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FROM THE EDITOR

2020 was an unprecedented year, and in some ways marks a clean break from the past. The pace, the operating style and the business models that enterprises were used to underwent permanent change in several verticals. Many offices were emptied and the entire workplace went virtual in some cases.

At the forefront of this change was technology. Standard operating procedures were cast aside as improvised policies and makeshift processes were overlaid on the old workplace. Dozens of gadgets, devices, and platforms came in to construct an entirely new virtual way of work, while cloud budgets ramped up and CISOs scrambled to make sense of application and network security in a nebulous new world. Many had predicted that the pandemic would have passed by now, but countries are still in the midst of vaccinating their populations, and enterprises are still looking to set in place measures that will have consequences for years (or decades) to come.

Enterprise 2021 is a special-issue magazine from Frontier Enterprise that aims to decode 2020 and unpack the possibilities of 2021 - it seeks to take stock of the changes we've seen and attempts to predict what the next year will bring. We've spoken to some of Asia-Pacific's top technology and industry leaders in this issue — we hope it provides insights for our readers and practical tips on how to transform their own workplace in this strange but promising year.

Rahul Joshi

Head of Content, Jicara Media

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SINGHEALTH

Managing the Covid-19 Pandemic with Digital Technologies
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Benedict Tan, Group Chief Information Officer for SingHealth, takes us through some of the technologies deployed in managing the COVID-19 pandemic and how digitalisation played a key role in managing the spread.

In the final month of 2020, the number of COVID-19 cases globally exceeded 77 million, with around 1.7 million deaths thus far and a death rate of around 3%. However, Singapore has been one of the countries that has been able to effectively manage the mortality risk of the disease. With a death rate of just 0.05%, it has performed far better than the global average, and has one of the lowest rates in Southeast Asia and the world.

According to a Reuters report released on 16 September 2020, the success of Singapore in managing the virus can be attributed to five main factors:

1. Infection Demographics: 95% of COVID-19 cases are amongst the migrant worker population, who are aged in their 20s and 30s and with less risk of falling critically ill;

2. Detection: Aggressive contact tracing and mass testing;

3. Hospitalisation: All COVID-19 patients above 45 years old or with underlying conditions are cared for in hospital facilities;

4. Mandatory Mask-wearing: It has been compulsory for everyone to wear masks in public places since April 2020; and

5. Strict Classification: Rigid adherence to the World Health Organisation's (WHO) definition in classifying COVID-19 deaths.

Singapore's COVID-19 measures can be described as an adoption of the "Hammer and Dance" approach, which was first shared by health writer Tomas Pueyo on the online platform Medium. This approach involves the initial 'hammer' - a series of more extreme measures such as travel restrictions, lockdowns, and wide-spread testing - to get the virus under control, before the subsequent 'dance', where restrictions are gradually lifted as the virus numbers are stabilized and controlled.

At the Healthcare Frontiers 2020 Conference, Benedict Tan, Group Chief Digital Strategy Officer at SingHealth spoke about how the organisation has been able to effectively manage the COVID-19 situation by adopting digital workflows and technologies.

SingHealth is Singapore's largest group of healthcare institutions and handles close to 50% of the country's

The SingHealth team (L-R): Thng Chiok Meng, Head Data and Digital Governance; Benedict Tan, Group Chief Digital Strategy Officer; Kevin Tay, Group Chief Information Officer; Mr Chua Kim Chuan, Chief Information Security Officer.

public healthcare workload. The group consists of four public hospitals, five national specialty centres, three community hospitals, and eight polyclinics. Their flagship hospital, the Singapore General Hospital, was voted as one of the top ten hospitals in the world in 2020 by Newsweek magazine.

Lessons from Handling the SARS Epidemic

COVID-19 is not the first time Singapore has been faced with a nationwide virus outbreak. In 2003, the country was facing an outbreak of Severe Acute

Respiratory Syndrome (SARS). Between February and May that year, Singapore saw 238 cases of SARS and 33 deaths.

"During SARS, we were caught a little off-guard", admitted Tan, "But since then, we have introduced various digital workflows and technologies in preparation for similar situations in the future. We had already implemented these digital tools and solutions before the COVID-19 situation, and it really helped us a lot in managing the situation."

The first solution is their Automated Visitor

A combination of cloud computing, a well-architected software stack and agile thinking methodologies meant that Singapore and SingHealth were able to develop minimum viable products quickly, deploy them in real scenarios, and iterate the product to increase its effectiveness.

Management System, which allows hospitals to control the number of visitors to their inpatient wards. The system is configurable, allowing them to adjust the number of visitors allowed in. For example, whilst four visitors per patient were allowed in normal circumstances, the number was reduced to only one visitor per patient during the COVID-19 outbreak to maintain safe distancing measures.

Secondly, SingHealth, together with the Integrated Health Information Systems (IHiS) and the other public healthcare clusters, implemented a Staff Surveillance System, or S3, portal. This was a system that allowed for all SingHealth staff, including their doctors and nurses, to key in their temperatures twice a day. This helped the organisation monitor the health and well-being of all staff, ensure that there were no fever clusters, diseases or infections spreading through the organisation, and immediately isolate and lock-down any such cluster that may form.

The organisations' telecommuting protocol was also set-up, as they realized early on during the SARS outbreak that working from home was important in continuing business-as-usual, and these protocols were quickly operationalised for a majority of staff in the event of any lockdown or safe distancing measures

This was further supported by the development and strengthening of web conferencing and video

consultation capabilities through platforms such as Zoom. The learning gained when developing these technologies made it easier for SingHealth to quickly adapt to the new solutions available and provide an effective range of healthcare services.

Digitalising Workflows

SingHealth also took the initiative to digitalise many of their existing workflows and processes. With the large number of healthcare facilities and services under its umbrella, emphasis was put on standardising the process and platforms used across the entire organisation.

To help with managing patient records, SingHealth developed a single Electronic Medical Record (EMR) system that was shared across all facilities in the organisation. This allowed their staff to see patient records from across their family of medical facilities, adding to the ease and timeliness of managing patient conditions and ailments. It also helped provide a platform for doctors to consult one another and collaborate in patient care, and serve as a single repository for data analytics. At the national level, Singapore has implemented the National Electronic Health Record (NEHR) system where all public and some private health and healthcare agencies submit summarised health records of the population. This platform has extended the sharing of patients' health records across Singapore's health system.

A common system across the cluster of medical facilities was also set up to handle patient appointments and registration, allowing them to quickly pull out patient information, review conditions, manage patients remotely, and offer a range of care options to meet their needs. It also helped them reduce visits and clinic sessions when issues such as safe distancing or safety measures arose.

Digital communication platforms were set up internally to help with information-sharing across the organisation. An intranet website called Infopedia was created, which allowed SingHealth to share information to all its staff members and help them manage the situation, and communicate routine instructions on changes or updates on the situation. The tightening of communication channels was also strengthened by utilising the TigerConnect secure messaging tool.

These workflows and processes were also supported by adopting standardised equipment and infrastructure, allowing the organisation to rapidly scale up their services without any delays in set-up and testing. For example, the Singapore General Hospital was able to quickly convert one of their multi-story carparks into a fever screening area to deal with the surge of potential cases during the early onset of COVID-19 in March 2020.

Harnessing the Data and New Technologies in 2020

Whilst the lessons learnt from SARS provided SingHealth with a strong digital foundation to manage COVID-19, SingHealth's success in managing COVID-19 also drew from its use of data and the new technologies that were available. As part of the global fight against the virus, many in the medical community have come together to share various digital data tools and dashboards, allowing everyone to learn from each other's experiences in dealing with the virus.

This data has allowed Singapore and SingHealth to make informed decisions on the most effective measures to be implemented. For example, whilst there were initial debates on the merits of mandatory mask wearing in Singapore, the policy was introduced and enforced quickly once new data and research showed its effectiveness in controlling the spread of the virus.

These data-driven decisions were supported through a range of other technologies available. A combination of cloud computing, a well-architected software stack and agile thinking methodologies meant that Singapore and SingHealth was able to develop minimum viable products quickly, deploy them in real scenarios, and iterate the product to increase its effectiveness. The Internet of Things and Internet of Medical Things played a huge role in areas such as patient management in foreign worker dormitories.

However, one major development that underpinned many of the management strategies was the ubiquity of the smartphone. Across Singapore, the smartphone has played an integral role in the country's contact tracing protocol, with all residents expected to log their movements through the SafeEntry or TraceTogether systems developed by the Government Technology

Agency. SingHealth is no exception. Tan mentions that "at SingHealth, the smartphone is used for contact tracing, patient registration, dissemination of educational materials, and even telehealth."

These advances have also increased the quality of care for patients themselves. For example, robots have been deployed at COVID-19 containment facilities to provide medical services to patients without exposing healthcare workers to additional risk. These robots are able to enter these facilities easily to consult and engage with residents on their medical status to ensure that their well-being is taken care of.

Instant messaging systems through platforms such as Telegram have also been set up to keep all patients and residents informed and aware of the developing situation. Named the Dr Covid Chatbot, it provides educational information in different languages for all residents, and asks them simple questions to check on their physical and mental well-being throughout their containment period.

In the hospitals, technology such as tablets and iPads have also been deployed to allow patients the ability to track and monitor their own conditions and communicate with nurses and doctors when necessary. Together with the use of medical robots, these technologies significantly increased the uptake and acceptance of telehealth amongst patients and doctors, with many using video consultations to stay in touch with their patients.

Tan raised this increasing acceptance of telehealth as just one example of the rapid acceleration of digital transformation due to COVID-19. "We are seeing an accelerated pace of innovation", he adds, "and it has almost demolished many people's preconceived mindsets and helped them adapt to this new normal." ∎

FEATURE

2020: A Strange Yet Transformative Year

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In short, 2020 was a year of forced change for enterprises as they scrambled to keep their businesses running and customers served. But while it was rough going for most, COVID-19 had the ironically positive impact of making the case for digital transformation and the need to put CX at the center of the business. Written by John Tanner, Contributing Editor at Frontier Enterprise.

There can be no doubt that the biggest story of 2020 in the enterprise technology sector was COVID-19. Indeed, the coronavirus dominated and disrupted virtually every aspect of our lives in some form or other, in or out of the office – so much so that there was practically no such thing as "out of the office" as work from home (WFH) became the new normal for many organizations.

We're so used to COVID-19 by now that it's almost easy to forget what a shock to the ecosystem the initial lockdowns were for many businesses. Most business continuity plans (BCPs) were designed to sustain the average company for perhaps a few days, maybe a week, but not several months. Consequently, BCPs buckled as supply chains were disrupted and both customers and employees stayed home. Even videoconferencing and collaboration platforms like Zoom, DingTalk and WeChat Work found themselves caught off-guard as demand for their platforms spiked almost immediately as employees found themselves having to work from home.

Indeed, WFH blindsided many enterprises across the region, as remote working wasn't a common practice in Asia at the start of 2020. As more governments started imposing mandatory lockdowns to get the spread of the coronavirus under control, many enterprises were essentially forced to adopt WFH if they wanted to stay operational.

That in turn meant IT managers suddenly found themselves confronted with a new set of security issues: how to ensure that employees attempting to access sensitive data could do so securely from home – a daunting task if your employees are using their personal laptops and iPads over their home broadband connections rather than company-issued laptops connecting to a VPN.

Meanwhile, bosses and IT managers found out the hard way that WFH isn't simply a matter of technology, but employee management. Employees used to a team-building office environment now had to cope not only with the stress of being cooped up to avoid the coronavirus, but also the challenges of maintaining the psychological division between work and personal time, and overcoming the paranoia that the boss may think they're not working hard enough.

By March – at which point the WHO officially designated the spread of the novel coronavirus as a pandemic – it was painfully obvious that COVID-19 wasn't just the flu, or a repeat of SARS. It was also obvious that the pandemic was impacting enterprises.

By May, the strain was already showing on the bottom line as many enterprises either laid off workers, cut salaries or froze scheduled pay raises to cut costs (though it's worth adding that salary cuts and freezes were also happening at C-level, not just the front line).

On the other hand, HR departments who were still hiring faced difficulties in connecting with furloughed employees looking for work elsewhere. This prompted CHROs from Accenture, Lincoln Financial Group, ServiceNow and Verizon to create and launch an analytics-driven platform called People + Work Connect, which pools non-confidential and aggregated workforce information by categories such as location and experience to help HR managers spot potential hires looking for work. While it's not yet known just how effective the platform has been overall since its launch in April 2020, Accenture says over 265 companies from 95 countries have joined as of December 2020, with more than 400,000 roles now on the platform.

IT departments were also disrupted by COVID-19 – not just in terms of having to support WFH arrangements at scale, but also budgeting for it. According to a survey from Censuswide and Rackspace, IT budgets are spread across many groups within organizations, making it difficult for IT decision makers to maintain visibility into where and how their IT budgets are being spent. Also, many organisations are not properly governing and optimizing IT costs.

Consequently, said Jeff DeVerter, head of CTO Solutions at Rackspace, "Many businesses have found out the hard way in 2020 that their IT systems, resources and spend tracking weren't ready for COVID."

Customers really are king

Meanwhile, enterprises needed to make sure they weren't losing customers as a result of stores closing. Early in the pandemic, enterprises were seeing significant spikes in requests for support, amid the COVID-19 pandemic. For example, Zendesk's Benchmark Snapshot showed a 20% year-on-year increase in global tickets for the week of March 15-22. According to Zendesk, the three biggest categories by industry were: remote conferencing and learning (with a 216% surge in ticket requests) , airlines (199%), and grocery brands (39%).

E-commerce sites such as Coupang, Sendo and Bukalapak also found themselves prioritizing customer experience and service, not least because so many people turned to such sites to purchase everyday essentials while they were in lockdown and/or quarantine. Customer service wasn't just a matter of ensuring items were in stock and transactions went through – they also had to work with supply chain partners to ensure that deliveries were made on time.

This was especially crucial for online grocery deliveries – a fact that Hong Kong consumers discovered the hard way. A recent investigation by the Hong Kong Consumer Council found that retailers were often delivering perishables like meat, fruits and ice cream that arrived at customer doorsteps spoiled, overripe or melted.

Meanwhile, online travel agencies like Expedia and Tiket.com had the problem of customers requiring refunds or changes in their bookings.

A good year for some

Despite such challenges, however, e-commerce was perhaps unsurprisingly one of the few business sectors that actually thrived in the year of COVID-19. Amazon is the one that makes the most headlines, of course, but overall the e-commerce sector got a boost from the pandemic in terms of both revenue and new users. In Singapore alone, Accenture Applied Intelligence estimates that the island's digital economy will rake in almost $500 million as a result of COVID-19. A separate report from Google, Temasek and Bain & Company says that COVID-19 boosted Southeast Asia's digital economy past the $100 billion mark. Of that, e-commerce was the largest vertical, growing 63% to reach $62 billion in 2020.

Meanwhile, COVID-19 gave a boost to digital payments in 2020, potentially setting the stage for accelerated adoption as DX initiatives also accelerate. Online banking also saw a significant boost in usage in Singapore.

That said, the financial sector overall had its share of pandemic-related challenges, from an escalation of cyber-attacks specifically targeting financial institutions to the difficulties of establishing and maintaining trusted partner relationships over Zoom rather than in person.

COVID-19 also provided a platform for robotics companies to make their business case for autonomous service robots doing everything from disinfecting shopping malls and hospitals to bringing food to your restaurant table.

Perhaps an overlooked yet ironic aspect of COVID-19 is its impact on the so-called 'gig economy', which includes Grab drivers, FoodPanda delivery people, Airbnb hosts, or people who bid for jobs on sites like TaskRabbit and Upwork.

Overall, 2020 was a mixed bag for gig-economy workers. Business-wise, COVID-19 meant more business for on-demand delivery drivers (although of course they also face higher risks just by being out and about in the midst of a pandemic), but it also meant less business for ride-hailing services like Grab, Uber and Lyft, and costly cancellations for hosts who rent out their properties on Airbnb and Vrbo.

Moreover, COVID-19 highlighted the disparities between gig workers and traditional workers when it comes to things like health insurance and qualifying for financial relief from government programs aimed to help small businesses struggling to survive in the pandemic.

DX saves the day

While COVID-19 impacted different sectors in different ways, by the latter part of the year a clear trend had emerged: for the enterprises that weathered the COVID-19 storm best, digital transformation made all the difference.

Indeed, the objective of DX is to make enterprises of all stripes agile and flexible enough to adjust quickly to sudden market shifts and disruptions – to include, as it turns out, a global pandemic shutting down supply chains and forcing customers and employees alike to stay home.

Perhaps unsurprisingly, many organizations who had been dragging their feet on DX initiatives have now found sufficient motivation to get cracking on it. By June, a survey from GlobalData and Telstra found 93% of businesses were recalibrating their digital transformation strategy to at least some degree (with remote working a top priority, naturally). A separate survey from Twilio reported that a whopping 97% of enterprise decision makers said the pandemic accelerated their company's digital transformation strategy by an average of six years. A more recent report from IBM Institute For Business Value found that the COVID-19 pandemic accelerated digital transformation for 59% of organizations in Singapore, while 66% said they were able to complete initiatives that previously encountered resistance.

When looking at those numbers, it's worth remembering that some industries have been pushed harder than others to embrace DX – perhaps none more so than the healthcare sector, which not only had to deal with the pandemic on the front lines, but also had to guarantee IT and service delivery internally as remote working and social distancing measures kicked in. Experts attending Jicara Media's recent Healthcare Frontiers 2020 Conference discussed how digitization in healthcare is more crucial than ever – and that the pandemic has made this necessity painfully clear.

Break out the crystal balls

By all reliable accounts, the pandemic will continue through much of this year, even as vaccines are rolled out – between the reported virus mutations and the fact that countries with out-of-control infection rates are struggling with proper vaccine distribution, the chances of a swift end to COVID-19 in 2021 are slim.

Which means that many of the lessons learned in 2020 will still apply

in 2021 – hence the various claims from industry watchers that WFH and other COVID-related policies will be the new normal.

Many CEOs are at least open to the idea of hybrid working environments where employees have the option to work from home. Indeed, they may have to if they want to attract new talent. A recent report from Deloitte found that up to 47.8 million people in the ASEAN-6 nations (Indonesia, Malaysia, Singapore, Philippines, Thailand, and Vietnam) could shift to entirely remote work over the next few years.

In fact, most employees in Asia hope those policies will remain in place long after COVID-19 is under control. A recent survey from Skillsoft found that 89% of workers across APAC want at least one COVID-19 practice adopted permanently, whether it's flexible working hours, remote working, more time dedicated to their physical and mental well-being, increased family time (47%), or a reduction in unnecessary work meetings and outside commitments.

Here are selected vendor predictions for 2021 worth betting on.

The year of the edge and 5G

The network edge made a difference in 2020 as enterprises embraced remote working and the cloud to keep workers and customers alike connected. That trend will continue in 2021 as the cloud becomes more crucial to enterprise operations, says Kumar Sreekanti, Chief Technology Officer and Head of Software at Hewlett Packard Enterprise (HPE).

"Three years ago, we predicted the enterprise of the future would be edge-centric, cloud-enabled, and data-driven. Today, that is no longer

a forecast, it is reality," Sreekanti says. "I believe we will shift from a cloud-first mandate, to a cloud everywhere mandate."

Keerti Melkote, president and founder of Aruba (a Hewlett Packard Enterprise company), adds that IT teams will take the next step in their transformational journey to the 'intelligent edge' and begin to create the requisite infrastructures. "As they do so, it won't just be about connecting constituents to the cloud. It will be about how users and IoT devices are connected, and about using data generated at the edge to power new experiences and business outcomes."

There's also a 5G component to the 2021 edge paradigm, as 5G rollouts continue and telcos set their sights on enterprises as the next big revenue opportunity, says Frank Feldmann, VP of the APAC Office of Technology at Red Hat Asia Pacific.

"5G, IoT and edge computing can be applied to smart fleet management, wherein edge devices can monitor critical vehicle systems and access the 5G network to send alerts, track the flow of goods, plan routes, and facilitate communications between a vehicle and any IoT-enabled entity that may affect or be affected by the vehicle," Feldmann says. "We foresee more APAC organizations and cities adopting 5G, IoT, and edge computing in 2021 to become more connected and efficient. Emerging use cases for the three technologies include analyzing sensor data for predictive maintenance and quality control, augmented reality systems for remote operations, and personalized 'connected experiences' for customer and supplier engagement."

The increased focus on the edge will make it more mission-critical, which in turn means edge security will become extremely important, says Fernando Serto, director of

Security Technology and Strategy, Asia Pacific, at Akamai.

"As traffic continues to grow, edge security will become increasingly critical to ensuring a strong security posture while balancing the need for speed, quality and resiliency we have come to expect when we're using the Internet," he says.

David Hughes, founder of Silver Peak, predicts that the 'new edge' will evolve to bring together the principles of SD-WAN, SD-Branch and SASE (Secure access service edge) in 2021, which he says will significantly enhance security posture and yield operational efficiencies.

Hughes also expects that edge strategies overall will be reevaluated in light of the 'new normal'. "It's now commonly recognized that the global pandemic has forever changed the way we work and conduct business. In 2021, enterprises will step back and review what they learned in the past year and evolve their remote work strategies, applying a longer-term perspective of the workplace. This will include eliminating trade-offs between security and user-experience and providing more a consistent experience as users work from home, the road or the office."

DX acceleration (with caveats)

As mentioned earlier, digital transformation initiatives are generally expected to pick up speed in 2021. On the other hand, that doesn't necessarily mean they're going to throw unlimited amounts of money at such projects and invest in all new technologies. The disruption of COVID-19 places several caveats in how managers approach their DX strategies from here on out.

For a start, says Sascha Giese, one of several Head Geeks at Solar Winds, IT managers are going to be expected to do more with less and optimize the

technologies they have.

"According to Gartner, the abatement of revenue uncertainty in late 2020 will allow for the resurgence of more predictable IT spending by CIOs, but social distancing will continue through 2021, capping office capacity at 40%," Giese explains. "IT teams will need to get even more creative with how they're spending their money, with IT spending expected to decrease. Though organizations don't need to put digital transformation on pause, there will be pressure for them to do more with less, leading them to focus on strengthening the tech already in place to optimize businesses."

Unfortunately, this will also apply to CISOs, says James Forbes-May, Vice President – APAC for Barracuda.

"Security executives will need to achieve the same level of security or more with tighter budgets in 2021," he says. "There will also be a continued shortage of cybersecurity talent in the region despite the recession and COVID-19 job losses."

David Hughes is somewhat more optimistic, predicting that 2021 will see the emergence of the "software-defined enterprise", in which the software-defined principles of SD-WAN will be applied in other areas like the data center and campus LAN.

"In 2021, these software-defined silos will begin to come together into a broader software-defined enterprise architecture," Hughes says.

More automation (i.e. AI)

A key component of making all this work will be automation powered by artificial intelligence and machine learning – so much so that even enterprises that have approached automation technologies with caution will have a change of heart, says Chrystal Taylor, another Head Geek at

SolarWinds.

"With tightening budgets and other pandemic-induced operational challenges, organizations and tech teams will have no choice but to fully embrace automation to optimize environments and reduce the time spent on monotonous tasks," Taylor says. "This will include automating time-consuming tasks like workstation patching, configuration changes for network devices, compliance checks and remediation, server patching, and more."

> **2021 will see the emergence of the "software-defined enterprise", in which the software-defined principles of SD-WAN will be applied in other areas like the data center and campus LAN.**

One area primed for greater automation is the IT help desk, she adds. "As monitoring and service desk integrations become more prevalent, tech pros will start the process of automating ticket assignments, asset updates, configuration management database (CMDB) updates, updates to customers, and more."

Andy Watson, Senior Vice President and General Manager for Asia Pacific Japan and Greater China at SAP Concur also predicts that AI and automation will play a bigger role in workplaces in 2021 as the pace of digital change increases.

"Many companies were in the early and mid-stages of digital transformation when the pandemic struck. They pivoted and sped up that transformation to address unprecedented global disruption and customer needs, and now they will be expected to continue operating within this new context," he says. "As businesses maintain hybrid remote-working models and anticipate other potential disruptions in 2021 and beyond, the role of automation and AI use cases in the workplace will grow. These may include enabling efficient day-to-day communications between knowledge workers doing their jobs from home and automating invoicing and expenses to keep valued partners paid and to preserve budgets."

Feldmann of Red Hat Asia Pacific agrees that we'll see a lot more automation in 2021 as APAC organizations strive to reduce complexity, lower operating costs and create an additional layer of automated insight to optimize business processes. For example, some APAC banks are already using robotic process automation (RPA) to approve credit card applications, automate payments, and validate claims.

However, he warns, "they must have an enterprise-wide automation strategy instead of deploying automation in silos in order to fully benefit from the technology."

Drilling down into specific use cases, Fabio Tiviti, Vice President of ASEAN at Infor, predicts that AI will become especially mission-critical for the healthcare sector in 2021.

"By applying machine learning to real-time global data sets, healthcare professionals can more accurately track contact between staff and infected patients, enable accurate diagnoses, utilize predictive analytics to track personal protective equipment (PPE), optimize workforce allocations, and develop more effective and lasting

vaccinations," Tiviti says.

He also expects AI to be critical for real-time supply and demand matching, which could have mitigated or even prevented the supply chain disruptions of 2020. Tiviti also predicts that AI will transform the hiring process in the unpredictable job market of 2021.

Cloud cloud cloud (not to be confused with multi-cloud)

As mentioned earlier, enterprises are expected to dive deeper into hybrid cloud as part of their DX strategies. That will spur increasing adoption of cloud-native apps, says Red Hat's Feldmann.

"Cloud-native applications can respond quickly to change, adapting and evolving with new features and functionalities released incrementally more quickly, reliably and frequently with less risk," he says. "As more organizations adopt hybrid cloud to increase the scalability and availability of apps, those that also embrace cloud-native development are in a better position to build and run responsive, scalable, and fault-tolerant apps on any cloud."

This in turn will drive container adoption in 2021, he adds. "With containers, developers can more easily release and update apps as a collection of loosely coupled services, like microservices, instead of having to wait for one large release. Recognizing that containers can help accelerate innovation, 45% of APAC respondents from [Red Hat's] 2021 Global Tech Outlook expect more than half of their workloads to be containerized in the next 12 months."

Infor's Fabio Tiviti also expects multi-tenant cloud architectures to be the new gold standard for enterprises.

"Using multi-tenant cloud

solutions means companies are automatically kept up-to-date with the most cutting-edge technology, without having to worry about manual updates or replacing hardware," he says. "As we move into a new year that likely will bring more uncertainty, multi-tenant cloud solutions will become critical technology differentiators, helping businesses remain agile and innovative, while also reducing their e-waste footprints and helping them move closer to their sustainability targets."

Challenges for the new hybrid workplace

The acceleration of DX in 2021 will necessitate a shift in corporate culture and mindset – long identified as crucial elements of any successful DX strategy, says Red Hat's Feldmann.

"With APAC businesses recognizing that digital transformation is driven by a change in mindset, we foresee more organizations embracing open principles, processes, and culture in 2021," he says. "By doing so, organizations can nurture collaboration and empower employees to bring their best ideas and selves to work, which can help accelerate innovation and address changing customer and business requirements in an agile manner."

At least some of that effort will go towards sustaining the new hybrid work environment by building effective and secure hybrid workforces, says Gan Ta Loong, managing director of Barco South East Asia.

"Workplaces are expected to be more flexible as hybrid working models become mainstream. These workplaces without boundaries will also increase vulnerabilities and security concerns. Solutions adopted in the next year must address the security, connectivity and productivity needs of the organisation

to be effective," Gan says.

At the same time, enterprises will search for ways to strike the right balance between work and leisure to ensure maximum productivity, he adds, noting that not every employee likes working from home – in fact, a recent Barco survey found 63% of respondents enjoyed WFH less than they did at the start of the pandemic.

"Given that we are expecting hybrid working to continue next year, businesses need to encourage the less tech savvy workforce to stay motivated and focused as well as prioritising employee safety and well-being. Organisations need to relook their company policies and think of solutions to overcome these challenges be it emotional well-being, or sustaining the workplace culture and practices."

Don Weinstein, Corporate Vice President of Global Product and Technology at ADP, agrees that employers need to focus on the well-being of their workers. Weinstein expects this to be driven by a number of trends in 2021, including a prioritized focus on resilience and safety, advancing diversity, equity and inclusion within the workforce, paying close attention to culture and social responsibility, a dynamic approach to WFH, and streamlining compliance-related tasks to alleviate the burden on HR and payroll departments while leveraging aid.

That said, as the hybrid workforce blurs corporate and personal boundaries, this will raise security challenges and necessitate accelerated adoption of zero-trust access in 2021, says Fernando Serto of Akamai.

"As hybrid working arrangements gain momentum in 2021, the lines between different security environments such as home/work, inside/outside will continue to blur, becoming even more fluid," Serto says.

"Previously held notions of inside/outside will need to be discarded, and IT professionals will need to treat every environment with the same level of protections, irrespective of where or who a user is. With a zero-trust access approach, security becomes more dynamic and adaptive to meet the changing needs of companies well beyond the next year."

James Forbes-May of Barracuda agrees that there will be an increased focus on zero trust to secure distributed enterprises and remote workers.

"To reduce the security risk in [hybrid] environments, a zero-trust approach will be the big focus for organizations in 2021 to provide secure, reliable and fast access to cloud or on-premise applications and workloads from any device and location," he says. "This ensures only the right person, with the right device, and the right permissions has access to company resources."

Security threats (old and new)

Which of course leads us to the various security threats that enterprises will enjoy in 2021. The short version: more of the same, plus more.

For example, says Forbes-May, cloud security has never not been important, but it will become more crucial in 2021 as enterprises accelerate migration to cloud services and switch to SaaS-based apps over on-prem implementations.

"While riding this wave of cloud adoption, don't let security take a back seat due to budget and resource constraints," he advises. "Make sure you know who is responsible for the security of infrastructure, workloads and assets in the cloud. Many don't fully understand the responsibilities of both their organisation and public cloud provider, which could leave gaps."

Barracuda also reminds CISOs that humans remain the weakest link in the security chain, and there are several attack surfaces specific to COVID-19 that employees and CISOs alike need to watch for: **COVID check-in apps; Contact tracing apps; and COVID-19 vaccine.**

ESET offers some additional new security threats to watch for in 2021:

• **Ransomware with a twist – pay up or your data gets leaked:** With ransomware attackers seeking greater leverage to coerce victims into paying, as well as upping the ante in ransom demands, the stakes are increasing for victims. Exfiltration and extortion may not be new techniques, but they are certainly growing trends, says Tony Anscombe, ESET Chief Security Evangelist: "Companies are becoming smarter, deploying technologies that thwart attacks and creating resilient backup and restore processes, so the bad actors need a 'Plan B' to be able to monetize their effort and build resilience into the attack, rather than being reliant on a single form of threat."

• **"Fileless malware" attacks:** these kinds of attacks piggyback on the operating system's own tools and processes and leverage them for malicious purposes. "Fileless threats have been evolving rapidly, and it is expected that in 2021 these methods will be used in increasingly complex and larger-scale attacks," says Camilo Gutiérrez Amaya, ESET Senior Security Researcher.

Raen Lim, Area Vice President for South Asia at Splunk, agrees that 2020 was "a year of unprecedented challenge for IT security teams" due to remote working, and expects that CISOs can expect the bad guys are coming up with new tricks to exploit this reality to infiltrate company systems. ∎

EQUINIX

The Digital Backbone

Tejaswini Tilak, Senior Director of Solution Marketing and Mac Lewis, Director-Strategic Alliances APAC at Equinix, take us through the necessary steps for transformation in a cloud-enabled world.

As you head into the office at the beginning of 2021, what are your top 3 priorities for the year?

[Tejaswini Tilak]:

1. Customer centricity – some things have changed permanently due to COVID-19, in particular the shift to digital. Clients are accelerating their move to digital as the advantages of digital have become quite clear. So, it's important to stay focused on customer needs and help them take advantage of these digital shifts.

2. Innovation and creativity – COVID-19 forced us to challenge some of the old norms and ways of working. But it also led to a lot of creative ways of adapting to the blended physical and digital worlds. We should continue to take advantage of the opportunities created due to new and digitally-enabled ways of doing work.

3. Focus on wellness – Wellbeing should remain top of mind. We can't expect people to be back to 100% productivity and back to "old normal". Everyone is going to go through an adjustment period, so it's important to focus on wellbeing.

[Mac Lewis]:

Due to the accelerated requirement by our enterprise customers to transform their current on-private premise applications and IT infrastructure to a cloud-based environment, we are:

1. Focused on how we help these customers who are looking to migrate to Microsoft Azure, AWS, Google Cloud or Oracle OCI.

2: Identifying critical applications and workloads the customer needs to migrate, rehost, refactor, retire/retain as key transformation aspects we can assist with.

3: Always keep the customers' business requirements as the focus; identify and work with multiple partners to execute the desired business outcomes.

The reason Equinix works with these four big cloud providers is due to the number of on-ramps each has located at Equinix IBX's globally. These on-ramps enable enterprise customers to directly connect critical applications, that require low latency and secure connections to databases, data and both hybrid and multi-clouds, supply chain partners and customers, while reducing complexity of the physical networking elements.

Not all cloud applications require high speed, real-time, low latency connections, however, critical business applications and workloads are heavily dependent upon these elements to operate as customers expect.

What were some of the biggest lessons of 2020?

[TT] Lessons for businesses around the world centre on navigating their digital strategies to stay competitive in the new normal. As many global businesses have implemented shelter-in-place policies and enabled their employees to work remotely, this has shifted traffic from corporate networks to their homes.

Given the dynamically changing environment, businesses need the ability to quickly ramp up - adding new locations, connections and applications – for business continuity. They need to continue assessing their situational risks/needs, evaluating business continuity options and scenario planning.

The surge in digital use has never been so drastic in such a short span of time. The response to the enormous demand for increased bandwidth has demonstrated our dependency on data centers and internet infrastructure to support us during and lead us through the crisis.

Many of Equinix's customers play a key role in the infrastructure supporting the health, financial, government and technology sectors, which are proving critical to maintaining public health and stabilizing the economy.

When you think about digital experiences -- such as this virtual interview we are conducting from my home office, the online classes our kids are taking because of school closures, and the streaming movies that are keeping us entertained during social distancing – all of these require internet connections to happen behind the scenes between companies. Those connections happen at Equinix.

[ML] From the accelerated uptake we have seen of customers building hybrid and multi-cloud solutions at Equinix, it seems obvious that previous on-premise private IT infrastructure and application management made adapting to the pandemic extremely difficult. Also, these companies could not wait years to gradually change, it needed to happen immediately, and some businesses suffered because they could not take advantage of the agility and adaptability cloud-based solutions offer.

Lesson learned were understanding how cloud is now at the core of any business, enabling engagement locally, regionally and globally; but also with customers, suppliers and other eco-system partners, to scale and change as unpredictable circumstances arise.

The second lesson is the need for various IT providers to work together, to design and execute an enterprise outcome. Transformation or migration to the cloud cannot just be undertaken by cloud-trained specialists for example. Due to regulatory or audit reasons enterprises cannot refactor all applications, or do not wish to move these, such as rebuilding existing databases from scratch, or migrating all SAP applications to the cloud. Therefore many other areas need to be considered when an enterprise is looking at its cloud strategy. Potentially, up to 16 different technology partners may be required.

What do you see as being the most impactful technologies coming into play over the next year?

[TT] I would emphasize two as being critical infrastructure pillars for enterprises as they look for competitive advantage and resilience beyond the pandemic: cloud native infrastructure, and an edge-first paradigm.

[ML] We are seeing more customers looking to stay competitive, increase productivity, explore new market opportunities and deliver better customer service through the adoption of analytical cloud services, AI and ML capabilities. Enterprises are looking at multiple cloud services offerings from multiple cloud providers, and in doing so, are needing to interconnect various public cloud services to access various workloads and data across multiple clouds in near real-time.

To enable this fully, organisations need to access various databases, and data sources, which often reside in multiple locations -- including in other companies.

We are seeing far more Cloud2Cloud requirements from enterprises, which require low latency, very quick scalability, and multiple interconnection points able to manage large data flows and ingestion from various sources.

How will enterprises be impacted by the pandemic and the post-pandemic reality?

[TT] The rapid global shift to remote work and time spent at home has demonstrated the increasing importance of infrastructure in today's digital businesses. Collaboration tools like Zoom, messaging apps like MS Teams and Slack, and cloud-based email were already being deployed in organizations at some level. The current environment has driven a surge in the usage of those tools along with document sharing and collaboration resources such as Box and One Drive. Another critical application from an enterprise perspective in the remote working environment is VPN gateways -- as secure corporate network access has become more important.

Service providers and similar businesses mirroring their practices were early adopters of digital transformation. With the advent of COVID-19, these digital leaders have experienced incredible surges in interconnection bandwidth growth, as they have the infrastructure in place to scale with the changes in demand. According to our latest market research, GXI Vol.4, service providers show the highest growth rate of interconnection bandwidth capacity, with a 5x increase in the forecast over the next four years, driven by greater demands from enterprises at the edge. Enterprises are also transforming infrastructure to match service providers' best practices, reaching over a 50% growth rate in 2023.

Data centers are part of the core digital infrastructure. Every time we post on social media, purchase a book online, stream a movie, send an email, etc. these communications move through a data center. The pandemic has reshaped internet usage patterns within a short period of time - we noticed that data exchange surged over 40% in Q2 2020.

[ML] In realty I think the 'new norm' is very apparent, and already in play, from the way enterprises are needing to manage their customer delivery, production, supply chain management, customer service and interactions to a far greater focus on internal employee welfare programs and communications.

All of these require a shift from traditional IT solutions to cloud-based architecture, and where critical applications and workloads need to be physically connected and with very low latency to Azure via ExpressRoute, AWS via DirectConnect, Oracle OCI via Fastconnect or Google Cloud via GCI. ∎

Tejaswini Tilak

Mac Lewis

STARHUB

Continuous Transformation and the Importance of Plan B

An interview with Kee Yaw Yee, Chief Information Officer, StarHub. Yaw Yee is responsible for the IT strategy, IT infrastructure, systems and applications required to support StarHub's business growth and customer goals.

Photograph courtesy of StarHub.

> The biggest lesson for me is to have a plan B that is ready to be activated and deployed when disaster strikes and business and life normality is disrupted. The ability of businesses to operate in an alternative paradigm is key for businesses to survive.

As you head into the office at the beginning of 2021, what are your top 3 priorities for the year?

A s the CIO for StarHub, my top priorities are as follows:

1) Progress the IT transformation programme that we embarked on last year, by keeping the vision and accelerating the momentum to refresh our IT stack in order to drive our digital strategy

2) Improve and optimise our operational IT with the aim to lower our cost of doing business

3) Improve our cybersecurity posture as we progressively expand our digital business footprint

What were some of the biggest lessons of 2020? Have we learned these lessons, and is the globe ready for another pandemic?

The biggest lesson for me is to have a plan B that is ready to be activated and deployed when disaster strikes and business and life normality is disrupted. The ability of businesses to operate in an alternative paradigm is key for businesses to survive. When businesses survive, people can at least maintain their way of life if they continue to be employed.

The world has survived a few major pandemics but not without significant casualties. I believe we can improve our resilience and posture to deal with pandemics by adopting a more collaborative and collective community mindset instead of pushing for individual survival. Nobody is safe until everyone is safe – this applies at the country level. Only when the world leaders think and act in the interests of the globe will we stand a chance of weathering another pandemic onslaught.

What do you see as being the most impactful technologies coming into play over the next year? What are your broad technology predictions for 2021?

Amid a prolonged pandemic situation, I believe technologies that enable business to proceed as usual will continue to maintain our way of life. For example, drones, AI driving robotics and automation, and data analytics – while these technologies have existed for a while now, we will find new, more practical and urgent applications for them. Companies that have invested in and are quick to deploy technologies to practical usage will strive in 2021 and beyond.

How has your workplace transformed over 2020, and what are your precise workplace transformation strategies for 2021?

Except for critical business operations and activities that can only be conducted on-site, our workforce has been working remotely since the pandemic hit. Starting this year, our employees are returning to the office in a split-team arrangement while observing safe-distancing measures. We have successfully transitioned into business-as-usual work arrangement.

Remote working and conferencing tools are also evolving as the demand for such software platforms has increased. We are discovering more and better ways for employees to engage with one another and external parties. My charter for my team this year is to continue to raise the bar on creating user-friendly platforms for business collaboration.

How will your vertical be impacted by the pandemic and the post-pandemic reality? What will the "new normal" look like for your industry?

COVID-19 has impacted our society, but it has also made us a more aware society, focused on sustainability, diversity, well-being, and pursuing aspirations in a way that is seamless and digital. StarHub wants to be part of this journey, enabling people and companies to work with us and grow their own digital ecosystem. We are expanding our enterprise business by pursuing growth in cybersecurity with Ensign InfoSecurity, cloud, data analytics and software-as-a-service (SaaS) with Strateq, as well as merging digital 5G services and solutions with our core connectivity products. Enterprises are expected to continue investing in their network infrastructure and adopting cloud and security services, data analytics and visualisation, Internet of Things and data centre-related services as part of their digitalisation journey.

Business activities are resuming safely in phases, and it is still the early days of Singapore's reopening. Enterprise customers, being cautious, are deferring the implementation of certain projects, leading to some level of delays. Travel restrictions are still in effect, impacting mobile prepaid and roaming services. We are monitoring the situation closely, and we expect to see recovery – which may be uneven – as the COVID-19 situation stabilises gradually in the future. ∎
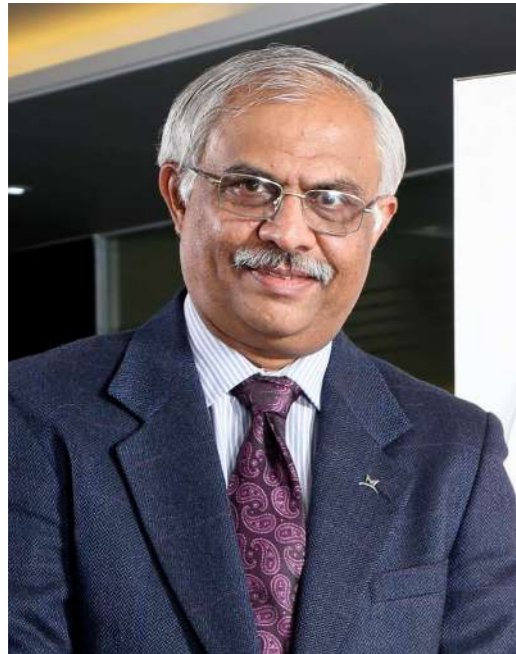
Photograph courtesy of MTR Foods.

MTR FOODS
AGILITY & GROWTH

Ganesh Shenoy, Chief Financial Officer & Vice-President - IT, at MTR Foods, details the multiple levels of workplace transformation involved in managing disruption.

As you head into the office at the beginning of 2021, what are your top 3 priorities for the year?

W hile the pandemic was essentially a disruption, it has triggered new learnings / insights leading to new ways of working which can be leveraged even after normalcy is restored. The top priorities for 2021 are:
• Embedding digital and automation tools / processes to energise the front-end teams resulting in significant sales productivity
• Accelerating more workflow processes across the business value chain to move towards a paperless organization
• Building a robust IT security framework as digitised processes scale at a much more rapid pace than before

What were some of the biggest lessons of 2020? Have we learned these lessons, and is the globe ready for another pandemic?

Disruptions are always great events in history which force everyone to challenge the status quo not just for survival but to also leverage the opportunities that

are available on tap. I think those organisations which always had strong Business Continuity plans (also testing and refreshing them constantly) were the organizations which flourished and grew exponentially. Some of the key characteristics that businesses need to specifically develop are :
• Resilient attitude amongst its employees — a "never give up" culture — which comes through if the organization nourishes an open minded, transparent, an innovative and a "here to win" cultural mindset.
• Flexible and empowered teams with open and clear two-way communication channels up the hierarchy to ensure that the business pulls in one direction.

What do you see as being the most impactful technologies coming into play over the next year? What are your broad technology predictions for 2021?

Several technologies which were on the fringe eg: Teams, Zoom etc have suddenly acquired significant prominence without which businesses could not have functioned in 2020. In addition, safety at manufacturing workplaces triggered the rollout of automated body scanners and devices to ensure early detection of infections as well as maintain social distancing. Several other technology developments in e-commerce, manufacturing, automation will lead to newer ways of interacting with customers / consumers. Some of the technology predictions for 2021 are:
• Augmented reality based e-commerce sites for apparel, fashion accessories etc
• Virtual fairs and exhibitions which may include multiple discussion tracks etc inviting experts from

across the globe
• Tele-medicine and remote diagnostic capability which will enable remote hospitals to get the benefit of medical experts for challenges in medical diagnosis and treatment

How has your workplace transformed over 2020, and what are your precise workplace transformation strategies for 2021?

Our workplace transformation is at multiple levels. The front end now executes its sales responsibility using hand held devices moving towards an almost contactless sales process with its stockists including an automated claims processing proess.

The office will most certainly move to a more flexible "Work from Home" model as we have worked almost a year on WFH without losing much momentum.

How will your vertical be impacted by the pandemic and the post-pandemic reality? What will the "new normal" look like for your industry?

In the finance and IT functions which I lead, we have moved to a more digital way of working in almost all functions which eliminate the need to work in an office. However, we have observed that processes and projects which require a more collaborative and engaging mindset (especially R&D, marketing etc) may require face to face meetings. So a blended work form is what we may finally evolve towards. ■

BITGLASS
Securing Digital Infrastructure

Jonathan Andresen, Senior Director of Marketing at Bitglass, explains precisely what security strategies are needed to safeguard distributed workforces, and the rise of Secure Access Service Edge in enabling the future of work.

W ith the office gradually entering the home, it has become increasingly important for workers to be able to get the data that they need for their work whenever and wherever they want it, and in a secure fashion. This emphasis on security also needs to be supported by an agile IT security posture that still allows the business to be dynamic and adapt in implementing the digital tools necessary to support remote work. This need for both security and dynamism means that companies need to constantly modernise IT infrastructure to support and sustain their workforce.

The Rise of Secure Access Service Edge (SASE)

"With most companies pre-pandemic, you typically assume 10%-15% are going to be working remotely. Now, it is suddenly 90%-100%," shares Jonathan Andresen, Senior Director of Marketing at Bitglass. "With all your business done remotely, architectures need to shift. We need a flexible security posture that can grow with the business and work in this kind of digital environment".

One solution that has come to the fore is SASE, or Secure Access Service Edge. SASE combines cloud security and networking security into a single platform. Whilst they had started with a foundational technology called CASB (Cloud Access Security Brokers), Bitglass has built on that success to become a full SASE provider, with cloud security, web security, and zero-

Photograph courtesy of Bitglass.

trust network access security forming their three main pillars. This full suite of services allows clients to secure their data regardless of where it resides, what devices are used to access it, or where their users are accessing it from. Together with the ability to customise the security needs to a very granular level, this allows their clients to employ a strong policy engine that provides modern security for the entire organisation, and yet retain the agility to move quickly in their digital transformation and improve productivity.

The Priorities of Digital Transformation

What then does this digital transformation look like? Andresen responds that there are a number of priorities that Bitglass is helping clients with. The first is to help them take advantage of new technologies that can support this process, such as the use of cloud services. With an increasing number of organisations having all their data residing in the cloud, the security platform for the company must also be built to support that kind of architecture.

Using new technologies and ensuring security all feed into the last priority, which is to help companies support a new modern workforce that revolves around remote working. For most organisations now, their workers lean heavily on mobile devices such as tablets, laptops, or even mobile phones. Yet, VPNs do not provide the speed and scalability required - this increases the need for new solutions

that can leverage cloud services and mobile applications to work in a more productive way.

At the same time, many companies are still exploring ways to create connections while working remotely. Working as a team is still a big part of the workplace, and technologies that allow real-time collaboration or video telecommunication have become critical in supporting interaction across physically distant groups of people.

The Workforce and Workplace of the Future

With the pandemic accelerating what had already been a long-term trend towards mobility, cloud services, and remote working, employers and employees have also embraced the benefits of these changes. For companies, remote working has meant cost-savings on operational expenses such as office space, and for their workers, many have warmed up to the flexibility and convenience provided by a remote working option.

"Remote working is not going to go away," concludes Andresen. "It will be with us for awhile, not only because of the pandemic, but because employees like working like this, and companies find it cost-effective. It will become increasingly normalized in 2021 and 2022, and form a big part of our work-life balance." ■

COMVIVA

The Telco Industry Boom

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The telco industry has taken an unusual trajectory over the past year — while most verticals have been hit hard, telcos have shown unprecedented growth. Manoranjan Mohapatra, CEO at Comviva, tells the industry's story.

As you head into the office at the beginning of 2021, what are your top 3 priorities for the year?

L ast year, gripped by a global pandemic, was an epic test of character and determination of organizations across the globe. As an organization, we did reasonably well to negotiate the unexpected challenges and partner with our customers. The key priorities for the year 2021 will be:

1. Leadership & Talent Development: As an organization, we strongly invest in people and capability development. Not only because it's the 'right' thing to do, but because it is the only way we know how to enable an environment where team spirit prospers, working is fun, and innovation thrives. This year would be the opportune moment to review, re-evaluate, and redesign how we plan for and manage the talent and capability the organization needs.

2. New solution development & Innovation. The crisis is a tipping point of historic proportions and organizations that recognize and respond to this trend will experience many opportunities on their journey to transformation. Innovation shall be the driving force of the post COVID recovery. Prioritizing innovation this year shall be the key to unlocking post crisis growth.

3. Driving Growth through strong Execution & Customer Centricity. Growth is a high priority for most organizations today. At an organizational level, we believe that strong execution and customer engagement is of utmost priority. New products or services, new business models, pursuing innovation as a long-term strategy, geographic expansion, and deepening ecosystems will also lead us to growth.

What were some of the biggest lessons of 2020?

The biggest lesson of 2020 is being flexible and getting used to dealing with uncertainty. In order to succeed, you must execute on the activities that are within your control. We have seen and learned how effective and efficient our people can be in a remote work environment, to deliver critical solutions and services with excellence and quality.

We have learned to embrace disruption and the opportunity to pivot at a pace that would typically take years but is now only taking months. Another key lesson has been the importance of acting fast.

What are your broad technology predictions for 2021?

Although we continue to work in a challenging environment today, it

Photograph courtesy of Comviva.

is because of our investment in our people and our technology that we remain resilient.

During the pandemic, consumers have moved swiftly toward digital channels, and organizations have positively responded in turn. Customer interactions have now become predominantly digital first. This year, cashless transactions have taken on a new significance. With 5G network rollouts gaining momentum, we can expect to see profitable, new use cases ramping up; we also expect to see an acceleration of private 5G networks. This trend will begin to expand with advancement of 5G technology offering greater availability, more bandwidth, lower latency and, most importantly, 5G-enabled devices.

Today, organizations are using big data, smart devices, AI, and augmented reality to understand customer behavior at an unprecedented level. As businesses

work to humanize the virtual experience in 2021, we'll see major developments in edge AI working with cloud-based AI ecosystems to deliver deeper virtual collaboration experiences.

How has your workplace transformed over 2020?

2020 has been the year of exceptions and we discovered several new facets of remote working. We had to keep our people's safety and health at the core yet maintain business continuity.

Working from home has become the new normal. While we have been working remotely, we have taken extra measures to ensure that we are integrated with teams and ensure that the personal touch and connect with our people is maintained. Since the lockdown, we introduced various forums like monthly CEO Chats, Open Houses to connect with the leadership teams. We made

sure to call up all employees living away from homes to check for any assistance and gave personalized attention wherever required. We shared productivity hacks, expert advice on WFH and other topics.

One big switch was partnering with our customers across 95+ countries. We deployed path-breaking solutions for our customers with zero travel, something that seemed impossible in the past. We realized the power of digital and collaborating remotely to create innovative solutions for customers and care for our teams.

Companies are at a crossroads, those that capitalize on post-COVID opportunities will find themselves in a good position to retain talent and attract people when the situation stabilizes.

What will the "new normal" look like for your industry?

> Some telecom companies have been strengthened by the spike in data traffic, increased use of broadband services. Traffic growth has, in fact, demonstrated increased reliance on connectivity and digital services.

The telecom sector has remained "mission-critical" to keep economies moving under the lockdown by providing business-critical connectivity and resiliency, facilitating work-from-home arrangements and keeping individuals and societies connected and informed, with access to medical, financial, commercial, and other essential services to manage the crisis. The business has not been affected much as people have increasingly consumed telecom value added services to stay connected and work remotely, and this is reflected through growing revenues of the telcos.

Some telecom companies have been strengthened by the spike in data traffic, increased use of broadband services. Traffic growth has, in fact, demonstrated increased reliance on connectivity and digital services.

Following the social distancing norm, people now prefer to do payments digitally i.e. via UPI apps, cards or Internet banking. Telecom operators are forming partnerships with OTT video players to provide personalized digital content through mobile-based entertainment and infotainment services. Operators are also partnering with technology providers like us to understand customer behavior using technologies like AI/ML and data analytics.∎

MTR FOODS
MOVING FAST IN FMCG

Venkat Raman, CIO at MTR Foods, says agility is a key factor in the FMCG and food manufacturing industry. He details the technology and trust needed in the business to race against the pandemic.

W hilst Fast-Moving in FMCG usually refers to the products themselves, it is becoming increasingly important for the companies themselves to move fast as well. The many changes and disruptions in recent years — including the pandemic — have made it more important for these organisations to adapt in an agile manner. The COVID-19 pandemic is the latest of such events, and the most successful companies are already showing their ability to not just react quickly to the latest developments, but also prepare for the future.

One of such companies is MTR Foods. Based in Bengaluru, India, MTR foods is a leading producer of Ready-to-Eat food and beverages, from curries and gravies, to instant spice mixes and frozen foods, with distribution not only across India, but also in international markets such as the US, UK, and South-East Asia.

A New Paradigm for Workplaces

This expansive distribution network is supported by the company's staff and internal stakeholders at different stages and locations. However, COVID-19 restrictions have required them to think of new solutions to continue supporting these operations. For example, the company initiated a large restructuring of the food processing plants and production lines after the first week of lockdowns to adhere to all sanitation and social distancing norms.

These changes go beyond production lines. "The workplace has changed," shares Venkat Raman, CIO of MTR Foods. "These changes can be seen in our interactions, place of work, and our productivity. Being agile is the need of the hour, and we, along with our partner ecosystem, have to gear up."

Supporting Work From Home

One of these major shifts has been the increasing importance of efficient work-from-home support, as companies deal with movement and space restrictions in the office. This is where technology has come in, with MTR Foods adopting a range of IT solutions from the provisioning of work-from-home infrastructure, the ability to leverage business applications, and the ability to secure business data and infrastructure.

Whilst the centrality of technology to the work-from-home experience cannot be discounted, Raman shares that the use of technology also depends on the relationships within a company, and that the element of trust between management and employees has been reinforced in the work-from-home scenario.

Venkat Raman explains: "Digital enablement is an essential part of fuelling rapid change and building resilience in business operations. Information technology helped organisations to rise up to the challenge and gear up for rapid response to the production demand changes and supply chain ecosystem constraints. Simultaneously, the focus was on building a business that is as future-proof as possible using new technology solutions. We in MTR understood that Information Technology will have to play a key role to increase resilience, protect operations, and support employees through the crisis. This, we realised, will also help sustain a competitive advantage to accelerate business growth in the coming future. An 'employee-first' mindset required meeting distancing protocols and sustain the efficiencies using technology. A comprehensive exercise was done to identify all manual interfaces and digitization was taken up on war footing.

My view is organisations need to look closely at their end-to-end operations to assess how well positioned they are to respond to future disruptions with greater confidence and speed. In the coming times, organisations which will survive and flourish are those which will reshape themselves into a digitally enabled, resilient, and agile organization that can quickly adjust in the face of adversity."

India's Growing eGrocery Business

These technology lessons and developments look to put MTR Foods in good stead to tap on India's burgeoning eGrocery market, as more consumers turn to digital alternatives rather than brick-and-mortar stores.

"Without a doubt, COVID-19 has changed economies, social systems, consumer behaviours, and supply chains," summarises Raman. "For a CIO, the key focus area should be bringing in agility and resilience in this support function, and we must be prepared to extend these IT services to our internal customers at reduced turnaround times." ∎

Photograph courtesy of MTR Foods.

LENOVO
PEOPLE & SOLUTIONS

Ronnie Lee, Country General Manager, Singapore at Lenovo, highlights the key solutions in play during the next phase of transformation, and why the company values its employees.

What are your top 3 priorities for 2021?

D espite a challenging and unique experience in 2020 brought about by COVID-19, we headed into 2021 strong and will continue our momentum. Our top priorities in 2021 will centre around acceleration of services and the community, while putting people first.

1. Putting people first. Our employees are our greatest asset. Their health, safety and mental wellbeing remains our priority. We have introduced the DEAR (Drop Everything And Run) programme, where employees are able to leave early on Fridays, and this definitely continues this year. Our counterparts in the region have also conducted workout sessions, sharing of recipes and sewing classes to engage its employees.

2. Supporting business partners in their continued digital transformation. As the world undergoes a transition, devices-per-user solutions and technology has taken a front seat in business transformation. Customers want more than just IT hardware support – they want an expansive IT service that can support their transformation in new ways. Lenovo has been a valuable partner by offering IT services which allowed them to pivot very quickly while maintaining business continuity. In Singapore, we were part of IMDA's Go Digital programme which supported SMEs build their digital capabilities and infrastructure.

3. Empowering communities to enable access to technology. As one of the leading IT companies in the world, it is our responsibility to ensure that everyone within our community will be able to benefit from technology. This community includes students and the underprivileged. We will continue to ramp up our outreach to provide IT support, devices or training.

What do you see as being the most impactful technologies coming into play over the next year?

Lenovo revealed its 2021 predictions recently, here are some of the key points:

Prediction #1: WFH culture sets off renewed focus on smart collaboration and office set-up of the future
Prediction #2: EdTech learns from the pandemic
Prediction #3: Subscription culture goes commercial
Prediction #4: Organisational security and consumer privacy are here to stay

What are your precise workplace transformation recommendations for 2021?

Workplace transformation would be closely associated with the terms "consolidation" and "collaboration". With a distributed and remote workforce, in-house IT support found it difficult to manage the tech requirements of the organisation as a whole, and for individual employees. This saw them turning to Lenovo for end-to-end services, as a consolidation point for all their tech and IT requirements. This has freed up time for the internal IT staff who will now be able to focus on more strategic aspects of the organisation.

With a distributed and remote workforce, organisations also turned to collaboration tools that allow them to communicate seamlessly. An example is the Lenovo ThinkSmart View, a personal business communications productivity assistant that helps solve many of the challenges that the new workforce faces – allowing them to stay comfortable, productive and connected.

In 2021, while businesses have embarked on digital transformation, it is important for them to leverage emerging technology, such as AI, IoT and 5G, so that they can take a larger leap. They will be able to do so by adopting these four types of technology or solutions for the next phase:

• Risk and crisis management solutions that will be key to operations
• Customer experience technologies that support changing customer behaviour
• Employee experience and human capital management tools to promote wellness and productivity
• Health and safety solutions to assist workforces to safely return to work ∎

Photograph courtesy of Lenovo.

VISA

Helming the Risk Office

Paul D. Fabara, Executive Vice President and Chief Risk Officer at Visa, is responsible for maintaining the integrity and security of the Visa payment system. He takes us through the payment landscape and the increasing sophistication of fraud in the market, as well as the steps being taken to counter it.

What are some key predictions in payments security for the upcoming year, in light of changing consumer habits due to the pandemic?

D espite continued economic uncertainty, the year-end holiday shopping season in Asia Pacific set new sales records, highlighting how the global pandemic has vastly accelerated the shift towards digital experiences and brought about changes in ways that could create long-lasting impact to consumer behaviours, fraud patterns and risk mitigation needs.

Last year, Visa focused our expertise and resources in ways to help financial institutions, merchant partners, governments and consumers navigate these seismic shifts. Looking ahead to this year, I believe many of the changes in digital payments will carry over. More importantly, the experiences of last year will accelerate innovation and force companies to learn from their mistakes to ensure they are not repeated in 2021.

First, consumer habits born from the pandemic will become the new normal. According to Visa's Back to Business Study, 78 per cent of global consumer respondents have adjusted the way they pay for items due to intensified safety concerns and nearly half (48%) would not shop at a store that only offers payment methods that require contact with a cashier or a shared machine like a card reader. As merchants move online to grow and keep pace with changing preferences, so will fraudsters. Merchants will thus need to update their fraud prevention strategies to support omnichannel commerce by leveraging in-house expertise or turning to reputable partners.

Secondly, the requirement for Strong Customer Authentication (SCA) and enforcement for eCommerce commenced on Jan. 1, 2021 for most of the European Economic Area (EEA) and the UK. Despite this being a requirement for the EEA and the UK, efforts to strengthen and meet SCA requirements will reverberate in other regions such as the Asia Pacific. With the increase in fraud activities in card-not-present channels, some multinational corporations will likely extend the strengthened security measures to other markets where fraudulent activity is high.

Thirdly, we are seeing a growing number of central banks and fintech companies exploring new and faster ways to send money, settle payments and share information. Although real-time payments, digital currency and open banking will help drive digital commerce for decades to come, they will also open up opportunities for faster fraud and more sophisticated fraudulent malpractices. 2021 will see payment volumes in real-time payments continue to grow, digital currencies continue to become mainstream, consumer and data privacy at the forefront of many discussions, and industry players working together to resolve new vulnerabilities.

Fourthly, government agencies will implement stronger authentication measures due to fraud losses. In 2020, the potential loss from unemployment insurance fraud in the U.S. could have amounted to over USD26 billion nationwide. Government agencies around the world will want to avoid further losses if additional government stimulus is made available in 2021. Strengthening authentication capabilities to better assess government benefit eligibility must be a priority next year, and if agencies do not have the expertise to do this in-house, they should turn to trusted partners in payments.

Lastly, we will see stronger authentication measures through the adoption of strong customer authentication standards like FIDO, and a shift from passcodes and knowledge-based authentication methods to user-centric authentication methods such as biometrics or token-based authentication. Plans for government and bank-led electronic identity schemes (e-ID) will advance along with trust frameworks and regulation to inform how the various parties can interact, and those who are unable to manage identity effectively will become targets for fraud.

What are your top 3 professional priorities in your current role for 2021 as the CRO at Visa?

Visa has worked hard for more than 60 years to earn the trust of financial institutions, merchants and consumers from around the world. Today, the company is known as an innovator and a trusted brand in payments. One of my priorities for the coming year is to ensure this trust continues by maintaining a strong control environment to help protect against risks to the company. This includes traditional risks and non-traditional risks such as pandemics, which requires strong operational resilience for business continuity to ensure there is no disruption to Visa merchants, financial institutions and consumer account holders.

The trust Visa has earned is partly due to the investments we have made over the years in mitigating fraud, which continues to remain extremely low while payment volumes from digital payments have increased. I am committed to ensure this continues. Not all payment companies have the resources and expertise to achieve this. Visa's fraud prevention efforts and payment security products, along with the company's scale is a key differentiator. It is part of the value of Visa in maintaining trust in the global payment ecosystem, which helps drive commerce.

Lastly, Visa is committed to inclusion and diversity and I want to ensure this is reflected in the Risk organization. It is a priority for me to consciously organize the team to ensure members of underrepresented communities have a chance to join the team and those who have joined feel there is upward mobility.

What are some best practices for businesses to protect themselves and their customers against payment security threats?

First, to protect customers, businesses should look at engaging in proactive consumer education campaigns to ensure customers are aware of different social engineering schemes. Equipping customers with knowledge will help prevent them from becoming victims of fraud.

Secondly, with more payment data being exchanged between payment parties as eCommerce transactions continue to grow, businesses should consider adopting richer, more secure digital payment experiences using tokenisation to keep their customers' payment data safe. Tokenisation helps keep sensitive payment information off networks, allowing payments to be processed without exposing actual account details that could potentially be compromised. This enables businesses to provide their customers with online payment experiences that are seamless and secure.

Lastly, businesses need to remain vigilant to threats. Businesses need to ensure that fraud prevention strategies are agile and robust enough to support a variety of commerce channels. This includes keeping software up-to-date, scanning eCommerce websites for vulnerabilities, and leveraging technology for transaction authentication and fraud management. Businesses without in-house expertise can look at working with reliable and reputable payment partners and PCI DSS validated service providers to secure payment account data and produce outcomes aligned to their business goals and interest.

Photograph courtesy of Visa.

What are some of the new fraud patterns and threats that have emerged over the course of the pandemic?

Before the pandemic, payment fraud was already shifting from in-store to online channels. With the pandemic further accelerating the shift towards eCommerce, an increasing number of fraudsters are turning their focus to the channel. Attempts at fraud are becoming more sophisticated with the use of software to automate the guessing of account numbers by criminals, making it more difficult to prevent without the use of updated fraud prevention measures and solutions.

As COVID-19 has resulted in many consumers making online transactions for the first time, those who are least familiar with payment security also tend to be most vulnerable. Consumers need to be educated on how they can protect themselves, such as by signing up for transaction alerts and learning ways to identify potential fraud.

Phishing scams have also become increasingly common, particularly scams targeting vulnerable consumers who are anxious and looking for news about the pandemic. Scams range from the sale of fake test kits online and the impersonation of various companies (logistics companies, payment companies and supermarket chains), to the theft of personal data leading to fraudulent transactions.

Thus, as many businesses pivot online, merchants need to pay particular attention to fraud management — from securely facilitating and processing payments to handling sensitive personal and payment information with care. Merchants should consider working or outsourcing their payment solutions to reliable and reputable vendors, leveraging their expertise in secure payments to minimise risk while maintaining consumers' trust in their business.

Will new technology on the horizon introduce more risks or mitigate them? What impact will emerging technologies have on the risks that businesses face currently?

Businesses should not be afraid of new or emerging technologies and should objectively evaluate them to determine how they can be used to improve business strategies and better meet customer needs. Although new and emerging technologies can introduce new risks, they can also be used to help manage the risk. For example, artificial intelligence in the hands of criminals can be used to perpetrate fraud but in the hands of security

professionals, it can be used to identify patterns and prevent fraud. Therefore, businesses should embrace new technologies to remain competitive and relevant but regularly evaluate and update their fraud prevention strategies and tools to ensure they can meet the new challenges.

At Visa, we support our eCommerce merchants by providing them with intelligence gathered by our Payment Fraud Disruption team in Visa Risk Operations Centers located around the world, about the latest cybersecurity threats. We also offer solutions such as our anti-fraud detection system, Visa Advanced Authorization and eCommerce Threat Disruption to proactively identify possible transactional fraud and vulnerabilities in the eCommerce environment.

For Visa, what are the most significant challenges in terms of how consumer behaviour as well as threat behaviour is changing in the current pandemic landscape? With new payment startups and P2P payments gaining prominence, how does Visa stay on top of the competition as well as unforeseen disruption?

As the saying goes, the only constant is change and the increase use of digital payments by consumers was expected. What is unique during this pandemic is the accelerated shift to ecommerce and contactless payments in a matter of a few months that would have normally taken a few years.

From a threat perspective, digital payments inherently are more secure than cash because of the multiple layers of security that helps to prevent fraud that can be used by payment processors, financial institutions and merchants. However, fraudsters are becoming increasingly savvy in finding security gaps in the processes and procedures and the payment security layers are only effective if they are adopted and properly used. Therefore, it is imperative that financial institutions and merchants regularly review their fraud prevention strategies. This can seem daunting or perhaps the organization does not have the expertise to do so. In these situations, they should turn to trusted, reputable partners like Visa who can help. ◼

PREPARING FOR ANOTHER PANDEMIC

Nandkishor Dhomne, Chief Information Officer at Manipal Health Enterprises in India, explains how being a healthcare provider with over 6,000 beds in a country of over 1.3 billion forces you to come up with a pandemic game plan.

D uring his closing fireside chat at the Healthcare Frontiers 2020 Conference, Dhomne detailed his hopes and aspirations for the entire sector, and identified where it must allot time, effort and money in order to be better armed in case of another future pandemic: "a war-like preparation" is necessary, he said.

For the near future

"We need wearable and mobile technology and it really needs to be strengthened. Now, 5G is coming — to enable mobile technology, you basically need to mainstream the technology for the deployment of a lot of applications," Dhomne stated.

He added that utilization of wearable and mobile technology will also be the key development moving forward as it can enable multiple parties to communicate remotely through various virtual platforms "provided the last-mile technology is taken care of."

Dhomne said that next on his list of things to prepare to combat another pandemic of this level is the organization of big data for mapping the spread and tracing of patients.

He said that developing more virtual healthcare platforms that are more effective, efficient and user friendly will be beneficial. He mentioned that the use of AI and big data in producing and distributing some sort of warning and guidelines during a pandemic is something that should be given attention. In order

for that to happen, there should be datapoints and inputs paired with a strong mobility system to produce an algorithm to observe how and where the spread is happening, which can also disseminate automatic guidelines that vary per age group.

"Can there be an automated checklist specific to a person's age and lifestyle sent via a mobile platform? It is important because a checklist to be followed by a 10 year old child may not be administered to a 64 year old," Dhomne explained.

He highlighted the importance of coming up with technologies that can provide essential services without making physical contact as it can multiply the speed, accuracy and reliability of thermal screenings and other diagnostic procedures. He also expressed that cybersecurity and all of its elements such as firewalls and remote logging will need focused attention.

For the now

He expressed that the technology landscape in Manipal is already "quite mature" with technologies such as IoT, RPA and AI-based applications in several phases and forms available. His organization also ramped up the use of telemedicine and video consultations by launching an app that can provide services for registration, appointment and payment and is integrated with the laboratory and pharmacy divisions.

Dhomne shared that several

efforts were being made improve the IT function during the pandemic — especially since all support divisions that used to operate in corporate offices were suddenly forced to work from home.

Photograph courtesy of Manipal Health.

As an example, he mentioned that the IT team had to come up with a way of processing purchase orders released by supply chain personnel in a remote set up. The hospital was functioning with doctors coming into the facility and attending to patients, so the supply of masks and personal protective equipment (PPE) had to be uninterrupted.

"HR processes must be fulfilled sitting at home — so to offer them on a laptop, iPad or desktop was an important thing. Also, there is a requirement for the finance function to make sure that payments get to the vendors on time, while they are also at home," he explained.

Dhonme also shared that Manipal's current cybersecurity system is strong and being periodically audited. "It's not a one-time deal for us and there's always a review, there's always improvement and there's always a continuous process of how we can enhance security. This is considering the fact that globally, healthcare organizations are the key target today from the hackers' perspective," he concluded. ◼

JLL

The Real Estate of Hybrid Work

George Thomas, Global Chief Information Officer at JLL, takes us through the hybrid work environment necessitated by the dispersion of the workforce, and the technology needed to fortify it.

As you head into the office at the beginning of 2021, what are your top 3 priorities for the year?

According to a recent JLL study on the Future of Work, hybrid work is now the preferred way of working and the new normal.

JLL has identified three key elements that underpin the success of a forward looking work model: 1) enable hybrid work; 2) empower and engage employees wherever they work; and 3) manage and sustain flexible occupancy planning.

The Technology Team at JLL focuses on areas that further enhance flexibility and resiliency of our workforce and technology infrastructure, namely:

- Enable hybrid work by deploying workforce technology enhancements in areas of collaboration, communications and office productivity software.

- Extend and virtualize technology infrastructure, such as further consolidation of network/on-prem storage to cloud-based services; virtual desktop infrastructure; and data infrastructure modernization and consolidation. This lays the foundation that allows our employees to work from anywhere.

- Leverage "smart" technology (such as AI and Robotic Process Automation) across areas such as cybersecurity, technology services and helpdesk, to improve service coverage and business continuity. This initiative empowers employees by automating the more mundane tasks so that the workforce can focus on the higher value projects.

- A greater emphasis on employee experience to ensure engagement, connectivity, continuity, and fluidity for the liquid workforce, as workers move between in-office and remote work. Examples include cross-functional/departments (e.g., with HR, CRE, business functions) partnerships and investments to improve existing workflow processes as well as digital and physical experiences.

What were some of the biggest lessons of 2020? Have we learned these lessons, and is the globe ready for another pandemic?

- The need for operational resiliency across business functions, technology and service delivery has never been greater. At JLL, we were fortunate to have had the foresight to begin a digitalization journey, shifting towards a cloud/resilient-first focus with our technology infrastructure as early as 2018.

- While a digital transformation strategy is important, it is the effective execution of this that enabled us to shift our workforce seamlessly to an all-remote mode when the pandemic hit in March 2020.

- Be flexible. The key for IT that COVID accentuates is a prioritization of resilient delivery – having the ability to nimbly adapt or pivot in a dynamic business or IT environment whether COVID subsides this year or continues to live with us for the foreseeable future.

- Be surprised. More than anything else, necessity drives adoption. We decided to accelerate the deployment of various collaboration technologies during the onset of COVID-19 in Q1 2020. At the time, the impact of the pandemic was largely unfelt outside of East Asia. Surprisingly, adoption of these collaboration tools went through the roof – proving the point that high user adoption is possible when the team really needs to leverage the technology.

How has your workplace transformed over 2020, and what are your precise workplace transformation strategies for 2021?

One technology which we will continue to emphasize in our 2021 deployment roadmaps would be distributed cloud, or "multi-tenant" environments (the distribution of public cloud services to different physical locations). The increased use of this infrastructure will address the need for our users to minimize latency by having cloud computing resources closer to the physical location where data and business activities happen.

The rationale behind this strategy is quite straightforward: 1) we know that the future of work models will require more flexibility and in turn higher compute requirements; 2) even after returning to an office setting, cross-border travel will likely remain muted, which would further tax the existing network infrastructure capacities; 3) we are observing newer technologies (e.g. 5G, edge computing, smart building infrastructure, voice-based chatrooms, etc.) and compliance requirements (e.g. data residency) becoming common in enterprise business operations — all of which would require a flexible hybrid cloud model to meet the forthcoming capacity, latency, residency, and cost optimization demands of the future.

What will the "new normal" look like for your industry? How will your vertical be impacted by the pandemic and the post-pandemic reality?

In the post-pandemic world, we are expecting a greater dispersion of corporate real estate footprints to meet the new workforce demand and working patterns. Physically, this could mean a greater use of flex- and co-working space, with the corporate offices remaining as the focal point of face-to-face interaction, collaboration and socialization.

Near-term real estate technology priorities will shift toward digital enablement in the new hybrid ecosystem: seamless connectivity and collaboration between offices and the remote locations, a touchless and increasingly digital interface within the workplace, real-time workplace analytics, and performance management. In order to better support a blend of virtual and physical experiences, we will continue to invest and evolve our technology infrastructure, management practices, security and governance policies, and our employee / customer engagement models. ∎

Photograph courtesy of JLL.

WHITE & CASE

The Outlook for Japan

—

Arthur M. Mitchell, Senior Advisor at global law firm White & Case and former General Counsel of the Asian Development Bank has 45 years of experience — much of it in Asia. He explores the prospects for Japan's tech sector in 2021.

Could you elaborate on Japan's approach to smart infrastructure and its regulations?

S mart infrastructure is a long-standing policy interest of Japan, and many Japanese companies have focused on this, since at least 2009-2010 when the country hosted APEC. The Japanese government is committed to helping companies export smart city technologies and, being relatively open to foreign investment, there is nothing to prevent international companies from participating in Japan's smart city initiatives.

The country still sees itself predominantly as a manufacturing hub and many Japanese companies are increasingly exploring 'smart manufacturing', following the German model in some cases. With a growing digital infrastructure, Japan is also ramping up its AI abilities and is very much following EU principles in this regard, introducing soft rather than mandatory laws.

Many Japanese cities are embarking on holistic smart city projects, looking at the deployment of transformative digital technologies in key sectors including healthcare, transportation and education. Equally, there are plenty of smart infrastructure projects that are more limited in scope; for example,

the introduction of a rainfall radar system in sewage networks to check waterflow and manage flood control.

However, a material barrier facing the country's smart infrastructure goals is the lack of common technical standards and interoperability – currently there are different vendors supplying different systems for various aspects of a city in silos, and with no central communication system between government ministries, data cannot be easily shared. If Japan can figure out how to overcome this, it will have a competitive advantage with all major Japanese suppliers exporting their technology in an interoperable way.

What's the outlook for Japan's smart city? How does its tech sector contribute to its future?

With a declining and ageing population, a better technological profile is a crucial aspect for Japan to maintain its position on the world stage. Currently, Japan recognises it is behind in terms of digital transformation with some of its companies falling lower on global indices against more technically adept and agile competitors. Another problem is a lack of data scientists – Japan will need to increase digital talent in order to take full advantage of the paradigm shift towards smart

Photograph courtesy of White & Case.

cities and "society 5.0".

Areas where Japan has had some success are in developing gaming products and AI solutions for manufacturing, but when it comes to competing against the big cloud providers, Japan is far behind in terms of capabilities. Looking ahead, we will see an increase in both competition and collaboration in the Japanese market, with individual companies seeking to collaborate with local or foreign companies in order to innovate.

In terms of bright spots, robotics and nano technologies are likely to be successful areas in Japan, and the government will work collaboratively, lending its support to companies innovating in digital solutions. Additionally, Japan's healthcare sector, increasingly under financial pressure, will see significant technological changes; this is already happening with technology being applied to move

clinical treatment from hospital to the home. Finally, as no single company is capable of developing all the technology required for smart infrastructure, it is likely that IoT will become an industry in itself – we could see some interesting tech alliances emerging from this, both in Japan and globally.

How will Japan's tech sector be impacted by the pandemic and the post-pandemic reality? What will the "new normal" look like for Japan's enterprises?

From a tech perspective, many companies in Japan were unprepared for the shift towards remote working in 2020, even young professionals. Japan has long recognised that it has been behind in terms of digital transformation and has been making efforts to address this in recent years. As with most countries, the pandemic has accelerated these efforts and the general public's adoption of digital technologies to provide and receive services. In a post-COVID-19 world, where feasible, it is likely many of these changes will become the norm and companies will adopt hybrid approaches in terms of combined use of hardware and software, as well as remote and physical working. Culturally, high levels of respect for the government and social aspects, such as willingness to wear a mask and bowing instead of handshaking, are positively contributing to Japan's management of the pandemic.

What do you see as being the most impactful technologies coming into play over the next year for Japan? What are your broad technology predictions for 2021?

We can expect to see interesting developments within blockchain,

robotics and AI over the next year. However, in order for Japan to be competitive in these areas, it will need to build up a suitably skilled workforce; for example, the government has estimated that there will be a shortage of 145,000 AI engineers by 2030. That said, the cooperative nature of Japan's society will work in its favour regarding the development of the country's tech sector, particularly in terms of less congested data sharing.

Leveraging technology to move medical care from hospitals to homes is also likely to come properly into play in 2021. There also remains continued expectation around the progress with driverless cars; however, Japan currently lacks the proper infrastructure for this. Meanwhile, it is also anticipated that Japan will pioneer the hydrogen market which will involve various technical aspects, including electrolysis to power 'green' hydrogen.

5G will also be an interesting area to watch. With various governments in the West making business difficult for Chinese 5G service providers, many Japanese tech companies believe there is an opportunity to seize here. For instance, companies such as NTT, NEC and Fujitsu are looking into opportunities to export various 5G components. However, Chinese 5G providers can offer a complete solution alongside aggressive pricing – these aspects will make it difficult for Japanese companies to compete on the same level.

What does a Biden Presidency mean for Japan's tech sector, given a traditionally close U.S.-Japan alliance?

Japan is an ally to the US in many ways and, with the Biden administration, we can expect

> **Areas where Japan has had some success are in developing gaming products and AI solutions for manufacturing, but when it comes to competing against the big cloud providers, Japan is far behind in terms of capabilities.**

the relationship between the two countries to become even closer, particularly in areas such as clean energy, technology sharing and smart infrastructure. The US is already working closely with Japan to cooperate on business and policy to further develop Japan's digital economy, and this can be expected to continue throughout 2021.

Close US-Japan collaboration on tech is supported by Prime Minister Suga's emphasis on a digital agenda, which is at the forefront of efforts to provide better economic outcomes for Japan. A new Digital Agency will be established to coordinate policy across government and lead the shift towards a digital society. Cyber security is among the technical capabilities Japan is seeking to improve; once this happens, we are likely to see increased information sharing between the two countries. ∎

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