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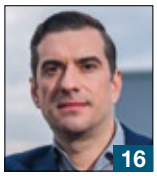

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Shubhendu Parth

Social media's extraordinary influence **must not go unchecked**

The world is full of necessary evils, but is social media one of them? It may be argued that it is neither necessary nor evil. Of late, however, its harmful effects have been more noticeable than its benefits. Be that as it may, the journey of innovation cannot be stopped.

One such innovation was television, invented in 1927 by Philo Taylor Farnsworth, a 21-year-old American. The 1950s saw the evolution of TV with shows like Peter Pan, The Tonight Show, and Disneyland catching the fancy of Americans. That was also when TV got its rather derogatory nickname, 'idiot box'. There are multiple theories – social and technical – explaining this. Some experts believe this has to do with the non-interactive, non-responsive nature of the TV. Others believe this has more to do with its impact on social behaviour. Mass entertainment before TV used to be theatre, ballets, music concerts or art exhibitions. TV confined people to their homes. Researchers have also shown that it affects critical thinking and the ability to comprehend.

Social media is a similar innovation that began with the emergence of the internet and has acquired a mammoth proportion due to the high adoption of the smartphone and availability of data connectivity over it. While the likes of GeoCities, Classmates.com and SixDegrees.com were the early social media platforms, the game-changers really were Facebook (introduced in 2004), YouTube (2005), Twitter (2006) and Instagram (2010). The nature of social connect changed further with the arrival of mobile messaging platforms like WhatsApp, Line, Viber, Telegram, Signal, FB Messenger and Google Hangouts.

According to Q3 2020 data by Statista.com, Indians spend on average 2.25 hours daily on social media. This is besides the time spent on broadcast, streaming and print media. This has the propensity of influencing social behaviour at an unprecedented scale. Its impact can be seen in the kind of information shared through platforms like WhatsApp – social, health, financial, and political. Many of these platforms have also been used by non-State actors to achieve nefarious objectives, including acts of aggression against the State.

The government is absolutely correct and within its right to put in place mechanisms that can help check the misuse of today's most influential media, and the likes of Twitter, Facebook, and WhatsApp should respect the rule of the land, including the need for traceability. There is, however, a genuine concern too: Can the government that arrests people for asking the prime minister why vaccines were exported, not misuse the information technology decryption rule to sniff and snoop for ulterior motives?

It is time the government infuses confidence among people by introducing the much required data protection bill, with enough teeth to protect citizens' privacy as defined by the landmark Supreme Court judgment of 2017.

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DATA CENTRE AND ITS NEW AVATARS

The good old data centre has undergone a dramatic transformation in its speed, purpose and energy consumption. But the market is witnessing a transformation too

The way data centres are shrinking in size, metal, hardware, space-needs and power-hunger is nothing short of a delight. It seems a lot like that newspaper party-dance game in which the partners have to keep dancing as the paper gets folded and folded and folded with every next round.

That explains why the monolithic and beastly iron-creature of the last decade is seldom visible anymore. In its place is its post-diet cousin – this data centre is more software than hardware; this data centre takes up less space and this data centre is designed around applications. And, do you know the best part? This data centre has been folded into new limits of being lean and thin. It's surviving on salad; uses less space, less energy, and is more agile. So does that mean the story of data centre changes from here?

NEW CHARACTERS: WORKLOADS, EDGE AND POWER

If we take a walk down the memory lane or a corridor of the museum for data centres, we would recall that just a couple of years back, a data centre was created to last 20 to 25 years.

But as Ovum experts have rightly pointed out, enterprise IT started to slowly move towards a new imperative for workloads. The need for regional data sovereignty added a big wheel to this shift. Speed and agility became paramount. This led to modularisation, distributed IT and low-latency strategy for data centres. So that's why the data centre space forked into two segments – the mega-big, multi-megawatt category where hyper-scalers reigned and the dedicated and lean category.

The arrival of multi-core processors and virtualisation, followed by containerisation, gave a new shape to the typical data centre. Now the data centre had to be closer to the source of where the data is generated. In some recent estimates shared by Dell, over USD 700 billion in capex is expected to be spent within the decade on edge infrastructure. While 10% of data is processed outside of the data centre today, 75% of data will be processed outside of a traditional data centre or cloud by 2025 – as per these edge-oriented projections.

Pravin Advani, Co-Founder & Managing Partner at SA Global Advisors outline the massive shift in data centres. "Back when data centres were built using large rooms of computers in the 1990s, to now with their virtual replacement with cloud-based technologies, data centres have gone through multiple quantum leaps. With the explosion of data through various digital devices and cloud-based applications, the data centre in the future will look significantly different from today. The rise of Infrastructure as a Service (IaaS) from cloud providers has given companies an option to build a virtual data centre in the cloud using just a few mouse clicks. Nevertheless, it will take time for the local on-premises data centre to completely fade away. In fact, many companies including Amazon are still investing in building their next-generation data centres and so are a few other global players in India."

THE DATA CENTRE SECTOR USES AROUND 1% OF THE WORLD'S ELECTRICITY AND THIS LEVEL COULD HIT DOUBLE-DIGITS BY 2030, ADDING MORE CARBON EMISSIONS.

And there are not one but many factors that explain this transformation – from virtualisation, to hyper-converged infrastructure (HCI), to power-efficiency metrics and a lot more. Here is what the new face of data centre looks like – without all the flab. And here's why.

A lot of the transformation of data centre can be put on the shoulders of cloud, and the muscles of HCI and virtualisation.

THE CLOUD TWIST

Enterprise spending on data centre hardware and software dropped by 6% to under USD 90 billion. The COVID-19 has also come in the way of pushing a new direction on worldwide IT operations. If we look at the last decade, average annual spending growth for data centre has been 2%, while for cloud services (IaaS, PaaS and hosted private cloud) it was 52%. Fresh data from Synergy Research Group also shows that enterprise spending on cloud infrastructure services continued to ramp up aggressively in 2020, and has been growing by 35% to reach almost USD 130 billion.

The 2020 worldwide spending on enterprise data centre hardware and software number stood at USD 89 billion. The key segments with the highest growth rates over the decade have been virtualisation software, Ethernet switches and network security. It is interesting to note that the server share of the total data centre market has stayed unperturbed, but the storage's share has dropped.

It is not a scenario of redundancy of data centres. In fact, if anything, the data paradigm has exploded in the last few years – in every stripe of technology disruption, be it artificial intelligence (AI), internet of things (IoT), or last-mile applications. They all need higher computer capabilities, and lead to a high quantum of data being generated and processed. This translates into a bigger need for data centre capacity. What could be happening though is that 60% of the servers that are now being sold are going into cloud providers' backyards.

As Naveen Mishra, Senior Director Analyst, Gartner, explains, "The Indian public cloud market is poised to cross USD 12.0 billion with a CAGR of almost 30% during 2020 through 2025. Indian enterprises have accelerated their digital journey and cloud is becoming an important component of this journey. In the last 12 months, based on user surveys/interactions, cloud deployments are primarily supporting five outcomes: IT modernisation, improved efficiency, improved productivity, increased agility and innovation and, finally, enablement of digital business strategy."

Shahin Khan, veteran technology analyst and founding partner at OrionX, avers that data centres have substantially caught up with virtualisation where possible and bare metal where necessary. "The prevailing model is scalable in capability with a cloud consumption model, hardware configurations that ensure quality of service, and advanced development tools that ensure developer productivity."

He also reminds us of the predictions of the data centre's wipe-out with the advent of cloud. That never happened. Data centres also became not the boring one-stroke painting that some people expected. Instead, data centres have embraced co-existence with cloud and heterogeneity, Khan underlines.

Mishra translates how the new usage scenario will shape into an impact on data centres. "India is seeing a sudden surge in creation of data centre capacity primary driven by traditional data centre services companies, which are investing into this to serve the accelerated hyper-scale demand, over the next three-five years. Gartner does not expect rapid increase in the on-premise/enterprise data centre footprint. Enterprises are

> EVEN IF WE CONTRAST THEM TO CLOUD ALTERNATIVES, THE DATA CENTRES OF TODAY WILL STILL BE PICKED AS THE MORE COST-FRIENDLY OPTION BY SOME INDUSTRY EXPERTS.

considering optimising their existing data centre footprint with all possible options available including public cloud, colocation and on-premise facilities. Increasing Edge footprints adds another layer of complexity to manage their hybrid infrastructure."

THE HCI PAGE-TURNER

And how can we forget about HCI while talking of the leaner version of yesteryear's data centre! HCI or hyper converged infrastructure covers a unified, software-defined system. It envelopes all traditional data centre areas from storage and computation to networking and management. It leverages data centre hardware using locally attached storage resources and spins up flexible building blocks that can replace legacy infrastructure.

The HCI market size was estimated to be at USD 3.84 billion in 2018 and is projected to hit USD 33.16 billion by 2026, according to a Valuates Report. There is staggering growth in this space because it gives enterprises all the advantages of a data centre, albeit at lower capital spending, operating expenditure, and better disaster recovery capability. It is a composite of integrated stack systems, integrated infrastructure systems and integrated reference architectures.

Valuates projections explain why HCI is showing a fast adoption pace – due to reduction in costs of infrastructure by combining or incorporating commodity hardware with a common operating model. But HCI is also facing issues like vendor lock-in and less elasticity. Often, one needs huge costs to add a new resource to the existing HCI.

Radhika Ramesh, EVP – Global Delivery Center Head, Cloud Infrastructure Services (CIS), Capgemini, reckons the implications of latency, HCI, SSD and Lithium-ion, etc. on the modern shape of the data centre. "First, low-latency apps require compute close to the user. Edge by definition will be closer to the user, and the Lithium -ion UPS allows us to protect hardware with a smaller form factor and in situations both inside and outside of a traditional DC. Also, HCI, SSD, multicore processing OCP and again Lithium-ion UPS all drive solutions to a smaller standardised footprint with greater power density and higher reliability."

She explains that coupled with the availability of software-defined components (storage, network), this will give us great flexibility and will reduce the requirement for traditional data centre space in the centre. "However, centre DCs will still be required to host legacy workloads, and DCs are much more energy-efficient when full, so

ASIA-PACIFIC AND NORTH AMERICA WOULD BE WITNESSING ROBUST GROWTH AS COMPANIES IN THESE REGIONS INVEST IN HYPER-SCALE AND EDGE DATA CENTRES.

THE CONTOURS OF INDIA

The India data centre market, by investment, is expected to grow at a CAGR of 12% during 2020-26.

- **April 2020:** Google announced an investment of around USD 400 million in the deployment of Blue-Raman cable. This one connects India with Israel and Italy.
- **August 2020:** Equinix entered India with the acquisition of GPX Global Systems in Mumbai, a deal likely to close by Q2 2021.
- **December 2020:** Adani Group announced to set up a hyper-scale data centre facility that will entail an investment of USD 340 million in Chennai. It has inked partnership with EdgeConneX, to build and operate 1 GW of data centre campuses across the country. Incidentally, they could be powered by renewable energy power plants in India.
- **Investment in self-built facilities:** National Payments Corporation of India, State Bank of India, National Payments Corporation of India and Information Technology Department Tamil Nadu Colt DCS have been developing the largest data centre in Mumbai, reportedly with a total power capacity of over 100 MW.

Source: ResearchandMarkets

there will still be pressure for organisations to centralise workloads where possible." In her guess, these competing drivers will lead to consolidation of DC space, and will also push organisations, which will end up with empty space in their central DCs to move to co-location service run by system integrators or dedicated DC hosting companies.

TIME TO CHILL DOWN, LITERALLY

But with all these new turning points comes a done-and-dusted question too. The modern data centre cannot afford to be an energy-guzzler anymore. The International Energy Agency has estimated that the sector uses around 1% of the world's electricity and this level could hit double-digits by 2030, adding more emissions. If we look at Power Usage Effectiveness (PUE), the measure of energy efficiency in data centres, the theoretical ideal stands at 1. This is where 100% of electricity consumption goes toward useful computation. But data centres are generating an awful lot heat as they expand further.

This is an important aspect that will define the future of the data centre to a large extent. Khan suggests that in addition to improvements in 'results/watt', we also see a move to renewable sources of energy and carbon-neutral facilities.

Sunil Gupta, CEO and Co-founder, Yotta Infrastructure, underlines the trend. "With the increased importance of data storage in the past couple years, companies are taking new approaches that include edge data centres, hybrid cloud, distributed IT, etc. While power remains a significant part of operating a data centre, identifying various methods of power conservation, such as alternate energy source and liquid cooling technology, has always been an important objective for R&D departments."

Data centre companies, across the globe, face the same challenge of designing and operating their facilities

> WITH 669 MILLION INTERNET USERS AND THE AIM TO BECOME A USD 5 TRILLION ECONOMY BY 2024, INDIA IS EXPECTED TO EMBRACE MASSIVE DATA AT EXPLOSIVE RATES.

to reduce environmental impact without sacrificing performance or reliability, points out Jeremy Deutsch, President, Equinix Asia-Pacific. "Increasingly, data centres are incorporating circular economy strategies in construction and operations to reduce climate and environmental impacts."

Ramesh counts this issue as a major change. "There is a requirement now to run data centres as efficiently as possible. We at Capgemini now run all our facilities on 100% green electricity and consider PUE as a critical measure for our facilities. Modular solutions like blade rooms allow for much more efficient operation, often using natural cooling rather than air-conditioning. The use of sealed hot and cold aisles and managing air flow around the facility is also important." She noted that moves by enterprises to get to net zero carbon dioxide make power efficiency a factor that will continue to increase in importance. "DCs are increasingly only financially viable at a larger scale, which makes space and availability of cheap power incredibly important."

Power and cooling still remains the most critical challenge, affirms Vijay Kumar Mahalingam, Vice President – Technical Services at Rahi Systems. "Low availability of adequate power, sometimes, leads to deferred expansion and impacts and new DC deployments," he adds.

Advani dissect the scenario in specific needs. "With estimates of over 175 zettabytes of data expected by 2025, companies are now looking for extremely cost-effective and more sustainable ways of storing data, which will be, increasingly, driven by global climate change and ESG imperatives. In the quest to achieve a near-zero carbon footprint, businesses in many countries are placing their data centres near cheap power sources to make them more affordable and energy-efficient over the long term. Connectivity to fibre networks, regulatory and data security are some basic considerations while building a data centre. Small, distributed data centres, called edge data centres, are being deployed to reduce the load on data centre networking bandwidth from the continuous rise of IoT, 5G, and mobile computing."

Another popular approach cited here is that of large data centres, called mega data centres. "While these mega data centres are expensive to build, the lease cost per square foot in a shared infrastructure model is far lower than that of an average data centre. With mass storage devices such as PCIe SSDs and SMR HDD, there are number of emerging storage technologies that promise greater storage capacity per unit, while pushing the limits on the use of power. Our conversations over the past quarter, with entrepreneurs and investors who are focused on the cloud and data centre space, clearly show that the enormous amount of data being generated is driving higher demand for hyper-scale facilities, along with the demand to support the platforms of the worldwide web, social media, streaming, cloud gaming, AI, machine learning, and, inevitably, hyper-scale cloud providers too. In addition, we see the need for hosted AI solutions for a new data-centric infrastructure architecture that puts data at the centre of the architecture to localise data aggregation, staging, analytics, streaming, and management at global points of business presence."

THE ENDING – STILL A CLIFF HANGER

No, the erstwhile data centre is not going to be passed to the obit page anytime soon. Even if we contrast them to cloud alternatives, the data centres of today will still be picked as the more cost-friendly option by some industry experts. The need for processing the data, using the compute power and ferrying them in and out of the cloud, pushes up the costs in the long term. This is unlike the fixed

and predictable nature of expenses in a data centre. And there are no costs for moving data in and out of them.

Plus, the needs of data localisation, strict compliance and regulations also make a strong case for data centres. We will not throw them away in the junkyard soon – that's for sure. Their face and DNA are changing well to survive the battles of the modern world.

Global investment in data centres is estimated to rise from USD 244.74 billion in 2019 to USD 432.14 billion in 2025 at a CAGR of 9.9%, as per the estimates of ResearchandMarkets. It has been augured that enterprise data centres will account for an increasingly high proportion of data centre investment. This would be followed by cloud, which will overtake enterprise data centres in investment by 2025.

As the digitisation and data wave gets stronger and stronger across the globe; there will be a pressing need for processing and storing data. This means the need for the construction of both large and small data centres. This trend would get accentuated with the progress on 4G and 5G networks, edge applications and the deployment of Industry 4.0 technologies. Asia-Pacific (APAC) and North America would be witnessing robust growth as companies in these regions invest in hyper-scale and edge data centres.

There might also be a trend to move data processing closer to customers. This will drive adoption of edge data centres. Speaking of the India market, there is a significant investment spike coming from colocation service providers thanks to high demand from BFSI, logistics, transportation, e-commerce, and government agencies. This has been spurred by the outbreak of the pandemic. ResearchandMarkets expects that the demand for high-capacity systems with 2N redundant configuration would increase over the next few years.

In the reckoning of Mordor Intelligence, the India data centre market is expected to grow at a CAGR of 8% over 2021-26. Drivers would include a rapid adoption of cloud-based business and an increased proliferation of online shopping due to the availability of user-friendly interfaces, high-speed internet and smart devices. Also initiatives by state governments to attract the construction of data centres in their states for economic growth would shape into a massive opportunity. With more than 669 million internet users presently and the aim to become a USD 5 trillion economy by 2024, it is expected that India will embrace massive data at explosive rates in the coming years. The market could also gain from new restrictions and limits on locations of data centres – as seen in major data centre hubs in Asia, like Singapore.

Over the last few years, the conversations around data and data centres have taken centre stage, as Gupta encapsulates it: "The favourable government support in the form of the 'Digital India' programme, data localisation and tax incentives have played a critical role in accelerating data explosion and spurt in data centre industry. However, the pandemic has been an inflection point, as businesses went 'digital and remote' overnight and enterprises have had to shift away from traditional ways of doing business."

Gupta illustrates how so many businesses are now adopting new IT infrastructure – including the move from traditional on-premises data centres to hyper-scale third-party data centres, hybrid IT, edge computing, distributed IT, and micro data centres. "Sectors such as BFSI, logistics, transportation, e-commerce, and government agencies are witnessing high demand for colocation services. Global enterprises involved in establishing a physical presence in the Indian market are co-locating facilities in the country. In other words, we are witnessing

> HCI GIVES ENTERPRISES ALL THE ADVANTAGES OF A DATA CENTRE, ALBEIT AT LOWER CAPITAL SPENDING, OPERATING EXPENDITURE, AND BETTER DISASTER RECOVERY CAPABILITY.

an increased investment from global colocation service providers fuelling the growth of the industry." Alternatively, as he surmises, several small-scale businesses today prefer managed hosting or cloud services rather than co-location, accelerating India's cloud journey.

"Cloud services have become a necessity for organisations to operate, with employees needing access to data from remote locations. Hence, work-from-anywhere cloud services such as Desktop-as-a-Service and Network-as-a-Service became must have services amid the COVID-19 crisis."

Plus, there is AI waiting as a surprise entry that will change the plot a lot. Khan reasons that without question, the major driver of data centres today is the arrival of AI workloads. "AI applications are enabled by a virtuous cycle. It is cheap to collect massive amounts of data, there is hardware and algorithms that can make sense of that data and need massive amounts of it, and there are economically viable uses for the resulting insights and automation."

AI and data-intensive applications, as Gupta echoes, are being tested as a solution to the data tonnage challenge with respect to the distribution and concentration of data. "Companies are strategizing to keep data as close to its source as possible for better latency as well as data sovereignty. These promising infrastructure changes also hold potential risks of data loss. Hence, it is critical to store data in fault-tolerant data centres that offer two parallel power and cooling systems with no single point of failure. In terms of changing customer needs, companies no longer want to deal with maintaining and operating a captive data centre due to heavy upgrading costs and security concerns."

He points out the emergence of XaaS or Anything-as-a-Service by explaining how migrating to highly scalable colocation data centres is emerging as a popular customer preference. "Additionally, customers are not just looking for rack spaces but a complete solution provider who can take care of all their IT needs such as cloud, network and security."

The way forward for data centres is to adapt even more and be more relevant than ever. Ivo Ivanov, CEO International at DE-CIX, assesses that according to the latest Gartner forecast, end-user spending on public cloud services in India will total USD 4.4 billion in 2021, which is a plus of 31.4% compared to 2020. "The accelerated pace of the digitalisation of enterprises will become one of the key factors for future economic growth – and will have a lasting impact on the fast-developing data centre market. Therefore, data centres need to ensure that they are part of a wider and flourishing digital ecosystem, including ISPs, CSPs, content networks, CDNs and enterprise networks – something they can achieve by getting connected to an Internet Exchange (IX) with state-of-the-art interconnection services, like DE-CIX. We can then support them to create their own interconnection story."

Technology development is accelerating, advancements such as AI, ML and autonomous vehicles will continue to drive growth in compute requirements, reminds Ramesh. "IoT and 5G will lead to more requirements that we don't yet fully understand. Development by the hyper-scalers and the realisation of edge networks will continue to drive change. We can be certain there is a requirement for data centres in the foreseeable future, but we can also be certain that the DC of 10 years' time will look very different to the ones we manage today."

Well, the day is not far when there would be no paper on the floor to be folded anymore, and when the partners would be levitating. That's what true chemistry between technology and users would culminate into. That's how the party should go on, and will go on.

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"LATENCY IS VERY MUCH THE NEW CURRENCY"

IVO IVANOV
CEO, DE-CIX International

How has COVID-19 impacted data centre business?
All areas of business and private life rely more heavily today than ever before on digital applications. These have proven their worth in recent months, finding their place in our professional and personal lives. But beyond the virtual desktop and video streaming, specific sectors are also taking leaps ahead with digital applications and services, ranging from e-health to very sophisticated logistics and mobility applications, and on to the finance sector. Access to the cloud, and cloud-based services, is becoming increasingly important for businesses – so data centres need to ensure that they are extremely well connected to be able to support the demands of their customers to reach a wide and diverse range of local, and global, cloud players.

How have data centres evolved during the last decade? What have been the key drivers?
We need to go back a bit earlier: Until the emergence of the iPhone in 2007, there was considerably less dependence on the distance between data centres and users. But with the advent of the mobile internet, a new form of internet access demanded increasing infrastructure to feed a new generation of services to a willing world. Networks, especially content and applications, needed to get closer to the user. Thus, they needed to be connected with more data centres, and data centres needed to be connected with each other. This has been a continual development – building out to the very edge of the internet and bringing digital content and applications as close as possible to the user. Reducing latency remains essential to today's and tomorrow's applications. This means that the combination of high-performance interconnectivity and proximity to people and business continues to drive innovation in digital infrastructure. Latency is very much the new currency.

We are seeing the emergence of edge computing, in addition to cloud deployments, to support mission-critical activities that require minimal delay in processing. What is the trend in demand and adoption in India and elsewhere?
As I said, latency is the new currency of our time: As latency requirements get lower and lower, it becomes more and more important to bring interconnection services as close to people and businesses as possible – in India and the rest of the world. Therefore, edge computing is essential for today's needs and demands, both from a private user's perspective as well as from a business perspective. One example of this for enterprises is being able to connect directly to the Microsoft 365 cloud, in order to reduce the latency and therefore enjoy optimised performance of the Microsoft 365 applications.

In addition, the recent developments in the provision of internet connectivity through low-earth orbit (LEO) satellites are yet another step in pushing out the frontier

"THE COMBINATION OF HIGH-PERFORMANCE INTERCONNECTIVITY AND PROXIMITY TO PEOPLE AND BUSINESS CONTINUES TO DRIVE INNOVATION IN DIGITAL INFRASTRUCTURE.

> BUSINESSES ARE BEGINNING TO UNDERSTAND THE IMPORTANCE OF LATENCY, WHICH MEANS THE DOOR IS OPEN FOR DATA CENTRE DEVELOPMENT CLOSER TO THE EDGE.

to the very edge. By offering internet connectivity to the satellite network providers – for example, by themselves being connected to an internet exchange – data centres in India will be able to participate in this development, opening up new markets in more remote regions of the subcontinent in the process.

We see that businesses are beginning to understand the importance of latency for the performance of their business activities, which means the door is open for data centre development closer to the edge.

We are already in the environment of 4G LTE and waiting for 5G.How do you see the role of data centres changing with the 5G coming in?

5G offers enormous potential for a range of industrial and economic sectors. A prominent example is connected factories in the wake of Industry 4.0. There are high hopes for 5G, mainly for improving the wireless networking of machines and production facilities, as the technology can cope with significantly more participants per radio cell than other systems. However, network coverage is crucial for industrial benefits, and sufficient network coverage is the major challenge here. Large cities and metropolitan areas are initially favoured for expansion and large plants are often located in rural areas. This has given rise to the need to build plants' own 5G networks, which are connected to the cloud via edge computing and corresponding data centres. In industrially strong regions where 5G network coverage is already reliable, edge data centres ensure that data can be processed directly on site, keeping latency as low as possible. Thus, these edge data centres are here to stay.

What is happening to data centres as we move towards trends like low-latency apps?

Besides using the latest – and therefore fastest and most reliable – technology in data centres, it is inevitable that data centres are interconnected with one another. The more interconnected data centres there are operating within close proximity to one another, the greater the interconnectivity gravity becomes, attracting more and more networks that want to access and participate in the increasingly dense ecosystem of what is becoming a new digital hub. This enables the development of local interconnection ecosystems to support the region in question with low-latency connectivity. Gone are the days when centralised data centres or cloud infrastructure on one continent can serve the needs of people and business on another.

Are data centres adapting well to VMs, cloud workloads, modularisation, solar-powered servers and localisation?

Since DE-CIX, as an operator of internet exchanges, is only a tenant in data centres, I cannot fully answer this question. However, what I can confirm is that the presence of the DE-CIX interconnection platform in a data centre increases the attractiveness of the data centre dramatically in terms of connectivity and performance.

What about data sovereignty? Can it be dealt with at the data centre level?

For the digitalisation of enterprise value chains, data sovereignty plays a very important role. For this reason, we brought to life the concept of a closed user group (CUG) at the DE-CIX Internet Exchanges. Industries today are in the grip of digital transformation. Businesses are shifting from monolithic, on-premise IT systems to platform-based models in which companies take part in ecosystems to share data and intelligence, and assemble solutions with third-party components. While cloud solutions facilitate data storage and handling, interconnection platforms are crucial for the one-to-many or many-to-many data exchange needed along data value chains.

Be it the automotive, healthcare, financial services or retail industry, connectivity needs are increasing, and this very often involves connectivity to a certain, defined partner universe. The CUG makes this possible, with compliance requirements baked in and with optimised security as a result of bypassing the public internet –and, in so doing, enabling an enterprise to have full sovereignty over their data journey.

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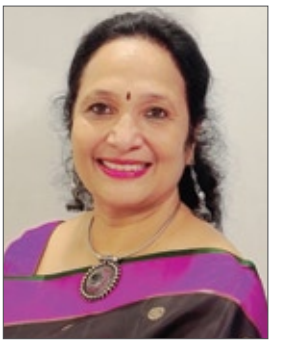
"MIGRATIONS TO HYPER-SCALERS HAVE CHANGED THE MIX OF WORKLOADS"



RADHIKA RAMESH
EVP – Global Delivery Center Head, CIS, Capgemini

How much has the data centre changed over the last ten years?

Over the last 10 years we have seen significant changes. Firstly, the competitive landscape we offer data centre services in now has the cloud hyper-scalers (Azure, AWS, Google) as the first choice for many of our customers rather than an exception.

Migrations of workloads from our sites to hyper-scalers have changed the mix of workloads we support. Latency from our sites to the hyper-scalers becomes a key measure and drives the location of new data centre decisions. Over the last 10 years we have moved away from heterogeneous hardware components from various manufacturers and towards the sharing of technologies and the adoption of x86, virtualisation and open source, and finally to converged infrastructure with virtualisation, software-defined networks and storage delivering powerful network, storage and compute in a single rack.

These advances have increased the power density (power per rack) required in data centres, changing the design, layout and cooling solutions we use. A combination of this increased power density and the migration of many services to the cloud has led to a reduction in the amount of data centre space our clients need and that has led to a consolidation in the number of data centres we run globally at Capgemini.

So what happens as we move ahead?

As we move forward it will become less and less common for end customers to own data centres and even service providers like ourselves are moving towards hyper-scaler data centres with customised co-location services bought from dedicated data centre providers.

One final change that is still emerging is the requirement for very low-latency content provision, and IoT devices with large data volumes or low-latency requirements that require compute solutions to sit at the edge of the network. This will over the next few years drive the creation of edge data centres in some form.

Any specific customer needs or demands that you have observed?

We at Capgemini have seen a change in demand patterns of customers. Enterprises would like to limit capex investment in data centre identification, acquisition and setup. They are increasingly trying to divest or close their own data centres and depending on system integrators to provide end-to-end service and resource consumption-based models for co-hosting and hybrid strategy.

"LATENCY FROM OUR SITES TO THE HYPER-SCALERS BECOMES A KEY MEASURE AND DRIVES THE LOCATION OF NEW DATA CENTRE DECISIONS.

> MOVING WORKLOADS IS COMPLEX AND EXPENSIVE; THEREFORE, IT IS BETTER TO NOT MOVE WORKLOADS IF YOU ARE UNHAPPY WITH A SYSTEM INTEGRATOR'S SERVICE.

Increasingly, though, customers are also looking to disaggregate data centre hosting from service provision. Moving workloads is complex and expensive; therefore, it is better to not move workloads if you are unhappy with a system integrator's service.

Most clients have a 'cloud first' strategy, preferring SaaS (Software as a Service) solutions. This gets clients into a multi-cloud environment.

Where systems have to be hosted outside of the cloud, focus has shifted to standardisation, virtualisation, hyper-converged technology and software-defined solutions. More and more often these workloads are considered an extension of the cloud rather than the other way around, leading recently to an expansion of services such as AWS Outpost and Azure stack.

This leaves traditional data centres managing a complex mix of shrinking workloads that cannot move to the cloud either because of security, data sovereignty, low latency demand or legacy hardware that is difficult to migrate such as mainframe. For example, large financial institutions which continue to leverage mainframe along with their move to public cloud might take some time to transform completely.

How much will IoT matter, especially from the perspective of ever-escalating data requirements?

Applications like autonomous vehicles and smart devices used for manufacturing or home appliances will require edge computing – which is processing that occurs at the edge of the network. This problem can be resolved in a number of ways and it is not yet clear which solutions will be widely adopted. It is probable that the network providers will play a pivotal role with the delivery of 5G networks.

We will likely see the emergence of many micro data centres at the edge of the network, which will perform immediate processing. These edge DCs will also play a role in content distribution and hosting for applications such as gaming that require very low latency.

Cloud hyper-scales will complete the picture with the processed data being sent to the cloud for aggregation for further processing and applying AL/ML for inputs into intelligent business operations.

Are data centres adapting well to VMs, cloud workloads, modularisation, solar-powered servers and localisation?

The modern data centre needs to be very efficient (ideally with a low PUE less than 1.1), have the ability to host high density workloads and have low latency to the hyper-scalers (so it needs to be physically close to the providers).This means many older DCs will either be in the wrong place, be limited by the power network or will be constructed with inefficient cooling solutions. These DCs are likely to not have a long-term future.

Moving forward, it is less and less likely that owning a DC makes sense for most organisations. Data centre providers are best positioned to adapt to varied needs right from traditional hosting, co-location services, private cloud and hybrid/multi cloud setup. Edge data centres will continue to spawn in manufacturing and residential hubs and key transport intersections to allow for processing IoT workloads.

What is the importance of data sovereignty in this new realm?

Data sovereignty is an area with growing significance. It drives the placement of workload into countries and is a barrier in many cases to moving to hyper-scalers. The same is true for restricted data that has to be dealt with at a high-security level.

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"DCs SHOULD BE READY TO DEAL WITH CHANGING LATENCY AND WORKLOADS"

NIKHIL RATHI
CEO & Founder, Web Werks

With everything moving to the cloud, how has the role of data centres changed, particularly in terms of customer needs and demands?

Today, organisations with on-premise data centres are moving to the hybrid cloud because of its performance, stability, security, and quality. Cloud adoption is unlikely to deliver the best results unless and until it is supported by reliable, robust, secure and low-latency network infrastructure. Co-locating in a third party data centre like Web Werks enables our customers to access cloud and connectivity to various other multiple network connectivity providers.

Web Werks has put together the most extensive range of cloud hosting services designed to allow our customers to work seamlessly. With public, private and virtual private cloud options available, as well as on-demand cloud services offering rapid deployment for a range of niche industries, we support our customers' business requirements. We focus on low-latency connectivity and exceptional network performance to ensure that customers' workloads are supported no matter what the capacity is.

What implications have low-latency apps brought for the data centre industry?

Digital will soon become a lifestyle choice, thanks to the burgeoning Indian millennial population. Due to high bandwidth and transmission demands, data centres will need to be ready to deal with changing latency and workloads. Latency becomes a significant factor as majority of businesses are migrating their critical data to the cloud. Data centres need to incorporate hybrid computing architectures. Web Werks is geared to capitalise on hyper-scale and the edge with a strategy that seeks to extend its interconnection advantage. Web Werks offers network dense interconnection ecosystem comprising all major telcos, 180+ ISPs, three major internet exchanges in India – NIXI, De-CIX, Extreme IX, large CDNs and OTT providers.

Enterprises can achieve application performance and user experience by deploying direct, private connections at the DCs. Businesses connect to their customers, employees and partners inside the data centres, offering an interconnection ecosystem.

Web Werks recently signed an agreement to form a joint venture with Iron Mountain. How much of the Rs 1,086 crore investment by Iron Mountain will go into creating cloud infrastructure?

Web Werks has entered into a strategic joint venture with Iron Mountain, a global provider of data centre and colocation services. Our customers have access to 18+ world-class data centre facilities across Web Werks DCs in India and Iron Mountain DCs in the Asia Pacific, USA and Europe.

> CLOUD ADOPTION IS UNLIKELY TO DELIVER THE BEST RESULTS UNLESS AND UNTIL IT IS SUPPORTED BY RELIABLE, ROBUST, SECURE AND LOW-LATENCY NETWORK INFRASTRUCTURE.

> BUSINESSES ARE BEGINNING TO UNDERSTAND THE IMPORTANCE OF LATENCY, WHICH MEANS THE DOOR IS OPEN FOR DATA CENTRE DEVELOPMENT CLOSER TO THE EDGE.

Together, we believe in providing secure, compliant data centres with efficient access to top carriers, cloud and IT services providers. Our initial focus will be on expanding data centres in all major cities in India. IMDC will be investing in Web Werks over two years to move into Bangalore, Chennai and Hyderabad.

Web Werks data centres offer dynamic digital infrastructure spanning private and public environments, choosing multiple providers and distributed geographies. With public, private and virtual private cloud options available, our customers can adopt a hybrid multi-cloud architecture.

Are data centres adapting well to cloud workloads, modularisation, solar-powered servers and localisation?

Let me first talk about renewable energy sources. We are committing to using 100% renewable energy and efficient solutions. Web Werks data centres are carbon neutral, contributing towards global go-green concepts. We run efficient PUE, which is 1.66 using efficient technology and plan to have captive solar power as a renewable energy source. Web Werks and IMDC's continuous focus on sustainability attracts more customers co-locating their IT infrastructure in our DCs. The two companies share respective operational expertise for building DCs with clean energy for energy-efficient cooling systems.

As to cloud workloads, Web Werks cloud offerings provide businesses with the tools, infrastructure platforms and expertise they need to succeed at each stage of cloud maturity. The portfolio comprises public cloud, private cloud, virtual private cloud, SAP cloud and a suite of backup/ storage/ DR Services and an innovative hybrid cloud management tool for service automation and orchestration.

How serious are challenges like cooling, power efficiency, space and real estate costs?

The proportion of energy used in the data centre is: 52% for IT equipment, 38% for cooling and 10% for supporting devices. Relatively, cooling systems use much electrical energy because most data centres operate with air conditioners. Therefore, adjustments to the cooling system are needed to improve the efficiency of electrical energy consumed. This will also reduce maintenance costs and electricity usage. Immersion cooling meets the needs of an ever-growing data centre power density and will likely increase the demand in future.

Reports indicate that the co-location data centre market in India is expected to grow from 375 MW in H1 2020 to 1,078 MW by 2025, a CAGR of 21%. What is driving this demand?

Home to a rapidly advancing economy, the geographical location of India puts it at a perfect distance from other business hubs such as Singapore, Dubai and Shanghai in APAC. India's extensive coastline also makes it an ideal point for cable landing. The pandemic has also opened gates to a spurt in cloud computing. With evidence of a shift of demand from the Asia-Pacific area to the Indo-Pacific, the Indian government encourages investments in the Indian data centre industry. The Indian market has millions of active internet users making the country an ideal segment to be tapped. In 2020, the data traffic in India grew by 36% year-over-year primarily due to a rise in 4G data consumption as 4G subscribers surpassed 700 million with 100 million new additions during 2020.

The increase in data volume would be supported by high growth in e-commerce, increased usage of social media, greater preference for over-the-top (OTT) platforms, the government's impetus to the Digital India initiative and rapid digitalisation of services across industries (5G).

Growing at a CAGR of 21%, the market is expected to reach 1,100–1,200 MW from the current 360 MW by 2025. Furthermore, the Indian government aims to develop cable landing and submarine cables and low-earth orbit satellites to improve connectivity and reduce latency across the country, particularly addressing the needs of Tier-2 and Tier-3 cities.

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"OPTIMALLY PLACED EDGE INFRASTRUCTURE WILL POWER 5G"

JEREMY DEUTSCH
President, Equinix Asia-Pacific

How much has the data centre industry changed over the last decade?

The rapid growth of the digital economy has driven increasing demand for interconnection, edge services and hyper-scale development. In order to overcome legacy IT constraints on digital transformation, enterprises want to build interconnection-first architectures – deployment of IT traffic exchange points that integrate direct, private connections between counterparties. Furthermore, many global businesses have implemented work-from-home policies and enabled their employees to work remotely under the pandemic, causing traffic to shift 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 and digital resilience. Businesses need to continue assessing their situational risks/needs, evaluating business continuity options and scenario planning.

Does your company's portfolio echo this evolution?

To support leading businesses around the globe in the increasingly digital world, we have transformed Equinix into the world's digital infrastructure company by not only expanding our global footprint but also enhancing our interconnection and edge service portfolio. We are giving digital leaders one global platform to scale, interconnecting their digital infrastructure for optimal performance, speed and flexibility so they can move fast, get to market first and pivot quickly when customer needs and market conditions change.

Which areas represent these important changes the most?

Organisations have realised that what they need today is not just a place to store data, but a vendor-neutral platform that allows them to interconnect and succeed in the digital era. Such interconnection is essential to business success in this new era of the digital economy. Today, geographically dispersed customers and employees are processing more data than ever, and existing IT architectures will not be able to keep up. To succeed, companies must re-architect IT infrastructures out to the digital edge, where they are close to the users in distributed locations around the world. Also, we are seeing organisations increasingly look at multiple cloud providers as certain workloads may run better on one cloud than another. Many organisations do not have the processes and/or resources in place internally to manage hybrid multi-cloud computing and look at interconnection and multi-cloud access as a way to bring various silos of computing together to be more competitive.

In today's dynamic environment, customers are assessing their situational risks and needs, evaluating business continuity options and scenario planning. As part of this, they are looking at adding supplemental capacity to meet new needs especially in support of distributed remote workforce (VPN, Unified Communications) and for business continuity purposes.

How crucial are forces like IoT and ever-escalating data requirements in redefining data centres?

New technologies like 5G, edge computing and IoT rely on real-time processing and use huge amounts of data that depend on cloud computing. These data-dense technologies will drive the need for data centres because they offer more scalable and cost-effective cloud computing. Successful IoT initiatives rely heavily on interconnection, requiring digital infrastructures that can physically link dispersed sensors, devices and machines that make up public systems, services and experiences, so they can exchange information in real time. IoT deployments can involve interactions between more than a dozen players across a single or even multiple ecosystems. Making these complex IoT ecosystems work together intelligently requires a foundation of direct and secure interconnection

> THE ENTERPRISE DIGITAL ESTATE IS FAST MORPHING INTO A HYBRID COMBINATION OF PUBLIC AND PRIVATE CLOUDS; PHYSICAL AND VIRTUAL DEPLOYMENTS.

that can deliver the performance, scalability and security required to build a smarter world.

What are the key challenges, then, we see today and how are you addressing them?

The enterprise digital estate is fast morphing into a hybrid combination of public and private clouds; physical and virtual deployments. Most enterprises looking to support their future business applications will need to deploy a hybrid digital infrastructure with the majority of new applications being deployed to the cloud, and legacy applications being cloud-enabled. There is a huge requirement for cloud-to-cloud interaction and sharing of data which is not best served by each-and-every cloud holding copies of the same data. Not only can that lead to prohibitive storage costs, but data ownership and integrity issues can arise. Private storage outside but adjacent to the clouds, which need that data is a cost effective, compliant and high-performance option.

Equinix enables businesses to deploy digital infrastructure in strategic interconnection hubs on a globally trusted platform. Adjacent to a rich network and cloud ecosystems, digital leaders can leverage dedicated, private connectivity to ecosystem partners and fast-track agility to offer differentiated experiences. With Equinix's digital infrastructure businesses can modernise IT systems with multi-cloud capabilities, scale with cloud adjacent data to optimise application performance, and build new digital capabilities with access to a choice of SaaS and business partners.

Is environmental responsibility a big concern too? How are you moving forward on this path?

We are committed to preserving our collective future by taking responsibility for our share of carbon emissions and advancing a bold sustainability agenda across our business. We are leveraging our position as a large corporate buyer of energy by partnering with like-minded companies to advance low-carbon policies, sharing renewable energy buying knowledge and encouraging innovation to drive change. We are pioneering green data centre design innovations and building and operating resilient, efficient and sustainable data centres around the world.

Where possible, Equinix leverages water recovery systems, rainwater capture and grey water recycling to reduce water consumption within our data centres. Looking ahead, we are evaluating methods to reduce the embodied carbon in our building materials for our new data centres. In our recently launched Co-Innovation Facility (CIF), we work with innovative partners to pilot and showcase advanced power, cooling and control methodologies for use in our future data centres.

Equinix International Business Exchange (IBX) data centres feature advanced design, security, power and cooling elements to provide customers with industry-leading reliability, including average uptime of 99.999% globally in 2020. As of December 31, 2020, all our IBX data centres are equipped with UPS power, backup systems and N+1 (or greater) redundancy.

What trends will emerge or be cemented as we step forward?

The circumstances we experienced in 2020 have accelerated years' worth of digital transformation in a matter of months, bringing a profound and sustained impact to how we live and work. Some of the significant trends we are witnessing right now span across three key areas. First, cloud-native infrastructure will dominate. Second, edge-first paradigm will fuel innovation. The modern applications of today are increasingly architected from the ground up for automated and elastic deployment at the edge. There, vast amounts of data originating from multiple sources must be processed quickly. Finally, optimally placed edge infrastructure will power 5G. Enterprises will begin to consider 5G in their infrastructure deployment planning. High-performance 5G capabilities require physical infrastructure that optimally extends into the edge. By placing applications and 'fixed-end' IT environments proximate to 5G access and core functions in cloud-adjacent, richly interconnected data centres, enterprises can reap the benefits of this powerful new technology.

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"DATA CENTRE HAS BECOME MORE LIKE A META SYSTEM"

SHAHIN KHAN
Technology Analyst & Founding Partner, OrionX

There have been a lot of technology changes during the last 10 years. How will you describe the evolution of data centres during these years?

The data centre has become more like a system, a meta system. It has become the infrastructure that houses data and algorithms, and ensures quality service for apps. IT has become more complex but also more efficient. Two major predictions did not come true, however. The data centre was predicted to disappear into pubic clouds but that did not happen. It continues to thrive in public clouds, on-premise and at the edge where its growth will be significant. It was also expected to be standardised around a small number of technology choices, but it has become more heterogeneous, more specialised and more customised.

Which are the areas that have witnessed most important changes?

Without question, the major driver of data centres today is artificial intelligence workloads. AI applications are enabled by a virtuous cycle. It is cheap to collect massive amounts of data, there is hardware and algorithms that can make sense of that data and need massive amounts of it, and there are economicallyviable uses for the resulting insights and automation.

How will you describe the impact of IoT, ever-escalating data requirements, and ongoing cloud adoption on data centres?

IoT is leading to edge computing where data centres of different sizes and capabilities are necessary. There was a time when you expected a smartphone on one end, a public cloud at the other, and nothing in between. Instead, what we see emerging is a giant fabric of resources from sensor to cloud. In this fabric, IoT is the fountain of data. The vast majority of data will be generated and ultimately consumed outside the cloud because the information content in every 'thing', whether a consumer product or a building or a city or a ship, will be harnessed, so we can manage, predict, automate, control and so on.

The proverbial volume, variety, and velocity of the data makes it too slow and expensive to ship it all back to the cloud. It necessitates several stages between IoT and the cloud. And at every stage, you must decide whether to process, store or transmit the data. And that means more data centres everywhere.

Are data centres adapting well to VMs, cloud workloads, modularisation, solar-powered servers, and localisation?

Data centres have substantially caught up with virtualisation where possible and bare metal where necessary. The prevailing model is scalable capability with a cloud consumption model, hardware configurations that ensure quality of service, and advanced development tools that ensure developer productivity.

How serious are challenges like data sovereignty, cooling, power efficiency, space, IT real estate costs, and other issues?

On big lesson of AI is that you need a lot more data than you thought you did. On the face of it, that means data superiority is necessary for information superiority. Basically, whoever has more data, just sheer volume of data, is poised to win. This immediately puts data privacy, digital rights and data sovereignty at the centre stage. It also ultimately determines where exactly a given data set is stored and a given workload runs.

Power costs are the next important issue. In addition to improvements in 'results/watt', we also see a move to renewable sources of energy and carbon neutral facilities.

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Why start-ups **come to a stop**

India's start-up ecosystem is booming. Policy framework is encouraging too. Then why aren't there any Indian Googles and Apples? Here is a clear-eyed analysis

The Indian start-up ecosystem seems to have everything going for it – great ideas, latest technologies, policy support and, most importantly, investor funding. Then why is it that many start-ups are not able to make it beyond the first year of operations? Even among the ones that somehow manage to stay afloat, more than two-thirds close down within five years.

In the last few years, in particular, we have seen the launch of so many initiativesfocused on start-ups, like Start-up India, Make in India and Skill India, among others. Industry bodies like Nasscom are working closely with the government to create and promote a culture of entrepreneurship. According to a Nasscom report, India saw the emergence of over 1,600 tech start-ups and a

record 12 unicorns in 2020, which is the highest ever added in a single calendar year.

Even COVID-19 has not deterred the growth of start-ups, says the industry body. On the contrary, it has accelerated digital adoption and the shift to online, thereby creating new opportunities for tech start-ups.There is significant momentum in the deep-techspace with increased interest from funding agencies to invest in such start-ups, states the report.

So, why are all these opportunities not being translated into successful businesses? What are the reasons behind the failure of so many start-ups?

LACK OF ENTREPRENEURIAL SKILLS

Great ideas have the potential to build great organisations, but they also need great leaders with entrepreneurial skills and business acumen to steer them in the right direction. Steve Jobs may have started Apple in his twenties, but it achieved success much later when he was in his forties and had a strong team backing him.

Too much hype has been built around the 20-something whizkids creating path-breaking companies. In reality, many of these youngsters who start with a big bang are not able to sustain themselves in the long run. Building a successful organisation requires visionary leaders with ability to manage sales and marketing, finance, logistics and administration among other essential business skills.

INNOVATION AND UNIQUENESS

Despite all the success that Indian IT has seen on the global front, there are hardly any breakthrough products or cutting-edge technologies that Indianstart-ups can boast of.Indian has not been able to create companies of the stature of Google or Microsoft and even the successful ones have emulated existing global ventures, the most prominent among them being Flipkart for Amazon. Indian techies might have done well while working for multinational companies and have even risen to leadership positions, but they seem lacking when it comes to building new companies of their own.

A study conducted by IBM and Oxford Economics finds that 90% of Indian start-ups fail within the first five years and the most common reason for failure is lack of innovation. As many as 77% of venture capitalists surveyed believe that Indian start-ups lack new technologies or unique business models.The true spirit of innovation requires start-up leaders to take bold decisions, create new business models and develop truly unique products with a long-term vision to succeed in the market.

MARKET UNDERSTANDING

A number of 'wannabe' entrepreneurs get into business without a clear understanding of what they plan to do. Many of them are young and inexperienced, and do not realise the importance of market research and its role in assessing the viability of a new product or service before it is launched. As a result, even the most innovative products come crashing down if the market does not need them.

A proper market assessment exercise is not only useful to understand the needs of the customers, but also helps in market positioning and brand promotion.A competitive analysis of existing products must be conducted to understand their strengths and weaknesses. All these factors help in deciding the focus and scope of a new product.

BUZZWORDS AND THE HYPE

The reason for failure does not lie solely in the hands of the entrepreneur; at times even investors get caught in the hype around certain technologies. Start-ups in desperate need of funding often rely on buzzwords and trending technologies to attract venture capitalists. Most of these VCs come from a finance or consulting background and are not able to assess the commercial viability of complex technologies. As a result, they usually get taken in by the

STEVE JOBS MAY HAVE STARTED APPLE IN HIS TWENTIES, BUT IT ACHIEVED SUCCESS MUCH LATER WHEN HE WAS IN HIS FORTIES AND HAD A STRONG TEAM BACKING HIM.

AN IBM-OXFORD ECONOMICS STUDY FINDS THAT 90% OF INDIAN START-UPS FAIL WITHIN THE FIRST FIVE YEARS AND THE MOST COMMON REASON FOR FAILURE IS LACK OF INNOVATION.

founder's confidence or ability to weave a convincing narrative around his or her product.

Nasscom figures validate the fact that investments in deep-tech like artificial intelligence or machine learning have steadily increased over the last few years. According to its report, 14% of total investments in 2020 were in deep-tech start-ups, up from 11% in 2019. Further, 87% of all deep-tech investments were in AI/ML start-ups, in 2020. In another global study conducted last year, it was found that two in five 'AI start-ups' actually have no AI. Among other such buzzwords, quantum computing, robotic automation and blockchain have also been often misused and exaggerated by start-up founders.

CASHFLOW MANAGEMENT

This is the most commonly cited reason for failure of start-ups. Start-ups often face cash flow problems if the stipulated targets are not achieved or returns take time to come for various reasons. According to a study conducted by a US bank, 82% of the time, poor cash flow management or poor understanding of cash flow contributes to the failure of a small business.

Many entrepreneurs end up investing a lot of money on setting up swanky offices or big marketing and advertising campaigns to create a buzz around their products. Having spent a large part of their given funds in the initial phase itself, they often have to struggle with cash flow issues in the later stages. Entrepreneurs who adopt a more balanced approach in managing their resources are usually able to sustain themselves in the long term.

A start-up needs to have a realistic business plan and strategy, with achievable goals clearly outlined in the beginning itself. Otherwise, after the initial euphoria dies out, even the investors may start losing interest. If the company does not deliver on its value proposition, the investors can even decide to pull out, leaving the company gasping for breath.

Shweta is former Executive Editor, Dataquest and an independent content development professional

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EMPLOYABILITY INDEX

AUGUST 2021

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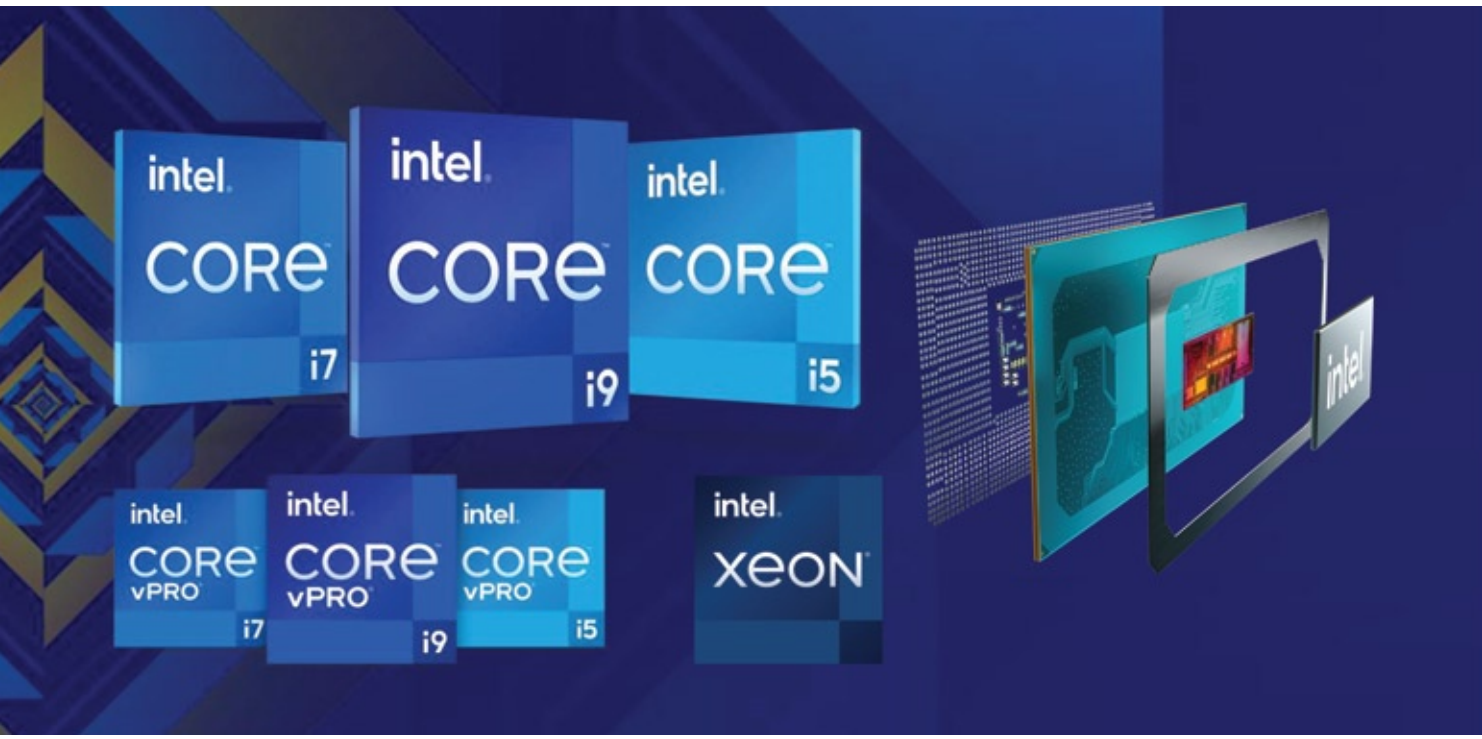
Inside Intel's **11th Gen H-Series CPUs**

The latest range of commercial and consumer mobile CPUs enable powerful, yet thin and light laptops for gamming, content creation, and high-end professional work



Intel's latest 11th generation core mobile processor architecture, Tiger Lake, has been gathering a lot of momentum ever since its first announcement at CES last year. Five processors based on this architecture were announced in September, meant for thin and light laptops. Along with the processors, Intel had also unveiled its new Evo platform brand for laptop designs based on these new processors. Then, at CES this year, the chipmaker giant introduced 50 new processors, many of which were aimed at gaming platforms for enthusiast level gaming. Finally in May this year, the company has introduced its Tiger Lake H processors for high-end laptops and desktops. Overall, you can expect a slew of products based on the new 11th Gen architecture in the coming weeks and months. Let's understand what the new processors and the 11th Gen architecture from Intel is all about.

10 NEW CPUs

While Intel has been launching a number of Tiger Lake-based CPUs since last year, we'll concentrate on the latest ones. Last month, the company introduced 10 new CPUs for high-end gaming, content-creation, and workstation laptops. Five of these are for consumers, while the other five are for commercial devices.

All 10 CPUs are members of the 11 Gen Tiger Lake H series of laptop CPUs. In this, at the upper end of the spectrum is the Core i9–11980HK CPU, which is an 8 core, 16 thread beast with 5 GHz max boost clock speed. It's billed as the world's best gaming laptop

> CORE i9–11980HK CPU IS BILLED AS THE WORLD'S BEST GAMING LAPTOP PROCESSOR AND THE ONLY ONE IN THE SERIES THAT'S FULLY UNLOCKED AND OVERCLOCKABLE.

INTEL 11th GEN H-SERIES CONSUMER CPUs

Processor Number	Cores / Threads L3 Cache	DDR4 (MT/s)[1]	Base Freq (GHz) @45W TDP	Intel® Turbo Boost Technology					Freq (GHz) @config TDP	Graphics Branding	Graphics Base / Max (MHz)	Tj (deg C)	Intel® Technologies		
				Max 1-Core Turbo (GHz)	Max 2-Core Turbo (GHz)	Max 4-Core Turbo (GHz)	Max 6-Core Turbo (GHz)	Max 8-Core Turbo (GHz)					Intel® SIPP	Intel® vPro™	Intel® TXT
i9-11980HK	8C/16T 24M	3200	2.6	5.0 w/ ITBM3.0	5.0 w/ ITBM3.0	4.9	4.7	4.5	3.3 @ 65W	Intel® UHD Graphics	350 / 1450	100	No	No	No
i9-11900H	8C/16T 24M	3200	2.5	4.9 w/ ITBM3.0	4.9 w/ ITBM3.0	4.8	4.6	4.4	2.1 @ 35W	Intel® UHD Graphics	350 / 1450	100	No	No	No
i7-11800H	8C/16T 24M	3200	2.3	4.6	4.6	4.5	4.4	4.2	1.9 @ 35W	Intel® UHD Graphics	350 / 1450	100	No	No	No
i5-11400H	6C/12T 12M	3200	2.7	4.5	4.5	4.3	4.1	N/A	2.2 @ 35W	Intel® UHD Graphics	350 / 1450	100	No	No	No
i5-11260H	6C/12T 12M	3200	2.6	4.4	4.4	4.2	4.0	N/A	2.1 @ 35W	Intel® UHD Graphics	350 / 1400	100	No	No	No

Source: Intel

processor and the only one in the series that's fully unlocked and overclockable. This is supposed to enable you to play intensive games at 1080p resolution with 240 Hz refresh rate or play games at 4K resolution up to 120 Hz refresh rates. The capability is impressive, but the actual performance will depend upon the laptop model that OEMs build, and the games you play on it.

Besides offering far better performance, the new processor architecture enables thinner and lighter laptop designs, which was something not possible in the earlier architectures. So, you can expect OEMs to release laptops that are less than an inch thick, support 4K screens, and offer gameplay at 60 fps or more.

Other members of the series are Intel Core i5, i7, and Xeon processors. There's no i3 variant here, as these CPUs are not meant for basic productivity work. Even the i5, for instance, which is at the lower end of the spectrum, comes with 6 cores and 12 threads, supporting a peak boost of 4.4 GHz for single core and 4 GHz for all cores. These two SKUs are meant for budget gaming laptops.

The commercial SKUs of Tiger Lake will support Intel's vPro technology, which offers a host of business specific security features and management tools. Plus, it has a new AI-based threat detection technology known as Hardware Shield. Moreover, all of them are 8 core/16 thread CPUs, and support ECC memory, which is not supported by the consumer variants. This makes laptops based on the commercial Tiger Lake SKUs a good option for applications like scientific or financial modeling, and it makes them more secure.

TIGER LAKE'S SPECS AT A GLANCE

The 11th generation CPU is based on Intel's Willow Cove Core micro-architecture. It's manufactured on Intel's third gen, 10 nm SuperFin process. The new architecture replaces the Ice Lake mobile processors family. As compared to the previous architecture, Tiger Lake has upto 50% larger L3 cache and 2.5x larger L2 cache. The GPU under this architecture has 1.5x more EUs (execution units) then the previous architecture.

THE COMMERCIAL SKUs OF TIGER LAKE WILL SUPPORT INTEL'S vPRO TECHNOLOGY, WHICH OFFERS A HOST OF BUSINESS SPECIFIC SECURITY FEATURES AND MANAGEMENT TOOLS.

INTEL 11th GEN H-SERIES COMMERCIAL CPUs

Processor Number	Cores / Threads L3 Cache	DDR4 (MT/s)[1]	Base Freq (GHz) @45W TDP	Intel® Turbo Boost Technology					Freq (GHz) @config TDP	Graphics Branding	Graphics Base / Max (MHz)	Tj (deg C)	Intel® Technologies		
				Max 1-Core Turbo (GHz)	Max 2-Core Turbo (GHz)	Max 4-Core Turbo (GHz)	Max 6-Core Turbo (GHz)	Max 8-Core Turbo (GHz)					Intel® SIPP	Intel® vPro™	Intel® TXT
W-11955M	8C/16T 24M	3200	2.6	5.0 w/ITBM3.0	5.0 w/ITBM3.0	4.9	4.7	4.5	2.1 @ 35W	Intel® UHD Graphics	350 / 1450	100	Yes	Yes	Yes
i9-11950H	8C/16T 24M	3200	2.6	5.0 w/ITBM3.0	5.0 w/ITBM3.0	4.9	4.7	4.5	2.1 @ 35W	Intel® UHD Graphics	350 / 1450	100	Yes	Yes	Yes
W-11855M	6C/12T 18M	3200	3.2	4.9 w/ITBM3.0	4.9 w/ITBM3.0	4.7	4.4	N/A	2.6 @ 35W	Intel® UHD Graphics	350 / 1450	100	Yes	Yes	Yes
i7-11850H	8C/16T 24M	3200	2.5	4.8	4.8	4.8	4.6	4.3	2.1 @ 35W	Intel® UHD Graphics	350 / 1450	100	Yes	Yes	Yes
i5-11500H	6C/12T 12M	3200	2.9	4.6	4.6	4.4	4.2	N/A	2.4 @ 35W	Intel® UHD Graphics	350 / 1450	100	Yes	Yes	Yes

Source: Intel

The new architecture supports PCIe 4.0 as against 3.0 in the previous version and supports 20 PCIe 4.0 lanes for high bandwidth connections to discrete GPU and NVMe SSDs, while the memory support goes up to DDR4-3200. In fact, according to Intel, the new architecture enables the CPU to directly access High-Speed GDDR6 memory that's attached to the graphics card. This feature enables gamers to have higher frame rates and smoother gameplay.

The Tiger Lake architecture also supports Thunderbolt 4, the port that supports up to two 4K displays and also doubles up as a USB4 connector. It will enable data transfers of upto 32 Gbps.

Another key specification supported by Tiger Lake is WiFi 6E, which builds upon the superfast WiFi 6 technology by adding support for a new 6 GHz band. An important feature of this band is that it will offer more WiFi channels, leading to lesser overlap between networks. This can be a boon for using the same in crowded areas like apartments or offices.

Lastly, the platform supports Dual eDP Graphics, a feature that will allow laptops to have two displays.

THE FINAL WORDS

While all the specifications and features of Tiger Lake CPUs and platform sound very impressive and exciting, how much of it all you'll enjoy purely depends upon how much and how well OEMs integrate them into their laptop models.

Gamers who've recently bought a gaming laptop are unlikely to go for a new Tiger Lake variant, but if you've purchased one a few years ago, then it would be worth exploring laptops based on the H-series model. The same logic holds for professionals due to so many enhancements being made in the platform to cater to modern-day business requirements.

All in all, it's an exciting new architecture that has been built keeping in mind the needs of modern-day mobile users and applications. Expect most vendors now to dole out new laptop variants based on the new Tiger Lake architecture.

Chopra is VP-Research and Consulting, CMR

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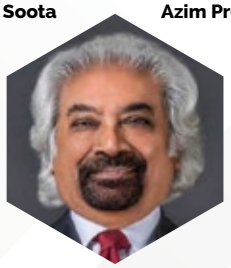

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Google next: **From crossing language barriers to Android 12**

The big tech event is back with exciting announcements. Google is working on a range of features and apps that will, in short, make your life a bit easier

After a break in 2020, Google's developer program Google I/O made a comeback this year. The tech giant held its virtual conference for developers at its Mountain View, California headquarters during May 18-20 and also announced several new developments.

The year's launch witnessed quite a lot of upgrades to the existing services like Google Maps and Google Photos, an enhanced camera app, Project Starline improved WearOS, new artificial intelligence, new security and privacy features and a lot more. Here are five key highlights from the Google I/O event that you must know.

#1

NEXT-GEN AI TO REDUCE LANGUAGE BARRIERS

During the Google I/O event, Alphabet CEO Sundar Pichai praised the firm's efforts to reduce the language barrier on the web with translation services and Google Assistant. "We've also used AI to improve the core search experience for billions of people," he added. "Yet, there are still moments when computers just don't understand us. That's because language is endlessly complex… LaMDA, our latest research breakthrough, adds pieces to one of the most tantalising sections of that puzzle: conversation."

LaMDA is a new language model the company is working on, which is much better at following conversations in a natural way, rather than as a series of badly formed search queries. What differentiates LaMDA is that it was trained on dialogue. Google has emphasised 'training' it to produce sensible and specific responses. It said that while generic replies like "That's nice" or "I don't know" are sensible, they are not good enough. At Google I/O, and later in a blog post about LaMDA, the conversational AI didn't just provide direct answers like Google Assistant, but even witty responses. Thus, LaMDA may make interaction a little more natural in future.

Google also unveiled a new Quantum AI campus in Santa Barbara, California. The company aims to build 1,000,000 physical qubits that would work inside an error-corrected quantum computer.

#2

MORE ACCESSIBLE AND SMARTER GOOGLE MAPS

The tech giant announced that Google Maps will use machine learning (ML) to reduce hard-braking experiences. 'Hard-braking' is when you slam hard on your brakes due to sudden traffic movement or confusion about which highway exit to take. Google Maps will now calculate the best route based on a lot of factors, like how many lanes a road has or how direct the route is.

It will identify the two fastest route options for you, and then automatically recommend the one with fewer hard-braking moments. Further, the company aims to add accessibility features where Local Guides and Places on the Map will also tell you whether they are

> AT I/O, GOOGLE SHARED A PREVIEW OF AN AI-POWERED DERMATOLOGY ASSIST TOOL, WHICH WILL HELP YOU UNDERSTAND WHAT'S GOING ON WITH YOUR SKIN, HAIR AND NAILS.

disability-inclusive with a wheelchair-accessible entrance, wheelchair-accessible restroom, wheelchair-accessible parking and so on.

#3

GOOGLE FOR BETTER HEALTH

Globally, skin conditions affect about two billion people. Approximately 40 million women undergo breast cancer screening every year in the US alone, and TB infects 10 million people per year. At Google I/O, the company reiterated its commitment to explore if AI could improve the screening process for these diseases.

At I/O, Google shared a preview of an AI-powered dermatology assist tool. It will help you understand what's going on with your skin, hair and nails. Using many of the same techniques that detect diabetic eye disease or lung cancer in CT scans, this tool gets you closer to identifying skin, hair and nail issues using your phone's camera. For each matching condition, the tool will show dermatologist-reviewed information and answers to commonly asked questions, along with similar matching images from the web. Of course, this is meant to provide you information and not a diagnosis.

The company also announced that to help detect TB early and work toward eventually eradicating it, Google researchers have developed an AI-based tool that builds on existing work in medical imaging to identify potential TB patients for follow-up testing. In January 2020, the company was already studying the use of AI to detect breast cancers via X-ray and CT scan reports. Although the findings have materialised as conclusive proofs, the AI is still under development, the company has noted.

#4

GOOGLE PHOTOS, UPGRADED

The company announced that now it will use neural networks to synthesise the movement between two nearly identical photos and fill in the gaps with new frames. That is, it will create an animation based on spiralling movements between two images. For example, if you take three close back-to-back shots, Google Photos will draw a parallel to create one animation or GIF.

Also, there would be password protection, that is, you'd be able to put your pictures behind a password. They won't appear when you are scrolling through the app. On Pixel, you'll even have the option to save photos and videos directly to your locked folder right from the camera. Google also announced upgrades to its camera app, saying it was working on a feature that would make the camera more inclusive of darker skin tones.

#5

FINALLY, ANDROID 12 – 'MATERIAL YOU'

Google I/O also provided a glimpse of the new design of Android 12 named 'Material You'. The company released the first beta of Android 12 to allow users to check out some of the features. Android 12 comes with a lot of changes and a personalisation option. On Pixel devices, users will be able to completely personalise their phone with a custom colour palette and redesigned widgets.

"We've also simplified interactions and recrafted the entire underlying system to make your experience more fluid and efficient. Your Android devices are now faster and more responsive with better power efficiency; you can use your device for longer without a charge," the company said. It added that the notification shade is more intuitive and playful. Further, Quick Settings will let you control practically the entire operating system with a swipe and a tap.

Android 12 will also provide a more transparent view of which apps are accessing your data (and what). "We've added a new indicator to the top right of your status bar so you know when your apps are accessing your microphone or camera. And if you want to remove app access to these sensors for the entire system, we've added two new toggles in Quick Settings."

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Brands in the **age of pandemic**

Distance and digitisation became keywords over the year. That is reflected in the brands consumers have come to prefer, making Zomato the most trusted one

Amidst the raging pandemic, there have been seismic shifts in consumer behaviour, in the way consumers interact with brands. To gauge this, the concept of 'brand trust quotient' has gained more prominence over the course of the past year than ever before.

A new research from CyberMedia Research (CMR) covering 2,164 consumers across major Indian cities highlights the changing nature of consumer relationships with brands amid the pandemic. The study lists the top 50 brands that positively impacted consumer lives over the course of the last year.

An interesting aspect of the study indicates that e-commerce platforms and digital brands have completely overtaken brands like Hero (#21), Honda (#23), Bajaj (#24), and TVS (#28). Other brands like Maruti Suzuki (#32), Honda Motor (#33), Tata Motors (#34), Croma (#41), MG (#42), Mahindra two-wheelers (#43), Suzuki (#44) and Toyota (#47) were also far behind the new-age brands.

"Trust is the new currency for a brand to succeed. Unlike before, the relationship that brands have with the consumer is no longer merely functional or transactional, but rather based on emotion and social connect. As a consequence of the pandemic, brands that have been able to consistently deliver across all consumer-facing touch points win big. In the better normal, brands would need to integrate and be indispensable in every aspect of consumer lives," said Satya Mohanty, Head-Industry Consulting Group, CMR.

Over the course of the pandemic year, consumers prioritised online food delivery, pharmacy, entertainment, digital payments, and OTT, among others. Zomato was the clear winner, followed closely by Amazon Prime Video and Amazon.com in the first-ever CMR Alpha Brands 2021 listing.

According to Sugandha Srivastava, Manager-Industry Consulting Group, CMR, "In the new post-virus world, consumers prioritise credibility, reliability and convenience when it comes to their purchase. The Alpha Brands study highlights that resilient brands are those that have invested in strong emotional equity in their consumer relationships. This is where Zomato, or Amazon, clearly lead."

The Alpha Brands listing has been arrived at on the basis of their performance across four major components: the brand's users, key decision makers, user satisfaction and net promoter score (NPS). The overall brand quotient was arrived at on the basis of consumer satisfaction and brand advocacy.

Food delivery: Zomato is the clear leader, followed by Swiggy at a distant second position. Through the course of the pandemic, Zomato has maintained a clear leadership.

> OVER THE COURSE OF THE PANDEMIC YEAR, CONSUMERS PRIORITISED ONLINE FOOD DELIVERY, PHARMACY, ENTERTAINMENT, DIGITAL PAYMENTS, AND OTT, AMONG OTHERS.

TOP 10 ALPHA BRANDS

Brand	Trust Quotient	Rank
zomato	8.64	1
prime video	8.43	2
amazon	8.35	3
paytm	8.32	4
SWIGGY	8.28	5
Google Pay	8.28	5

Brand	Trust Quotient	Rank
Disney+ hotstar	8.20	6
PhonePe	7.99	7
	7.88	8
bigbasket	7.80	9
MEDLIFE	7.80	9
NETFLIX	7.61	10

Trust Quotient : Score out of 10 | **Source:** CMR Alpha Brands 2021

It trumps Swiggy both in terms of consumer satisfaction (81%) and in consumer advocacy (53%).

Online grocery: Even before and during the pandemic, Big Basket was the most used brand in online grocery (62%), followed by Amazon Fresh (58%). In terms of consumer advocacy, Amazon Fresh (25%) trumped the competition.

In making their purchase decisions, consumers factored offers and discounts (94%), time saved (91%) and doorstep delivery (86%). Interestingly, more middle-aged consumers started shopping grocery online during the pandemic.

Online pharmacy: Medlife is the most trusted brand, followed by Apollo Pharmacy. In terms of satisfaction, Apollo Pharmacy has the most satisfied users (81%), followed by Practo (75%) and Medlife (64%). In advocacy, Medlife has the highest NPS score (28%), followed by PharmEasy (14%).

E-commerce: Amazon and Flipkart continued to be locked in the e-commerce battle. Even before, and during the course of pandemic, Amazon led the market in terms of brand users (78%), customer satisfaction (72%) and in net promoter score (36%).

Digital payments: Paytm has most satisfied users (86%), ahead of GooglePay (82%) and PhonePe (79%). On the other hand, Google Pay users tend to advocate their brand more (38%), over those of Paytm (31%) and PhonePe (21%). Consumers prioritised safety, security as well as convenience in choosing their digital wallet.

OTT: Amazon PrimeVideo has the most satisfied consumers (81%), followed by Disney+ Hotstar (73%) and Netflix (67%). Between the pre-pandemic (before March 2020) and post-pandemic (post-March 2020) periods, Netflix registered 14% growth in terms of new subscribers. In terms of brand advocacy, Amazon PrimeVideo (54%) trumps Netflix (28%).

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Why drone delivery makes sense **for medical emergencies**

Drones help overcome logistic challenges in taking vaccine or medical essentials to remote areas quickly. They can go mainstream with the right policy milieu

The vaccination drive for COVID-19 is a gigantic task, even though India has a well-structured vaccination delivery system owing to its universal immunization programmes. While the country has the world's largest railways and road networks but a new, efficient mode of transporting vaccines is required to overcome the logistic challenges considering the fact that India is a vast country with 67% of population living in the rural side.

This is where a drone-based distribution system plays a vital role. Using drones could make delivery of critical medicines and vaccines, especially to remote areas, more accessible and faster. Using drones to deliver medical supplies will help in better resource management of the limited supplies and facilitate just-in-time delivery to the current supply chain system. The smart inventory management and overcoming stock out issues can help lighten the current burden and deal with the crisis efficiently. In fact, many countries in Africa are using drones to deliver vaccines. There are instances of drone usage in emergency situations in India as well.

Thus, there is a need to think beyond the conventional methods and adopt the rapid drone delivery system for transportation of vaccines and emergency medicines to tackle life threatening diseases. Just as emergency usage of vaccination was granted, emergency usage of drone deliveries could also be permitted in the healthcare sector.

> MANY COUNTRIES IN AFRICA ARE USING DRONES TO DELIVER VACCINES. THERE ARE INSTANCES OF DRONE USAGE IN EMERGENCY SITUATIONS IN INDIA AS WELL.

Also, the policymakers need to acknowledge the fact that drones are rapidly revolutionising the healthcare landscape by making faster delivery of critical lifesaving medicines. The effectiveness of these unmanned aircraft systems (UAS) with advanced models can effectively deal with tremendous pressure piling on the global healthcare sector.

Today some of the most exciting potential applications come from the use of drones in the healthcare and medical deliveries. Drones are effectively delivering biologicals like blood, serums, viral culture, vaccines and organs in fastest and safest manner which is helping save millions of lives. Appreciating its sweeping influence on future medical services, the healthcare sector is leaving no stone unturned to position drones for medical use.

The modern healthcare system represents some of the greatest achievements of the human intellect to improve the quality of people's lives. Yet, in this modern age, many people in rural and underdeveloped quarters of the world still lack access to basic healthcare. Closing these gaps has gained a new urgency during the current pandemic.

With the use of drones, health workers can easily place orders by text message, or call and promptly receive their deliveries in 30 minutes on average. Medical drones could fly into these remote areas with supplies that are tailored to the situation. Deliveries can be made from the sky, with the drone descending to a safe height above the drop zone and releasing a box of medicine by parachute or by landing at a designated spot near to health centres it serves. It is high time we think of a future where packages would reach in minutes instead of hours/days.

Drones for healthcare logistics have recently seen a range of landmark moments. Drones have already been used with great success in places like Haiti, where they delivered much-needed aid packages after the 2010 earthquake.

In the event of a serious disaster, drones could take to the skies with the supplies that are essential to keeping individuals alive and healthy, even for extended periods of time. From medications to water and emergency rations, drones get the supplies to the affected areas quickly without the agonisingly long wait that can occur when roads are cut off and airports are shut down.

Also, a research report by the John Hopkins Bloomberg School of Public Health indicated that drones in the medical field have the possibility of improving vaccination rates and aid in various immunisation programs held globally. This is true especially at a time when the COVID-19 cases are rising rapidly, leading to an acute shortage of healthcare workers and facilities.

With medical drones allowed to do deliveries and entrepreneurs push for new ways to utilise the technology, we can soon expect a faster, cheaper method of delivery of things that we need most, even during the most crucial moments of an emergency situation.

Delivery of vaccines and medical supplies utilising drones is not a new idea. The world has already witnessed that drones can be extremely helpful in remote locations where there's a lack of proper infrastructure, connectivity and motorable roads. There are numerous advantages of using drones in healthcare: they can save lives, time, money, and human labour. There are drone models that are completely autonomous and can fly as per the pre-fed flight plans without the need for any human intervention and monitoring.

It's high time the Indian government created an empowering policy milieu where the use of drones can become mainstream. Then most of its terrestrial spread can receive adequate medical coverage. Initiatives need to be taken in the country to create a system for medical drone procurement and to bridge key healthcare gaps.

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Time for a **quantum leap**

Though it will take years to realise its full potential, quantum computing offers incredible advantages. Financial institutions should embrace the new paradigm

Digital transformation is unequivocally the buzzword today, and in the financial services industry it is a critical imperative to succeed in an ever-evolving environment.

In order to stay competitive and ahead of the curve, financial institutions must keep pace with industry-wide developments and embrace new-age digital technologies. One such technology that seems to be gaining traction in the financial services industry and has the capacity to unlock digital potential and resolve operational bottle necks is quantum computing.

WHAT IS QUANTUM COMPUTING?

Quantum computing is a technology that harnesses the principles of quantum mechanics to carry out complex data operations. The devices that perform these quantum computations are called quantum computers. They can perform complex computational operations exponentially faster than traditional devices.

The computations performed by traditional computers use bits to encode information – each bit having a value of either 1 or 0. In quantum computers, information is stored in quantum bits, or qubits, which can have a binary value. Furthermore, these qubits can also achieve a mixed state, called super position wherein they achieve the values of 1 and 0 simultaneously.

By harnessing this capability, a quantum processor with a collection of qubits can contain exponentially more information than a processor with the same number of classical bits, thereby allowing for far more complex problem-solving.

IMPLICATIONS FOR FINANCIAL SERVICES

Financial institutions can leverage quantum computing

> FINANCIAL INSTITUTIONS CAN LEVERAGE QUANTUM COMPUTING TO REAP MANY BUSINESS BENEFITS, INCLUDING STREAMLINING EXISTING PROCESSES AND ENABLING EFFICIENT FINANCIAL MARKET ANALYSIS.

to reap several business benefits, including streamlining existing processes, enabling efficient financial market analysis, and ensuring effective risk management and portfolio optimisation.

In particular, financial institutions leveraging quantum computing can utilise data-driven analytics from large and unstructured data sets to gain sharper insights, make smarter decisions, and improve customer service.

Additionally, quantum computing can also help financial institutions to safeguard customers' financial data, enhance cybersecurity, mitigate fraud, increase transactional speeds, and reduce operational costs.

PREPARING FOR A QUANTUM FINANCIAL FUTURE

The arrival of quantum computing is potentially game-changing, but it is still in the nascent stages of adoption due to the mystery surrounding its power of computing. Additionally, a number of restrictions impose limits on the current utility of quantum computers.

The qubits in quantum processors have a short shelf life, due to a phenomenon known as quantum decoherence, and are subject to high error rates. Also, leveraging quantum computing at scale requires hardware with an ideal collection capacity of one million qubits.

As a result, quantum computers will need to be resilient and able to solve effective error correction. Which means it will probably be a few years before functional quantum computers can be built.

While it may take several years for quantum computing to be institutionalised, organisations are investing huge amounts of time and resources to fast-track the process of developing commercially-accessible quantum computing technology.

With financial institutions starting to gain access to the hardware necessary for developing quantum algorithms, it is the right time to start building skills, knowledge, and an understanding of quantum computing, and to begin collaborating with partners to explore potential business applications and the risks surrounding quantum computing.

Quantum computing represents the future, opening up vast possibilities for financial institutions to meet data computing and business needs that might otherwise be difficult to resolve through traditional methods. With quantum computing, banks and assets managers would be able to quickly and accurately assess risks, optimise portfolios, manage securities and safeguard customers.

Building a quantum computer that outperforms classical computers is a formidable task that may take time to be fully implemented. However, financial institutions that proactively adopt and embrace this new paradigm will be primed to stay ahead of the competition.

Tandon is Head of Banking Excellence, Newgen Software

BUYOUT / TAKEOVER

A 24-year old company working in the field of "IT and communications" having a turnover of Rs. 5 crores with a potential of generating revenues to 12-15 crores per annum, having staff including technical engineers, software developers, marketing executives, etc, with a total of 45 employees, having head office at Hyderabad and branches in Delhi, Mumbai and Bangalore with infrastructure is for immediate takeover/buyout. Further vital and relevant information will be made available, on request, during personal meeting at Hyderabad office.

Interested parties may contact 9848014835.

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Let the sun never set **on your business**

The 'follow-the-sun' model of workflow allows teams in different time zones to pass the baton among them and continue the work. Does your business need it?

By its basic definition, FTS – follow-the-sun (or round the clock) – means that development or support literally follows the sun. It's a type of global workflow in which issues are handled by and passed between offices in different time zones.

Principles of the FTS model are focused at increasing the response time for service handling and problem

> A PERTINENT THEME FOR DEPLOYING THE FTS MODEL REVOLVES AROUND LOCATION SELECTION. INCREASING THE NUMBER OF SITES IN A DAILY CYCLE INCREASED THE WORKING SPEED.

> THE CHALLENGES ARE ASSOCIATED WITH LEADERSHIP (COORDINATION, COLLABORATION AND ACCOUNTABILITY) AND CULTURE (LANGUAGE, COMMUNICATION, AND TRAINING).

resolution. It also aims to reduce development and production durations, and time to market. The sites are spread across multiple time zones, allowing work to be handed off across locations. Besides, employees hand off work at the end of shift to the next site that may be based out across several time zones. Work is owned and worked on by one site at a time.

Industries whose products outdate vigorously (mobile handsets, firmware, e-commerce systems, supply chain management) rely more on the FTS model for development and support. Rather than adding manpower, paying for overtime, skipping process steps, or setting aggressive deadlines, such companies as part of their software development strategy, embrace FTS.

The central idea for the FTS approach is the hand-off. In traditional software development, global teams are less dependent on one another and work is not usually handed off. The FTS approach is based on the principle of handing off unfinished work to the next location at the end of the workday.

A pertinent theme for deploying the FTS model revolves around location selection. Research indicates that a routing model that supports geographical locations for FTS has to support 'optimal time zone difference' (biological feasibility) and 'the natural ease of communication' (that is, complementary culture, and language). Overall, it was found that increasing the number of sites in a daily cycle increased the working speed.

The decision to adopt the FTS model for driving value starts with few core questions.

- **Complexity of development or support issues:** Can the pressing challenges be addressed without staffing people on a 24-hour clock?
- **The customer location.** Is your business servicing or delivering not globally but regionally? If yes, then do you need the FTS model?
- **What part of the day (or night) are you stretched the thinnest:** If your customer analytics data points to peak times outside of your standard working hours, the FTS option can be explored.
- **The extent of self-service and app usage.** To what degree, have you leveraged mobile apps and options of customers' self-service systems?
- **Team size:** what scale do you operate at? Increasing output and adding team members are trade-offs that have to be weighed based on the industry/product line, specific expected outcomes, and RoI best practices.

Successful implementation of the FTS model depends on a number of embedded infrastructure system and standards, for example, tools for estimating and planning schedules, sprint management, handoffs and progress tracking, utilisation of code repositories, version control management system, tools for supporting data security and encryption, communication applications including screen sharing, and reports generation utilities for Scrum and Agile methodologies.

Going through case studies and field reports would highlight challenges and best practices in the implemented FTS models. The challenges are associated with the dual rubric of leadership and culture. The leadership aspect includes coordination, collaboration and accountability, while the cultural aspect comprises language, communication, and training. The best practices are the adoption of agile methodology, technology used for sharing and handoffs, and process documentation.

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The new **data storehouse**

A cloud data warehouse offers several benefits – the most important among them being a strong backup plan to meet any eventuality

If there's one lesson to be learned from the pandemic, it is that organisations should always be prepared for the worst. They should also have a strong backup plan that is agile and can be deployed in any scenario with minimal disruption. One way of doing this is through a cloud data warehouse which enables organisations to adapt and accommodate rapid and ad-hoc changes in workloads. It does so by enhancing provisioning of resources or by scaling down the same as per the data volumes and its usage across users.

The data volume as well as the number of users who may access it at any point in time is not predictable. The flexibility that a cloud data warehouse brings along enables faster processing of data. It helps organisations be nimbler in managing data and workloads and arrive at insights faster.

By ensuring that cutting-edge insights are delivered to the business users through efficient self-service interfaces, businesses can accelerate the pace of informed decision making and this can augment sales. It can also help to engage and retain customers, enhance loyalty, and create a customised and contextual customer experience.

The process of building or implementing a cloud data warehouse can empower an organisation with value.

> ORGANISATIONS THAT CAN COMPREHENSIVELY MANAGE THE VALUE CHAIN OF DATA CAN EMPOWER THEMSELVES WITH SMARTER BUSINESS DECISION WHICH POSITIVELY IMPACT GROWTH.

> THE HUGE TERABYTES OF DATA IN THE ORGANISATION CAN BE USED AS A FODDER TO EFFICIENTLY IMPLEMENT AI/ML CAPABILITIES ON TO THE CLOUD DATA WAREHOUSE.

CONNECTING DIVERSE TECHNOLOGY ECOSYSTEM

The enterprises of today have a complex IT landscape. They have legacy applications which are mostly run on-premises. They have a variety of applications which are cloud native. They also must deal with applications which are in the midst of a modernisation exercise.

The modernisation from on-premises to cloud is a process that the organisation addresses by working on the functional or technical debt that these applications bring along. Organisations must also deal with multiple clouds which are either closed source or open source and could yield their influence across SaaS, PaaS or the IaaS layer. A cloud data warehouse can seamlessly connect the legacy and new-age systems and enable data to retain its characteristics all through. Thus, data can be made ubiquitously available when required across systems and processes. This enables organisations to analyse data faster and create accurate and critical insights for businesses in near real-time.

MANAGING MULTIPLE DATA TYPES

Data is not as linear and tabular as we want it to be. Today, businesses must understand structured, unstructured, and semi-structured data completely and know it right from its origins. Is it real-time data? Is it data that is streamed? Is it data that is generated by the customers' interaction with product/service offerings?

Every bit of data assumes its own significance and importance. A cloud data warehouse can manage all such types of data and enable organisations to get a holistic view of the data and derive better inferences.

SELF-SERVING INTERFACE FOR MULTIPLE USER NEEDS

An organisation's data team may include data analytics and engineers as well as creators of reports from the data. To add to it, there are business users who seek very different value from each data point. The reports and dashboards required across each such constituent is different as per their function. A finance professional, for instance, may infer the same data differently as compared to an operation's professional.

With a cloud data warehouse, data is no more in silos. It is liberated and served across self-serve BI interfaces to enable business users to make sense out of the data across the organisation and make an informed business decision – quickly and seamlessly.

COMPREHENSIVE MANAGEMENT FOR DATA VALUE CHAIN

Data today is no more a departmental asset. It extends well beyond an organisation's perimeter and it creates a priceless value chain in the process. Organisations that can comprehensively manage this value chain of data can empower themselves with smarter business decision which positively impact growth.

With a cloud data warehouse, the entire process from data assimilation across sources to data ingestion, refinement, processing, enrichment, and the allied integrations to enable data to break-free of departmental silos can be managed efficiently. The cloud also brings in an added level of security to further empower the organisation to leverage data for quick insights and business results.

What's more, the huge terabytes of data in the organisation can be used as a fodder to efficiently implement AI/ML capabilities onto the cloud data warehouse. This will help drive cross-efficiencies leading to automation of processes, and automated generation of report across key metrics that would be required by the business users at periodic intervals.

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Why do you need to hire a **Chief Bitcoin Officer?**

Bitcoin is a highly complex phenomenon, and any organisaiton dealing with it should consider having someone with a specialist's knowledge of its risks

Bitcoin has drawn many naysayers since it hit us years ago. Some call it an online scam, while others call it fake money. This coin was created in January 2009 by the mysterious 'Satoshi Nakamoto', and unlike central bank-backed currencies, bitcoin is operated in a decentralised environment. The value of one bitcoin was zero when it was first introduced in 2009 and when it first started trading it was valued at USD 0.0008 to USD 0.08 in July 2010. Today, it is more than USD 57,000.

Bitcoin has gone past the getting-to-know stage and right now far more people know about bitcoin. It is often described as a cryptocurrency, a virtual currency, digital currency or a store of value. Depending on where you are located, you may see shops accepting cryptocurrency. With online payment service giant PayPal allowing its customers to buy and sell bitcoin, this will truly open up to more usage.

PayPal is not the only publicly traded company that is into the king of cryptocurrencies. Many others have adopted bitcoin as a form of reserve asset and hold direct control over their bitcoin funds.

The top six public companies with the biggest bitcoin portfolios are MicroStrategy Inc (91,579), Tesla Inc (43,200), Square Inc (8,027), Marathon Digital Holdings (5,263), Coinbase Global Inc (4,487), and Galaxy Digital Holdings (4,000). This adds to a total value of USD 9.05 trillion (BTC: USD 57,810).

Similarly, the top three private companies with the biggest bitcoin portfolios are MTGOXK.K (141,686), Block.one (140,000), and The Tezos Foundation (24,808) comprising a total value of USD 17.72 trillion (BTC: USD 57,810). The top three ETF-like funds with the biggest bitcoin portfolios are Greyscale Bitcoin Trust (654,885), CoinShares/XBT Provider (69,730), and Ruffer Investment Company (45,000). This makes the overall market cap at USD 44.49 trillion (BTC: USD 57,810), according the data from Bitcoin Treasuries.

The list above excludes firms such as Morgan Stanley and Goldman Sachs that have recently started offering bitcoin to their wealth management clients. These companies together manage about trillions of dollars too. The list, however, also does not include governments or government-linked entities that are holding bitcoin. For example, it is reported that Ukrainian officials are holding over USD 2.6 billion in bitcoin.

As you can see, the bigger corporations are putting bitcoins to their balance sheets. They need subject-matter experts to advise them on how they should manage their bitcoin holdings. This is precisely why companies should start looking at hiring a Chief Bitcoin Officer (CBO). This role should be on the same level as that of the chief financial officer but the CBO will look at the cryptocurrency side of things. It would also be good if this key appointment holder has relevant experience dealing with the government on crypto regulations and understand finance or fund management. Handling bitcoin and other cryptocurrencies is not an easy task. You will need dedicated resources and expertise.

REGULATORY RISKS

There isn't a blanket approach for bitcoin for all governments. Though governments understand bitcoin, they do not embrace it all. Bitcoin is still seen as the rival to the fiat currency. Creating a Central Bank Digital Currencies or CBDC is one way to track the flow of money and possibly the flow of bitcoin.

For example, for US taxpayers, it is known that anyone with more than USD 10,000 digital currency aboard needs to fill out a Report of Foreign Bank and Financial Accounts (FBAR). This rule could have changed and the

> WHEN GOVERNMENTS START TO REGULATE, BAN OR RESTRICT BITCOIN, THE CBO WILL BE THE FIRST TO KNOW AND ACT ACCORDINGLY.

> CRYPTOCURRENCY EXCHANGES ARE CONSTANTLY IMPROVING THEIR SECURITY MEASURES; BUT THIS DOES NOT MEAN THAT IT IS 100% SAFE TO PUT YOUR COINS IN A SINGLE BASKET.

everchanging rules may be a legal concern for many. When governments start to regulate, ban or restrict bitcoin, the CBO will be the first to know and act accordingly.

SECURITY RISKS

The CBO needs to look at security risks. Hackers often target bitcoin wallets and exchanges. As we all know, bitcoin transactions are permanent and irreversible, and there is no third party to retrieve your lost coins. Putting your bitcoin with the centralised exchanges is the closest to how you keep your money in a bank but bear in mind that there are cases where exchanges got hacked and millions of dollars were wiped out overnight.

Cryptocurrency exchanges are constantly improving their security measures; but this does not mean that it is 100% safe to put your coins in a single basket. There are other instances where the founder of the exchange got arrested by police and withdrawals were stopped for weeks. So, if your company has a big holding of bitcoin, it is important to place them in the right wallets catering to the investment strategies and with the right set of security features.

MARKET RISKS

Bitcoin's price is volatile; it can fluctuate a few thousand dollars each day in today's context. The unexpected changes in the market sentiments can lead to sharp and sudden price movements. It is also subject to high volumes of buying and selling on exchanges and movements by bitcoin whales. Bitcoin had also fallen more than 80% in a single day in 2014.

The CBO needs to be ready for such fluctuations. The person needs to look at the latest market news, keep track of the latest institutional investors, the price that they came in, probability of the next halving, the new fork, and so on. Take hard forking for instance. When it occurs, the market may experience sizable price volatility and we may see suspended trading or price differences in various exchanges.

If you are into bitcoin and your company bought a substantial amount of bitcoin, these are some of the things you need to take note of. The job of a CBO is not easy and it is a specialised role.

After I posted this on Twitter, I have people coming to me asking if this is applicable for SMEs. My reply to them: if your SME is forward-looking, you should start to look at this as well. You may not be hiring a CBO because of the cost reasons, but you may consider hiring a chief litecoin officer or a chief crypto officer.

For those who can, it is better to hire the chief bitcoin officer today.

Lian, an early blockchain adopter and serial blockchain entrepreneur, is an Advisory Board Member, Hyundai DAC; member, Gyeongsangbuk-do Blockchain Special Committee, Republic of Korea; and author of the book 'Blockchain Revolution 2030'

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Making the **world go around**

The importance of data in business operation is obvious. It is how, when and where it is put to use that makes all the difference between today and tomorrow

Businesses are increasingly living on the edge today. Companies embrace data-rich digital transformation innovations for a competitive advantage. Cloud providers like us have enabled companies to deliver both the solutions expertise and the data platform to power mission-critical applications for e-commerce, digital payments, fraud prevention, customer 360, real-time recommendation engines, and other 'instant decisioning' applications.

Data is massive and extremely powerful. It can tell us about a company's strengths and weaknesses. The algorithms can utilise scientific methods to provide valuable and forward-looking insights to an organisation. Data is produced, analysed, converted to knowledge and sent to the enterprise edge, where it impacts billions of consumer interactions each day. Positive experiences result in increased revenue and customer loyalty.

Therefore, constructing a strategy for making all this data actionable is extremely important. Actionable insights are meaningful findings that result from analysing data. For example, in autonomous driverless cars, data on the weather, traffic conditions, objects, people and animals among other things is critical in making a decision of when to stop, decelerate or swerve in a particular direction. The data from sensors is collected in real-time and decisions are made based on it.

Similarly, for a retail company which sells online, the vast amount of its data can be converted into useful insights and can help in knowing the consumer preferences better. The more data available to data scientists and engineers for use in creating decision-making algorithms, the better the yield on the decisions. This helps a company in developing more effective marketing strategies, increase sales and decrease costs.

Moreover, the pandemic has made organisations realise the importance of data much more than ever before. According to a recent study by Cognizant, the breathtaking speed and scale of the COVID-19 crisis has put tremendous levels of stress on analytics and models. They have also created challenges for ensuring that the data analytics and models employed are timely, complete and secure.

No company or industry is exempt from today's data challenges. Regardless of whether the company is in finance, telecom, healthcare or any other industry, all organisations are impacted by data and they live on the edge. However, for organisations in today's marketplace, just being 'on the edge' is not enough. The leadership needs to be bold enough to make right decisions based on data analytics to stay competitive and relevant in the market. Some steps to take the right decisions include focusing on the company objectives, viewing the relevant data and insights drawn from the same, and planning your strategy and defining parameters to measure the success.

According to the 2020 Data Pipelines Market Study, enterprises are placing a high priority on data integration, especially to support analytics and business intelligence (BI) initiatives corporate-wide. It further states that 80% business operations leaders, including those from service delivery, manufacturing and supply chain, say data integration is critical to their success.

Overall, it would be apt to say that data in today's world is one of the most important commodities. Data can define a company's success or failure. Analysing and evaluating the right data is the need of the hour. While we live on the edge, it's crucial to make decisions based on real-time data insights, as that is what would define where your company would stand tomorrow.

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Online textile industry **can deliver next unicorns**

The online textile industry has turned the crisis into opportunity. As retail sales were off bounds due to the lockdown, the online market has flourished

Did anyone ever think even in the wildest of dreams that one day the coronavirus will arrive in India, that too all the way from China, and change the existing things to such a great extent that it will impact our daily life? Everything has changed in the post COVID-19 era – our work from the office is now work from home, our travel and tourism are reducing to new lows, our meetings are now mostly virtual, events too have gone online. But there is a silver lining as well: many people, sectors and industries have turned the crisis into an opportunity. One such sector is the textile industry.

The Indian textiles and apparel industry contributed 2.3% to India's GDP, 13% to industrial production and

> MANY TEXTILE INDUSTRY EXPERTS HAVE PREDICTED THAT THE TREND OF INCREASED SALES IN THE ONLINE TEXTILE INDUSTRY WILL CONTINUE TO PERSIST IN FUTURE AS WELL.

12% to export earnings (as of March 22, 2021). Moreover, exports of readymade garments (of all textiles) were worth USD 1.04 billion (as of November 2020).

TURNING CRISIS INTO OPPORTUNITY

The crisis situation has provided a big opportunity for the online textile industry. The sales in the online textile industry witnessed a jump in various cities and states of India during the lockdown.

It goes without saying that cloth is one of the basic needs of mankind. It is nothing less than any essential commodity, and that's why even during the lockdown online textile industry witnessed a boom in sales. The lockdown failed to leave any negative impact on the online textile industry because of its operations in the virtual space leaving no room for human or physical contact to further spread coronavirus in the country. The online textile industry even registered an increasing trend in sales due to no dependency on the offline industry, for example, wholesalers, semi-wholesalers, retailers and middle persons.

THE NEXT UNICORNS IN NEW-AGE INDIA

With such an increasing and upward trend being witnessed in the online textile industry, retailers with a presence on the internet have a big possibility to become the unicorns (that is, a company with a value of over USD 1 billion) of the new-age India.

When the lockdown was imposed, it was a summer season, and people did their summer-related purchases online as retail shops were not allowed to open. With all these developments in place, businesses of the online retail industry also witnessed a spike in revenue sheets.

The online textile industry has all the valid reasons to give birth to new unicorns in India. During the lockdown, shopping was taking place through the online route and most of the customers were happy with the online experience. Right from choosing items to trying them, even the return policies created a win-win situation for shoppers on the internet as customers felt very comfortable purchasing their stuff online. It has been predicted by many textile industry experts that the trend of increased sales in the online textile industry will continue to persist in future as well. And, hence, the birth of online retailer unicorns is imminent.

TEXTILE E-RETAILERS: THE GAME-CHANGERS OF 2021

In 2021, e-retailers will prove to be a big game-changer by playing a pivotal role in the recovery of the Indian economy. When the economy shows green shoots, the future of the online textile industry looks promising in the wake

> THE BUDGET PROPOSED A SCHEME TO SET UP SEVEN MEGA TEXTILE PARKS TO ENABLE THE TEXTILE INDUSTRY TO BECOME GLOBALLY COMPETITIVE AND ATTRACT LARGE INVESTMENTS.

> THE INDIAN TEXTILE INDUSTRY IS ENTERING INTO A NO-HOLDS-BARRED PHASE WHERE THE SKY IS THE LIMIT, PROVIDED IT GETS A ROBUST SUPPORT FROM THE GOVERNMENT.

of increased domestic consumption after a lockdown in addition to export demand playing an important role.

Even the government has made it clear that the textile sector is one of the key focus areas of new policies being framed to achieve the target of becoming a USD 5 trillion economy. The government in its budget 2021-22 proposed a scheme for setting up mega textile parks to make the textile industry in India globally competitive. The initiative is also aimed to attract large investments and boost employment generation through the creation of world-class infrastructure.

Seven mega textile parks will be established over three years as part of the scheme. They will have integrated facilities and quick turnaround time for minimising transportation losses, eyeing big-ticket investments in the sector. Now, with such a massive level of production in the textile sector due to the unprecedented boost by the government, e-retailers are going to be the biggest beneficiary of these developments. Online shoppers have already tasted the convenience, trust and comfort of shopping on the internet and will continue to enjoy and avail benefits in future as well. And, e-retailers will emerge as the biggest winners in this entire success journey of the online textile industry.

ROLE OF TECHNOLOGY AND TRENDS

Technology can play the role of big brother in reviving, rejuvenating and reinvigorating the Indian textile industry. Undoubtedly, tech support is vital to any sector but when it comes to textile, it becomes even more important due to the integral role of machines right from sourcing raw material to giving final shape to the products that eventually consumers are going to get.

Further, our textile industry is expected to witness some new trends in the future – increased demand for natural fibres and shifting focus towards non-woven fabrics to name a few.

THE INDIAN TEXTILES INDUSTRY'S POTENTIAL

The Indian textiles industry has immense potential to register an indelible mark while contributing to the growth and success story of the nation, but the sector needs more support from the government in the form of policy initiatives and crackdown on red-tapism involved in availing schemes meant for the textile industry.

The government has decided to rationalise the duties on raw material inputs. But more export promotion policies are required for the textiles sector, like in the past when the government allowed 100% FDI in the sector under the automatic route.

The Indian textile industry is entering into a no-holds-barred phase where the sky is the limit, provided it gets a robust support from the government in terms of policies, promotions and incentives so that the domain can move up the ladder and chart its own course in the right direction.

Mundra is Chairman & MD, Nandani Creation Limited

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SAW THE INDUSTRY EXPERTS DELIBERATE ON THE TECHNOLOGY TRENDS, 5G'S IMPACT ON SOCIETY, LOCAL MANUFACTURING, AND THE ISSUES RESHAPING THE ECOSYSTEM.

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Booming fintech sector **has looming cyber threats**

Dr. Gulshan Rai, India's first National Cyber Security Coordinator, on the top five cyber security risks looming large on the burgeoning Indian fintech sector

Fintech service providers are considered torchbearers in digital financial services, particularly in the post-COVID world. They have been catalysing and accelerating the economy during the pandemic. According to the NPCI data, there were 150 million active users of UPI in 2020, which is a 32% increase on the YoY basis. The total number of digital payment transactions has crossed two billion, the debit and credit cards are more than 950 million numbers, which is more than 10% increase YoY. Currently, there are more than three million Bharat QR deployed. However, with the phenomenal increase in the financial transactions, a significantly upward trend has been seen in the cases of UPI breach, credit and debit card frauds also.

> A 1,000+% JUMP IN MALICIOUS ACTIVITY HAS BEEN RECORDED DURING LAST SIX MONTHS, INCLUDING CYBERCRIMES, PARTICULARLY THOSE RELATED TO DIGITAL TRANSFORMATION.

> CLOUD HAS MANY ADVANTAGES, BUT AN IMPROPER CONFIGURATION OF PUBLIC CLOUD SYSTEMS AND OF THE SERVICE PROVIDER FACILITY PROVIDES EASY ACCESS TO HACKERS.

During the launch of Aujas Cyber Defense Center (CDC) in Mumbai, Dr. Gulshan Rai, Director-General of CERT and the first National Cyber Security Coordinator spoke in detail about the top five emerging cyber security risks looming large on the burgeoning Indian fintech sector. He also explained why fintech companies need to build a strong cyber resilience system inside or outside their organisation to protect themselves and their users from such risks.

Digital transformation: While financial institutions are adopting fintech solutions to embrace the digital wave, the malicious activities have also increased manifold. As per the CERT data, a more than 1,000% jump in the malicious activity has been recorded during the last six months amid the pandemic, including cybercrimes, particularly those related to digital transformation. The new and emerging cyber security risks show the unique characteristics of the digital world of monetizing everything from data to stolen card details, passwords, etc.

Data breach: The cyber threats frequently faced by financial institutions and users include malware attacks, phishing, and vishing are customised to the nature of financial transactions to breach the systems, and gather critical information. Most fintech companies and customers store data such as card details, user passwords and credentials in their respective platforms. A small breach may lead to the leakage of sensitive information.

Downloading apps without evaluating its genuineness and security risks is another factor causing data breaches. Apps get access to the stored data in the system including the financial information of the users. Most of this stolen/breached information is available on the darknet for sale.

Cloud security risks: Cloud has many advantages, but an improper configuration of public cloud systems and of the service provider facility provides easy access to hackers. Weaknesses in the interfaces and vulnerabilities in hardware and software also create problems. The fact that encrypted information gets decrypted at every interface also poses problems depending upon the security of the system.

Application security: Hidden vulnerability in the application design can attract cyber attackers. Organisations usually don't test their applications or do the security verification after procuring them. When they run those applications in their systems, they create vulnerabilities and risks and become the causes of potential breaches.

Weak passwords: This is true for both the service provider and the individual users. If you are not able to secure your own systems, rest assured that your service providers are not going to be bothered about it either. The hackers are using AI- and ML-powered, sophisticated tools to exploit risks and harvest the personally identifiable information and financial data of the users. Some of them are even difficult to trace.

India is a leading fintech hub .Close to 200 best fintech companies in the world are developing solutions in India and marketing solutions for India, but the security risks are also looming large. The nature of that data lying with these fintech platforms also makes them more susceptible to security breaches.

"Managing digital identities of individuals is also a major challenge as fintech companies aim to provide an integrated omnichannel experience to users by extending a host of banking wealth management and payment services in a seamless manner. Hence, increasing efforts must be made to educate the individual users, telecom service providers and the fintech service providers," advised Dr. Rai.

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Raising the cyber citadel **for capital markets**

Vikram Limaye, MD & CEO, National Stock Exchange, recommends best solutions to protect trust, the foundation of capital markets, against cyberattacks

Cyber risk is one of the top threats the financial industry is facing today. Large-scale remote access by businesses during the pandemic has also expanded the threat landscape considerably. Around half the world's securities exchanges were subject to cyberattacks last year, reveals a joint study by the International Organization of Securities Commissions (IOSCO) research department and the World Federation of Exchanges office. The cost of such events is immense as it impacts brand equity, integrity and reputation. The damage to public trust and confidence is also irreparable.

"Since the capital market is considered a key growth driver of the national economy, it becomes imperative for the capital market ecosystem to seek ways to secure itself from cybersecurity breaches and risks. Be it commercially sensitive information, or intellectual property or business intelligence or customer data – securing them is crucial," Vikram Limaye, Managing Director and CEO, National Stock Exchange of India (NSE) said.

MANAGING CYBER RISKS IN THE DIGITAL ERA

Managing cyber security in the digital age requires a comprehensive blueprint to meet four key mandates. These include increasing customer expectation to protect the data within the digital ecosystem, improving cyber resilience due to expansion of threats, meeting regulatory and compliance expectations when protecting consumer interest, and securing brand reputation by mitigating internal and external breach risks.

"Trust is the bedrock of capital markets. Regulators expect capital market firms to improve privacy protection for customers who in turn are demanding that their data and information be protected across the digital products and services. The capital markets ecosystem needs to invest in a comprehensive set of cyber risk management capabilities that covers the entire value chain and ensure that the risk is efficiently managed across the ecosystem. There is also a need to define the cyber risk appetite with well-articulated security mission statements, and well-defined threat response measures," said Limaye.

COMPREHENSIVE CYBERSECURITY FRAMEWORK

While a comprehensive and next-generation cybersecurity framework is critical for capital markets firms to grow and prosper in a hyper-connected world, comprehensive monitoring for maintaining risk-free

> THE CAPITAL MARKETS ECOSYSTEM NEEDS TO INVEST IN A COMPREHENSIVE SET OF CYBER RISK MANAGEMENT CAPABILITIES THAT COVERS THE ENTIRE VALUE CHAIN.

AN INTEGRATED APPROACH TO CYBERSECURITY CAN ALSO BRING IN TRUST, ENABLING FIRMS TO WIN THE BUSINESS CONFIDENCE OF THE STAKEHOLDERS, INVESTORS AND CUSTOMERS.

BEST PRACTICES

Cyber security is arguably one of the most critical challenges facing market participants and regulators today, but it must be dealt with head on, with strategic focus and commitment. Here are some best-practices suggested by Limaye, which can help the capital market players manage their cyber risks more effectively:

- **Establish effective governance:** Effective governance is at the heart of any cybersecurity framework. It helps determine the risk appetite and allocate the necessary resources. To ensure the effectiveness of the cybersecurity framework, it is important that the senior management and the board are closely involved in monitoring governance.
- **Adopt global best practices:** Following an existing cybersecurity framework helps market participants to keep up with the fast-evolving cyber threats landscape. It also enables organisations to apply the principles and best practices of risk management to improve security and resilience of the critical infrastructure.
- **Partner with niche cybersecurity companies:** Given the skill and expertise gap, it is critical to engage with the right security partner. Aujas Cybersecurity, which is now part of the NSE family, offers a unified approach to cyber security. Its next-generation Cyber Defense Center is a centre of excellence in security and enables the alignment of people, processes and technologies.

operations and business continuity is also a must at the same time as the capital market firms function in a highly regulated environment.

Without strong security governance, it is difficult to gain clarity of cyber threats and risks which might increase due to exponential growth in trade volumes and data exchange. It'd be also difficult to keep track of the changing regulations and make informed decisions.

"But enabling such governance can be challenging for organisations that leverage legacy security frameworks and silos of security approaches. This traditional approach needs to change. An integrated approach to cybersecurity can also bring in trust, enabling firms to win the business confidence of the stakeholders, investors and customers. The approach must be an effective combination of specialised capabilities to ensure governance, mitigate risk and meet compliance," said Limaye.

COLLABORATION IS THE KEY

Over the past few years, national authorities, standard setting bodies and private sector organisations have launched initiatives to address cyber risk and increase cyber resilience of the capital markets and the industry. The Indian regulators such as SEBI and RBI, for instance, have proposed and mandated comprehensive guidelines on data security, electronic banking technology, risk management and frauds for cyber resilience.

"Capital market players must recognise it is suboptimal to deal with cyberattacks in silos. They must adopt a common set of standards to continually strengthen security, governance, security policies, processes and systems to keep pace with changing attack vectors and risks. Industry participants must work together to standardise approaches and frameworks for security risks," suggested Limaye.

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In cyber security, **only the paranoid will survive**

Cyber security becomes all the more critical in capital markets and financial services. Top practitioners shared their insights during a panel discussion

Security of enterprises, especially financial services, is at a crossroads today. The proliferation of digital platforms has led to a rapid surge in vulnerabilities leading to exponential growth in cyber risks. Ensuring security of customers, businesses and stakeholders has never been more challenging.

To help enterprises secure themselves in this digital landscape, cybersecurity services provider Aujas Cybersecurity launched its next-gen Cyber Defense Center (CDC) in Mumbai recently which enables faster detection and response to complex threats through an integrated, scalable and automated approach to security.

The CDC offers proactive, ML-driven threat detection, monitoring and response capabilities through Security Orchestration and Automation and Security (SOAR) and Security Information and Event Management (SIEM). Due to the interoperability of multiple security technologies, Aujas CDC can meet the rising demand to adopt proactive threat detection, investigation, and response capabilities, according to the firm that is an NSE subsidiary and the enterprise security service provider for organisations across North America, Asia Pacific and EMEA regions.

This is the second CDC of Aujas, after the first in Bengaluru. The company is also looking to build two more CDCs, in Saudi Arabia and the US, soon.

"The Cyber Defense Center of Aujas is an effort to create a new-age platform to identify the digital assets of the company deployed in cyberspace while monitoring and protecting them. There are going to be experts sitting across the globe, monitoring all the digital assets of our customers, and giving them protection. We are also creating a Fusion Engine using AI and ML. We shall be continuously monitoring cyberspace and giving the forewarnings in terms of what are the possible threat vectors that can come and hijack your systems," said Dr. N Muralidaran, Chairman, Aujas Cybersecurity, and also MD and CEO of NSE IT Ltd.

In a panel discussion on the theme of 'Will Automation Solve the Cybersecurity Challenge, Durga Dube, Global CISO, Reliance Industries; Sameer Ratolikar, EVP and

"IT'S CRITICAL TO INTRODUCE CYBER TRUST TO ENCOURAGE DIGITAL TRANSFORMATION ACROSS INDUSTRIES AND THE ONUS IS ON ALL THE CYBER GUARDIANS TO MANAGE THIS SPACE."

— **Dr. N Muralidaran,** Chairman, Aujas Cybersecurity, and MD & CEO – NSE IT

"WE SHOULD NOT LOOK AT AUTOMATION AS JUST ANOTHER TOOL FOR SOLVING SECURITY ISSUES. HUMANS AND MACHINES NEED TO WORK TOGETHER TO MAKE AUTOMATION SUCCESSFUL."

— **Sameer Shelke,** CEO & Co-founder, Aujas Cybersecurity

"SECURITY IS LIKE THE RED QUEEN'S GAME. YOU HAVE TO KEEP RUNNING ALL THE TIME TO KEEP PACE; OTHERWISE YOU'D GET LEFT BEHIND."

— **Navin Kotian,** Co-founder & COO, Aujas Cybersecurity

CISO, HDFC Bank; Shiv Kumar Bhasin, CTO and COO, NSE; and Sameer Shelke, CEO and Co-Founder, Aujas spoke on the cyber security trends and the pandemic-induced risks and how enterprises can protect themselves from such risks. The session was moderated by Anil Chopra, VP-Research and Consulting, Cybermedia Research.

Bhasin said, "Even if you have a well-staffed SOC, it is very difficult to reduce the latency in detecting and mitigating any attacks in your digital environment without automation."

"Besides incident response management, automation is equally important for vulnerability management, password management and third-party risk management as well," added Ratolikar.

"Automation alone is not enough to solve a cybersecurity issue. It has to be a well-orchestrated and well-coordinated effort," said Dube.

"We should not look at automation as just another tool for solving the security issues. Humans and machines need to work together to make automation successful. While machines are great for accomplishing repetitive and accomplishing complex tasks, humans are great at contextual and creative thinking, and thus great for incident response and proactive security management," said Shelke.

Vikram Limaye, MD and CEO, NSE and Dr. Gulshan Rai, Director-General of CERT and first National Cybersecurity Coordinator, also shared their insights on the security trends in the capital market ecosystem and the fintech sector, respectively, and advised a set of best practices for the firms operating in those domains.

Citing Andy Grove's the famous quote that only the paranoid survive, Navin Kotian, Co-Founder and COO, Aujas Cybersecurity, said that it is true for cyber security as well.

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When social media **becomes anti-social**

Social network and microblogging apps help us connect with a wider world. But they are also trapping us in a vicious cycle of psychological disorders

"Social media is not a media. The key is to listen, engage, and build relationships." Well, that's what David Alston said.

Social media is a tool created to connect people over the globe, to facilitate easy access to people across countries. It hasn't been long since we started to breathe social media. Young adults, in the age group of 18-29, are most likely to use social media, almost 90% of them do. But others are not left out. In a study report by Smith and Page (2015), social media usage among those above 65 year of age has increased three-fold since 2010 when only 10% people used social media. It won't be an exaggeration to say that social media is not a trend that only the youth follows; it's a habit that prevails for the entire population.

Today, social media is not just any mode of connection. Rather, it has become our mode of survival. Try keeping us without being in touch with Facebook, Twitter or Instagram; it feels like a fish out of water. There would be few phenomena in human history that compete with the dizzying growth social media has witnessed.

This phenomenon, of course, is not without its downside, as every parent of a teenager have found.

> SOCIAL MEDIA HAS BECOME OUR MODE OF SURVIVAL. TRY KEEPING US WITHOUT BEING IN TOUCH WITH FACEBOOK, TWITTER OR INSTAGRAM; IT FEELS LIKE A FISH OUT OF WATER.

NEGATIVE IMPACT ON MENTAL HEALTH

There is an overload of information that can severely affect the mental well-being causing mental fatigue and energy drainage. A relevant study was done by Dhir (2018), the findings of which suggested that using social media compulsively resulted in mental fatigue. That is not all. There are several troublesome patterns emerging from the world of social media.

Anxiety and Depression: Being drowned in the sea of emotions, anxiety and depressed states turn out to be most common. More the time spent on using social media, greater symptoms of dispositional anxiety which was pretty evident in a study by Vannucci (2017). The pattern of excessive social media usage and depression is significant in all age groups.

Fear of missing out: Mostly the fear of missing out is related to social media consumption. Beyens (2016) in a study revealed that stress relating to Facebook use increased fear of missing out (FoMO). Fear of missing out sets the life of people in autopilot mode.

Body image issues: In the study conducted by Fardouly (2016) revealed that body image concerns among young men and women are mostly associated with social media usage, particularly Facebook, it is also suggested that in a longitudinal study the relation between the Facebook and body image issues may strengthen.

Loneliness in adolescents: Thousands of friends and followers and not having even a single real relation are trends of this generation. Lonely children and adolescents use online mode to communicate their personal and intimate feelings than those who are not lonely (Bonetti, 2010).

A representative survey of the U.S. on the adolescents, threw light on the relationship between screen time and suicidal ideation. It was found that children who spent more time off screen were less likely to report mental health issues as compared to the children who spent more time on screen, including that on social media and smartphone (Twenge, 2017). Virtual world does not really suffice the need for real communications and connections.

Lowering of self-esteem: Constant comparison with virtual display of others' life leads to lower levels of self esteem, making youngsters feel unworthy. A study by Jan (2017) proved that there is a strong correlation between social media and self esteem. The relation between them came out to be a negative correlation. As social media usage increases, it causes self- esteem to decrease.

THE PERILS OF FoMO

Among all the troubles of social media, the one which has set a hashtag trend among the youth is Fear of Missing Out (#fomo), a term coined by Dr. Herman in 1996. It is like a bug in the cognitive processes of perception that everyone else is having a better and happier life because of all the photos and tweets on their social platforms and there is something fundamentally important that they are missing out, while others in their friend list are experiencing that.

Often, the young do not realise that others are merely bragging on these platforms. It's a space where everything and anything can be bragged about. From the place where you ate to the parties you went to. Most of the times, the happiness portrayed on the social media platforms may also be exaggerated. A study concluded that problematic smartphone use was positively correlated with envy and this relation was mediated by FoMO (Wang, 2019).

The most affected section of the society is adolescents. In a study by Fabris (2020) it was concluded that FoMO was associated with decreased levels of emotional well-being in adolescents. There was also a negative relation found between neglect by online peers and higher sensitivity to stress which was a trigger for social media addiction. There is no gender difference as such in experiencing FoMO but the younger population surely has higher rates for the same (Rozgonjuk, 2021).

> CONSTANT BUZZING OF NOTIFICATIONS FROM INSTAGRAM, WHATSAPP, AND SNAPCHAT KEEP DISTRACTING THE MAJORITY FROM THEIR WORK AND HOURS ARE LOST.

FOUR THINGS TO DO

There have been a few interventions and research findings which work on grounding the humans who might feel overwhelmed with social media usage.

- In the digital world where everything happens over social networks, it won't be practical to quit social media all together, but you can surely go on regular digital detoxification to keep your mind sane and functional. Switch off your mobile phones over the weekends or simply uninstall some of those apps for two-three days, take time to get back to other things that you have wanted to do.
- If quitting social media doesn't sound like a plan, then limiting its use can really be helpful. Limiting social media usage to 30 minutes per day can lead to prominent changes in well-being (Hunt, 2018).
- Keep track of your emotions in writing as you feel FoMO can be one of the resorts to hold on to your emotions and not get carried away with them.
- Try to keep a gratitude journal. Rather than constantly feeling as if something or the other is missing out, live the moment and try to be thankful for what you have.

THEN THERE'S PHUBBING

Phubbing is the term used when people ignore someone they are with and instead pay attention to their phones. Al-Saggaf (2020) did a study to find relation between phubbing, fear of missing out and boredom, and found that FoMO was used as an excuse to phub so as to avoid the feeling of boredom. It's like you surf because you feel FoMO and then you feel FoMO because of compulsive scrolling, leading to a vicious cycle.

It has been established that social media engagement on one hand and anxiety and stress on the other are mediated by FoMO. Also, social anxiety and compulsive Facebook use were mediated by fear of missing out and rumination. There was a prominent relationship between social media use and depressive symptoms because of problematic use behaviours. In some cases problematic smartphone usage leads to learned helplessness as well.

LACK OF ATTENTION SPAN AT WORKPLACE

A study done in Germany by Rozgonjuk (2020) predicted strong positive correlation between FoMO and social networks use disorder, as well as a negative impact on productivity at work and regular functioning of life. Constant buzzing of notifications from Instagram, WhatsApp, Snapchat, and the likes of it keep distracting the majority from their work and hours are lost. This whole dark circle leads to work stress when deadlines are not met.

Researches and studies have revealed that our personalities are severely distorted because we constantly try to be someone else and do something that is trendier. The effort to achieve this seems to make our whole identities flawed. Worse, it is not that people don't realise what social media is doing to them. They do acknowledge the fact that it makes them more anxious and depressed because the major focus is on what we are missing out. This disturbs our whole mental well-being.

Let social media be a source to connect with people and not make it a device to disconnect us from ourselves.

Aryavani is a Researcher specialising in psychology

Dukaan ties up with Dunzo, **Shiprocket to automate delivery system**

Dukaan, a SaaS platform for online stores, has announced that it has tied up with an on-demand commerce company Dunzo and tech-enabled logistics aggregation platform Shiprocket to integrate delivery into the platform for a seamless retail experience. "By integrating both capabilities, Dukaan's 3.5 million merchants can automate their delivery systems and also acquire better control of their business with techniques to manage their deliveries across stores and consumers," the company stated in a press release.

The automated delivery system can also help retailers scale their business by reducing the time and effort spent on managing the logistics involved with each customer order. "This in turn improves the experience for the end customer as well as those involved in the supply chain operations," the company noted.

The pandemic-led surge in demand for home deliveries indicates a long-term trend that would become normal in a post-pandemic world and hence, retailers must prepare for the future and ensure prompt supply chain operations. While Shiprocket provides an automated end-to-end workflow, Dunzo provides "what they want when they want it" on-demand delivery.

"The partnerships with Dunzo and Shiprocket provide enhanced and automated delivery capabilities at the core of the platform. The growing demands of delivery tracking rest on bringing predictability to order service time and delivering a great experience for consumers and we at Dukaan are always working towards building a seamless future for the retail industry," said Summit Shah, Founder and CEO, Dukaan.

ThoughtSpot, Databricks offer solution **for Data Lakehouse**

Analytics cloud company ThoughtSpot has announced a tie-up with Databricks to help its customers get insights from its SQL through a simple search, or use AI to automatically uncover insights without even asking a question. The tie-up includes the launch of ThoughtSpot for Databricks, giving joint customers the ability to run ThoughtSpot search queries directly on the Databricks Lakehouse, powered by Delta Lake, without the need to move any data.

"Companies can now bring ThoughtSpot's intuitive consumer-grade analytics experience to users so they can engage directly with their data and models in Databricks. Connecting to Delta Lake on Databricks only takes a few clicks, and then users can begin searching to answer their own data questions," the company said in a press release.

They can drill down infinitely to get granular insights, leverage one-click AI analysis to uncover trends and anomalies in their data, and search to tap into AI and ML workflows. These insights can be utilised to write back to source applications to operationalise insights and drive actions.

Product leaders and developers can build data apps, products, and services everywhere and embed powerful data apps on top of Databricks, enabling organisations to serve internal customers and monetise data with consumer-grade native apps. Insights and predictions from machine learning workloads can be accessed through natural language search, getting them into production with business users very fast.

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Bosch launches cloud-based **AIoT platform for industries**

Robert Bosch Engineering and Business Solutions (RBEI) unveiled the new Phantom Edge – an AIoT platform, which combines the power of artificial intelligence (AI) and the internet of things (IoT) to provide real-time view of electrical energy consumption, operating usage, electrical parameters, and appliance-level information.

"It is a powerful ecosystem on the cloud and on-premise that delivers manufacturing efficiency, real-time alerts and notifications for timely actionable insights," the company said in a press release. It has a user configurable portal and dashboard that provides transparency and visibility of factory operations, worker productivity and machine effectiveness. It automates data capture and measures accurate down times by providing timely, bias-free and precise data that form the basis for managers to set targets, track performance, analyse, and improve on a continuous basis.

Phantom Edge device, which is built with Arm Cortex, i.MX 8M Mini Dual lite, 1.6 GHz Speed processor, 2GB RAM to perform powerful AI and machine learning (ML) algorithms and 8GB internal memory to store the data during the connectivity loss. The device supports Wi-Fi, 2G, 3G, 4G for cloud connectivity and BLE, RS 232 serial and Ethernet for communicating with peripheral sensors/assets. The solution also comes with a cloud-based SaaS application with a capability to give real time alerts and notifications for customers to act upon the asset's productivity and energy consumption.

LTI announces OT solution **for manufacturing sector**

Larsen & Toubro Infotech has announced the launch of ServiceNow based Operational Technology Management solution for the manufacturing industry. The solution aims to address the latent demand of the industry to have digital workflows for Operational Transformation (OT) Service Management.

"The solution leverages LTI's tech and domain expertise along with digital workflow enabling capabilities of ServiceNow, to deliver a scalable and secure solution for manufacturing operations using the Now Platform," the company said in a press release. This will help manufacturers embrace the concept of OT Management, in addition to IT Service Management (ITSM) practices. The solution also secures critical infrastructure from potential external threats and attacks, by helping ensure the foundational elements of OT cybersecurity.

"With insights from this solution, manufacturers can derive business benefits such as assured systems availability and rapid resolution of issues through a common service data model for manufacturing operations," the release said adding that the key features of the solution includes digital view of all OT assets along with location, configuration and health; improved response time to OT service requests; and helps reduce risk by improving compliance.

"LTI's expertise in Factory Floor and Enterprise Operations Management combined with ServiceNow's continued innovation across the Now Platform helps ensure that OT Management addresses all of the current needs for manufacturers. Our combined collaboration will improve overall visibility, response times and security across the entire manufacturing value chain," said Binoy Gosalia, Global Head of Industry Partnerships at ServiceNow.

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