Improved growth for global
AI market in 2021

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Editor's View

By Phil Alsop

Sustainable sustainability?

THERE SEEMS to be a very real commitment to addressing global environmental issues by a majority of countries, ahead of this autumn's COP26 summit. Scaremongering or not, the suggestion is that this event represents something of a 'last chance saloon'. If a plan of action, with definite targets and timescales, is not agreed, then what Covid-19 has, mercifully, failed to do so far, will, instead, be achieved by global warming. Where once the assumption was that this meant everything becoming hotter, end of story, we now understand that climate volatility is the order of the day. More frequent and more significant weather events. Flooding, famine, rising sea levels, melting ice caps, air pollution levels continuing to rise.

Set against this background, the IT industry has an unenviable task. As levels of digital consumption increase exponentially (but with much of the world yet to really come online), IT companies are tasked with improving the sustainability and environmental performance of their solutions. Now, it's not impossible to marry the two apparently conflicting demands, but there does need to be an open and honest conversation which leads to a truly integrated plan that moves towards carbon neutrality at the very least, before zero carbon comes into focus.

Politics will likely prove a major obstacle. Not just developing countries who resent being told to clean up their act by developed nations who have happily polluted the planet for the past 200 or so years; but also big business which does not want governments to meddle with their plans. And governments themselves seem to struggle when it comes to consistency. Unenviable choices will have to be made for sure. But having a plan is a good place to start.

Whatever one thought/thinks of Brexit, it's not immediately obvious that almost certainly reducing your levels of trade with your closest neighbours in favour of markets further afield is a good idea for the environment. That's just one example where a government has to decide which priorities matter most. And it will be a brave administration indeed which has the green agenda override all other considerations. For now, the IT industry must continue to make progress on sustainability, and highlight how much of its technology actually reduces environmental damage (ie massively reducing the need to travel). Whether it will be allowed to work voluntarily towards targets, or b forced to by legislation, no organisation can afford to ignore the environment any longer.

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Worldwide revenues for the artificial intelligence (AI) market, including software, hardware, and services, are forecast to grow 16.4% year over year in 2021 to $327.5 billion, according to the latest release of the International Data Corporation

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dca The data centre trade association

Acceleration of digital transformation pushing organisations towards a more data-driven approach

84% OF BUSINESSES have seen more demand for data due to Covid-19, but nearly a third say data quality remains a fundamental barrier.

New research from Experian reveals how the acceleration of digital transformation, through the Covid-19 pandemic, has led to greater demand for data insights to inform decision making and strategy.

The annual Global Data Management report, which surveyed 700 data practitioners and data-driven business leaders globally, found that changing customer behaviour has intensified businesses› need for high-quality data. Eighty-four percent have seen more demand for data insights in their organisations due to Covid-19. In fact, 72% say that the rapid push to digital transformation is making their businesses more reliant on data.

Beyond underscoring its business value, the pandemic has also exposed data's potential to be used for societal good – and business leaders are keen to explore this further. Seventy-eight percent see COVID-19 as a defining moment for organisations to set-up and use data for societal good where they can, while 86% would like to be able to use their data in some way to benefit society.

Increasing collaboration with other organisations to better support those in need, sharing talent and resources to develop and deliver products, or allowing their data practitioners to spend time on voluntary project were all highlighted as a potential approach to achieving this. However, they will struggle to use data for either business or social good unless they can overcome endemic weaknesses in legacy data management practices. Experian's report outlines key barriers that organisations must address:

- **Data quality and maturity:** On average, organisations believe a third of their data (32%) is inaccurate in some way. It's unsurprising then that 55% of business leaders lack trust in data assets, and 51% say improving data quality is a 'significant priority'.
- **Data skills:** Embracing the power of data is being stunted by a skills gap - 62% say a lack of basic data literacy skills impacts the value they get from their investment in data and technology, while 55% believe they lack skills/resources to leverage data assets fully.
- **Agility:** Sixty-two percent admit a lack of agility in data processes has hurt their response to changing business needs in the wake of COVID-19.

Andrew Abraham, Global Managing Director, Data Quality, at Experian, comments on the findings: "The pandemic has been a catalyst for long-awaited digital transformation. Businesses need to move fast to serve customers' changing needs, and leaders know that data-based decision-making is key to evolving the right way.

"It's also heartening to see organisations looking beyond the business applications of data, to how they can use it for societal good. However, if businesses are to succeed in either area, they must overcome fundamental barriers to effective data management."

The paper also provides insight into businesses' data priorities, as well as expert advice on how organisations can meet digital transformation objectives by making improvements in the following areas:

- **People:** With a data literate workforce, a business is armed with talent that can make timely, data-driven decisions. Reassuringly the report reveals that 85% of organisations are hiring data roles in the next six months.
- **Technology:** Technology has a critical role to play when it comes to modernising data management practices. Eighty-five percent of business leaders say sourcing more technology for staff is a priority.

New ways of working:
- **DataOps:** DataOps aims to shorten development cycles, increase deployment frequency, and create more dependable releases of data pipelines, in close alignment with business objectives. This practice helps organisations adapt more quickly to changing conditions.
- **Getting back to basics:** Before new initiatives complicate the issue, go back to basics – people, processes, and tools. To build resilience against future risk, invest in the right areas to recognise return on investment on data management more quickly.

'Digital-enabling' countries proved more resilient to the Covid-19 economic shock

THE US, Germany and Denmark once again make the top three of the 2020 Enabling Digitalization Index (based on data from end-2019).

The EDI measures the ability – and agility – of countries to help digital companies thrive and traditional businesses harness the digital dividend. It scores 115 countries based on five components: regulation, knowledge, connectivity, infrastructure and size. For 2020, the US leads by far due to its best-in-class knowledge ecosystem, competitive market size and favorable regulation. In fact, its connectivity score has increased by +1.8 points after a +5.1 point increase in 2018 (see Appendix 1).

Meanwhile, Germany boasts the best knowledge ecosystem and infrastructure for trade. It saw a moderate improvement in both the regulation and market size

scores, but its connectivity quality has dropped relative to the rest of the world despite the continuing upwards trend in the number of secure servers. This is due to fewer mobile lines per 100 inhabitants and a slightly declining share of internet users. Denmark started 2020 as the best performer in terms of connectivity quality. Indeed, after tripling its number of secure servers in 2018, it has more than doubled it again to reach a higher number than China and Canada, and close to that of France (with a population of only 6 million).

China's rise seems unstoppable. In the three years preceding the outbreak of Covid-19, China moved from rank 17 to rank 4. China has seen rising scores across the board: the country's regulation score improved by +7.4 points after increasing by +15 points in 2018. The connectivity score also increased by +1.3 points. Lastly, the knowledge score

rose by +12 points due to an increase in China's innovation capability over 2019. Yet, the skills score did not follow the same pattern, highlighting that China still has leeway to boost the skills (especially digital skills) of its population. This would allow Chinese companies to appropriately tap its innovation potential.

Data also show that others in Asia made progress in the years preceding the Covid-19 crisis: Hong Kong, now at rank 7, previously 11. South Korea, at rank 12 up from rank 16. Six out of the fifteen top digital enablers were in the Asia-Pacific region at the end of 2019. France had also advanced by two spots to rank 15, and Spain had gained 4 spots to rank 20. Other remarkable progressions include Vietnam from 67 to 57 and Saudi Arabia from 53 to 41, confirming a clear willingness to transition towards a new model of growth.

Remote becomes reality

63% of IT executives say at least a quarter of their employees will continue to work remotely permanently. With the Covid-19 pandemic forcing mass remote working across the country, 63% of IT executives say at least a quarter of their employees will continue to work remotely permanently. That's according to research from the leader in employee experience and creator of the experience management (XM) category, Qualtrics.

The research, conducted withmore than 200 IT executives from France, Germany and the UK also shows 70% of organisations increased the frequency of employee listening since COVID-19 began, and 74% of respondents said they're currently taking action on IT transformation projects in direct response to employee feedback.

IT executives and senior technology leaders in Europe are playing a critical role in helping their workforce navigate the global pandemic and driving employee engagement, enablement, and productivity.

"Our data shows us that 63% of IT leaders believe this new model is permanent, and the role of IT in improving the Employee Experience will only grow in importance," said Jay Choi, EVP and GM of EmployeeXM, Qualtrics. "That's why we believe technologies

such as Qualtrics EmployeeXM for IT will be critical in supporting IT leaders and their teams rethink how they listen to the needs of their employees and act on their feedback to deliver world-class technology experiences."

Leadership is critical as every business becomes a technology business

ACCORDING TO the Accenture Technology Vision 2021, technology was a lifeline during the global pandemic – enabling new ways of working and doing business, creating new interactions and experiences, and improving health and safety.

Technology forever changed expectations and behaviours and created entirely new realities across every industry. As companies shift from reacting to the crisis, to reinventing what comes next, the boldest, most visionary leaders – those who use technology to master change – will define the future, says the 21st annual report from Accenture, predicting the key technology trends that will shape businesses and industries over the next three years.

The report, "LeadersWanted: Masters of Change at a Moment of Truth,"outlines how leading enterprises are compressing a decade of digital transformation into one or two years. Relying on a strong digital core to adapt and innovate at lighting speed, leaders are growing revenues 5x faster than laggards today, versus only 2x faster between 2015 to 2018, according to Accenture research.

The result is a wave of companies racing to reinvent themselves and use technology innovations to shape the new realities they face.

"The global pandemic pushed a giant fast forward button to the future. Many organisations stepped up to use technology in extraordinary ways to keep their businesses and communities running – at a pace they thought previously impossible – while others faced the stark reality of their shortcomings, lacking the digital foundation needed to rapidly pivot," said Paul Daugherty, group chief executive – Technology and chief technology officer at Accenture. "We now have a once-in-a-generation opportunity to turn this moment of truth for technology into a moment of trust – embracing the power of exponential technology change to completely reimagine and rebuild the future of business and human experience."

Accenture surveyed more than 6,200 business and technology leaders for the Technology Vision report, and 92% report that their organisation is innovating with an urgency and call to action this year. And 91% of executives agree capturing tomorrow's market will require their organisation to define it. Shaping the future will require companies to become masters of change by adhering to three key imperatives. First, leadership demands technology leadership. The era of the fast follower is over – perpetual change is permanent.

Tomorrow's leaders will be those that put technology at the forefront of their business strategy. Second, leaders won't wait for a new normal, they'll reinvent, building new realities using radically different mindsets and models. Finally, leaders will embrace a broader responsibility as global citizens, deliberately designing and applying technology to create positive impacts far beyond the enterprise to create a more sustainable and inclusive world. The Technology Vision identifies five key trends that companies will need to address over the next three years to accelerate and master change in all parts of their business:

Stack Strategically: Architecting a Better Future – A new era of industry competition is dawning – one where companies compete on their IT systems architecture. But building and wielding the most competitive technology stack means thinking about technology differently, making business and technology strategies indistinguishable. Eighty-nine percent of executives believe that their organisation's ability to generate business value will increasingly be based on the limitations and opportunities of their technology architecture.

Mirrored World: The Power of Massive, Intelligent, Digital Twins – Leaders are building intelligent digital twins to create living models of factories, supply chains, product lifecycles, and more. Bringing together data and intelligence to represent the physical world in a digital space will unlock new opportunities

to operate, collaborate, and innovate. Sixty-five percent of executives surveyed expect their organisation's investment in intelligent digital twins to increase over the next three years.

Technologist: The Democratization of Technology – Powerful capabilities are now available to people across business functions, adding a grassroots layer to enterprises' innovation strategies. Now, every employee can be an innovator, optimising their work, fixing pain points, and keeping the business in lockstep with new and changing needs. Eighty-eight percent of executives believe technology democratization is becoming critical in their ability to ignite innovation across their organisation.

Anywhere, Everywhere: Bring Your Own Environment – The single biggest workforce shift in living memory has positioned businesses to expand the boundaries of the enterprise. When people can "bring your own environment" they have the freedom to seamlessly work from anywhere – whether that's at home, the office, the airport, partners' offices, or somewhere else. In this model, leaders can rethink the purpose of working at each location and lean into the opportunity to reimagine their business in this new world. Eighty-one percent of executives agree that leading organisations in their industry will start shifting from a 'Bring Your Own Device' to 'Bring Your Own Environment' workforce approach.

From Me to We: A Multiparty System's Path Through Chaos –Thedemand for contact tracing, frictionless payments, and new ways of building trust brought into sharp focus what had been left undone with enterprises' existing ecosystems. Multiparty systems can help businesses gain greater resilience and adaptability; unlock new ways to approach the market; and set new, ecosystem-forward standards for their industries. Ninety percent of executives surveyed state that multiparty systems will enable their ecosystems to forge a more resilient and adaptable foundation to create new value with their organisation's partners.

Businesses accelerate digital technology implementation for 2021

HCL TECHNOLOGIES has issued findings on digital technology investment and deployment by enterprises in the wake of COVID-19. The Digital Acceleration for Business Resilience report, done in conjunction with Vanson Bourne, surveyed 420 senior business and IT decision makers across industries and found the majority of companies (89%) are stepping up their digital initiatives, which the report terms "Digital Acceleration." The respondents state cybersecurity and cloud are the top two technologies to receive increased investment as a direct result of the pandemic.

The report also reveals three key actions business leaders must take to realize the benefits of digital acceleration for their organizations and customers. These steps include the reprioritization of digital investments and shortening of implementation cycles, inspecting and reworking business architecture for operational agility, and auditing the partner ecosystem to ensure their companies have the right external expertise. While these actions are necessary for companies around the globe, the data also shows they must be uniquely designed and deployed for individual industries.

Digital acceleration is pushing business leaders to turn their three-year roadmap for digital transformation into an iterative implementation that can promote long-term changes to stay competitive and support business and customer needs. From budgeting for new, adaptable innovations that foster enterprise agility to building strategic partner ecosystems, it's clear that decision makers are taking action to stay competitive in the current landscape.

COVID-19 Has Shifted Boards' Focus to Digital Investment

A notable finding of the survey is a major increase in reported board-level focus on digital transformation pre-pandemic to today, jumping from 42% at the start of 2020 to 55% currently. As the pandemic situation evolves, this number is expected to keep rising. Additionally, those

industries that started 2020 at the bottom in terms of board-level digital focus have reported the greatest increases throughout the year, closing the gap and representing a leveling of digital investment focus across industries. The survey also shows 88% of organizations already have a formal digital transformation strategy in place, and 57% have a tactical roadmap to follow, making next-generation implementations under digital acceleration vital for resilience. Architecture Agility Empowers Business Stability

The pandemic has disrupted business globally, with 62% of organizations reporting a negatively disrupted supply chain and 90% reporting a change in demand (either positive or negative). The takeaway is a need for greater flexibility built into business process and technology architecture to respond to uncertain environments now and in the future.

For large and complex legacy organizations, the inability to quickly adapt and test business models in an iterative fashion poses a critical challenge to transformation. An increased focus on next-gen technologies such as cybersecurity and cloud are necessary for future-proofing today's enterprises.

COVID Highlights the Importance of a Strategic Partner Ecosystem
Business leaders are well aware that today's business ecosystem extends beyond their individual organization. The survey reveals 45% of respondents use a partner ecosystem to execute their enterprise digital transformation and 48% report external partners as playing a role in defining their digital transformation strategy.

Additional findings from the survey include:

Respondents state the top three barriers to digital transformation are data security/governance (40%), legacy technology (35%), and lack of internal skills (35%)
More than half (58%) of respondents report they have created new in-house teams to execute digital transformation, while only a slightly smaller proportion (55%) are executing within business units
70% of organizations with a robust data strategy provide a consistent omnichannel customer experience, vs 27% of organizations with incomplete or nonexistent data strategies
The full report includes comprehensive data on the key technology investment areas, utilization metrics of digital capabilities and technologies, and barriers to digital transformation success.

Pandemic increases IT downtime

STRATEGIC INFLUENCE of CIOs and CTOs within organisations is growing as companies race to shore up cloud, remote work, and full-stack IT observability capabilities.

LogicMonitor, the leading cloud-based IT infrastructure monitoring and observability platform, has released a new global research report, titled The Race to IT Observability, which delves into the ways that the pandemic has impacted traditional CIO, IT operations and developer roles within organisations while also shifting executive priorities towards cloud migration, remote workforce enablement and end-to-end unified observability.

The study of 600 global IT leaders – 200 of which were in EMEA – reveals that previously siloed IT teams and technologies are converging as enterprises accelerate their modernisation efforts in reaction to COVID-19. The responsibilities of CIOs are expanding and the roles of traditional IT operations and administration teams (ITOps) are moving closer and closer to those of agile application developers and quality and security engineers (DevOps) as business priorities shift to align with the customer and their digital experience.

◉ 78 percent of EMEA CIOs and CTOs feel that their input and importance within the boardroom has increased in the last 12 months (86 percent of CIOs/CTOs based in North America feel that way; 74 percent based in APAC)

◉ The vast majority of EMEA enterprises (93 percent) have seen some level of convergence between traditional IT operations and administration teams and development teams in the last 12 months

◉ 91 percent of those respondents credit the 2020 COVID-19 pandemic with accelerating this convergence

◉ 28 percent of EMEA IT leaders believe that improved security will be the top benefit resulting from convergence between ITOps and DevOps; followed by greater ability to scale (15 percent); better cross-org collaboration/alignment (12 percent); better customer experience (12 percent); and increased ability to automate (12 percent)

"One of the key benefits of the convergence between ITOps and DevOps is that such a synergy makes it increasingly feasible to achieve true unified IT observability within modern enterprises," said Daniela Streng, vice president and general manager, EMEA. "As our research shows, observability is all about gaining full visibility into the health, performance and availability of an organisation's IT stack. Companies who achieve unified observability will find it far easier to complete their digital transformation initiatives and succeed in today's digital economy, which is why LogicMonitor is focused on becoming the industry's leading IT observability platform."

Enterprises are prioritising data security, cloud and IT automation in today's era of remote work
Many IT leaders are changing the way they invest in various IT initiatives as digital transformation accelerates due to COVID-19 and the rise of remote work.

◉ In 2020, 74 percent of EMEA IT leaders substantially increased their investments in data security; 68 percent substantially increased their investments in cloud technologies and services, and 65 percent substantially increased their investments in IT automation

◉ 13 percent of EMEA enterprises say that expanding use of the cloud is their number one priority in 2021, followed by supporting remote work (12 percent) and modernisation/transitioning away from legacy tools (11 percent)

◉ 73 percent of EMEA IT leaders plan to increase investment in cloud technologies and services in the next 12-24 months, followed by data security (71 percent) and IT automation (67 percent)

IT outages and brownouts remain widespread
One negative IT trend that businesses continue to experience at alarming rates – despite the severe negative business impact – is IT downtime, which includes both brownouts and outages. EMEA IT leaders identify the increase in remote work, migration to the cloud, mobile computing and the Internet of Things as the top trends contributing to widespread downtime.

◉ In the past three years, 96 percent of EMEA IT leaders said their organisation had experienced an IT brownout; 94 percent said their organisation had experienced an outage

◉ 50 percent of EMEA IT leaders said they had seen an increase in IT downtime as a result of the pandemic since March 2020

◉ 50 percent of respondents in EMEA saw an increase in downtime since the pandemic began, compared to 57 percent in North America and 48 percent in APAC

◉ 8 percent of EMEA IT leaders admit to experiencing 50 or more brownouts and 7 percent admit to experiencing 50 or more outages in the last three years

◉ Globally, enterprises experience an average of 15 IT outages every 3 years and 19 brownouts.

◉ Lost productivity tops the list as the most negative impact EMEA IT leaders have experienced as a result of IT brownouts (73 percent) and outages (65 percent), followed by lost revenue (41 percent for brownouts and 44 percent for outages) and damage to brand/reputation (34 percent for both brownouts and outages)

◉ 20 percent of EMEA IT leaders say their organisation was shut down permanently as a result of IT outages during the past three years

As the world continues the rapid pace of digital transformation—made even more imperative by the ongoing pandemic – organisations cannot afford to experience downtime. By embracing the technologies that provide them with full observability into their IT infrastructure, organisations can mitigate the risk of downtime and quickly resolve issues when they do occur.

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Worldwide IT spending to grow 6.2% in 2021

Worldwide IT spending is projected to total $3.9 trillion in 2021, an increase of 6.2% from 2020, according to the latest forecast by Gartner, Inc.

WORLDWIDE IT spending declined 3.2% in 2020 as CIOs prioritized spending on technology and services that were deemed "mission-critical" during the initial stages of the pandemic.

The unprecedented speed of digital transformation in 2020 to satisfy remote working, education and new social norms presented lockdowns and social distancing measures as double-edged swords – one which has abated the pandemic's negative effect on IT spending going into the New Year.
"CIOs have a balancing act to perform in 2021 — saving cash and expanding IT," said John-David Lovelock, distinguished research vice president at Gartner. "With the economy returning to a level of certainty, companies are investing in IT in a manner consistent with their expectations for growth, not

their current revenue levels. Digital business, led by projects with a short Time to Value, will get more money and board level attention going into 2021."
All IT spending segments are forecast to return to growth in 2021 (see Table 1). Enterprise software is expected to have the strongest rebound (8.8%) as remote work environments are expanded and improved. The devices segment will see the second highest growth in 2021 (8%) and is projected to reach $705.4 billion in IT spending.

"There are a combination of factors pushing the devices market higher," said Mr. Lovelock. "As countries continue remote education through this year, there will be a demand for tablets and laptops for students. Likewise, enterprises are industrializing remote work for employees as quarantine measures

Table 1. Worldwide IT Spending Forecast (Millions of U.S. Dollars)

	2020 Spending	2020 Growth (%)	2021 Spending	2021 Growth (%)	2022 Spending	2022 Growth (%)
Data Center Systems	214,985	0.0	228,360	6.2	236,043	3.4
Enterprise Software	465,023	-2.4	505,724	8.8	557,406	10.2
Devices	653,172	-8.2	705,423	8.0	714,762	1.3
IT Services	1,011,795	-2.7	1,072,581	6.0	1,140,057	6.3
Communications						
Services	1,349,891	-1.7	1,410,745	4.5	1,456,637	3.3
Overall IT	3,694,867	-3.2	3,922,833	6.2	4,104,906	4.6

Source: Gartner (January 2021)

keep employees at home and budget stabilization allows CIOs to reinvest in assets that were sweated in 2020."

Through 2024, businesses will be forced to accelerate digital business transformation plans by at least five years to survive in a post-COVID-19 world that involves permanently higher adoption of remote work and digital touchpoints. Gartner forecasts global IT spending related to remote work will total $332.9 billion in 2021, an increase of 4.9% from 2020. "Digital business represents the dominant technology trend in late 2020 and early 2021 with areas such as cloud computing, core business applications, security and customer experience at the forefront. Optimization initiatives, such as hyperautomation, will continue and the focus of these projects will remain on returning cash and eliminating work from processes, not just tasks," said Mr. Lovelock.

Despite the availability of COVID-19 vaccines, the virus will continue to require government health interventions throughout 2021. Non-COVID-19

geopolitical factors such as Brexit and the U.S.-China tension will also inhibit recovery for some regions. Overall, returning global recovery back to 2019 spending rates will not occur until 2022, although many countries may recover earlier. People-gathering industries, such as restaurants, travel and entertainment, will hover at the bottom long-term.

"COVID-19 has shifted man industries' techquilibrium," said Mr. Lovelock. "Greater levels of digitalization of internal processes, supply chain, customer and partner interactions, and service delivery is coming in 2021, enabling IT to transition from supporting the business to being the business. The biggest change this year will be how IT is financed, not necessarily how much IT is financed."

Global government IT spending to grow 5% in 2021

Worldwide government IT spending is forecast to total $483 billion in 2021, an increase of 5.1% from 2020, according to the latest forecast by Gartner, Inc. "Government organizations continue to be challenged

Table 1. Government IT Spending Forecast by Segment, 2020-2021, Worldwide (Millions of U.S. Dollars)

	2020 Spending	2020 Growth (%)	2021 Spending	2021 Growth (%)
IT Services	160,043	4.8	168,639	5.4
Software	108,212	8.9	118,149	9.2
Telecom Services	63,935	-0.5	67,200	5.1
Internal Services	63,927	1.0	62,423	-2.4
Devices	33,029	1.6	34,875	5.6
Data Center	30,279	5.7	31,514	4.1
Total	459,425	4.2	482,800	5.1

Source: Gartner (January 2021)

with the appropriate level of interventions to respond and recover from the COVID-19 pandemic," said Irma Fabular, senior research director at Gartner. "Public health and safety measures, including vaccinating citizens are of paramount concern, which necessitate governments to continue to accelerate their digital transformation journey."

Three segments are on pace to exceed the overall market growth in 2021. The software segment, which includes application, infrastructure, and vertical-specific software, will experience the strongest growth in 2021. "Governments are innovating at a quicker pace by adopting commercially available technology solutions for operational and mission critical needs," said Ms. Fabular. "We are seeing innovative use of technology and data to control and respond to the pandemic, as well as provide financial and humanitarian assistance."

As government organizations continue to embrace remote work and hyperconnected public services, spending on devices is expected to grow 5.6% in 2021, up from 1.6% growth in 2020 (see Table 1). "The COVID-19 pandemic exposed weaknesses in the ability of government organizations to quickly respond, scale and secure essential services," said Ms. Fabular. "Lessons learned from the responses by government organizations provide the impetus to increase resiliency and build for a stronger future for its citizens and businesses."

In 2021, government budgets will continue to address recovery and growth needs of communities and businesses. In addition, investments to address digital equity and access to remote government services will be prioritized.

70% of customer service and support employees want homeworking

Seventy percent of customer service and support employees want to continue to work from home (WFH) at least once a week after the pandemic ends, according to a survey by Gartner, Inc.

In September 2020, Gartner surveyed 5,000 employees, including 550 customer service professionals, and found that service employees who traditionally did not have many opportunities to WFH are now used to it and like it, and they wish to continue in some capacity once the pandemic is over. This is in line with most service leaders who believe WFH is here to stay post-pandemic. Eighty-one percent of service leaders believe between 30% to 80% of their workforce will primarily be working from home two years from now.

"As service leaders weigh the future of their work from home programs, they'll have to balance their own visions for the future with employee wishes," said Lauren Villeneuve, advisory director in the Gartner Customer Service & Support practice. "A key factor should be the impact it has had, and will continue to have, on the employee experience. Leaders will want to understand which focus areas should be prioritized and which should not as they decide where to invest in and optimize their work from home programs." Customer service and support leaders working on long-term post-COVID-19 WFH strategies should consider the following:

- **Culture:** Since the mass shift to working from home, many service leaders report growing concerns for the future of their company culture. However, Gartner data indicates WFH has posed less of a challenge to organizational culture than

Table 1. Low-Code Development Technologies Revenue (Millions of U.S. Dollars)

	2019	2020	2021
Low-Code Application Platforms (LCAP)	3,473.5	4,448.2	5,751.6
Intelligent Business Process Management Suites	2,509.7	2,694.9	2,891.6
Multiexperience Development Platforms (MDXP)	1,583.5	1,931.0	2,326.9
Robotic Process Automation (RPA)	1,184.5	1,686.0	2,187.4
Citizen Automation and Development Platform (CADP)	341.8	438.7	579.5
Other Low-Code Development (LCD) Technologies*	59.6	73.4	87.3
Overall	**9,152.6**	**11,272.2**	**13,824.2**

Other LCD technologies include rapid mobile app development (RMAD) tools and rapid application development (RAD) tools. Low-code is the evolution of RAD to cloud and SaaS models. Note that Gartner defines a no-code application platform as an LCAP that only requires text entry for formulae or simple expressions. The LCAP market, therefore, includes no-code platforms. Furthermore, "no code" is not a sufficient criterion for tasks like citizen development, as many complex tooling configuration tasks are no code but still require specialist skills. Columns may not add to totals shown because of rounding.

Source: Gartner (January 2021)

anticipated. In fact, most customer service employees who work remotely say organizational culture has remained the same – and most of those who do think it's changed actually say it's improved since the shift to WFH. Service leaders should continue to monitor culture within their own organizations but may want to consider investing time and resources elsewhere.

- **Collaboration:** While employees affirm WFH hasn't negatively impacted culture, it has impacted collaboration. Service employees say they are collaborating less frequently since transitioning to WFH. While service leaders have invested in collaboration technologies, they should make sure they also create opportunities for collaboration, model collaborative behavior and reward collaboration when it occurs to ensure the technology is used.

- **Career development:** Pre-pandemic biases against remote employees now seem particularly unfounded given employee performance has largely remained consistent throughout the pandemic. While the vast majority of service employees continue to WFH, this presents less of an issue. But if managers hold these beliefs once some employees return to the workplace, they could create a barrier to career progression for employees who choose to continue working from home. Service leaders should work to uncover why these biases exist and closely monitor managers who manage remote employees or hybrid teams for signs of bias.

Low-code development technologies market to grow 23% in 2021

The worldwide low-code development technologies market is projected to total $13.8 billion in 2021, an increase of 22.6% from 2020, according to the latest forecast by Gartner, Inc. The surge in remote development during the COVID-19 pandemic will continue to boost low- code adoption, despite ongoing cost optimization efforts.

"While low-code application development is not new, a confluence of digital disruptions, hyperautomation and the rise of composable business has led to an influx of tools and rising demand," said Fabrizio Biscotti, research vice president at Gartner.

Low-code as a general social and technological movement is expected to continue growing significantly. For example, low-code application platforms (LCAP) are expected to remain the largest component of the low-code development technology market through 2022, increasing nearly 30% from 2020 to reach $5.8 billion in 2021 (see Table 1).

Digital Business Acceleration Drives Application Delivery

Digital business acceleration is putting pressure on IT

leaders to dramatically increase application delivery speed and Time to Value. The increased demand for custom software solutions in support of digital transformation has sparked the emergence of citizen developers outside of IT, which, in turn has influenced the rise in low-code.

Gartner research says, on average, 41% of employees outside of IT – or business technologists – customize or build data or technology solutions. Gartner predicts that half of all new low-code clients will come from business buyers that are outside the IT organization by year-end 2025, too.

"The economic consequences of the COVID-19 pandemic have validated the low-code value proposition," said Mr. Biscotti. "Low-code capabilities that support remote work function, such as digital forms and workflow automation, will be offered with more elastic pricing since they will be required to keep the lights running."

SaaS and Hyperautomation Will Drive Low-Code Adoption

All of the major software-as-a-service (SaaS) vendors currently provide capabilities that incorporate low-code development technologies. As SaaS grows in popularity, and these vendors' platforms are increasingly adopted, the low-code market will see commensurate growth in LCAPs and process automation tooling.

Additionally, business technologists want to create and execute their own ideas to drive more automation across their business applications and workflows. The needs of business-driven hyperautomation will be one of the top three drivers for low-code adoption through 2022.

"Globally, most large organizations will have adopted

and resources, according to Gartner. CISOs must expect executive conversations to shift away from performance and health-related discussions to risk-oriented and value-driven exercises.

Gartner also predicts that by 2024, 60% of CISOs will establish critical partnerships with key executives in sales, finance and marketing, up from less than 20% today.

"Effective CISOs realize that heads of sales, marketing and business unit leaders are now key partners as the use of technology and, subsequently, the incurrence of risk happens outside of IT," said Mr. Olyaei. According to the Gartner CISO Effectiveness Index, top-performing CISOs regularly meet with three times as many non-IT stakeholders as they do IT stakeholders; and they meet with them more frequently than bottom performers.

Cyber, physical and supply chain security converge
For asset-intensive enterprises such as utilities, manufacturers and transportation networks, security threats targeting cyber-physical systems present an increasing risk to the organization.

Bad actors increasingly target weaknesses wherever they are, as demonstrated by the surge in ransomware affecting organizations' operational systems and recent supply chain attacks.

The siloed nature of today's security disciplines then becomes its own risk and a liability to the organization, and the IT-centric focus of most security teams needs to expand to include threats in the physical world. Gartner predicts that by 2025, 50% of asset-intensive organizations will converge their cyber, physical and supply chain security teams under one chief security officer role that reports directly to the CEO.

Remote work can improve access to IT security talent
Gartner research conducted pre-COVID-19 found that 61% of organizations surveyed were struggling to find and hire security professionals.

"As organizations shifted to remote working in response to the pandemic, it proved that some, if not all, security capabilities could be delivered remotely," said Richard Addiscott, senior research director at Gartner. "This includes security monitoring/operations, policy development, security governance and reporting, security awareness, and incident response via dispersed teams. Cybersecurity teams can work remotely and still provide effective capabilities."

As a result, Gartner predicts that by 2022, 30% of all security teams will have increased the number of employees working remotely on a permanent basis. Gartner recommends that security and risk leaders consider adapting their operating models and expand their job advertising to gain access to candidates residing outside of their organization's traditional recruitment geographies.

multiple low-code tools in some form by year-end 2021. In the longer term, as companies embrace the tenets of a composable enterprise, they will turn to low-code technologies that support application innovation and integration," said Mr. Biscotti.

40% of boards to have dedicated Cybersecurity Committee by 2025

By 2025, 40% of boards of directors will have a dedicated cybersecurity committee overseen by a qualified board member, up from less than 10% today, according to Gartner, Inc.

This is one of several organizational changes Gartner expects to see at the board, management and security team level, in response to greater risk created by the expanded digital footprint of organizations during the pandemic.

According to the Gartner 2020 Board of Directors Survey*, cybersecurity-related risk is rated as the second-highest source of risk for the enterprise, following regulatory compliance risk. However, relatively few directors feel confident that their company is properly secured against a cyberattack. "To ensure that cyber risk receives the attention it deserves, many boards of directors are forming dedicated committees that allow for discussion of cybersecurity matters in a confidential environment, led by someone deemed suitably qualified," said Sam Olyaei, research director at Gartner. "This change in governance and oversight is likely to impact the relationship between the board and the chief information security officer (CISO)."

While CISOs should experience more scrutiny as a result, they are also likely to receive more support

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Improved growth for global AI market in 2021

Worldwide revenues for the artificial intelligence (AI) market, including software, hardware, and services, are forecast to grow 16.4% year over year in 2021 to $327.5 billion, according to the latest release of the International Data Corporation (IDC) Worldwide Semiannual Artificial Intelligence Tracker. By 2024, the market is expected to break the $500 billion mark with a five-year compound annual growth rate (CAGR) of 17.5% and total revenues reaching an impressive $554.3 billion.

AMONG THE THREE technology categories, software represented 88% of the total AI market revenues in 2020. However, it is the slowest growing category with a five-year CAGR of 17.3%. Within the AI software category, AI Applications took the largest share of revenue at 50% in 2020. In terms of growth, the AI Software Platforms market is forecast to be the strongest with a five-year CAGR of 32.7%. The slowest will be AI System Infrastructure Software with a five-year CAGR of 13.7% while accounting for roughly 36% of AI software revenues. Within the AI Applications market, AI ERM is expected to grow slightly stronger than AI CRM over the next five years. "The global pandemic has pushed AI to the top of the corporate agenda, empowering business resilience and relevance," says Ritu Jyoti, program vice president for AI Research at IDC. "AI is becoming ubiquitous across all the functional areas of a business. Advancements in Machine Learning, Conversational AI, and Computer Vision AI are at the forefront of AI software innovations, architecting converged business and IT process optimizations, predictions and recommendations, and enabling transformative customer and employee experiences."

The AI Services category grew slower than the overall AI market with 13% annual revenue growth in 2020. However, it is forecast to grow 17.4% year over year in 2021, outperforming the overall AI market by approximately 1%. Its five-year CAGR is expected to be 18.4% with revenues reaching $37.9 billion by 2024. This technology category breaks down into two market segments: IT Services and Business Services. IT Services is the larger of the two, accounting for nearly 80% of all AI Services revenues.

From a growth perspective, IT Services for AI tends to grow faster than Business Services for AI except for 2024, where Business Services for AI is forecast to perform slightly higher than both IT Services for AI and the overall AI Services market.

"Though the pandemic interrupted the momentum of worldwide AI services market growth, enterprise demand for AI capabilities to support business resiliency and augment human productivity sustained double-digit expansion in 2020, even as other discretionary projects experienced delays," said Jennifer Hamel, research manager, Analytics and Intelligent Automation Services. "Client demand for technical expertise to develop, implement, and manage AI applications drives IT services expansion, while increasing adoption of AI-enabled automation within business processes boosts spending on business services."

I Tracker covers a total of 160 vendor companies in the AI Services market. Under IT Services for AI, the Top 3 companies in 1H 2020 were IBM, Accenture, and Infosys. These were the only companies to bring in more than $500 million in IT Services for AI revenues and their combined share of the market was 28%. Beyond the Top 3, 13 other companies generated more than $100 million each during the same period. In the Business Services for AI market, there were only four companies – Ernst & Young, PwC,

Worldwide AI Software Forecast, 2020-2024

Source: IDC 2021
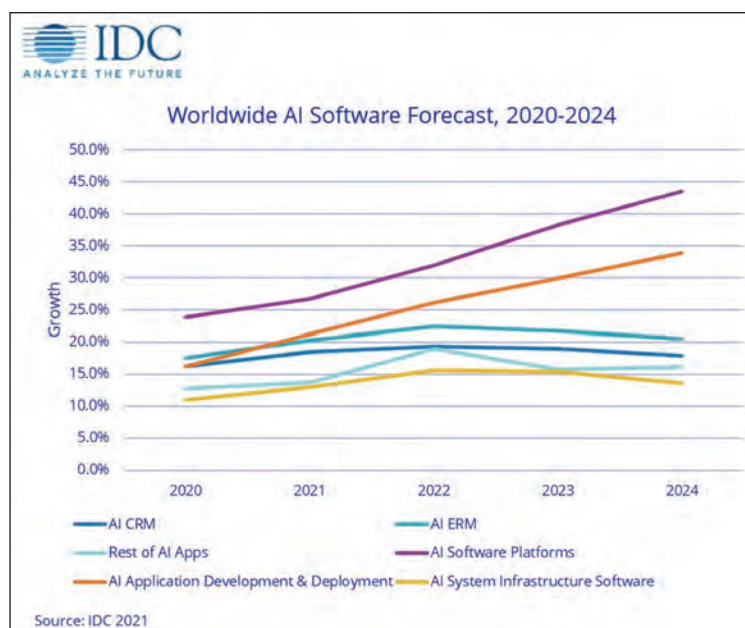
Deloitte, and Booz Allen Hamilton – that generated revenues of more than $100 million in 1H 2020. Overall, the competitive landscape in both services markets for AI is a highly fragmented one where players from across the services value chain continue to invest in technology assets, innovation resources, and expertise in applying AI to solve industry- and domain-specific problems for clients.

The AI hardware market is the smallest category with approximately 5% share of overall AI revenues in 2020. The share is forecast to increase slightly in 2021 at the expense of AI Software. The AI Server market grew faster than the AI Storage market in 2020, but these results are expected to the reverse in 2021 when AI Storage is forecast to grow 31.8% year over year compared to 26.4% for the AI Server market. By 2024, AI Hardware is forecast to be a $30.5 billion market with AI Servers representing an 82% revenue share.

Top 3 Companies in the AI Software Primary Market and the 3 AI Software Platforms Functional Markets, 1H 2020 (ranking based on worldwide revenues)

AI Software Market	AI Type	#1	#2	#3
AI Software Platforms	AI Centric	IBM	Microsoft	SAS Institute
AI Applications	AI Centric	IBM	OpenText	Slack
	AI non-Centric	Microsoft	Intuit	Google
AI System Infrastructure Software	AI Centric	IBM	Microsoft	Dynatrace
	AI non-Centric	Microsoft	VMware	McAfee
AI Application Development & Deployment	AI Centric	Microsoft	Google	Palantir
	AI non-Centric	Microsoft	ESRI	Teradata

Worldwide AI Services Forecast by Technology Category Detail, 2020-2024

Source: IDC 2021
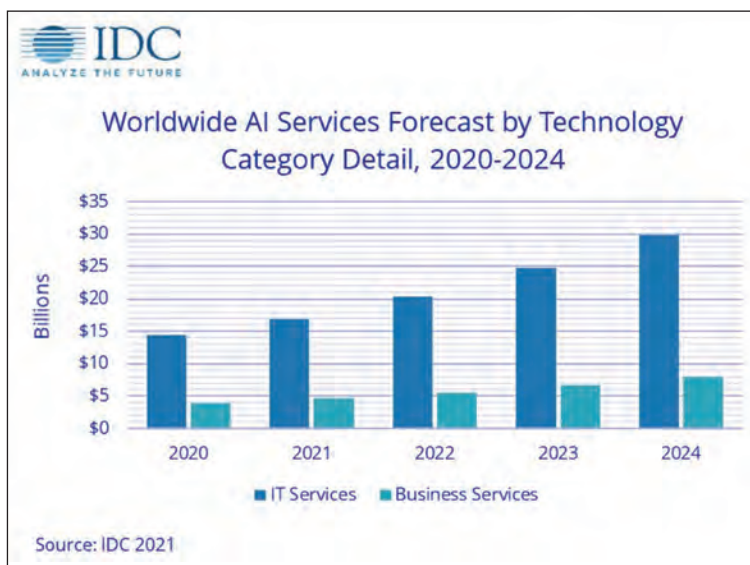
"The AI server and storage markets continue to see rapid growth, providing an increasingly specialized and innovative infrastructure foundation under the entire AI landscape," said Peter Rutten, research director, Infrastructure Systems, Platforms and Technologies at IDC.

In terms of 1H 2020 vendor share, the top companies in the AI Server market were (in alphabetical order) Dell, HPE, Huawei, IBM, Inspur, and Lenovo. Each of these companies brought in more than $250 million in 1H 2020 and collectively these 6 companies accounted for 58% of the market, while 30% went to ODMs. While the number of vendor companies tracked in each market is the same, the competitive landscape of AI Server market is more fragmented than the AI Storage market, where the Top 3 companies accounted for 49% market share in 1H 2020.

Private LTE/5G Infrastructure Market to

Worldwide AI Hardware in Top 5 Regions, 1H 2020

Source: IDC 2021
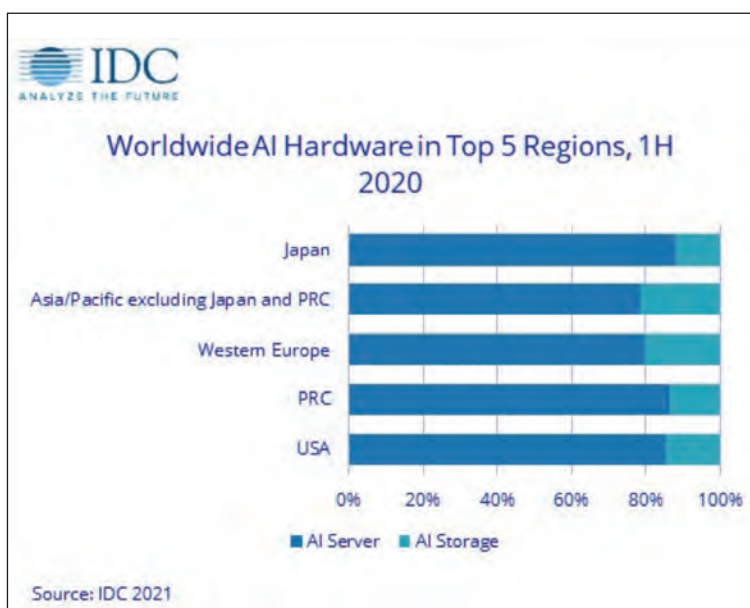
Reach $5.7 Billion in 2024

A new report from International Data Corporation (IDC) presents IDC's inaugural forecast for the worldwide Private LTE/5G infrastructure market for the period 2020–2024.

Private LTE/5G infrastructure is any 3GPP-based LTE and/or 5G network deployed for a specific enterprise/industrial customer that provides dedicated access. It includes networks that may utilize dedicated (licensed, unlicensed, or shared) spectrum, dedicated infrastructure, and private devices embedded with unique SIM identifiers.

Private LTE/5G infrastructure carries traffic native to a specific organization, with no shared resources in use by any third-party entities.
Worldwide revenue attributable to the sales of private LTE/5G infrastructure will grow from $945 million in 2019 to an estimated $5.7 billion in 2024 with a 5-year compound annual growth rate (CAGR) of 43.4%. This includes aggregated spending on RAN, core, and transport infrastructure.

"Private LTE infrastructure is already used by select verticals worldwide to solve mission-critical networking challenges. However, the barrier to consumption has remained high, limiting adoption to organizations possessing in-house competency and access to dedicated spectrum," said Patrick Filkins, senior research analyst, IoT and Mobile Network Infrastructure. "With more spectrum being made available for enterprise uses, coinciding with the arrival of commercial 5G, interest has grown toward using private LTE/5G solutions as a basis for connectivity across a multitude of mission-critical, industrial and traditional enterprise organizations."

Many organizations are deploying private LTE today, and a select few are beginning to deploy private 5G in limited instances. While many of these verticals overlap in both use case and network needs, the market opportunity can be categorized in three segments:

- **Mission-critical:** Verticals that require "always on" connectivity addressable through redundancy and dedicated resource, as well as the clear need or desire for mobile site connectivity. Loss of connectivity would likely result in significant negative business or operational outcomes.
- **Industrial:** Verticals whose primary focus is process and industrial automation for Industry 4.0. It also generally involves providing high-capacity and ultra-reliable low-latency communication (5G URLLC) either with time-sensitive networking (TSN), or as an alternative.
- **Traditional enterprise or "Business-Critical":** These are verticals that require deterministic wireless networking beyond traditional Wi-Fi, but where redundancy and automation needs are lower. Theseinclude "business critical" applications, where loss of connectivity could result in loss of revenue.

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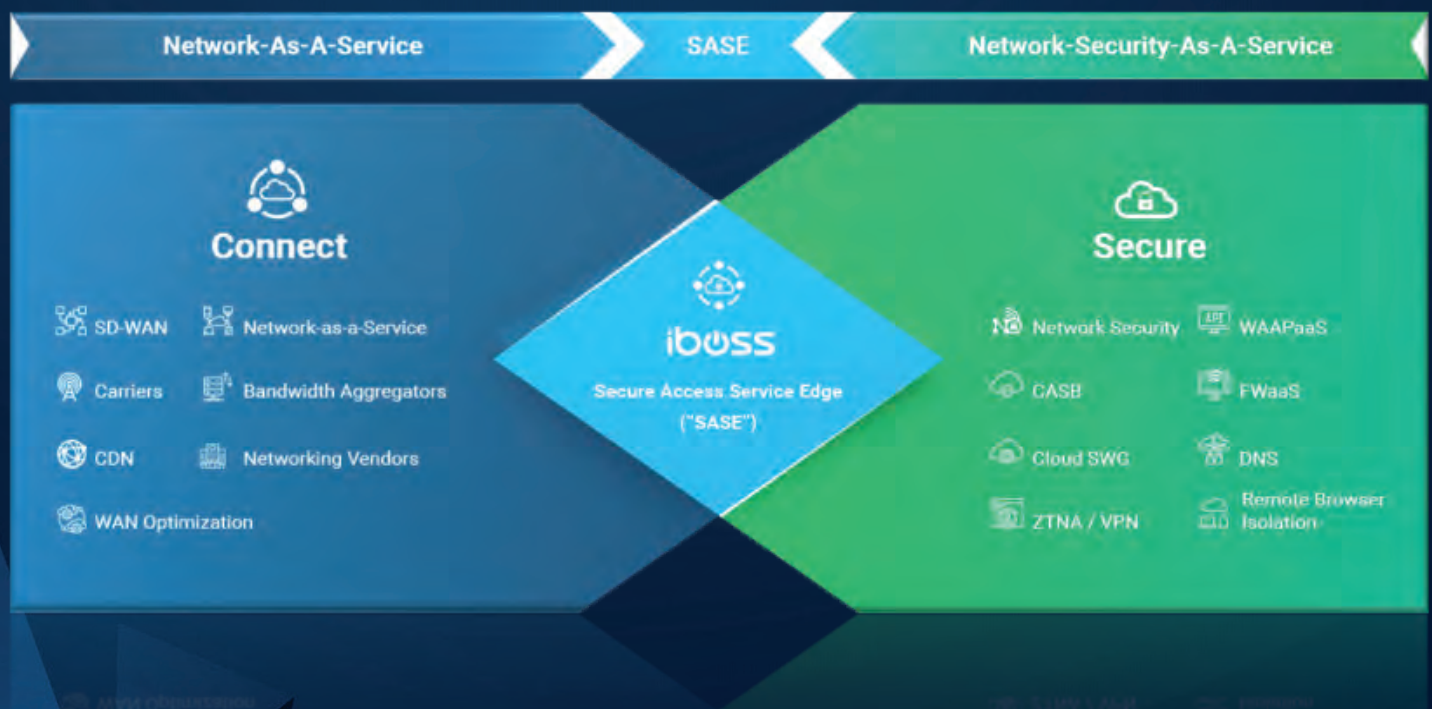
How to thrive in the enterprise AI era

Enterprise AI is the ability to embed AI methodology — which combines the human capacities for learning, perception, and interaction all at a level of complexity that ultimately supersedes our own abilities — into the very core of an organisation's data strategy.

BY ALEXIS FOURNIER, DIRECTOR OF AI STRATEGY, DATAIKU

IT ISN'T JUST A TREND or something to be leveraged for one-off projects and use cases. The ability to become a true AI enterprise by successfully scaling and employing robust data projects and processes at all levels of the company is an organisational asset pivotal to the success of businesses of the future, regardless of the industry.

Many businesses struggle to get started on their Enterprise AI journey, but there are also some who are thriving. The companies that succeed are the ones that go beyond leveraging Enterprise AI for one particular project or use case and instead focus on scaling it out to a level that will sustain the business in the future.

Scaled Enterprise AI companies manage to build a foundation for data science, machine learning, and AI at an organisational level. Here's a quick look at how some of them are fully embedding AI in the enterprise.

Leverage Horizontal (Team-Wide) and Vertical (Cross-Team) Collaboration

When we think about Enterprise AI, a key focus of companies that are achieving success is the ability and proven capacity to fully embed AI as a regular capability inside new processes and ways of working.

This means bringing all people together around AI efforts, from business people to analysts and data scientists. Traditionally, delivering this has been challenging for companies, because it demands a full transformation and a full value chain reorganisation as well as a mass effort to upskill people.

A key part of getting everyone on the same page is creating spaces where data is accessible. These companies are opening sandboxes where people can learn, experiment, and put governance in place that creates a positive incentive to testing. They are also putting the right checks in place before machine

> Being able to iterate rapidly on a spectrum of data applications — whether that means building out a self-serve analytics platform or fully operationalised AI integrated with business processes — is key to fully embedding Enterprise AI within an organisation

learning-based models are industrialised or put into production.

It all goes back to the virtues of collaboration, and the virtues of sharing and democratising initial access, so that even business people, who may not understand everything in terms of data science, are in a better capacity to actually iterate in the right manner with data scientists. In the same environment, data scientists get closer to the business bottom line so that they really understand the needs of the business, and so on.

We may come to know it as 'Inclusive AI,' or simply a concept that encompasses the idea that the more people are involved in AI processes, the better the outcome (both internally and externally) because of a diversification of skills, points of view, or use cases.

Iterate Rapidly

Being able to iterate rapidly on a spectrum of data applications — whether that means building out a self-serve analytics platform or fully operationalised AI integrated with business processes — is key to fully embedding Enterprise AI within an organisation.

The reality around most data projects is that they don't bring real value to the business until they're in a production environment. Therefore, if this process isn't happening quickly enough — both in terms of total overall start-to-finish time-to-insights as well as the ability to rapidly iterate once something is in production — efforts will fall flat. Proper tools that allow for quick, painless incorporation of machine learning models in production are the key to a scalable process.

Speed is also of the essence in that feedback from models in production should be delivering timely results to those who need it. For example, if the data team is working with the marketing team to operationalise churn prediction and prevention emails, the marketing team should have immediate insight into whether the churn prevention emails sent to predicted churners are actually working, or if they should re-evaluate the message or the targeted audience.

Prioritise Data Governance

Data governance is certainly not a new concept — as long as data has been collected, companies have needed some level of policy and oversight for its management. Yet until recently, it has largely remained in the background, as businesses weren't using data at a scale that required data governance to be top of mind. In the last few years, and certainly in the face of 2020's tumultuous turn of events, data governance has shot to the forefront of discussions both in the media and in the boardroom as businesses take their first steps towards Enterprise AI.

Recent increased government involvement in data privacy (e.g. GDPR and CCPA) has no doubt played a part, as have magnified focuses on AI risks and model maintenance in the face of the rapid development of machine learning. Companies are starting to realise that data governance has never really been established in a way to handle the massive shift toward democratized machine learning required in the age of AI. And that with AI comes new governance requirements.

Data governance needs to be a collaboration between IT and business stakeholders. A traditional data governance program oversees a range of activities, including data security, reference and master data management, data quality, data architecture, and metadata management.

Those responsible for data governance will have expertise in data architecture, privacy, integration, and modeling. However, those on the information governance side should be business experts, understanding what the data is, where it comes from, how and why the data is valuable to the business, how the data can be used in different contexts, and how data should ultimately be used for optimised business benefit.

Embedding AI in the enterprise successfully is not an insignificant task. However, if businesses can work to understand data at a more detailed level, including its constraints, they are well on their way to understanding what they can do with that data to develop additional insights to transform the way they are working.

What's your data worth?

Valuing data like any other asset would make it work better for business.

BY HERMAN HEYNS IS CO-FOUNDER AND CEO OF ANMUT

"IF I SAY DATA ASSETS to my CFO, his first question is going to be 'how do I put them on the balance sheet?'"

Said one CDO of a very large bank we spoke to recently. It's a real challenge for the data industry and one that isn't going to be solved anytime soon. Doing so needs globally agreed accounting standards, which in themselves take years to agree. And we don't even have standardised ways to agree data definitions in individual companies and countries. Yet the question of what is data worth will only get more relevant. But is the benefit of valuing data like any other asset solely about balance sheets, M&A and accounting?

Our experience and 87% of data leaders say no
Data is an asset like no other. It's not on an even playing field in the game of business investment decisions. Proving a clear line of sight to ROI is hard, and in itself requires an extra investment. Some, like Barry Panayi Chief Data Officer, Lloyds Banking Group, and Non-Executive Director at Ofgem, argue it should be a BAU investment.

"Data's not on an even playing field, it should be a BAU investment, like keeping the loos clean or having a finance department. When investment in data projects have to compete on short term ROI measures to get signed-off, you create all sorts of problems for the future."

Valuing data like any other asset delivers a range of benefits, beyond a monetary number.

Never have to convince people data's valuable again
91% of business leaders say data is critical for success. 76% are committed to large scale transformation on data. 67% of Boards say data is material. Yet, just 34% of businesses consistently manage data to the same professional standards as other tangible assets. That is a massive 57% gap between the intent and the execution.
When people understand data, they will value it and act accordingly. That's the standard industry line. Data literacy. It hasn't worked over the past 20 years, so why would it now?

Tell a business their data assets are worth £4bn because of the value they create, and watch them go to work on what they now know is valuable to their business. No more time spent convincing people why they should prioritise data.

Allow the CFO to compare investments like for like
The COO at one of Anmut's clients, a major infrastructure provider with a £6bn annual spend, said, "For every £2 of physical asset, we now know we have £1 of the data asset. It's given people in the business the language to manage data as a strategic asset. For the first time, I can compare investments in concrete with data."

Money is a medium of exchange. Its absence makes decisions about capital allocation far harder. And people are very good at going the path of least resistance, just ask Amazon or Uber.

Know which data assets to invest in to move the needle the most

When you simplify it, a business makes decisions about where to invest capital across different assets to drive activities that create value. Valuing data as an asset makes it speak the language of business. If the method of valuation is robust, the result is a prioritised list of the business' data assets. Investing in these assets then generates significant returns, because data assets underpin multiple use cases. When you consider the failure rate of data-related projects, having the assurance of investment delivering value is not just good for the business, but the CDOs job too.

Make the difference between data and technology clear

When technology receives x5 more budget and x3 more attention than data, making the distinction between the two clear for business decision makers clear, could be a source of advantage. One that might stop the CFO from thinking the CDO's budget is x5 larger than it actually is.

Make the full ROI of data clear for all to see. Depending on how you do it. There are many different methods of valuation.
- Basic cost-based methods just measure data cost, which is far below the benefits, so inaccurate.
- Market-based methods set the price on what

someone is willing to pay, but there isn't a trusted and efficient data market yet.
- Utility-based methods seek to use economic measures of the benefits to value data.

Typically, short term changes in costs or revenue as a result of data use, but they miss most of the benefits data brings, which are over the longer term. Stakeholder valuation determines which activities create value in the eyes of the business' stakeholders, by how much and how data dependent those activities are.

This values specific data assets based on the role they play in creating value, not just revenue or efficiencies, giving a more realistic picture of how the organisation creates value and the value of data in that. If you choose stakeholder valuation, it's possible to project, full short and long term ROI of investments in data assets. The kind of thing that makes a CFO very happy.

At first, talk of valuing data like any other asset feels like a nice to do tomorrow, rather than a business imperative today. Yet it's tough economic times like this that every investment has to count. Data is the way to achieve this, but we all know data has been chronically underinvested in, unless a step change in the way we approach data is made, we won't see a step change in the data itself.

Ways of working in 2021 and beyond: rethink, refresh and revise how you work

To say that 2020 was a tumultuous year would be an understatement. We faced disruption and upheaval to every facet of our personal and professional lives, including routines that we have relied on for years if not decades, right down to buying groceries and exercising.

BY VP WORLDWIDE SYSTEMS ENGINEERING, PURE STORAGE

UNDERSTANDABLY, many of us have been left wondering when things might go back to normal. Not so long ago, 91 year-old Margaret Keenan from the UK became the first person in the world to be given the Covid-19 vaccine, and there are early signs that we may be on the road back to normality.

However, just because we may be able to return to the status quo in 2021, who's to say that we should? I speak in the context of our professional lives. This year has presented us with an opportunity to take pause and rethink the way we live and work, as well as the chance to establish a new sense of balance moving forwards. 2020 was a challenging year but the optimist in me sees the silver linings. For example, many of us have eliminated long or costly commutes and traded non-essential meetings and international travel for tele-working and Zoom calls, resulting in more time spent with our families, room for hobbies, a lower carbon footprint and a decrease in global emissions to name a few.

In particular, over the last several months I have spent a lot of time thinking about how we have navigated this change, how to apply key learnings, and how to help my colleagues and their teams adapt to the new normal that's set to arrive in 2021 and beyond.

Here's what I've learned so far:

Empathy comes first
At this time, more than ever, empathy must come first in every conversation. "Seek to understand before seeking to be understood" – Stephen Covey

Energy stores are generated by Self, Family, Work in that order
Focus on your own health and your family bond in order to supercharge your energy available at work.

Perspective helps people process change
Maximise your exposure to a wide array of opinions, including ones that conflict with what you believe.

Challenge your thinking and create new opinions. Share your learnings with your teams.

Get beyond the walls of your office

Get out of your home office, enjoy nature, listen to a podcast, or even take a call the "old school" way while walking around the neighborhood. Video conferencing is an incredible technology but it is not intended to replace every other form of communication.

Remote meetings

Evolve your format - Don't simply leverage Zoom as a platform for your meetings, evolve the way you conduct meetings to drive engagement, participation and most importantly collaboration – think about breakout rooms, post-it notes and whiteboard functionality to really change the experience.

Integrate podcasts to break-through monotony of webinars

In my opinion thoughtful dialogue delivered via podcast provides a different forum than conference calls or webinars and within my organisation, overall knowledge and learnings have dramatically improved.

Ruthlessly Prioritise

Focus on what is important, eliminate "busy work" with no tangible outcomes and help your teams prioritise outcomes over activity. Inspect the outcomes, not the tasks.

Communicate to your teams with an emphasis on 'why'

Help your teams connect every announcement or corporate change with the relevance to your organisation and why it matters. You should also make the connection clear as to how changes and developments will help employees deliver a better service/experience to your customers.

Cut yourself some slack

This is hard and not every idea you try is going to work. Be honest with yourself and your teams about what is working and what is not. Don't be afraid to show humility. We are going through 10 years of change in less than 12 months and there are bound to be bumps along the road.

There are countless other lessons to be learned from this year, but if you can integrate some of these learnings into your work life you'll soon see the benefits. Your colleagues will appreciate a conscious effort to lead by example through compassion and a laser-focus on outcomes. Indeed, companies and managers who place physical and mental health of employees first and foremost are set to attract and retain the best talent.

It's the leaders who champion empathy, an innovative way of doing business and an understanding and recognition of their employees' unique personal lives who will get the most out of their staff, regardless of whether this is in-person or remote. It will be interesting to see which companies get it right, and whether new companies emerge to take market share from those unable to adapt to this uniquely challenging environment.

> It's the leaders who champion empathy, an innovative way of doing business and an understanding and recognition of their employees' unique personal lives who will get the most out of their staff, regardless of whether this is in-person or remote. It will be interesting to see which companies get it right, and whether new companies emerge to take market share from those unable to adapt to this uniquely challenging environment

Using a value stream approach to go beyond DevOps and Agile

Software application development is a profitable and high-growth industry, with the UK market estimated to reach a value of £32.8bn this year. To compete effectively and remain relevant, organisations have focused on making sure the entire lifecycle, from concept to release, is as short and efficient as possible.

BY MIKE O'ROURKE, CHIEF R&D OFFICER, DIGITAL.AI

THE PUSH TO OPTIMISE the software development and delivery lifecycle has seen the creation of strategies such as DevOps, where software development and IT operations are integrated, and iterative Agile planning and management methodologies are adopted.

However, as many development teams have discovered, independent efforts to improve DevOps and agile practices can only take them so far. While individual processes might be optimised, many teams still lack a comprehensive view of the entire lifecycle, the insight to make data-driven decisions, and the ability to funnel knowledge learned in the field back into planning, development and delivery processes. One solution to this challenge is a value stream approach that concentrates on creating better visibility across the teams, tools and processes involved in software development and delivery. A value stream approach uses continuous analytics delivered through an integrated platform to establish a better understanding of the business impact of the software development pipeline, including customer satisfaction, revenue and growth. It connects the major components that enable the continuous development and delivery of software to provide visibility and

insight into not just the end-to-end process, but also into the impact and alignment with business objectives. Essential components to achieve this integrated view include Agile planning and project management, DevOps, application security, quality testing, and AI-powered analytics.

Improving agile planning and project management
At the heart of agile methodologies is a focus on continual improvement through collaboration and iterative planning. Taking a value stream approach to Agile enhances planning and management by providing visibility, tracking and reporting on work across all teams, locations, programs and portfolios. Crucially, this includes bi-directional communication between development teams and the wider enterprise. A value stream platform approach to Agile ensures that all teams have full context for the release pipeline, including the real value of their activity and how it impacts the
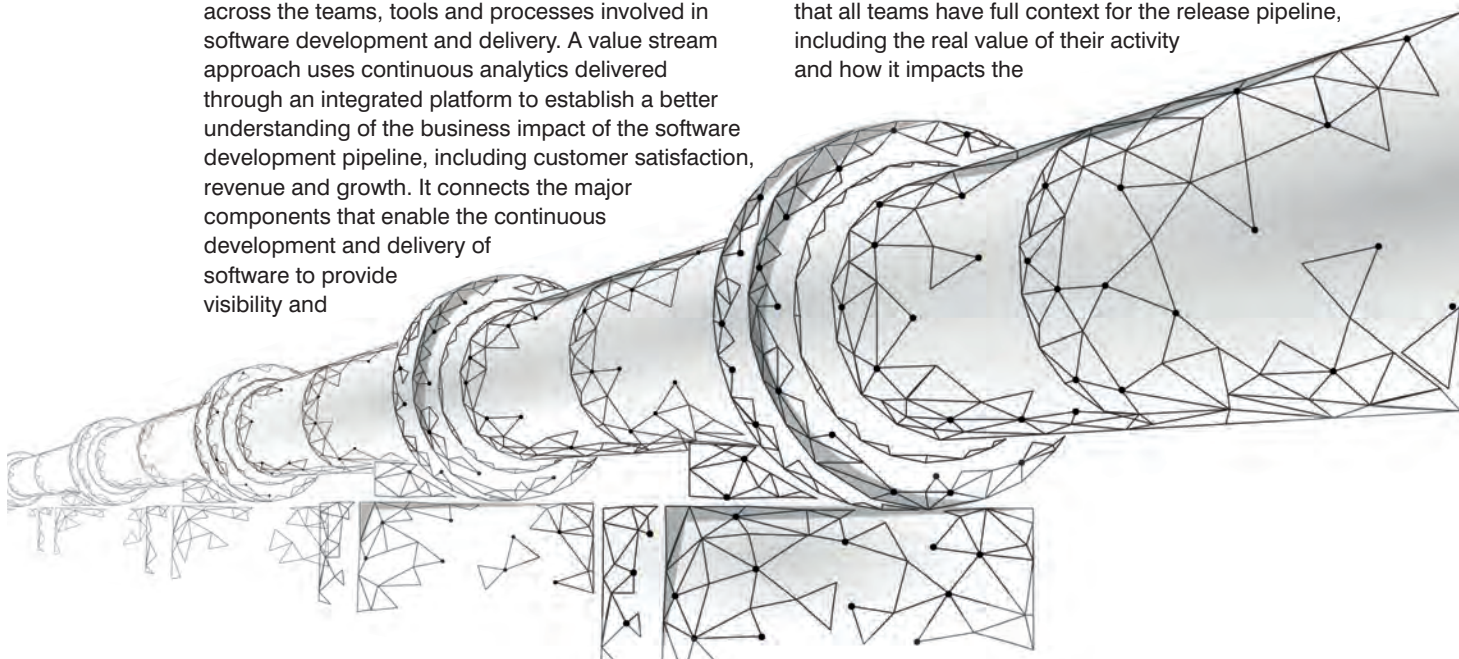
rest of the development lifecycle to improve the overall performance of the business. These capabilities are even more critical now, as teams are likely to be working remotely and be scattered across multiple locations.

Enhancing DevOps

DevOps involves a process of continual improvement to the development process, particularly through the application of automation to accelerate complex activities repeatedly executed across distributed teams. However, it is all too easy for this process to become overly focused on managing the technical steps and collating related metrics and lose sight of the wider business needs. With a value stream approach to DevOps, organisations gain a holistic view of the entire lifecycle and surface new opportunities to leverage the speed and predictability offered by DevOps, ensuring that IT outputs are aligned with business outcomes, and new tools and processes implemented will maximise value for the entire company rather than a single team or process.

Putting security first

In the race to release applications as quickly as possible, security has historically been overlooked in the development lifecycle. While it may shave some time from the development schedule, stinting on security has consistently been found to result in a product that is vulnerable to cyber-attacks and leave the customer, and ultimately the business itself, at risk. Instead, security measures should be woven into the code of the application itself. This integrated approach ensures security concerns are addressed at all stages of the software lifecycle and allows for the introduction of specific security capabilities, such as encryption and obfuscation to protect data at rest and in transit, as well as defences that can send an alert to the developer or shut the app down if users attempt to open it in a sandbox. Making security part of the value stream process reduces risk, eliminates rework, and improves customer trust, satisfaction and retention – all key components of driving sustained business value.

Optimising testing

Testing is one of the most important elements of the development process, as a slow, crash-prone app will result in poor customer satisfaction and loss of revenue. All new products and product updates therefore need to go through rigorous testing before they see the light of day.

However, for many organisations testing is also expensive and unpredictable. One of the biggest challenges of software testing is the sheer volume of systems and platforms that must be accounted for. The application must be fully functional on each of the many of different mobile and desktop devices, operating systems and browsers, in any possible combination. Automated testing is essential for analysing the different deployment possibilities

without impacting development time. A continuous approach to testing supported through a value stream approach can also help to dramatically speed up the release and deployment process, allowing iterations to be tested throughout the development process so that issues can be addressed as they emerge. This ultimately ensures that each product delivers greater value to the business by improving the team's responsiveness to troubleshooting issues, without causing lengthy and costly delays.

Iterating with AI-powered analysis

An essential element of both DevOps and agile software development and delivery is the ability to respond rapidly to feedback and coordinate continual changes to the operating environment. Rather than analysing the outcomes only after product release, continuous analysis throughout the development lifecycle makes it possible to iterate processes and increase value at each stage of development.

Increased understanding of software delivery performance and predictive assessment of areas for improvement can be enhanced with the use of advanced AI-powered analytics. By gathering data from throughout the development process and feeding it through natural language processing and machine learning algorithms, it is possible to continually assess performance across both development and IT operations and identify issues that are damaging efficiency or causing risk. The resulting insights can be used to inform changes to the value stream and resolve any issues early on. By using AI analytics to process data throughout the lifecycle and beyond, the organisation can unlock a far greater level of value from the development pipeline.

Keeping a laser focus on business outcomes, not outputs

While shortening product development and delivery lifecycles will continue to be a major initiative for organisations, they must not lose sight of the greater goal: driving business value. Each team should look at how they can help the business achieve objectives such as improving efficiencies, reducing customer churn, driving down OpEx and improving the speed of delivery. Rather than cutting corners, this must come through creating more efficient processes, with each development stage contributing as much value to the company as possible.

Keeping the value stream top of mind throughout the development lifecycle by providing end-to-end visibility and insights, enables teams to work together to improve both production efficiency and product quality. With a value stream approach that integrates each stage of development, organisations can build on investment in DevOps and agile management practices to ensure all activity is generating value that will lead to increased customer satisfaction and company growth.

Accelerating MLOps requires a mindset shift

There aren't any hotter topics in the software development world than machine learning operations, or MLOps for short.

BY KAI HILTON-JONES, SENIOR DIRECTOR OF SOLUTIONS ENGINEERING EMEA, GITHUB

ACCORDING TO LEADING ANALYSTS the market for MLOps is set to be worth as much as $4 billion by 2024 in the US alone. And it was one of just nine growth areas to make the cut in Deloitte's Tech Trends 2021 report.

But let's back up a minute. What exactly is MLOps? And more importantly, why do we need it?

Understanding the need for a new approach to developing machine learning models
AI, while still arguably a nascent technology, is maturing fast. Enterprises now recognise the power of machine learning and its ability to give meaning to operational data, helping generate insights, predict trends and, ultimately, provide a competitive advantage. But operationalising ML can be challenging. Development and deployment of models is often done in disconnected silos, and typically happens slowly. So slowly, in fact, that IDC research found that more than one-quarter of AI/ML projects fail - with lack of necessary skills and integrated development environments reported as major contributory factors.

Enterprises are waking up to the need to find a way

to incorporate ML model development into their DevOps processes, ensuring collaboration between data scientists and app developers to help bring ML models to production more reliably - and much faster. When you break it down into such simple terms, it sounds straightforward to implement. The industry has already made major strides in institutionalising DevOps over the past two decades, so adding MLOps into the mix should be simple, right?]]
In practice, things are more complex. Taking MLOps from concept to reality requires a keen understanding of the mindset and tools required to make it a success. And that requires understanding why MLOps is a discipline in its own right and not a bolt-on to DevOps.

The difference between MLOps and DevOps
The bottom line is that the kinds of problems developers face in machine learning are fundamentally different to the problems they face in traditional software coding. It's not enough to port your continuous integration and continuous deployment (CI/CD) and infrastructure code to machine learning workflows and call it done.

Functional issues, like race conditions, infinite loops, and buffer overflows, don't come into play with machine learning models. Instead, errors in machine learning development tend to come

from edge cases, lack of data coverage, adversarial assault on the logic of a model, or overfitting. Edge cases are the reason so many organisations are racing to build AI Red Teams to diagnose problems before things go horribly wrong.

Ultimately MLOps and DevOps are solving a different set of challenges. In the last few years, DevOps has gradually shifted away from a culture of CI/CD and towards Git-based techniques to manage software deployments. by using Git as a single source of truth, developers can build robust declarative apps and infrastructure with ease. This transition has made software less error prone, more scalable, and has increased collaboration by making DevOps more developer-centric. But when it comes to machine learning applications, DevOps gets much more complex.

Machine learning development and traditional software development have many similarities. But the differences - which are often subtle - are enough to throw a development team completely off track if they rigidly stick to a standard software development process. Because MLOps is still emerging, data scientists are often forced to implement tools that support development from scratch. Many DevOps tools are generic and require the implementation of "ML awareness" through custom code. Furthermore, these platforms often require disparate tools that are decoupled from your code leading to poor debugging and reproducibility.

To illustrate the degree of complexity and unique requirements in machine learning development, here is a snapshot of some of the specific challenges MLOps need to solve:
- Model reproducibility and versioning
- Track, snapshot and manage assets used to create the model
- Enable collaboration and sharing of ML pipelines
- Model auditability and explainability
- Maintain asset integrity and persist access control logs
- Certify model behaviour meets regulatory and adversarial standards
- Model packaging and validation
- Support model portability across a variety of platforms
- Certify model performance meets functional and latency requirements
- Model deployment and monitoring
- Release models with confidence
- Monitor and know when to retrain by analysing signals such as data drift

Addressing all of those challenges in MLOps hinges on a new approach to an enterprise's most valuable IT asset: data.

So what should MLOps look like?
A brand new set of tools is required to bridge that gap

between traditional DevOps and MLOps. Data is the critical factor. Effective machine learning development requires versioning data and datasets in tandem with the code. In turn, that means we need tools that are bespoke and unique to the many challenges of developing machine learning models at scale. In its simplest terms, DevOps covers the collaboration between development and operations disciplines to streamline software delivery, while MLOps smoothly integrates data science and data engineering into existing DevOps processes.

How is MLOps operationalised?
Buying the tools you need for MLOps is the easy part. There are plenty of tools available that can help teams to track, version, audit, certify and re-use every asset in your machine learning lifecycle and provide orchestration services to streamline management of the whole process. And GitHub Actions can go even further by integrating parts of the data science and machine learning workflow with a software development workflow.

But just like DevOps, MLOps is not a product that can be bought and installed. It's a set of processes that need to be agreed, nurtured and constantly evaluated and tweaked. The harder part is developing a supportive culture for MLOps that recognises and celebrates its uniqueness as well as its close ties with DevOps. Putting in place the understanding of why MLOps is different and institutionalising that ethos is more than half the battle. It takes training, a commitment to reworking existing processes and a fixation with what successful MLOps delivers: fast and reliable models that deliver business value.

And there's another upside that can't be underestimated. Collaboration between data science and operations engineers not only eliminates inefficiencies through automation, it also frees up developers and data scientists to spend more time doing what they love most. And that can only be good for the future of open source innovation.

How GitHub and DevSecOps
provides a seamless experience for developers

There is no doubt that enterprise IT infrastructure has undergone radical changes over the last few years.

BY PAUL FARRINGTON, EMEA CTO AT VERACODE

WHILE Lean DevOps has moved application development practices ahead in terms of speed, reliability and resilience, they are still often lacking in ensuring robust security. For this reason, DevSecOps was introduced into the software development lifecycle (SDLC) to bring development, operations and security together under one easily accessible umbrella.

DevSecOps streamlines the detection of insecure code at every phase, driven by enhanced automation in the software delivery pipeline. This significantly minimises the potential of human-generated mistakes and reduces the risk of future attacks and downtime. A recent State of DevOps report found 45% of companies that have fully integrated security into pipelines can close vulnerabilities within one day

from discovery. Competing demands and priorities mean developers are under intense pressure to meet tight deadlines, and often pull from open source libraries that have vulnerable code. In fact, a survey by Veracode and Enterprise Strategy Group (ESG), Modern Application Development Security, found 54% of organisations push vulnerable code just to meet critical deadlines. While developer teams plan for remediation on a later release, lingering flaws only add to risky security debt. With speed a critical factor in what makes or breaks the success of an organisation's application deployments, this means the health of code – and a business' security – is on the line.

How can companies ensure their DevSecOps practices are seamless?

By integrating DevSecOps practices and code scanning tools into popular developer environments, the process of creating secure software become seamless, improving efficiency and efficacy. For example, GitHub Actions connects tools to automate every step of the development workflow, solving the need for speed without sacrificing security and quality. This enables developers to stay on schedule by allowing them to build, test and deploy, all within the GitHub User Interface (UI) and of course at the command line too. There will be no more need to dive in and out of third-party interfaces and platforms when they have a coding issue!

When paired with the right application security (AppSec) scan types and SaaS solutions, this integration makes GitHub Actions an invaluable part of the development team's workflow.

Tools accessible in a familiar interface mean developers can jump right into secure coding, with critical testing and analysis that won't slow down production.

Being where developers are to deliver enhanced workflows

With native integration, developers can perform Static Analysis (SAST) scans from within their own GitHub projects, which significantly expands the testing capability for developers using GitHub workflows, and allows them to build security into their DevOps processes to scale development across their team. Scans can complete within seconds to minutes so that pipelines flow fast, and developers can easily tune-out findings that are not relevant.

Working within the GitHub environment, developers have the control to which they are accustomed. Scan results are converted into GitHub code scanning alerts and developers receive clear remediation advice natively to keep their projects moving forward with fewer delays. Once code is at the deployment stage, the Policy Scan provides a thorough assessment of the application's codebase and leaves an audit trail for compliance to prove security efforts.

> By integrating DevSecOps practices and code scanning tools into popular developer environments, the process of creating secure software become seamless, improving efficiency and efficacy

Using technologies which are already wildly popular with developers means far less downtime and fewer bottlenecks to achieve faster innovation. With such a high frequency of commits flowing through GitHub – where more than 2,000 direct contributors made commit contributions to TensorFlow alone in 2019 - having a SaaS-based, multi-scan solution provides developer teams with a leg-up when it comes to harnessing GitHub Actions for speed and efficiency.

Why more businesses need to develop secure software

Renowned Silicon Valley Venture Capital firm, Andreessen Horowitz, predicted the future correctly when it said, "software will eat the world". Today, software is a critical part of our daily professional and personal lives and it is time more companies understood the importance of shifting left in the development lifecycle to enable teams to find and fix flaws at scale.

As our latest global research in the State of Software Security (SoSS) Report found, 76% of applications have at least one flaw, which shows the risk that still remains hidden in the software we use. By first integrating and then automating application scanning, this should reduce the risk caused by delays in remediating software flaws.

Fostering a proactive collaboration between developer teams and Application Security professionals is one way to improve the hygiene of many enterprise IT infrastructures. Having easily accessible technology to fix software vulnerabilities quickly is another. Powered by analysis of more than 21 trillion lines of code to date, our technology provides developers today with the accurate insight to naturally secure their work.

This means a reduced time to market for businesses, which is certainly a competitive advantage in a troublesome global economic environment.

Reconnect with DevOps productivity best practices

For those in the ever-changing DevOps world, here are some best practices to reconnect with that can help you to start the new year off with the best foot first.

BY NICK MILLS, GENERAL MANAGER, EMEA, CIRCLECI

From the builder to the building block of enterprise success
FOR THE LONGEST TIME, developers were just expected to build things. They were given a set of tools, told what to build, and seen as a cost centre. As companies have become totally software-driven, that perspective has shifted. Instead of seeing the development team as this cost centre to control, top enterprises are thinking about how to maximise the capabilities and productivity of these expensive, hard-to-hire, skilled experts. In fact software delivery is a huge competitive differentiator.

Continuous integration and deployment have become key in achieving success for businesses, and so the decision-making power of developers has grown.

Continuous deployment has become the aspirational goal for most software delivery teams - and so they remain in demand at all times. For the always-on team, it's important to stay fresh and keep striving to hit the top of their game.

This year has been tough. The minute COVID-19 really impacted society, enterprises realised that they could not rely on access to a build machine sitting underneath a developer's desk. Being able to move quickly and reliably has become core to what software delivery teams have to do as first-class individuals with budget and decision power to keep the whole organisation delivering.

Develop better practices by learning from industry
CircleCI has massive amounts of unique data on how technology delivery teams perform. This year's 2020 State of Software Delivery: Data-Backed Benchmarks for Engineering Teams report examines over 55 million data points from more than 44,000 organizations and 160,000 projects. The software delivery patterns observed, especially the data points from top delivery

teams, show key similarities that suggest valuable benchmarks for teams to use best practices.

- **Throughput:** The number of workflow runs matters less than being at a deploy-ready state most or all of the time.
- **Duration:** Teams want to aim for workflow durations in the range of five to ten minutes.
- **Mean Time to Recovery:** Teams should aim to recover from any failed runs by fixing or reverting in under an hour.
- **Success Rate:** Success rates above 90% should be your standard for the default branch of an application.

And beyond these goals, some best practices, from the big to the niche, are important to keep up as we head into what we hope will be a better year.

From the technical...

Know when code Is being deployed:
If new versions of services are being deployed throughout the day, make deployments visible to the wider team. You can use various solutions, like CircleCI, Rollbar, and Slack together to make sure everyone knows when code is being deployed.

Prevent broken code from being deployed:
Some bugs do make it past tests, and are deployed to production. One class of bugs that often slips through unit tests are where (well-tested) software components are configured or combined incorrectly right at the top level of the app. If a team uses Kubernetes, for example, they can use its power to give an extra safety net when deploying, to catch such bugs. Consider a service running on three pods.

When deploying a new release of the service, one pod is started running the new code. Once this pod is healthy, one of the old pods is terminated, and a second new pod is started. Rolling the pods one-by-one ensures there are three healthy pods in production as code deploys. If a new pod fails to start, Kubernetes will restart the new pod, leaving the remaining pods in place.

Ensure messages are delivered:
Any service that runs in production might be terminated at any time, and the danger is that a service might consume a message from a message queue, and be shut down before it has a chance to take the required action. This has the same effect as the message being lost. Ensure teams can defer acknowledging the receipt of messages until they have performed the required action.

...To the corporate

Think 'fast': The value of speed is clear. For IT organisations it's no longer about control - it's about building tools on behalf of all the software development teams inside of an enterprise and helping everyone collaborate.

Think long-term: The way you scale is by making the mundane highly leverageable. For example, can everyone on the team act as a great recruiter? Does the office space (or remote working practices) encourage open collaboration, ideas sharing, and simple handovers? Are tools helping more than holding back? Look at every part of the system and optimise for scalable and repeatable success.

Keep learning: DevOps teams are doing incredibly interesting things: from building autonomous vehicles to space vehicles to machine learning to everyday mobile applications, and everything in between. Stay humble and keep learning from the industry. Find your heroes and follow them - keep learning from success stories.

Hire dedicated engineering managers: Often you'll have engineers managing engineers, but management is a separate skill-set. And as technology execs transition through growth stages and rise within the business, they need to hire great technical leaders who can be given autonomy.

DevOps has a bright future in 2021, and reconnecting with the right mind-set will set the team up to succeed. Whether a coder or a manager - ensure the team secures headspace to focus on upskilling, being productive, and focusing on the factors that drive scaleable success.

For those businesses scaling up from seed to series C, it's worth taking a look at the Sifted 'Building tech teams' report, made with CircleCI, to learn from those who have successfully managed their transformations.

Adaptive computing platforms deliver efficient AI acceleration

AI has begun to change many facets of our lives, creating tremendous societal advancements. From self-driving automobiles to AI-assisted medical diagnosis, we are at the beginning of a truly transformative era.

BY GREG MARTIN, DIRECTOR, STRATEGIC MARKETING, XILINX, INC.

BUT WITH OPPORTUNITY, comes challenge. AI inference, the process of making predictions based on trained machine learning algorithms, requires high processing performance with tight power budgets, regardless of deployment location – cloud, edge or endpoint. It's generally accepted that CPUs alone are not keeping up and some form of compute acceleration is needed to more efficiently process AI inference workloads.

At the same time, AI algorithms are evolving rapidly, faster than the speed of traditional silicon development cycles. Fixed-silicon chips like ASIC implementations of AI networks risk becoming quickly obsolete due to the rapid innovation in state-of-the-art AI models.

Whole application acceleration

There is a third, less well-known challenge. This centers around the fact that AI Inference does not get deployed in isolation. Real AI deployments typically require non-AI processing, both before and after the AI function. For example, an image may need to be decompressed and scaled to fit the AI model's data input requirements.

These traditional processing functions must operate at the same throughput as the AI function, again with high performance and low power. Like with the AI inference implementation, the non-AI pre and post processing functions are beginning to need some form of acceleration.

To build a real application, the whole application needs to be implemented efficiently. In a data center application, the application may have thousands or even millions of parallel instances. Every fraction of a

Watt that can be saved per instance will make a huge difference to overall power consumption
A solution is viable only if the whole application meets both the performance goal, through acceleration, and the power requirements, through greater efficiency. So how do we viably implement a whole application acceleration?

There are three key elements: the ability to build a custom data path; use of a single-device implementation; and the ability to take advantage the latest AI models as they continue to rapidly evolve and improve. Let's take a look at all three elements.

The ability to build a custom data path

Most forms of AI inference operate on streaming data. Often the data is in-motion, such as part of a video feed, medical images being processed, or network traffic being analyzed. Even when data is stored on disk, it's read off disk and streamed through the "AI application".

A custom data path provides the most efficient method for processing such data streams. A custom data path frees the application from the limitations of a traditional Von-Neuman CPU architecture, where data is read from memory in small chunks, operated upon and written back to memory. Instead a custom data path passes data from one processing engine to the next, with low latency and the right level of performance. Too little processing performance would not meet the application's requirements. Too much performance would be inefficient – wasting power or physical space with capability that's sitting idle. A custom data path provides the perfect balance – rightsizing the implementation for the application.

Single device implementation

Some solutions are good at AI inference, but not whole application processing. Fixed-architecture devices such as a GPUs generally fall into this category. GPUs can often be capable of high Tera-operations per-second (TOPs) numbers, a common performance metric, but AI inference performance typically needs to be matched with pre and post processing performance.

If the non-AI components cannot be efficiently implemented on the same GPU, a multi-device solution is needed. This wastes power by requiring data to be sent between devices, which is very inefficient and costly in terms of power consumption. A single device that can efficiently implement the whole application has a significant advantage in real-world AI inference deployments.
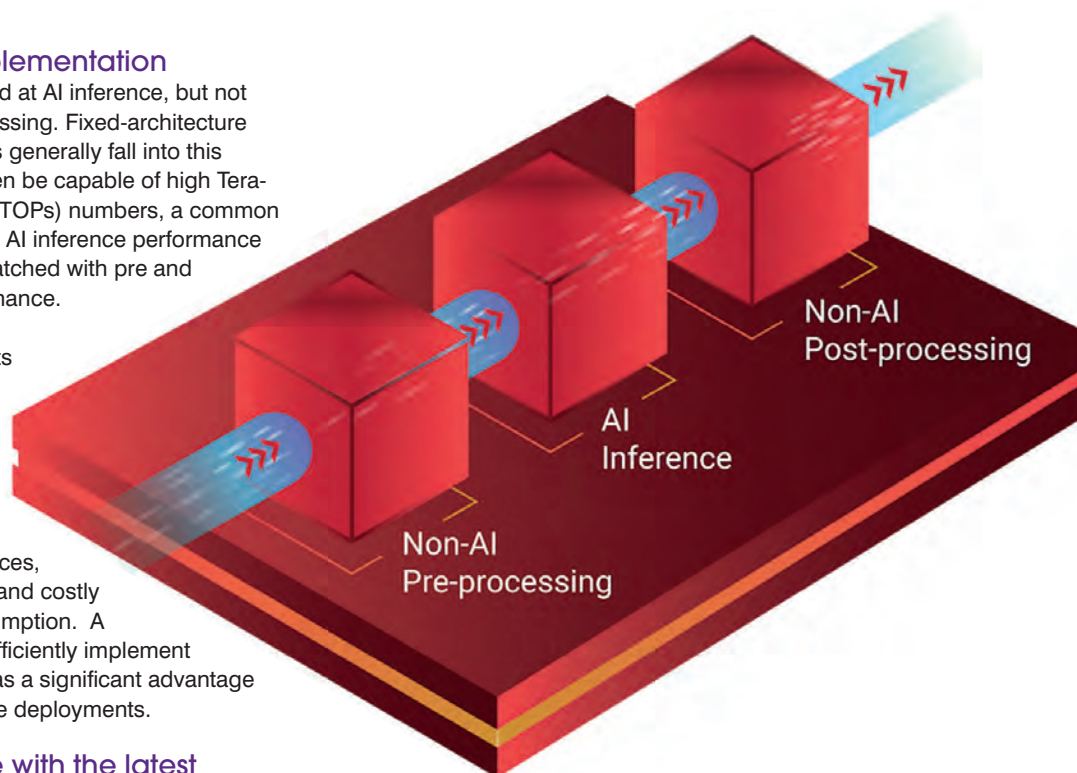
Adapt and evolve with the latest AI models

The pace of innovation in AI is staggering. What's considered the state of the art today could easily be rendered nearly obsolete six months from now. Applications that use older models risk being uncompetitive, so the ability to rapidly implement the latest models is critical. So what technology allows dynamic updates of the AI models while providing the ability to build a custom data path to accelerate both AI and non-AI processing in a single device? The answer is adaptive computing platforms.

Adaptive computing platforms

Adaptive computing platforms are built on hardware that can be dynamically reconfigured after manufacturing. This includes longstanding technologies such as FPGAs, as well as more recent innovations such as Xilinx's AI Engine.

A single-device platform such as Xilinx's Versal™ Adaptive Compute Acceleration Platform can accelerate both the AI and non-AI processing functions, by allowing custom data paths to be built. They are also capable of implementing the latest AI models quickly and efficiency because the hardware can be quickly reconfigured. Adaptive computing devices provide the best of both worlds. They offer the efficiency benefits of custom ASICs without the lengthy and expensive design cycles.

Xilinx Versal AI Core Series VC1902

The best implementation of an AI application doesn't need to be the fastest, it needs to be the most efficient, yet remain flexible. It must be right-sized, delivering the performance that's needed, nothing more and nothing less.

Summary

As AI inference becomes more pervasive, the challenge is not just how to deploy the AI model, but how to most efficiently deploy the whole AI application. When applications are replicated thousands or even millions of times, a small energy saving in each instance could save an entire power station worth of energy. When you multiply that by the myriad of new AI applications under development, the effects will be dramatic.

There should be no doubt that efficient acceleration of whole AI applications should be a goal for all in the technology industry and adaptive computing platforms provide a competitive solution.

It's time for change:
looking to the Edge

For many years industry has been limited in its ability to process big data due to the limited bandwidth available in national infrastructure. With the advent of 5G and fibre optic techniques expanding capability up to 800G, the game has changed.

BY MATT VALENTINE, MANAGING DIRECTOR, ARUBA UK&I

INDUSTRY CAN NOW ACCESS data across the whole network in real-time. In the past, this was processed centrally at regional data centres but with the explosion of the amount of data industry can now get its hand on, it's being processed at the fringes.

The question is: why does this matter? The intelligent edge has the potential to power real-time analysis and surface actionable insights that can boost operational efficiency and accelerate innovation. Additionally, it will open up new opportunities and revenue streams that simply weren't possible before. As immersive and personalized experiences come to the fore, ultimately the edge will enable industries to fulfil the next stage of their digital transformation.

But there's a lot to do before this can happen. We first need to look at where we are today and what else has to be done to get us from here to there. These were some of the driving questions behind one of Aruba's latest reports looking at current perceptions of Edge, with the results painting a picture of huge potential.

Addressing key barriers
The results from the survey showed that 44% of ITDMs in the UK are already using Edge technologies

to deliver new outcomes - and a further 21% are planning to do so in the immediate future. Meanwhile, as many as 57% believe their need for an integrated system at the Edge is urgent. However, it will take a while for the results of these investments to be realized, and businesses need to remain patient. Only a small minority (5%) said they were within six months of being able to act on most of the data collected from their network. In contrast, 37% told us that it'll take 18 months just to get to this stage.

All the data, yet no solution

The amount of data available is rapidly growing daily, and the ability to make use of it is unprecedented. As ITDMs grapple with this growth within their networks, they are consistently looking towards the cost and latency benefits of Edge technologies. 24% told us there are already drowning in the amount of data being generated, while another 30% said they can't process data fast enough to act on it. That said, results also identified that IT leaders are thinking more broadly about potential use cases. A significant number are looking to the Edge to support organizational agility, not just efficiency, and fuel the creation of new products, services, and revenue streams.

Skills, security, cost, and concerns

There are still some barriers preventing further implementation at the Edge. Unsurprisingly, cost case

up as one of the most prevalent concerns, but there were two others: a shortage of specialist data skills and fears over new security vulnerabilities.

Almost every organization surveyed in the UK (87%) thinks they are missing at least some skills (i.e. AI, analytical, technical) needed to help their organization unlock the value of data. Meanwhile, there are justified concerns over the security implications of connecting high volumes of devices at the Edge - 59% of ITDMs said that connecting IoT or user devices at the Edge had made, or would make, their businesses more vulnerable. However, 25% further identified improved security as one of the biggest benefits of capturing data from user devices.

Heading for the Cloud

We know that Edge is still a work in progress for many. Our research identifies the steps companies have to take towards this goal and towards the next stage of their digital transformation journey. Harnessing insights at the Edge is a huge opportunity for businesses to revolutionise their approach to data and unlock its true value and purpose. Those that can store, process and analyse at the Edge, will be better equipped to optimise their existing business model, and over time, develop innovative products, services and experiences that will not only augment but transform their offerings for customers.

The resilience of RegTech:
compliance's saving grace?

It's now crucial that financial institutions think about RegTech as part of their wider transformation strategy and reap its potential to provide real-world solutions for today's ever-changing landscape.

BY PHILIP MILLER, CO-CEO AND CO-FOUNDER, SOLIDATUS

THE USE of RegTech has skyrocketed within the financial sector in recent years[1]. This is hardly surprising considering the sheer amount of data that companies now generate – alongside an equally rapid increase in compliance burdens. Estimates suggest that the size of the global RegTech market is expected to grow from $6.3 billion in 2020 to $16 billion within five years[2]. This enormous growth has been driven by huge innovations in computing power, the falling costs of emerging tech, and the data explosion. This growth has inevitably also created huge opportunities for RegTech providers to ease many of the pain points that financial institutions are now facing in keeping up with this rapid pace of change and its resulting compliance burdens.

Before the 2008 financial crisis, compliance was frequently seen as a legal tick-box exercise, often side-lined to small departments within businesses. Now, over a decade later, surges of new rules and regulations have hit the financial industry at a staggering rate, continuously adding more to the already extensive and ever-growing list of requirements in place. This, matched with stringent timelines set by regulators, has resulted in many companies facing hefty fines and aggressive consent orders. In fact, over $36 billion worth of regulatory fines have been levied against financial institutions since the 2008 banking crisis[3].

Weathering the Covid-19 storm

The pandemic has forced businesses – and all departments within them – to rethink entire processes at lightning speed. While the use of technology to comply with regulation isn't a new phenomenon, a huge number of regulatory rules that were bought in since the financial crisis have been adjusted since the pandemic took hold, including the addition of yet more obligations[4]. Financial institutions have had to find ways to carry on as 'business as usual', which is particularly difficult when the entire workforce is doing so from home.

Although the intensity and duration of the economic fallout from Covid-19 remains difficult to estimate

> Unexpected events such as staff falling ill, personal responsibilities like childcare, redundancies, furlough and the ongoing search to reduce costs have further incentivised the automation of compliance processes to make sure that cracks do not appear

at this point, the financial sector has consistently shown its resilience. As part of this response to the changes forced by Covid, recent events have now thrown an even brighter spotlight on RegTech's value, and the industry is now at a pivotal moment in its development.

When used to its advantage, the key benefits of RegTech are two-fold. Its ability to automate manual processes, increase consistency, expand coverage, and improve the effectiveness of compliance – all whilst creating greater business efficiencies – have proved invaluable in today's climate. With ongoing lockdowns and remote working, companies have been forced to restructure and reallocate human resources across the business. Unexpected events such as staff falling ill, personal responsibilities like childcare, redundancies, furlough and the ongoing search to reduce costs have further incentivised the automation of compliance processes to make sure that cracks do not appear.

Yet, despite its undisputed value and the strong financial arguments for implementation, the current uncertainty has meant that some have held back on investment in RegTech, sometimes due to perceived initial expense or internal barriers such as employee resistance to embracing new tools. This is especially true when there is a lack of clarity around the return on investment (RoI) that RegTech should deliver and how to measure its success against targets. This often stems from a failure to capture the correct financial data. Whilst a huge factor is its potential cost savings, a holistic view is needed to identify where it will add real value, enhance risk management, and also increase revenue generation within the business.

To engage key stakeholders across the entire compliance and technology network, clear objectives and a well-defined project scope is essential to the overall success of adoption. For example, our platform solution allows businesses to coherently map all of their internal data against a tailored set of compliance issues which can then be easily understood without requiring in-depth technical knowledge or lengthy training. This visual representation of the lineage allows data to be mapped, assessed, and evaluated, without needing to trudge through various archives

and data tables to reach similar conclusions. By implementing robust, innovative, and in some cases disruptive RegTech solutions like these that make compliance and data processing more accessible and efficient, companies can further improve understanding, performance, and efficiencies – and ultimately provide far greater assurance that business operations will remain resilient, especially in times of crisis.

RegTech as part of a wider transformation strategy Regulation enforcement is showing no signs of slowing down, and according to a Thomson Reuters report, in 2019 alone, 56,000 new updates were tracked from over 1,000 regulatory bodies, at a rate of 217 a day. Whilst there are considerations associated with its implementation, it's now crucial that financial institutions think about RegTech as part of their wider transformation strategy and reap its potential to provide real-world solutions for today's ever-changing landscape.

Many of the problems created thus far by Covid-19 have been significantly mitigated with integrating appropriate systems, controls, and technology as part of cloud-based compliance programmes. However, it's not enough to patch these issues together with temporary solutions. It's crucial that any RegTech implementation is considered a permanent, value-added initiative that will provide infinite value even in a post-Covid world.

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The top emerging technologies for finance organisations

Cloud ERP, advanced data analytics and data storage are the most likely emerging technology investments for corporate finance through 2024, according to Gartner.

A STUDY of 167 finance organizations in November 2020 showed a widespread intent to invest in emerging technologies in the next three years, with cloud enterprise resource planning (ERP) being the most favored choice, according to Gartner, Inc.

"Many finance organizations are trying to figure out the digital landscape and ways to identify and execute cost savings opportunities in order to allocate more funding to digital initiatives," said Dan Garvey, vice president in the Gartner Finance practice. "As with many business functions, COVID-19 has accelerated the pace of finance investment in digital transformation."

While digital transformation has been a major priority for finance organizations in the past, the pace of transformation has materially changed. "Digital investment and transformation are no longer things that CFOs can take a 'wait and see' approach on or throw small investments at. The time is now, and CFOs need to act swiftly," said Mr. Garvey.

Figure 1. Likelihood of Investment in Emerging Technologies in Next Three Years

N=167 Source: Gartner (November 2020)

N=167 Source: Gartner (November 2020)

Advanced data analytics, data storage, and robotic process automation (RPA) were all likely areas for investment in the next three years, while artificial intelligence (AI) and blockchain were less common responses (see Figure 1).

"It's not surprising to see cloud ERP as the top choice for finance organizations because it is a maturing technology with clearly established benefits that offer an escape from the bloated 'monolithic' ERP systems of yesteryear," said Mr. Garvey. "Advanced analytics, data storage and RPA are also all established technologies with well-proven use cases in finance." AI and blockchain, however, are not so well-established and for many finance organizations would pose bigger implementation problems and a less certain return on investment. Moreover, it is possible to get some exposure to the potential benefits of AI without investing directly.

"Many cloud ERP and advanced analytics offerings are increasingly offering embedded AI capabilities, and that neatly solves many challenges around integration and in-house expertise," said Mr. Garvey. "There's no doubting the potential of building your own AI, but is the finance organization capable of realizing that potential?"

Blockchain also has great transformative potential, but right now out-of-the-box use cases are also limited and not applicable to most of the work that the finance organization conducts. The size of the business in revenue correlates closely with its propensity to invest in AI, Blockchain or the Internet of Things (IoT).

"This is likely in part because of the sophistication of an organization's IT infrastructure," said Mr. Garvey. "Implementing AI, blockchain or IoT is unlikely to be simple, and there are lower hanging fruit for most finance organizations that want to drive meaningful gains with emerging technologies."

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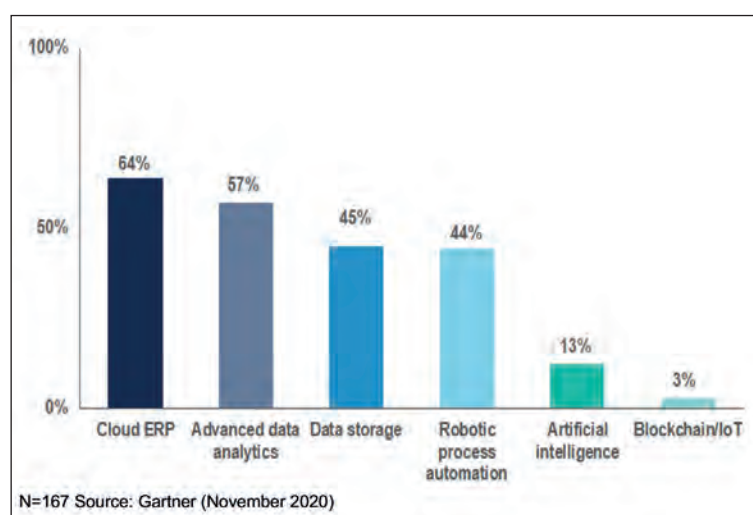
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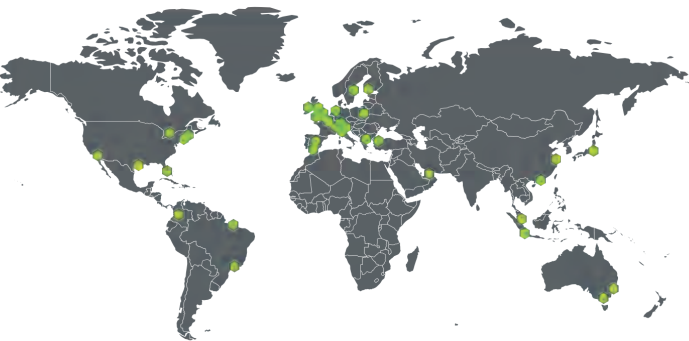
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Five ways insurance will change by 2025

I've never seen so much evidence from within the Insurance industry that we're on the cusp of a fundamental change.

BY ADAM GOLDSMITH, INSURANCE SPECIALIST, SAS UK & IRELAND

GIVEN THE DISRUPTION we've witnessed over the last 12 months, and the level of uncertainty that persists, it's very difficult to generalise and predict how the industry will change as a whole. However, one thing that is for certain is that the industry is already in the eye of the storm. Change isn't on its way, it's arrived!

General insurance will look very different come 2025. The big question becomes whether firms are ready to face up to the challenges and opportunities that lie ahead. As Charles Darwin said: 'It is not the strongest of the species that survives, nor the most intelligent, but the one most adaptable to change.'

1.) Insurers will achieve joined-up customer understanding

A typical Insurer today is set up in very traditional manner. There remains distinct, separate departments for the key functions: including assessing risk, acquisition, customer engagement, claims handling, customer protection and renewal. This is in addition to maintaining the operational, financial and organisational support structure that's needed for the firm to survive.

Yet very few insurers have a truly joined-up view of a customer's full journey with their organisation, let alone what can be done to optimise each interaction. What's needed is the ability to understand each customer touchpoint as they traverse through their journey, as well as the ability to make decisions as to how best to engage them.

This imperative is more urgent than it might appear. One example of a forced change for insurers is

the recent FCA final report on home and motor pricing that was very critical of 'complex and opaque' pricing processes. In particular, it criticised the industry's 'loyalty tax' on customers that renew with the same providers each year. With this regulatory mandate for change, insurers will be forced to take a more holistic approach to the way they price policies for their customers, across both new business and renewal processes.

Insurers often cite legacy policy admin and claims systems as the biggest barrier standing in the way of this approach being adopted. By 2025, however, the most successful insurers will have broken those barriers down, gaining an unprecedented understanding of their customers' needs and preferences, and the ability to offer pricing plans that are both fair and competitive.

2. Insurance will transition from a digital business to an algorithmic business

We've long heard of 'digital transformation' being a key objective for insurance executives. However, by 2025 it's expected that successful insurers will have completed this transformation. Digitalisation will no longer be the differentiator, it will be the default. As a result, a new way to drive business advantage will have to emerge – and it will be centred on the use of algorithms to drive business decisions. This is not a new concept. Gartner describes algorithmic business' as the 'industrialised use of complex mathematical algorithms pivotal to driving improved business decisions or process automation for competitive differentiation'.

We've already seen some insurers start this journey in their claims function. Companies, including Aviva, have long automated decisions concerning whether a vehicle is deemed a total loss or not. However, the trend will become much more prevalent, with Gartner research predicting that, by 2023, over 33% of large organisations will have analysts practicing decision intelligence, such as decision modelling.

3. Customer interactions will change

It's clear by now that COVID-19 will fundamentally change how insurance is done – both in terms of how customers want to interact with insurers, and also how insurers need to adapt. While we hope this pandemic won't be with us forever, it has opened the eyes of many executives to what is possible within the customer-facing parts of their organisation.

From my discussions with insurers, many have commented on how well employees and customers have adapted to the new normal. While there were initial logistical hurdles in virtualising contact centres, they've been impressed at how well staff have adapted under pressure to deliver what customers and shareholders expect . Many are likely to follow the approach of Lloyds in allowing staff to work remotely for the foreseeable future. Indeed, the previous

months have exploded the myth that minimal policyholder interaction is a barrier to customer experience innovation. Technology can more than fill the gap. As companies like By Miles have shown, on-demand or telematics-based products can deliver an insightful monthly, weekly or even daily dialogue with customers.

4. Risk prevention will become the norm

Insurance has long been society's safety-net, protecting us when something goes wrong in our lives. Yet, it would be to everyone's benefit if risk could be avoided altogether. The use of telematics to assess the risk of younger drivers was the first big industry push here, but by 2025 we will see this becoming ubiquitous across many other products and customer demographics.

The recent example of Munich Re's acquisition of IoT service provider Relayr will benefit manufacturers with a 'pay as you use' model. This will enable them to be more flexible and react faster to market changes. The IoT Observatory is also exploring new ways that data extracted from connected sensors and devices can help to transform risk assessment and empower insurers with data.

This is no small step for any traditional insurer. But it is one that puts a truly customer-centric lens on the service that insurers deliver. Data-driven risk prevention allows for significant product differentiation, taking insurers out of their comfort zone and enabling them to explore whole new opportunities.

5. Looming recession will be a breeding ground for new fraudulent activity

Come 2025, we will be living in a very different world with new risks that require novel insurance solutions to resolve. One of the largest looming threats is insurance fraud. Recent analysis from the Insurance Fraud Bureau shows that fraudulent claims rose by 5% in 2019, and there are concerns the current economic climate could see this rise even further. In the aftermath of the 2008 Financial Crisis insurance fraud rose by 17%, and there's no guarantee this won't happen again on the back of growing practices like crash for cash fraud and ghost broking.

Putting in place an effective defence mechanism to intelligently detect, prevent and investigate potentially fraudulent claims will be an essential requirement by 2025. Fraudsters are nothing if not resourceful and they regularly target the weaker insurers. A soft defence is a liability while those that take fraud detection seriously will drive a more profitable outcome. This is especially true when it was announced recently that close to 20% of each policy premium is goes to cover the cost of fraud.

So, there's plenty for insurers to ponder and get right if they're to be competitive in 2025.

Walking the innovation tightrope:
Balancing strategic cost-cutting with cloud investment

The financial services industry has undergone drastic, technology-led change over the past few years.

BY TOM SCHRÖDER, DIRECTOR INTERNATIONAL PARTNERS AND STRATEGIC ALLIANCES, SERVICEWARE

EVEN BEFORE THE PANDEMIC, the industry was facing increasing pressure to keep up with rapidly evolving customer expectations, digital-savvy challenger brands, and the need for stricter regulation and security. The events of recent months, however, have acted as the much-needed rocket fuel to the innovation engine for many organisations. In fact, findings from the McKinsey Consumer Pulse Survey reveal digital engagement levels among European customers have increased by 20% since the beginning of the pandemic.

This has subsequently pushed financial institutions and banks to rapidly digitise current offerings. Digital transformation in the sector has reached a clear and distinct tipping point – and now, it is increasingly apparent that those who do not invest in a digital future will be left behind.

Whilst the race towards a more innovative and customer-centric future has already begun, many financial organisations are yet to fully recover from the full impacts of the pandemic. And with further economic turbulence on the horizon, it is crucial that financial services businesses leverage strategic cost measures to not only mitigate the impact of short-term pandemic fallout, but most importantly recover and succeed in the long-term. Whilst many businesses have turned to reducing staff numbers as a means of releasing liquidity, this simply isn't a realistic option. Employees are an organisation's most valuable asset – and it will ultimately be these workers that are needed to rebuild what has been lost during the pandemic. Instead, financial organisations must explore where efficiencies can be made when it comes to other costs and spend.

Striking the balance between cost and innovation

Cloud is one area of innovation that holds huge potential for the financial sector and that can offer significant cost savings if used effectively. Whilst many financial institutions already use cloud-based software for business processes such as customer relationship management, HR and financial accounting, the opportunity for cloud within core activities such as consumer payments, credit scoring, statements and billing is endless. In fact, from 2016 to 2018, Deloitte Global saw a threefold increase in the number of financial organisations adopting cloud to promote innovation.

Cloud-based services can reduce internal costs and optimise business growth by offering a much more scalable and reliable IT infrastructure that is specifically designed to streamline performance and support development and expansion. Cloud technology gives financial institutions the opportunity to continuously refine and improve services, according to changing customer demand and business need, whilst enabling them to assess how much is being used versus how much is being spent. For many organisations, cloud also provides the opportunity to achieve better value for money, as businesses only pay for what is being used.

With cloud now being seen as the digital backbone of many financial businesses, cloud solutions will continue to evolve. However, with this change will come increasing complexities – both in terms of the services available and also the variety of operating models. It is therefore essential that financial institutions have the right tools to continually monitor

and analyse cloud spend (on average, 23% of IT expenses), in real-time, and with accuracy. Those who do will effectively pave the way towards growth.

Taking a holistic approach to tightening legacy spend

In today's current economic landscape, optimising budgets is an absolute necessity; however, traditional ways of managing IT spend are simply not working. This is where maintaining a complete view across the whole organisation is required. The ability to manage cloud costs will be unlocked by reliable financial management tools, which can empower the financial industry to truly understand and evaluate cloud spend. By gathering real-time operational, project and vendor cost data, financial institutions will be well-equipped to make fact-based decisions to drive down costs – both now and in the future. From our experience, we've seen our clients easily shrink their running costs by 5% and reallocate these resources to more appealing and business-driving growth initiatives.

In light of these changes, financial companies must now take advantage of the tools that will enable them to evaluate the implementation and operational costs of technology to help stabilise business – including cloud, on-premise and even shadow IT. Whilst in theory, all software and IT assets within a business should fall under one centralised IT department,

providing the CIO with ultimate visibility, the reality is often very different. Shadow IT, incurred in part by bring-your-own-device increase and the explosion of remote working, has seen a rapid rise and Gartner predicts it now accounts for 30-40% of IT spend in large organisations. As such, this is causing an ongoing headache for the people that are in charge of technology, security, and compliance, who need transparency across all applications to ensure cost transparency against value, not to mention security.

As we head into 2021, and competition within the industry continues to rise, it's vital that financial institutions free up budget to reinvest in digital initiatives for growth. To achieve this, it is imperative to gain a transparent view of costs versus business value generated. In some cases, this may mean that cloud services are the best solution, whilst in others, in-house legacy systems may represent better value for money. This is where an integrated, high-performance and, above all, flexible solution is needed – to create a holistic overview of business spend, on which decisions (about cost, process, operations and more) can be based.

Financial institutions that do maintain an end-to-end view across their entire IT portfolio will be able to take back control of their running costs and streamline their budgets towards future innovation this year and beyond.

Best practices to deploy process mining

Process Mining is a powerful tool that analyses the processes running across enterprise systems like Enterprise Resource Planning (ERP), Customer Relationship Management (CRM) etc. and based on the information captured in the event logs, comes up with process maps.

BY SOMIT KAPOOR, VICE PRESIDENT AND GLOBAL HEAD – ENTERPRISE OPERATIONS TRANSFORMATION (EOT), WIPRO LTD

SUBSEQUENTLY, the mapped processes, with numerous variants, are studied with reference to a standard, with the aim of process optimization and possible automation. While this has been successful across industries, many organizations are still reluctant to adopt the solution due to various factors like lack of awareness, apprehensions related to data security, choosing the right way to go forward with adoption etc.

But once an enterprise decides to implement Process Mining, there are certain factors that it should consider before going forward with implementation in order to reap maximum benefits:

1. Business Process Management (BPM) maturity
Based on BPM maturity, organizations can be broadly classified as function oriented and process oriented. In function oriented organizations, business functions such as sales, marketing, finance etc. work as isolated silos and there is minimal coordination among them

as the processes are not clearly defined. Process Mining has a huge potential to help define the end-to-end processes and give in-depth understanding of the process flow. Also, cross functional coordination and operations get promoted(as, operations get governed by long end to end processes, it encompasses involvement of different functional units at various touchpoints, promoting collaborations in order to achieve the final goal), leading to improved productivity. But, such enterprises may have a greater threshold to execute as work has to start from scratch, with defining process ownership responsibilities and backing from management (since, hitherto these organisations have worked as siloed functions, a clean slate approach has to be taken to design process oriented operations, and in doing so proper planning & backing from the management is a prerequisite. Process ownership responsibilities are to be defined so as to have accountability at various checkpoints. All these initiatives call for great amount of efforts).

In case of process oriented organizations which have a mature BPM, process owners are already defined so implementation of Process Mining is straightforward and changes are easier to identify and implement.

2. Identification of process exceptions
As per Pareto principle, 80% of the outputs are achieved by 20% of efforts, while remaining 20% outputs call for 80% of efforts. The same is true for enterprise processes, as the 20% exceptions require a major chunk of efforts to execute and manage. Thus, it becomes imperative to identify and eliminate these exceptions which come in the form of rework, long lead times etc. So, the Process Mining should be able to easily identify such exceptions and help enterprises eliminate them to increase process efficiency and employee productivity.

3. Application across gamut of processes
Usually, when enterprises go for Process Mining, they focus only on a few processes which they think are subpar and need intervention, and stop once those are corrected. But a better approach would be to apply the tool to other processes as well to uncover the true potential and further improve operational efficiency in all sets of processes.

4. Integration across enterprise operations
Enterprises should make Process Mining a part of their regular operations. This becomes quite useful to quick check for any bottlenecks. Once bottlenecks are identified, the process optimization activity gets expedited. The tool can also be utilized for development projects which are aimed at delivering certain specific objectives.

5. Ability to deliver process excellence
The success of a process is determined by the impact it creates across the various touchpoints during the flow. Therefore, Process Mining should be deployed keeping factors like customer satisfaction, internal

efficiency and process automation in mind. Process excellence is achieved only if these three factors are taken care of by the discovery and mining activity. This calls for having a clear vision in terms of what is expected from the Process Mining activity.

Enterprises need to have in depth interactions with Subject Matter Experts(SMEs) in order to understand where they stand with respect to the above factors and how different Process Mining offerings in the market can help them achieve their objectives and then decide on the right vendor for themselves.

Mining has a huge potential to help define the end-to-end processes and give in-depth understanding of the process flow. Also, cross functional coordination and operations get promoted(as, operations get governed by long end to end processes, it encompasses involvement of different functional units at various touchpoints, promoting collaborations in order to achieve the final goal), leading to improved productivity

Understanding legacy infrastructure by looking at the Egyptian pyramids

When you look at the Saqqara Necropolis, the oldest of Egypt's pyramids, do you immediately discard it as an irrelevant relic? Not at all. You admire it for the architectural skill involved in its construction, and the story behind its eternal beauty.

BY MARC ZOTTNER, FIELD CTO, VMWARE TANZU

WHAT IF WE looked at legacy infrastructure in IT through the same lens? Too often, tech teams rush to discard mainframes and legacy infrastructure, immediately aiming to build something shiny and new. However, just as the Saqqara was revolutionary at the time of the built, and acted as the origin point of Egypt's 96 other pyramids, mainframes that we now classify as 'legacy' were the epitome of innovation when first set up. Like the thousands of blocks that built the pyramids in Saqqara, mainframe applications have thousands, even millions of lines of code. Each serves a very specific purpose: a purpose that has probably outlasted the developer who first wrote the code. Only once this purpose is examined and understood, can enterprises move onto successful app modernisation.

Learning from a Pharaoh's thought process

Organisations have been rushing to modernise their IT infrastructure in the last decade, and the race to digitally transform has picked up even more since the beginning of the 2020 pandemic. Caution is important here, as decisions made in a rush today may end up hindering progress for decades to come.

What if we moved away from terms such as 'app modernisation' and 'digital transformation'? Instead of associating our approach to making applications timeless with 'transform' and 'overhaul', it may be beneficial to just focus on extending software to generate valuable business outcomes. Map the goals of a tech project, and then work backwards to

understand what you need to achieve it. Imagine how your most business-critical applications would look like in a decade. Would they be simply structured, easy to understand, highly-functional, low-effort to evolve?" App modernisation shouldn't be approached 'tool-first', 'technology-first', or 'pattern-first'. Don't start mingling with tools and technologies without first clearly understanding what you are trying to build, and why you are building it.

For example, an event-driven or microservice architecture does not make sense for all projects. Taking a step back to understand the business goals first is essential. Then a proper notional architecture can be derived before the right tools and frameworks should be selected to achieve these.

Most modernisation projects are focused around fixing a certain problem IT teams have identified by adopting a not necessarily related technology. In reality, modernisation for our customers is about making new requirements possible, saving cost, scaling capacity, increasing stability and security, at a higher speed. It digitally provides them a competitive edge while boosting business growth.

The key to success lies in first understanding the truly desired outcomes of the modernization work and keeping them prioritized. Defining early qualitative objectives and measurable key results is a spot-on practice to guide transformation journeys. Without such a compass, it is extremely easy to get lost in the depths of our majestic monolithic construction or swamped in a never-ending analysis-paralysis. This mindset empowers companies to successfully approach brownfield transformations, as well as greenfield cloud initiatives. While the root causes of the core concerns are often obvious, proper solutions are not. Monolithic problems cannot be solved with the same thinking used to create them.

Ensuring a timeless approach to app modernisation

There are four elements of a successful application modernisation initiative. The first is to begin having the end in mind, aligning all stakeholders on goals and non-goals. It is key to start small: even if your portfolio contains thousands of apps. Start with a single business unit and a handful of applications that matter, where a huge impact could be made.

Test-driven development, continuous integration and continuous deployment can then be used to reduce manual processing time and increase determinism through automation. It is also important to just plan enough to start, learn on the job, informing strategy and building new skills through hands-on effort, and loops of rapid feedback and result measurement. Lastly, break things down – iterate quickly and continually on thin slices of complex systems focussing on high-level architecture before technology. Following these tenants enables tech

> In reality, modernisation for our customers is about making new requirements possible, saving cost, scaling capacity, increasing stability and security, at a higher speed

teams to quickly focus on the right things and deliver impactful, iterative results.

Recently, VMware Tanzu worked with a large European public sector customer to support them with the modernisation of a mainframe application being over 30 years old and requiring several millions of euro yearly as maintenance and running cost. This involved reworking software and processes impacting millions of citizens and tens of thousands of officials. The challenge was to find a way to start rewriting the monolith to a cloud-native area, with a modern programming language, without impacting the implementation changes required by the latest legislation. By using the approach outlined above, in only a few weeks, the customer was able to get the first components of the mainframe rewritten in Java and running in production. The path from code change to production has been reduced from four weeks to 30 minutes. Several engineers and developers have been empowered to further modernize the application, as if they would be building a new one, delivering value in shorter development cycles on a weekly basis – with no downtime.

Now, back to Egypt

In the years following the Saqqara, many Pharaohs based their monuments on the same concept, look and approach. Over time, other innovations were incorporated - including etching hieroglyphs on the stones - and plans modified.

Just as historians and archaeologists approach the Egyptian pyramids, empathy and context are crucial tools for app modernisation. The end game for archaeologists is not to put beautiful relics in museums, but to really understand the story, culture and the motivations of the people who built them. Similarly, CIOs must first understand the mindset of developers and technology teams at the time of the initial concept, to truly be able to embody a fresh mindset for app modernisation.

FOR ANY ORGANISATION it's important to always look ahead and understand what the future holds. However, no one could be prepared for the onslaught of the Covid-19 pandemic, whose affects we are still very much in the grips of today.

In January 2020, many of us had some idea of what the future of the workplace would look like. Some foresaw the gradual creation of an enjoyable workplace where everybody would feel comfortable, and where mental health, flexible working and all-round fulfilment were integral. For others it was a situation where companies would adopt the best technology to make working more efficient. Different businesses prioritise different things, but one thing all these ideas had in common was they would largely be implemented in the same environment – the office. However, Covid-19 has transformed everything. Since the first lockdown back in March, many business leaders have seen the benefits remote working brings, and the ways in which it can complement the traditional office environment. This sudden but prolonged change in working culture has led to a new concept – hybrid working. So how can we make this concept a success?

Covid and the tech impact

With much of the UK now seemingly in a cycle of lockdowns and tiers, it doesn't seem like the fully attended office environment will be back for a while at least. This alone illustrates how we should dispense with any remaining temporary remote working practices in favour of something more solid and reliable.

It is now coming up to a whole year since the first lockdown began. As a result, many leaders and employees should know what works and what doesn't when it comes to hybrid working. As far as technology is concerned, it's important that business leaders

The future office

How a hybrid approach is the best way forward,

BY AARON FOSTER, TECHNICAL DIRECTOR, TELCOSWITCH

look back and see what has been implemented, what needs to be improved, and what changes should be made in the short and long term. Questions need to be asked: did you deploy everything with stringent security standards in place, or are there lingering vulnerabilities that could be damaging if you experienced a data breach further down the line? What was seen as a safe makeshift arrangement when the pandemic began could now be a major security risk.

Effective and efficient communication tools are imperative if a hybrid working system is to be successful. Tools that enable you to make and answer calls from a desk phone, computer or mobile are not a recent invention – they have been integral to any unified communications arrangement for many years. However, there are few organisations that have maximised the potential of these technologies. To increase efficiency and ultimately gain the competitive edge, it's important business leaders make full use of the most innovative unified communications tools on offer to them.

Impact on company culture

Although having the right technology in place is important in making the hybrid approach a success, there are other elements that are just as key. It's imperative leaders continue to emphasise the importance of a defined, supportive workplace culture. This doesn't come overnight and requires a lot of preparation to achieve, which is something many organisations did not have time for when the pandemic first hit.

Above everything else, leaders need to be trained in the unique characteristics of hybrid working. It's important to go beyond showing how to do the basics

like using a new video conferencing system or how to use the latest software. Instead, business leaders need to create personalised plans for their teams to help manage and support growth. To make this a reality, heads of departments and managers need to have the correct resources, funding and training to support employees who are working remotely, regardless of how often they make it into the office. The next thing to consider is how to maintain the company's wider vision and philosophy, which stays true to your ideals as a business and makes sure everyone feels comfortable in their chosen environment. It's important to continue being social with your team just like you would be in the office. Instead of focusing on office-based perks such as free snacks in the kitchen or a ping pong table, consider having virtual drinks on a Friday, personal catch-up calls, or a company-wide virtual social on a regular basis. After all, a great culture breeds high productivity as well as job satisfaction.

What does the future have in store?

There's no right or wrong way to approach the changing office environment, especially when change is so unexpected. In the past, companies choosing to completely transform their workplace dedicated countless hours and budget to it, and even then not everything would go quite right. With that in mind, no one should expect transforming in the current climate to be plain sailing.

Each business leader has their own vision when it comes to hybrid working, but for it to be a success it's crucial to provide managers with the correct training and to commit to ironing out all technological deficiencies. If these challenges can be resolved, you'll be on your way to creating a successful, eager and loyal team of hybrid workers.

To realise transformation requires a cultural change

For many people, Jimi Hendrix is considered the best guitarist in the world. His ambidexterity undoubtedly played a big role in his success.

BY CARSTEN RUST, SENIOR DIRECTOR DIGITAL TRANSFORMATION EMEA, PEGASYSTEMS

MUCH TO THE REGRET of his admirers, he never actually played live using his right hand, only his left – or at least if he did, there is no recording of it. But it doesn't matter if you believe psychologist Stephen Christman, who argued that Hendrix was "mixed-right-handed", because the two-handedness of Jimi Hendrix led to a "highly developed creative predisposition". This meant that he was not only able to coordinate the motor skills of his hands perfectly during guitar playing, but also to perfectly coordinate lyrics and melodies.

The increased interaction of both halves of the brain, which is manifested in ambidextrous individuals, could also be of great use to executives in the challenges of digital change.

Executives face a mountain of challenges: markets are becoming increasingly digital in every way, customer demands are rising as well as globalization. Additionally, ever-increasing competition demands new products, rapid innovation and superior business models which all bring their own obstacles. An all-round reassessment, if not a complete overhaul of a company is necessary for real change. Such an act of power can hardly be achieved with digital transformation alone, after all, numerous challenges further increase the complexity of the tasks. For example, data protection, cybercrime, reduced personnel and budget resources, climate change, market discourse, and of course, preserving the motivation and inspiration of employee through rapid phases of change. And that was even before the limitations of Coronavirus had to be considered. The exchange of technologies and the more efficient the formation of business processes are only the beginning.

However, an incremental approach will not work. Executives need to be able to see the whole picture as if they were zooming out of a map to break away from the city view and see the entire continent. Only by being able to visualize the big picture will they be able to determine the course for the future. Increased interaction of both brain hemispheres is crucial.

A fundamental part of digital transformation is to optimize existing business models, including the elimination of inefficiencies, the reduction of variance, and the improvement of reliability. Many leaders have focused on this, and they still do, in the belief that the past is a good template for the future. In view of the digital change, this is simply not the case. The future looks fundamentally different and leads to unknown territory. Therefore, it is important to explore and develop new business models at the same time, focusing on innovating, in terms of both technology and in adapting to trends in the

market. During any business transformation, it is essential to be willing to experiment and take risks and thus also to be open to mistakes. Those who are not prepared to go down this path will restrict the opportunities available to them.

Ambidexterity fits perfectly with the dual approach of utilization and exploration. Leaders are particularly successful when they can play their guitar both right and left, that is to say, it is important to keep both disciplines in balance and to carefully coordinate them. If the tip of the scales is too far away from innovation, it is then slowed down, and the potential of future market opportunity is neglected. If it is overly focused on exploration, the business may be at risk, because it will be overwhelmed by new business models.

A good example is the automotive industry, which is currently looking for the right balance between utilization and exploration. On the one hand, it is constantly optimizing the design of its internal combustion engines, which account for a large part of its revenues, and on the other hand, it is now investing billions in the development of electric cars and other alternatives after a hesitant start that could have been a disaster for some manufacturers. In a fast-changing society, it is not just a matter of responding quickly to market changes, adapting to new market trends, or even legislation or environmental protection, but also proactively and boldly pushing new business models. To be courageous is to be convinced of an idea and be willing to invest relevant budgets into it, and perhaps also daring to radically replace the existing business model.

A wonderful example of this is the approach taken by filmmakers during the collapse of analogue photography. Despite numerous restructurings, Kodak failed to jump on the new digital train and ended up having to file for bankruptcy. Fuji took the bold and radical path: The manufacturer used his know-how with collagens, i.e. substances that make analogue films last longer, to launch a new cosmetics brand, which he was able to successfully establish in Asia.

The balancing act between utilization and exploration succeeds if the following principles are followed:
- Create a common vision and identity for the company
- Integrate innovation projects into the corporate strategy
- Define innovation metrics to measure project progress
- Implement incremental budgeting based on innovation metrics without detailed business plans
- Foster collaboration of cross-departmental teams and allow all employees access to company resources, regardless of their role
- Promote experimental work and the use of new methods, as well as the learnings from mistakes
- Establish incentive models that promote innovative thinking, especially outside the innovation team
- Accelerate and decentralize decision-making processes through increased transparency and innovation metrics

For many companies, such an approach represents a radical culture change, and executives must be prepared to give up their inherent resistance. It may not always be easy, but perhaps the increased interaction of both brain hemispheres will help here too.

DCA Colocation Working Group –
An introduction from DCA CEO Steve Hone

AS THE Trade Association to the Data Centre sector the DCA understands that it is imperative that key issues affecting the sector have a point of focus. The DCA SIG's (Special Interest Groups) / Working Group regularly come together over shared interests to discuss issues, resolve problems, and make recommendations. Outcomes can result in best practice guides, collaboration between group members, participation in research projects and much more. Members find these groups are a great way to ensure their opinions and views are considered in a positive and cooperative environment.

The DCA currently facilitates nine Special Interest or Working Groups. DCA members can join any of the groups and contribute.

The purpose of the DCA Colocation Working Group is to provide a unified voice for the UK Plc data centre colocation and Data Centre Provider community. The Group is chaired by Dan Scarbrough, with Leon O'Neill acting as Deputy Chair.

The Groups Objectives:
Educating international buying community to the operators present in the UK, and the services offered. Increase awareness of the importance of the data centre sector in an ever growing and reliant digital world. Drive the debate for increased inward investment to support the growing and mission critical data centre sector. Promote UK colocation capacity by arranging DC Tours for overseas customers.

Develop closer collaboration between the Telco with Colo sectors in terms of Network and Compute Capacity. Continue to work with fellow Trade Bodies in Europe to ensure the DC sector has a unified voice to policy makers. Coordinate stronger working relationships with external international organisations such as OCP, ONF. Lobby to develop incentives to make the UK the destination of choice for hosting overseas customers digital services.

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

Conquering the next challenge for colocation providers: Speed

By Ashish Moondra, Senior Product Manager, Power, Electronics & Software at Chatsworth Products (CPI)

AS THE TRANSITION from the Information Age to the Age of Artificial Intelligence gives way to heightened significance of connectivity, cloud service providers and the IT industry work around the clock to ensure the life most of us know today, high-speed internet, mobile connectivity, self-driving cars and machine-to-machine (M2M) learning. A recent Cisco Annual Internet Report confirms this reality.

By 2023, for example, nearly a third of the global population is expected to have Internet access – that is about 5.3 billion users. Meanwhile, the number of IP networks is projected to be more than three times that number. Within the data centre space, the colocation market may see the most growth, with an estimated CAGR of almost 11% from 2020 to 2025. Faster

time to market- in lieu of undertaking an on-premise data centre project that may take months to complete – is the primary reason for the attention toward this segment.

Needless to say, delays in bringing up a new customer within a multitenant environment directly translates into lost revenue. Therefore, it is no surprise that colocation providers are challenged to scale up with solutions that are quick to deploy, manage and service.

The following are two key points for colocation vendors to consider when looking to quickly get new customers up and running.

Vendor Selection
Within colocation environments, end customer requirements generally vary

based on budgets, functionality required and the IT equipment that will be housed within the cabinets. Service-level agreements (SLAs) require colocation facilities to be able to quickly provide the infrastructure equipment that meets the needs of their end customer.

Partnering with equipment vendors that have local manufacturing capabilities and a build-to-order model provides colocation vendors with the ability to quickly procure products aligned with end customer requirements. In-region manufacturers typically have a wide breadth of standard solutions and the ability to create and deliver custom solutions in a short timeframe.

While evaluating equipment vendors for their ability to deliver products in short lead times, it is critical that data

centre professionals ask questions related to location of the supply chain as well as their risk mitigation plans. With the booming demand for more things to be connected to the Internet, some electronic components as well as populated, printed circuit board assemblies can have lead times spanning several months.

Equipment manufacturers in North America that rely on in-region sources for long lead time components will have a better ability to scale quickly to meet demands of larger projects. The common denominator within the date centre white space is the equipment cabinet. Dealing with vendors who can preinstall all infrastructure solutions within the cabinet, including power distribution equipment, cable management solutions, access control and environmental monitoring per the end customer's needs will save colocation vendors significant time, effort, and money.

Additionally, preconfigured solutions that are tested together before they leave the factory minimizes any surprises that could otherwise delay schedules when multivendor equipment is received separately. Finally, consider that preinstalled solutions require minimal packaging, helping reduce waste and the tie required to deal with it.

Product Considerations

To allow remote manageability of the off-premises equipment, colocation vendors provide intelligent hardware solutions that allow monitoring and control of power and environmental parameters within the cabinet. Growing regulatory and security demands also require end customers to control physical access to the cabinet and maintain an audit log of all success attempts.

While these solutions provide significant advantages to the end customer, the challenge is to deploy them speedily over the network and quickly configure them to be fully operational. Intelligent power distribution units (PDUs) that also integrate environmental monitoring and access control provide a unified solution that require just one single network connection. The speed of deployment can be further enhanced by utilizing intelligent power distribution units with Secure Array IP Consolidation that allow up to 48 intelligent PDUs to share one

primary IP address and an alternate one for failover capability.

This setup allows the white space infrastructure for complete rows of cabinets to be managed by one or two ports on a network switch. The alternate and inefficient solution would have been to first install, wire and configure extra network switches purely for infrastructure monitoring, connecting them to every monitored device and then taking a crash cart to each device to perform their IP setup. Once the PDUs are deployed on the network the next step that could take a considerable amount of time is the configuration of every monitored device that includes network access, threshold, and notification settings. In this scenario, choose PDUs with bulk configuration capabilities over the network. However, the preferences of end customers for mass configurations can differ.

For example, while a data centre operations group may prefer bulk configuration through a data centre infrastructure management (DCIM) software solution, network professionals or developers may prefer automated configuration using a Command Line Interface (CLI) or Application Programming Interface (API), This means colocation vendors that deal with multitude of end customers will be ahead of the competition if they

provide a solution that supports most types of bulk configuration methods. All these capabilities not only make initial deployment and configuration easier, but also simplifies ongoing management.

Another important and usually overlooked aspect to consider is the serviceability of the products. The most common maintenance to be performed on Intelligent PDUs is timely firmware upgrades. The products chosen should allow for these upgrades to be easily performed over the network or through UB ports on the equipment. A field-replaceable controller on the unit also allows for seamless serviceability and upgradability.

These upgrades should be capable of being performed while the units continue to provide basic power distribution to connected equipment. Finally, consider that intelligent products such as PDUs should include warranties with an advanced replacement coverage as a norm rather than exception. With data consumption growing faster than ever, speed of deployment and delivery is the most pressing challenge for colocation providers. The ones who consider the two recommendations above will be able to have a competitive edge that will ultimately allow them to grow their top line revenue faster and be ahead in the race.

Ashish Moondra
Ashish Moondra has a total of 20 years of experience developing, managing and selling rack power distribution, uninterruptible power supply (UPS), energy storage and Data Centre Infrastructure Management (DCIM) solutions. Ashish has previously worked with American Power Conversion, Emerson Network Power and Active Power, and has been an expert speaker at various data centre forums.

Colocation, colocation, colocation

By Anna Nicholls Head of Marketing, Teledata

WHEN YOU'RE CHOOSING a colocation provider, you need to think about a lot more than just the location. Sure, location is important. You'll need to be able to access the data centre fairly regularly, so it's helpful if your provider is commuting distance for your technical engineers - although a decent data centre provider should offer a remote hands service, making location less of a deal breaker - but there are other points to consider when you make the decision on which colocation provider is right for you.

What is colocation?

Colocation (also known as colo) is when you put your equipment - servers, storage, switches, software - into somebody else's data centre. You provide the kit, they provide the space, power, rack and connectivity. That's usually where the provider's involvement ends. Upgrades, monitoring and backups will be handled by you and be the responsibility of your IT team, while the data centre provider concentrates on keeping the lights on, and the buildings secure and connected. Basically, you're renting space in a data centre.

Why colocation?

So why would a business choose colocation? What are the benefits? Well powering and cooling servers is expensive. With colo, you're using the data centre's power, at a much lower cost due to economies of scale. Data centres give you access to a wide range of connectivity options offering both resilience and competitive choice, so ultimately you'll have increased availability compared to an on-premise set up. You still maintain complete control of your hardware and network, but with a reduced TCO (Total Cost of Ownership) compared to on-premise. So other than location, what else do you need to think about when choosing a colocation data centre?

Access

We've talked about access from a location perspective, but check whether the data centre will be accessible to your engineers at the times they need it. Will they need to make appointments in advance, will access be available out of hours - evenings, overnight and weekends - without an appointment in emergency situations? What about bank holidays? Are there any restrictions on access which might impact your team's ability to maintain your network?

Security

In a world of increasing threats to digital data, this is probably one of the biggest decision points when choosing a colocation provider. Your colo provider will be responsible for keeping your data physically secure, so it's critical that whichever data centre you choose takes appropriate measures to protect itself. Look for a facility that goes above and beyond. From the obvious perimeter fences, access cards and security guards, to the higher levels of security and access control such as mantraps, virtual tripwires, SOCs (Security and Operations Control Centres) and links to police control centres. If compliance is a requirement, check that your data centre provider is ISO accredited.

Connectivity

Connectivity is king, and a data centre is only as good as its connectivity. Some data centres are carrier neutral, which will give you both choice and resilience. TeleData is carrier neutral, with multiple carriers offering diverse points of entry plus dark fibre availability. We also offer direct connections to major Manchester and London data centres, giving customers a broad range of options and a wide reaching, robust connectivity network.

Resilience

We'll start by talking about power - but resilience covers a wide range of eventualities which need to be considered. It's the data centre provider's job to keep the lights on, so you need to make sure you're happy with their procedures for keeping the facility running in the event of a power outage. Power outages simply cannot happen in a data centre, but they do happen, so what processes are in place to make sure that the cogs keep whirring? Ask about UPS, backup generators, battery storage options and be absolutely certain that you're confident that your colocation provider will not suffer an unexpected power down.

The same goes for other events and disasters - floods, fires, attempted break-ins and anything in between. What has your provider done to pre-empt these situations and therefore, provide contingencies in case the worst happens?

Choosing a colocation provider is a big decision for any business, and if you're going to be tied into lengthy contracts, you need to make sure your decision is a good one. Not all data centres are created equal, but what's important is that the one you choose meets the needs of you and your customers, hits your SLAs and offers the right level of resilience, at the right price.

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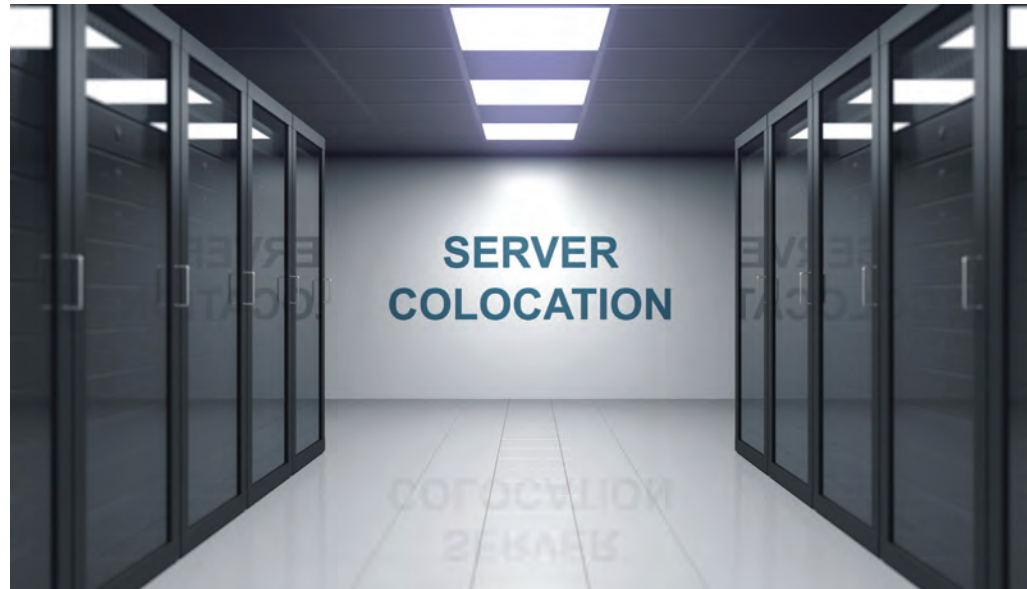
The DCA Colocation Working Group

By Leon O'Neill

LEON O'NEILL is the Deputy Chair of the DCA's Colocation Working Group in this article he provides his thoughts on how Covid is affecting the DC Sector and the responses he has seen from the industry. Leon also talks about why the Colocation Working Group was formed and how he hopes it will promote co-operation between UK based operators.

At the start of 2020, who would have thought the world would have changed so much? From a global pandemic forcing businesses into enacting their business continuity plans (or finally implementing one), to accelerated remote working adoption and even global political leaders acknowledging the importance of digital infrastructure, thus promoting our peers to the proud and prestigious position of "key worker". It's been a very tough year for everyone, and I mean everyone. Yet our industry rose to the challenge and proved, beyond a doubt we have the expertise, technology and wherewithal to meet these unique challenges AND had one of the best years for customer acquisition in a long time.

 I would say (not out loud, of course), we (The DC industry) have been preparing for some kind of attack for many years, preparing ourselves for some form of legislation, or red tape dreamt up by someone that has very little knowledge of what it is we actually do, has far too much time on their hands and is preparing legislation after watching a YouTube video posted by someone with a user name like "technology-will-kill-us" who hasn't spotted the irony that the poster is utilising technology to get their message out. However, nobody expected that an attack would come from a microscopic, airborne virus. Except Homer Simpson, yeah, seriously, he called it in 1993. – google it.

What we did learn, is we are willing and very able. But now we need to talk about how we sustain our growth, how we maintain profitability whilst adopting/promote new agile technologies that operators can leverage to overcome whatever legislation might come in the future and achieve that all important target of net zero carbon emissions. After all, those pesky politicians are starting to take notice, realising we are not just digital infrastructure, we are critical infrastructure. It may have taken Zoom calls for them to learn this (which in itself is funny to watch when you realise that the leaders of the world don't know how to use the mute button!) but hey ho, we will take what we can get. Perhaps now the Politicians can put some effort into education programs to attract youth and diversity into our industry, but I promised myself I wouldn't get into that here…..moving on then.

From an activity perspective, we have seen a huge increase in demand for colocation and cloud services, compared to the steady growth of previous years. Akin to dropping an Alka Seltzer into a bottle of coke (definitely google that), the rise in demand has been driven both by the pandemic and hyperscale activity but what excites me and the DCA the most is the activity away from hyperscale/webscale providers. We have multiple instances of new build and expansion plans with the likes of Ark, NTT, Telehouse and Virtus working to increase capacity/availability contributing to the prediction that London will hit 1.2GW of power usage within the next two years.

And it's not just London: with a significant acquisition in Wales, Hyperscale developments in Manchester, the Midlands experiencing increase absorption rates, Northern Ireland building a brand-new world-class data centre and large investment in the network infrastructure of Scottish data centres. Our industry is on the tip of every investors tongue with M&A activity rampant and investment opportunities growing.

Operators are adopting additional revenue streams above and beyond the real estate conversation such as cloud and financial services. Hardware leasing is increasingly more attractive and an appetite to join the circular economy as OCP hardware becomes more accessible helps the operator to promote themselves as a "one hand to hold SLA". It's very exciting time to be in the data centre game right now.

I regularly speak to UK operators about the challenges they face in their day-to-day operations and as this pandemic continues to invade every aspect of our lives and environments, what strikes me the most is how each operator have adapted so quickly, their willingness to share methods around new ways of working and the support they have provided their staff in that adaptation. It's

that sharing that is at the heart of what the DCA UK Colocation Working Group is all about.

Our purpose is to promote co-operation between UK based operators over competition. So how do you bring the operators together to promote the UK as a leader in digital infrastructure? Firstly, let's give the operators a platform on which to communicate, develop partnerships and share ideas. The DCA UK Colocation Group is purposed for all of the above, but it's only as effective as the participation of its members. So secondly, join in.

It's that simple. This isn't a club or a clique or a hierarchy. It's an opportunity to develop/grow your business, get access to information not often in the public domain and promote your business as part of a shared vision of UK operators on an international stage. We will not only talk about, but act on collaboration, new technologies, financing, staff acquisition, thought leadership, just about anything that your business deems relevant for the group,

with maybe the odd alcoholic beverage or two, or three, go on then, maybe one more…..perhaps one for the road…. and finally a night cap. (when the pubs re-open of course – mustn't defy those social distancing rules now, mustn't we….. Kay Burley?)

And as we move into 2021, we still have many challenges to overcome, including staff shortages, supply chain challenges, attracting youth and diversity into the industry, that 2030 carbon neutral target and lest we forget the now tangible impacts and opportunities of Brexit. And whilst all of those challenges appear daunting, I would argue they represent an opportunity.

So, lets follow the lead of the British people as they clap our brave NHS in an act of support, let our Data Centre Operators unite to promote the UK as a sustainable, profitable and agile location to house international companies' data.

To join the DCA UK Colocation working group for more information contact: **mss@dca-global.org**

**Leon O'Neill
Deputy Chair,
DCA Colocation
Working Group**

Leon O'Neill has been involved in the Data Centre, IT and Construction sectors for over 25 years.

He has built a vast network of partners to encourage the industries adoption of agile, sustainable and profitable solutions. Closely aligned with Technology Real Estate Investment Funding partners, Leon aims to bring together their unique skill sets to support the development of the digital infrastructures of the future.

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