory protections simply fail to function adequately in today's new environment.

Several proponents argue that a solution to this problem could involve shifting the burden of protection to the data controller, through an approach that many people know as 'legitimate interests' processing. Instead of making data subjects read long privacy policies and give often-uninformed consent to data collection and use, the data controller should instead have to show that they have a legitimate purpose in using the data.

However, this requires the introduction of effective riskbased controls to mitigate risk to data subjects from a data controller's use, or else the term 'legitimate use' is no more than a subterfuge. Figuring out these issues is critical for maximising the value of data while protecting people's right to privacy.

The third issue is that even if you can collect good quality data, and people allow you to collect it from them, the real benefit of data comes from actually using it to deliver an outcome. In most cases, using something alone is not going to produce as good of a result as with collaboration. The sharing, combining, and use of data in a broad sense is where the real value and innovation comes in, but once again the data protection hurdle stands in the way. While numerous techniques for protected data processing exist, many of them are slow, expensive, cumbersome, or simply do not work in higher-risk or distributed data processing environments. For example, protecting data through techniques such as anonymisation looks good on the surface, but it has numerous limitations that organisations keep running into.

Different tools are required to protect data while it is in distributed, shared use for maximum value-gain. For some purposes you need one tool, and for expanded uses you need another. The very real benefits of data are out there but harnessing them in a fundamentally different way that balances privacy and data enablement is the key.

To move forward, a solution is needed that balances fundamental societal benefits and risks to individuals on all sides. Data must be able to be collected and used in a way that protects individual privacy; as well as to be processed in a way that allows quality preservation, and the sharing and combining of data with others.

Data sharing, combining and enriching is where data value, insight, privacy and security meet. Processing using traditional centralised data protection technologies may be too slow and inefficient to obtain digital insights as quickly as needed, and for cutting-edge data use processes, a decentralised data protection solution is necessary.

A decentralised, risk-based data protection approach allows broader and more-valuable data processing to occur, without diminishing the value of the data or at the cost of privacy rights and personal protections. The tug-of-war between data utility and data protection can be resolved, with the right approach. The solution is the use of technology that is not only able to handle issues with Big Data and complex processing in machine learning and AI environments, but also complies with the GDPR and other evolving global data privacy laws.

Different tools are required to protect data while it is in distributed, shared use for maximum value-gain. For some purposes you need one tool, and for expanded uses you need another





How solid is your business continuity plan?

Organisations that have been able to react quickly to help their customers face the challenges posed by Covid-19 will have set themselves apart from their competitors.

BY ANDY BRIERLEY, UK GM AT RACKSPACE TECHNOLOGY.



COVID-19 wasn't a scenario many businesses would have rehearsed for. Many companies' business continuity plans (BCP) – particularly those requiring flawless uptime and information security – involved moving to another physical office.

Until this crisis, it was barely conceivable that the majority of organisations, aside perhaps from those with key workers, would be forced to operate from their employees' homes. Even for companies where employees could work from home in some capacity, few were prepared for the shift towards the entire workforce consistently and, for some, indefinitely, working remotely.

Taking flexibility, agility, and scalability into account

Research from workplace consultancy Leesman revealed the UK was one of the least prepared countries to deal with a mass home-working strategy. Many have now adjusted to the situation in one way or another, though this experience has taught us a lot about the importance of having systems and processes that are flexible across every area of the business. Indeed, when it comes to IT infrastructure, many teams are guilty of only preparing for scalability in line with predictable business or seasonal fluctuations, like Black Friday in retail.

But scalability needs to be top of the agenda across every area of a business, with infrastructure in place that affords adaptability for unexpected events, to support the subsequent changes in both customer and employee behaviours.

Ultimately, businesses need to continue building the resilience, flexibility, and scalability into their infrastructure, that will allow them to adapt quickly in line with the changing demands of both their internal and external stakeholders. In turn, by building the infrastructure and muscle memory for change, they'll be prepared for future unexpected events. So, how can this be affectively achieved across the business?

Measuring the success of your BCP

There are multiple factors involved when deploying a business continuity strategy, and similarly to any project or deliverable, there are also various factors to consider when measuring its success. This can depend on which sector the business operates in, its goals, and, perhaps most importantly, what its customers' expectations are. However, while this is all still relevant now, the pandemic has caused a new key question to emerge for any business leader to ask when looking at an organisation's BCP – will this work in a real-life crisis?

The answer to this question lies in a company's agility. In a constant state of turmoil, whether it's Brexit, the digital revolution, or the pandemic, the success of BCPs is now measured on their ability to quickly adapt to the changing requirements. As a result, organisations are finding they may have to shift their operations beyond recognition. A company's agility underpins how they continue operating services virtually, have their entire workforce working remotely, while maintaining the security of information, processes, and systems.

Business and IT leaders need to reassess the role of cloud

When we emerge from these current difficult times, it will be important for business and IT leaders alike to

reassess their BCP and the role that cloud has in it, because turbulent times like these will inevitably strike again, and businesses need to be prepared for round two.

From introducing and scaling applications, to increasing the capacity of online services as buying patterns shift, the agility that has been critical to companies' ability to scale and survive has been underpinned by the cloud.

This was already recognised in some industries: for example, the Financial Conduct Authority already recommends that financial services firms should be using multicloud to ensure continuous uptime. BCPs must evolve to recognise that agility is the key to business continuity – and that cloud is the tool they can use to execute a successful delivery.

Many organisations have had BCP exercises in place for years, and although it's difficult to be fully prepared for a situation as unique as this, it is clear that the organisations that have been able to react quickly to help their customers face the challenges posed by Covid-19 will have set themselves apart from their competitors.

Business leaders should take this as an opportunity to identify any gaps they have in their plans, and make sure they are plugged by ensuring they have the right infrastructure in place to support their employees and customers.



BOTH LINKEDIN AND ADOBE have already embraced a software-as-a-service (SaaS) approach so they can deliver innovation faster and more cost-effectively for their customers who crave flexibility. For the same reasons, Amazon Web Services has adopted the infrastructure-as-a-service (IaaS) model and Windows Azure a platform-as-a-service (PaaS) approach. Needless to say, XaaS uptake has already been significant.

However, thus far, a crucial element has been missing from the proposition — performance-as-a-service. This will be the next frontier in XaaS and the key to the market reaching its anticipated \$344.3 billion valuation by 2024. Afterall, companies are facing an increasingly challenging business environment and need to ensure employee productivity to survive and thrive. Network and application performance is key to this. Therefore, it's only logical for companies to bring in experts who can offer them a lifeline through performance-as-aservice.

Why we need to plug the performanceas-a-service gap

System performance, for instance the time it takes to access and download resources, directly impacts staff productivity, and consequently a companies' ability to operate efficiently and maintain a competitive edge. In fact, just under 50 percent of C-Suite executives acknowledge that slow running and outdated



The adoption of everything-as-a-service (XaaS) is on an unstoppable upward trend.

BY JOE BOMBAGI, DIRECTOR SOLUTIONS ENGINEERING, UK & IRELAND AT RIVERBED TECHNOLOGY.

Incorporating performance-asa-service into the XAAS model



technology is currently impacting the growth of their business, according to Riverbed's recent Rethink Possible report.

Just think about the broad range of businesses, across multiple sectors, that depend on computeraided design (CAD) to do their work. CAD files are notoriously large. As a consequence, they will take a long time to load if the user is on a network that is performing slowly. This not only causes employee frustration but damages staff productivity and impedes the businesses' overall ability to service clients efficiently. The result? Dissatisfied customers who will be primed to move to a competitor that can deliver the same services quicker and more effectively.

The links between slow-running technology, employee inefficiency and business challenges are clear. However, identifying that the technology is not performing as it should isn't as simple as one might think. Businesses need to introduce capabilities such as performance-as-a-service, so they can achieve visibility into network and application performance, to identify where issues lie and how to resolve them for optimum performance.

The role of visibility in performance-as-a-service

Every organisation that wants to guarantee their systems are operating efficiently need end-to-end visibility. Without it, they are hamstrung in their ability to identify and resolve performance issues. With this in mind, it's concerning that a third of IT decision makers don't have full visibility into their businesses' applications, networks and end-users, according to Riverbed's Rethink Possible report. These companies need to embrace performance-as-a-service, delivered in the form of application performance and optimisation platforms, to bridge the visibility gap.

Adopting these tools will empower IT operations teams to visualise any challenges employees may be facing, so they can be resolved before they negatively impact staff productivity. For instance, they will enable IT to look at every packet flow and identify bottlenecks, such as when Office 365 is being excessively slow. Armed with this information, IT teams will be able to identify the need for an application accelerator which could cut opening and download times. As such, performance-as-a-service guarantees end-users superior digital experiences, which they can use to better serve customers.

Performance-as-a-service holds the key to meaningful SLAs

The visibility into network and application performance, delivered as part of the performanceas-service model, not only ensures staff productivity but offers the key to implementing meaningful service-level agreements (SLAs). At present, a common SLA is uptime, but 100% uptime is irrelevant if usability is missing. Ultimately, nobody The links between slow-running technology, employee inefficiency and business challenges are clear. However, identifying that the technology is not performing as it should isn't as simple as one might think. Businesses need to introduce capabilities such as performanceas-a-service, so they can achieve visibility into network and application performance, to identify where issues lie and how to resolve them for optimum performance

cares if an application is up 99.99% of the time if the performance of that application is so poor it's practically unusable. Harnessing performance-as-aservice, IT teams can lay down tangible performance quality requirements when signing new agreements with service providers. They can then track how their providers are performing against these SLAs through their enhanced visibility into network and application performance. This will ensure they are getting a strong return on their investment.

Expanding the XaaS model to incorporate performance-as-a-service

Performance-as-a-service has the potential to form a powerful part of the XaaS proposition for two key reasons. Firstly, managing the performance of applications and networks is the key to employee productivity, and in turn business efficiency and competitive advantage. Secondly, it enables businesses to hold service providers to account through meaningful SLAs. After all, it is relatively simple for service providers to introduce new technology, but it is far more complex to make that technology work well for the business.

Performance-as-a-service, therefore, ensures cost and operational efficiency. In an ordinary business climate, these make the difference between growth and profitability and stagnation. However, under the strained business conditions that COVID-19 has created, performance-as-a-service can no longer be ignored if businesses want to withstand these challenging times.

COLLABORATION

Overcoming collaboration roadblocks in the digital workplace

Trust, technology, and creative team thinking: all these attributes proved vital for any business hoping to stay operational and successfully engage workforces that are now working remotely.

BY MARTIN TAYLOR, DEPUTY CEO AT CONTENT GURU.



ACCORDING to Time magazine, the recent coronavirus outbreak triggered the world's largest work-from-home experiment. One where companies got to discover, for real, just how resilient their business-as-usual contingency plans were.

As firms in the UK and the rest of the world begin preparing to implement their post-COVID recovery strategies, organisations will need to take specific actions to ensure they are prepared to weather future crisis conditions with confidence. That includes initiating a newly invigorated remote-working environment to ensure everyone can continue to collaborate and work towards a common goal, no matter where they are in the world.

Overcoming collaboration roadblocks

During lockdown, many organisations experienced a steep learning curve where remote working practices were concerned. As firms now prepare to put their remote working models onto a more permanent footing, many will need to address the common collaboration roadblocks that prevented people from performing as effectively as they would in the office-based operations of old. The need for effective remote collaboration is especially pressing in contact centres, where maintaining productivity depends on keeping employees connected and motivated at all times, as well as having the ability to evolve and scale operational models at speed.

COLLABORATION

The reinvention of remote working practices will require a careful review of technologies, processes, and people to maximize how employees contribute to fast-changing organisational priorities.

Rethink the working culture

Many firms discovered that the recent rapid shift to virtual and remote working required unprecedented levels of flexibility, teamwork and adaptability. As a result, functional silos and old ways of working had to be demolished to ensure everyone across the organisation could be aligned behind common goals. Unsurprisingly, collaboration and mass communication rapidly became the order of the day – every day.

Organisations that thrived best during lockdown acted quickly to ensure leaders in every function of the business could speak daily, share learnings and collaborate closely. Going forward, building on these new strategic cross-functional teams will be essential as the focus moves from managing the initial crisis to shaping future recovery and growth.

Similarly, eliminating information silos to ensure that every employee was kept informed, via a variety of digital channels on a daily basis, on what was happening within the organisation, their department and their team proved critical for building trust and engagement. In the process, firms redefined the employee social contract and made decision-making much more streamlined and responsive.

For remote working to be successful in the long term, organisations will need to review their organisational structures, workforce training and performance management frameworks and consider how they plan to make teams more effective in the future. Leaders must decide how best to leverage new technologies, automation and AI to support the dispersed workforce. Ultimately, long term resilience will require the fostering of an organisational culture in which the contributions and wellbeing of workers are recognised, and team performance is prioritised.

Make bold technology decisions

Organisations that had already invested in cloudpowered digital platforms found themselves ahead of the game when it came to pivoting their operations in response to the recent public health crisis.

Providing the fast-paced flexibility and adaptability needed to institute remote working at scale, they were able to quickly connect remote workers with the tools and technologies they needed to continue working from home – without missing a beat.

For many firms, the exigencies of the crisis served to accelerate nascent digital transformation plans aimed at enabling new and efficient ways of working. Within days of lockdown, tools such as Microsoft Teams and Zoom were adopted to communicate and Organisations that thrived best during lockdown acted quickly to ensure leaders in every function of the business could speak daily, share learnings and collaborate closely. Going forward, building on these new strategic crossfunctional teams will be essential as the focus moves from managing the initial crisis to shaping future recovery and growth

collaborate. Going forward, organisations will need to increase automation to drive further efficiencies and productivity. The goal is to ensure all platforms are fully integrated so that users can move seamlessly between customer records and product information sources, or easily communicate with customers and one another in the right channel for that exact moment in time – IM, SMS, video call, social media or voice. Many contact centres have discovered that siloed technology gets in the way of delivering a great customer experience and makes it time consuming and frustrating for agents to perform their day-to-day tasks.

Build a trusted enterprise

Implementing platforms that make it easy for users to work compliantly and in a highly supported way is good for employees – and essential for building customer trust. Today's contact centre technologies feature in-built quality management systems that can collate data and provide call transcripts. This enables supervisors and agents to review where additional learning is required – or escalate difficult calls so supervisors can step in. The most advanced solutions even feature AI technologies that actively support agents with suggested next actions, and automatically display the customer details they'll need to resolve issues fast.

Finally, with remote work becoming the new normal, maintaining compliance with regulations like PCI DSS and GDPR will be critical. Policies and processes that maintain governance standards are just the start. Utilising platforms and technology solutions that keep data secure while ensuring work still gets done must become a top priority, if it is not already.



Speaking the local **language**

Solving global IoT network challenges

BY IAN MARSDEN, CO-FOUNDER AND CTO AT ESEYE.



IMAGINE THE SCENARIO: you're the CIO of a healthcare business with thousands of IoT-enabled devices deployed around the world. They're devices that people rely on, and they're connected via the local mobile network. It's midnight and you've been told that all your devices in Peru have lost connection, putting lives at risk. You thumb through details of the 76 mobile network operators (MNOs) covering every country your devices are deployed in, until you find the relevant supplier to call. Now, here's the catch. Do you speak the technical, let alone local, language needed to diagnose the problem and bring the devices back online? Will you be speaking to enterprise-level global support, or local support? More to the point - how can you ensure this scenario doesn't become a reality?

When such scenarios occur, it's often because the IoT devices in question are connected through a contract with a local network provider. To the CIO coming up against complex regional regulations such as the

prohibition of long-term roaming, they may feel they have no choice but to contract with local MNOs to keep their devices online. In doing so, however, they take on the pain if any outages occur. But this is rarely their only option.

Of course, most CIOs would not profess to be telecoms experts – and do not want to spend a large amount of their time essentially running a global virtual mobile network – so it can be difficult to know how to anticipate, mitigate or fix outage issues, or influence anything else that might prevent their devices connecting to the network.

They often rely heavily on the MNO, but those operators rarely prioritise IoT support, as their primary function is to serve mobile phone customers. Add in time zone and language differences to the mix, along with a spread of devices across multiple regions as well as legislations, using a regional MNO can be a recipe for disaster.

Maintaining a connection

For CIOs responsible for connecting devices that are now out of their control – for example, a healthcare device that's been sold to an end consumer – this presents several business risks.

Once the device is sold, the manufacturer has little (if any) control over its location – and IoT connections governed and regulated by region can cause significant problems.

For example, in some regions telecoms regulators prohibit network roaming for non-home devices beyond a given period (known as permanent roaming), at which point the device must be 'localised' onto a local telecoms network. This leaves the device at the mercy of the local network; therefore, it is important to select a localisation partner who provides a matching quality of service to deliver the required application service level.

While it might be possible to re-route mobile network traffic if you are using a managed connectivity service provider, when localising traffic to a single network this does increase the risk presented by network outages – which do happen. In fact, it's also often possible for managed IoT service providers to foresee outages and in theory, that leaves time to reroute the traffic before IoT devices are affected. But for many providers, IoT devices are at the bottom of their priority list (with many traditional networks treating IoT as an 'add on' to their main business), or they may not even have access to other networks. That can leave IoT device users and manufacturers helpless.

Ultimately, the CIO wants peace of mind that their device, wherever used, can connects to a reliable network longer term to deliver the required service to their customers, without the risk of it being disconnected due to regulatory restrictions or other. For a CIO of a multi-national or multi-region business, a multi-network connectivity solution that incorporates a localisation option can certainly help avoid any possible network outages longer term.

Safeguarding data security

Even when reliable connectivity is established, other issues may arise, specifically around data security.

When manufacturers release an IoT device into a standard network, they have little control over the regions to, or through, which their data is sent if traffic is re-routed. Unless the MNO can assure IoT users that all their re-routed traffic is consistently firewalled, that raises serious questions around data security and compliance.

An alternative to using regional networks is to partner with an IoT-specific virtual mobile network operator (V-MNO) with an abstracted, agnostic mobile network. These managed networks are designed and optimised especially for IoT traffic and have multiple contracts with expert MNOs whose provision of a mobile network is, crucially, unrestricted by region, and managed according to their own requirements.

These managed networks are also run by teams who talk both the technical and local languages and work with MNOs that meet the needs of IoT devices whether they remain in the region of origin or leave it.

Specialist IoT connectivity providers can re-route traffic to entirely different networks if required, and by-passing data through a private APN (Access Point Name) and VPNs, they can assure security throughout as well as near 100% device up-time.

If you are the CIO managing thousands of IoT devices around the world and chose to run it on an independent, agnostic managed IoT network, the provider would simply re-route the devices to a functioning network, maintaining their connections, data security and near 100% service provision. Nobody would have to be woken up at midnight, and no lives would be risked.

So, to sum-up, the CIOs at the healthcare business need not personally know or speak the technical and local language to work with MNOs and resolve complex IoT network challenges – nor should they be expected to. Instead, they can rest assured that a multi-network connectivity solution geared up for localisation has got them and their healthcare business covered, safeguarding their IoT estate's connection and providing support whenever, and wherever, issues arise.



AUTOMATION

The role of technology in navigating the unknown

How businesses can show empathy during a crisis

BY DANIEL BAILEY, VP EMEA AT ZENDESK.



AS the coronavirus pandemic sweeps the globe, customer service agents everywhere are having to rapidly adapt to manage ticket surges, customer cancellations, refund demands and more, amidst increased market – and job – uncertainty. All while working from home, often with limited access to their tried and tested support structure.

In looking at the impact of the pandemic on customer support teams, Zendesk's Benchmark data indicated that support teams in EMEA saw a 16 percent increase in companies' average weekly ticket volume from the end of February of this year to the beginning of May. At a global level, the trends show that more customers are turning to chat and messaging channels, with total tickets during the same period are up 101 percent over WhatsApp, 34 percent on chat, and 15 percent through direct messaging on Facebook and Twitter.

Technology is playing a major role in helping service agents to navigate these unprecedented challenges, so they can provide an empathetic experience to anxious customers during this period – one that allows them to feel heard and understood.

So, how can businesses best employ it to support their employees, so that customers continue to receive the best service?

Continue training virtually and build your knowledge base

Eighty-seven per cent of those surveyed for the Edelman Trust Barometer 2020 say that customers, employees, and communities are more important than shareholders to a company's long-term success. If looking after agents and customers is paramount to shoring up future business prospects to the benefit of everyone, what tools and training can we give service agents during times of crisis?

Agents need a combination of hard knowledge – how to navigate a ticketing system, for example – and soft knowledge, about how to relate and connect to customers, especially during this difficult time. Be

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intentional about showing agents – through video or call recordings – what "great" looks like with a specific situation or scenario, to help them to fully understand the concept and expectations.

What's more, teams that practice new skills before they're "on the field" perform better, as practice repetitions create the muscle memory needed for knowledge and skill retention. One method is for agents to use an online tool, such as Lessonly, that has practice scenarios ready for them to tackle. Automation also plays a critical role in taking the pressure off agents, by linking customers with already available information on a company's website. A strong knowledge base that is getting updated regularly is therefore key – not just for customers, but for agents to get consistent prompts, flows and information.

Automate repetitive activities

Machine learning and Artificial Intelligence (AI) can be incredibly helpful in eliminating simple and repetitive activities, so that agents can focus on solving more complex problems. A large amount of AI has been used for resetting passwords, for example. A simple activity, but one that can take up a large part of a support team's day.

Together, machine learning and AI allow agents to have more capacity and knowledge and to be empathic at the right time. That is, when a customer has already gone through the initial and automatic stages of service and is upset about not having yet found the solution to his problem. When the agent comes in to provide support, it can create a lasting impact when the conversation is approached with patience, kindness and a collaborative spirit to identify and resolve these complex requests, especially in adverse situations.

GoCardless, a fast growth fintech company is using AI to automate repetitive queries and provide customers with answers to their questions, without having to get in touch in the first place. In this way they are reducing pressure on their service agents, who can then provide a better quality of service to those who really need it.

"Since launching our Help Centre and increasing our support articles from 11 to over 900, in multiple languages and localised for certain regions, ticket volumes are increasing at a much slower rate," explains Daniel Mooney, Director of Customer Success at GoCardless. "Our customers want to find the answers to questions themselves and to have content they can look at to help them solve their issue quickly. It has now become their default tool for understanding how GoCardless works."

Businesses that continue to serve customers efficiently and with empathy - even during the major disruption caused by the ongoing pandemic - will inspire loyalty and advocates long after it is over. By supporting our customer experience agents with best in class technology, we can help to make their jobs easier and their interactions more successful.

Since launching our Help Centre and increasing our support articles from 11 to over 900, in multiple languages and localised for certain regions, ticket volumes are increasing at a much slower rate

BIG DATA



Monetising data collection in the age of AI

Data collection, privacy, and AI can absolutely coexist. But right now, we're wading through muddy waters.

BY WILL HAYES, CEO, LUCIDWORKS.

MOST PEOPLE have a vague understanding that their data is being fed into automated systems that helps inform companies how to target us more effectively-- from financial services products, to home goods to membership offers. Firms across various industries are turning to machine learning and Al to record signals from customer behaviour, to craft more personalised digital experiences.



This type of "you-know-me" experience can be convenient when a site offers you the perfect product at the perfect moment, but can also be slightly concerning when you click "accept" without fully understanding that your cookies and data are travelling far beyond the page you're browsing. Equally concerning is that the security of our entire personal, financial and digital lives could be at stake. This debate has become even more real and important in the wake of COVID. Many people are working remotely with potentially sensitive information on their computers, and online retail sales have surged as customers share personal data online to purchase and ship products. As systems learn user preferences, the digital experience improves, which is good news considering we have a long way to go before in-person interactions get back to normal.

However, as technology advances, critics continue to question whether privacy and the artificial intelligence that powers personalization can coexist. Now

BIG DATA

that technologies, such as data collection, image recognition and 5G are advancing rapidly, it is critical that we have a better understanding of how and when to share data digitally.

As consumers become more aware of how organisations are utilising their data, privacy will become a commodity. We'll be given a transparent choice on whether to withhold our information, or offer it to the most trustworthy bidder. Al will have consumers wielding their privacy as an asset like never before, and future infrastructure will need to support this.

The Revolution Is Coming

According to Statista, there were 45 million active social media users in the UK in 2019, which translates to around 67 percent of the country's population. Social media platforms have essentially become shorthand for staying in touch. They are also a great example of the struggle between wanting control over personal data, but still wanting access to a social platform.

Complicated user agreements aren't going to survive for much longer, as our offline and online personas become inseparable. We don't need more legalese and life hacks; we need more transparency. We are on the brink of a privacy revolution, as we face the reckoning of what's been a relatively fast and loose method of data collection. Once consumers gain more knowledge on the subject, they can make an educated decision about swapping privacy for convenience.

As the scales shift, consumers will soon have complete control over their data. They can say, "If you want to scan my photos to train your facial recognition system, I'll forfeit the convenience of you recognising and tagging my Facebook photos to keep you from doing that." Or, they will accept whatever monetary or other value exchange you're offering instead.

As privacy laws become stricter and the demand for transparency grows, we can envision data exchange being attached to every service that we consume. This exchange would consist of every strand of personal information that is collected, and how it is being utilised. Users could be offered the choice of whether to opt out of certain information collection in exchange for an overall reduction in the service or monetary penalties. This will effectively create more value for our privacy, which can be exchanged and eventually normalised across applications.

People Should Be Asking: How Do I Protect What's Mine and Still Get What I Want?

While Facebook and Google gain the lion's share of animosity, what could actually pose a larger threat is when we perform smaller transfers of data. How many workout apps, astrology charts, or Instagram filters have we downloaded over the years? If people were able to visualise how their data is being channelled from the site they opted into, all the way to third party vendors, they would be horrified.

The line between convenience and creepy is a thin one. For example, when a brand I interact with regularly knows I like to buy a certain style of top, I don't mind it when the company recommends it back to me. On the other hand, if I haven't heard or reached out to a business in months, and they send me an email that makes me feel like they've been building a profile out of third party data and know my preferences, that's where it gets creepy.

A recent study from FobrukerRadet revealed just how far your data can go without your knowledge. For example, the dating app Grindr shared detailed user data that included IP address, advertising ID, GPS location, age, and gender with a significant number of third parties that were involved in advertising and profiling. Many of the third parties that were receiving this data are also in the business of collecting, using, and selling location data for various commercial purposes. As the majority of people fail to read the fine print before downloading, all this is often overlooked.

Where does this leave companies?

If we briefly imagine a world full of people with only good intentions, we would be praising what this massive data collection has enabled: improvements in healthcare such as the ability to provide remote aid, projecting the likelihood and potential impact of catastrophic weather to adequately equip disaster teams, supporting at need groups in a pandemic, detecting unusual activities that could indicate credit card fraud, and more.

However, that's not always the case. More data means better AI, which could compel companies and governments to acquire data without any regulations. Once organisations realised the incredible value of data, there was pressure to continue mining it in order to keep up with the competition. They might not know the kind of value this data might offer in the future, but they simply get it so that they're ready when they figure out what to do with it.

The end goal: Peace of mind

The most important thing that is lacking in data collection is choice. A consumer can't make an educated choice, without full transparency of where their data could travel to. People will likely continue to opt-in to sharing (or selling) their privacy to continue using a platform. The peace of mind that comes along with full transparency could even have people optingin for sharing more information, if the trade-off proves to be great enough.

Data collection, privacy, and AI can absolutely coexist. But right now, we're wading through muddy waters.

BLOCKCHAIN

Blockchain: benefits in the supply chain and beyond

Global supply chains are fragmented and pose a sequence of challenges.

BY ERMINIO DI PAOLA, VICE PRESIDENT, HERE TECHNOLOGIES



GETTING AN ITEM as common as a pencil into the hands of a consumer can require a process involving hundreds or even thousands of people, from material procurement to manufacturing to distribution. If something goes wrong, be it misplaced stock or erroneous paperwork, it can be onerous and potentially too costly to determine where the fault occurred.

Now, companies around the world are finding ways to improve transparency at all stages of their supply chain. Through a combination of blockchain and real-time location intelligence, businesses can make the movement of goods more accountable, with the location and state of all items constantly verified with all stakeholders, consequently improving consumer confidence and brand reputation.

Why blockchain?

In short, blockchain is a distributed ledger. It can be best thought of as a continuously growing list of records, which are the blocks. Each one of these records, or blocks, are duplicated and redistributed to multiple different locations – all of them linked together with cryptographic technology. The links are subsequently the chains.

With so many points in space, and all points connected to each other via heavily encrypted chains, each addition is made from a validated source that is a trusted part of the network. Then, via a secured process, the update is spread to all the other blocks.

This makes the information within the blockchain system inherently secure. It's extremely difficult to make an invalid entry and, if you were able to make one, this would then be detected by all of the other blocks. Adding location intelligence to these capabilities creates yet another dimension of blockchain, and one that provides numerous benefits for the supply chain. By layering reliable location data with the intrinsic security of the blockchain distributed ledger function, it provides 100% certainty that an asset is being used at the right place, at the right time, by the right person.

In the context of a large-scale shipping operation, for instance, there may be thousands of containers filled with millions of packages or assets. Using a system that can track every asset with full certainty, any concerns can be eliminated about whether the items are where they are supposed to be, or if anything is missing.

Building trust and eliminating fraud

As blockchain expands, so too will the data it records, which in turn increases trust. By ensuring via this secured digital ledger that an asset has moved from a warehouse to a lorry on a Thursday afternoon, more data can then be added. For example, it can show that the asset moved from a specific shelf in a warehouse on a specific street and was moved by a specific truck operated by a specific driver. Securing the location data with full trust provides assurance that things are happening correctly and means that financial transactions can be made with more confidence.

Layering mapping capabilities and rich location data to a blockchain record also enables fraud detection. Without blockchain, it cannot be certain that the delivery updates provided are in fact accurate. Blockchain makes transactions transparent and decentralised, enabling the possibility to automatically verify their accuracy by matching the real location of an item with the location report from a logistics company. As every computer in the network has its

BLOCKCHAIN



own copy of the blockchain, this helps to eliminate a single point of failure or fraud.

A new approach for workers

Globalisation of the supply chain isn't the only thing causing problems. Outdated technology and archaic processes put more pressure on workers, which means the supply chain isn't as efficient as it should be. In its 2019 report, the Business Continuity Institute found that 73% of companies surveyed were using Microsoft Excel to plan and monitor their supply chains, as well as to predict and mitigate disruptions. Blockchain can assist by automating inventory management, relieving the amount of reliance on paperwork.

Additionally, with blockchain's margin of error at a minimum, supply chain employees have fewer opportunities to make mistakes. When issues do arise, these errors can be discovered quickly by the technology, eliminating the need for a central intermediary to govern the network thus eradicating any dependence on detection by humans.

With blockchain streamlining processes across borders and making operations more mobile, this

could provide opportunities for a percentage of the workforce to also function remotely. This would also significantly increase the number of contactless transactions, a vital aspect for remote workers to remain safe. Not only that, but further utilisation of blockchain creates roles to ensure the technology operates accordingly. In fact, blockchain topped the list as the most in-demand hard skill for 2020 according to LinkedIn, considered as a priority for employers hiring in the US, UK, France, Germany and Australia. This was the first instance of blockchain having appeared on this list, indicating how rapidly the technology is infiltrating numerous sectors and proving its business value.

The future of blockchain

At the moment, blockchain is used primarily in the large-scale movement of goods, and in financial transactions like cryptocurrencies. But in the future, demand for the security that blockchain provides may rise exponentially, putting responsibility on infrastructures to develop secure and compliant solutions which can be used by anyone. Until that comes, however, consumers can feel confident that their deliveries will arrive on time, thanks to technologies like location intelligence and blockchain.

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