



DIGITAL MONEY IS
MAKING THE WORLD
GO ROUND p. 26



MAKING IT BIG,
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THE BUSINESS OF INFOTECH

DQ **38** YEARS

WHAT NEXT IN FINTECH SAGA?

2020 was a tipping point for **fintech players**. Question now is where they move next – and how they react to platforms, apps, and incumbents coming to the party



A close-up, high-angle shot of an AMD Ryzen Pro processor mounted on a dark-colored motherboard. The processor is square with rounded corners and has "AMD RYZEN PRO" printed on its top surface. The motherboard is densely packed with various components like capacitors and traces, all illuminated with a cool blue light. The processor is the central focus, with its metallic surface reflecting the ambient light.

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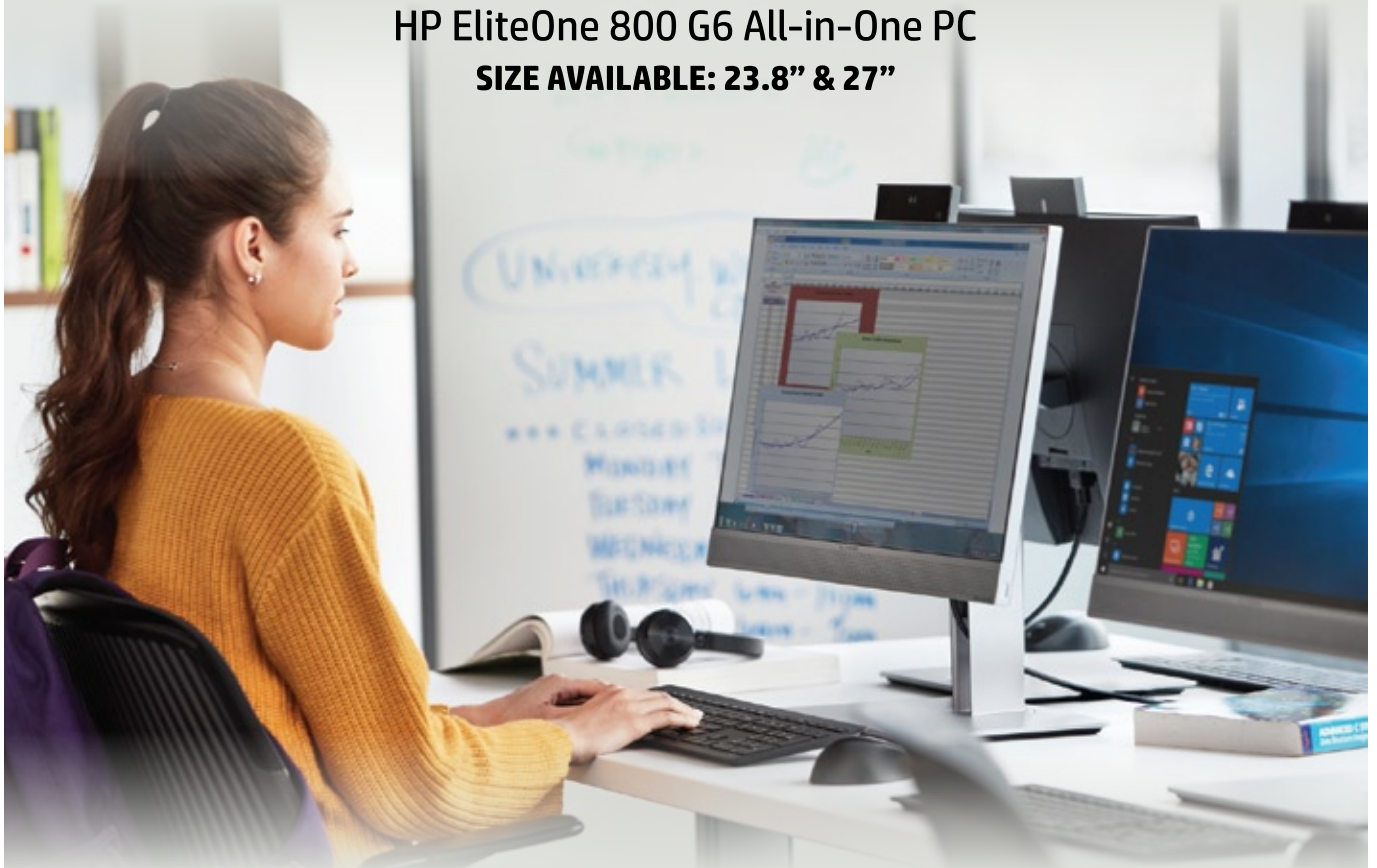


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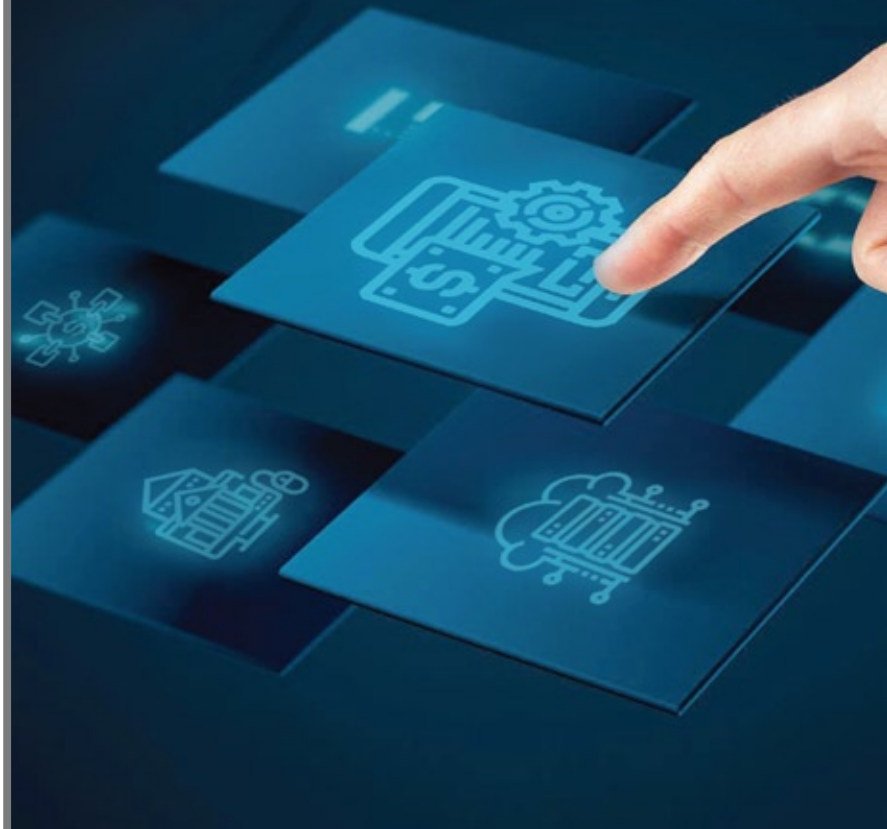
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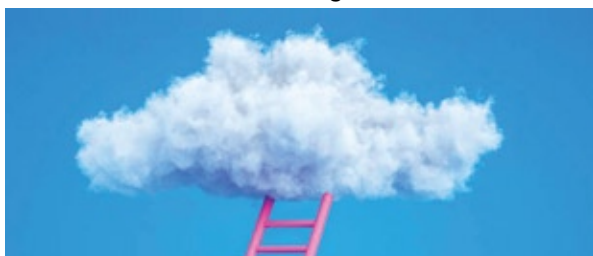
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CORRIGENDUM

The December issue of Dataquest wrongly listed Birla Institute of Technology and Science, Pilani as Birla Institute of Technology. The name of the institute on pages 22 and 26 should be read as Birla Institute of Technology and Science, Pilani. The error is regretted. Please also find the revised institute profile on page 74 of this issue.

DATAQUEST

THE BUSINESS OF INFOTECH

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Shubhendu Parth

Right intentions, now comes the difficult part

If tokenism can help drive an economy, the Union Budget 2021 scores 100%. Consider, for example, the fact that it was the first digital-only budget, without any physical copies, given the COVID scare. And though the increase in customs duty on key electronic components may lead to some short-term pains, but the budget does sound good on long-term intent.

Customs duty changes are expected to provide a level-playing field to MSMEs, and experts see them as a precursor to upcoming schemes under the production-linked incentive (PLI) plan to promote local manufacturing of electronics components. In the short term, though, it has already started pushing prices up. The decision to exempt one person companies (OPC) from paid-up capital and turnover norms can be a big game-changer. This will encourage start-ups, drive technology innovations and entrepreneurship.

The other key budget highlights directly impacting the ICT sector include: one-year extension of time limits for tax exemptions available to recognised start-ups, decision to launch the MCA 21 3.0 portal, plan for a Digital Census, portal for gig, building and construction workers that can help extend social security benefits to them, integration of 1,000 more mandis with e-NAM, and expansion of e-courts, including facilitating faceless appeals for Income-tax Appellate Tribunal proceedings. The budget also talks about strengthening research and development by setting up a Natural Language Translation Mission and a National Research Foundation.

A big boost to the Digital India dream is also expected with the Rs 1,500-crore push to promote digital payments, encouraging fintech companies to offer innovative solutions and better customer experience. Besides, the government also plans to set up a world-class fintech hub in Gandhinagar to create an ecosystem; Indian companies can now collaborate globally for technical know-how and investments. It is likely to help local fintech start-ups attract incubators, accelerators and investors.

Overall, the IT industry seems to be upbeat that the budget will further bolster Digital India and also drive investments in newer technologies like analytics, AI and ML. It also has the potential to create new opportunities for the sector and catalyse the country's efforts to become the world's digital solution provider.

As a statement of intention, the budget is then on the right track. How the implementation part unfolds is what matters.

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WHEN TECH MET MONEY: **WHAT NEXT IN FINTECH SAGA**



2020 was a tipping point for fintech players. Question now is where they move next – and how they react to platforms, apps, and incumbents coming to the party

The test of a true breakthrough is how soon its cousins are born. Software saw it when SaaS accommodated almost everything under the sun and had a huge family comprising PaaS, IaaS, NaaS and what not. Fintech is shaping up well for that test. Today it has even nieces and nephews blossoming in all directions – insuretech, loantech, wealthtech and so on and on.

At the moment, everyone is excited about the shoots branching out all across the tree. So it can be little boring to check the strength of its roots. But, hey, that's what industry-watchers do, the boring stuff. And yet, somehow, something exciting always comes out of a boring afternoon. Let's begin.

FROM A NEW WORD TO A BIG CONTENDER

The year 2021 will actually sift contenders from pretenders and may be, bartenders. Analysts have a strong feeling that 2021 would bring opportunities and challenges, stronger than before, for the players that exist and the ones that have started emerging.

The current digital push on account of lockdowns has definitely provided a strong impetus to the fintech growth story, surmises Vivek Iyer, Partner and National Leader (Financial Services) Risk, Grant Thornton Bharat LLP. "However, what is going to be important is how they ensure that the trend is not ephemeral. The challenges for fintech continue to be the focus to run a sustainable business with a focus on bottom-line."

Asked if the current fintech spree will actually sustain, Arun Jethmalani, founder and MD, ValueNotes, takes a moment before unravelling what the future might look

like. "It has surely grown into a wide space – we have insurance, stock market, and everything else that is being disrupted in a strong way. The good part is that tax evasion will get even harder now."

Arnav Gupta, Analyst, Digital Business Strategy, Forrester, points out that fintech will gain even more speed with the data-sharing architecture coming to life. "We will see deeper penetration, better financial flow and a stronger financial well-being."

But the next part is going to take some brick-work from innovators and regulators alike. "As we go further, some parts will see some regulatory problems, like the lending space. This is due to issues like bad loans and rumours of Chinese manipulation going around. And regulation is going to be a big challenge. We need to catch up to a lot here. Indian regulators are cautious after watching how the space panned out in markets like China. So fintech will have to qualify to the need for trust." Jethmalani argues.

Some pockets will grow better than others, like those that can disintermediate something or those that can enable something. According to Jethmalani agency businesses will do particularly well in this landscape. "Disintermediation of existing chain will help small players whether it is insurance or stock brokerage. Overall the sector will see good growth and levers like accelerated digital adoption and online transactions will help this growth. Players that enable payments or connect merchants and markets would get strengthened as hot segments."

In the prognosis of a recent Nasscom-Zinnov report, the space is well on the march to a trillion dollar digital

FINTECH HOTLIST

PAYMENTS

- **Indialdeas:** Remember the pioneer electronic presentment technology and payment services company? Indialdeas started enabling banks, businesses and other institutions in the field of invoices, statements and bills and payments and today, what we know as Billdesk has been around since 2000. It has given the average user and merchant the advantage of paying the bill at one click from anywhere. It has also forayed into the space of recurring payments now.
- **Paytm:** Vijay Shekhar Sharma's Paytm is a household name in India. What started as a simple DTH and recharge platform is no more just a digital wallet company: it has already created two decacorns (companies worth more than USD 10 billion). Its user base saw a big fillip just after demonetisation. It has made forays into fixed deposits and money investment markets, even as its huge multi-source and multi-destination payment play remains its strongest part.
- **Pine Labs:** Then there is Pine Labs that was formed quite early (in 1998) and caters to the area of point-of-sale machines and last-mile retail solutions to merchants. It drew a lot of excitement in media speculations and buzz as the first unicorn in 2020. It has recently entered the neo-banking space and has launched app for taking micro-merchants, home entrepreneurs and street vendors into the NFC-enabled ambit. It has partnered with some leading card networkstoo.
- **Razorpay:** A very early innovator in the market, Razorpay has shown a big growth in terms of market coverage, numbers and partners. As a provider of payment solutions to online merchants in India, it started well before demonetisation spurred other players into the market. Today it has a lot of new financial products and a vast SME foothold. It has now moved towards automated banking and working capital areas too.

LENDING & CREDIT

- **Capital Float:** This venture is from CapFloat Financial Services and specialises in empowering consumers to manage their finances, with easy access for working capital finance options for SMEs, growth potential for MSMEs, and some features of credit-worthiness assessment. It claims over 8,500 crore loans disbursed so far across 300 cities.
- **CRED:** This is Kunal Shah's comeback and has a unique proposition of rewarding users who pay their credit card bills on time. It seems to command almost 20% of the credit card holder base in India already. The company has already secured investments from Sequoia Capital India, Ribbit Capital, Tiger Global and General Catalyst, and has seen Series C funding recently.
- **Groww:** This stockbroking start-up was founded by a group of former Flipkart employees and is growing well in terms of funding and market expansion. It is counting strong on retail participation in wealth creation and investing to increase exponentially in 2021. The pillars it states as its differentiators are low brokerage and the DIY-ease of easy, fast and transparent investing.
- **Kissht:** This was founded by some of former McKinsey topbrass and backed by Sachin Bansal's Navi technologies. It also offers what it calls 'easy and quick EMI at POS', apart from hassle-free shopping experiences. Interestingly, it has partnered with a few other fintech players recently to launch the Fintech Association for Consumer Empowerment. The intent is to promote open and responsible lending practices in the digital world.



WHAT'S GOING TO BE IMPORTANT IS HOW FINTECH FIRMS ENSURE THE TREND IS NOT EPHEMERAL. THEIR CHALLENGE CONTINUES TO BE THE FOCUS TO RUN A SUSTAINABLE BUSINESS.

– **Vivek Iyer**, Partner & National Leader (Financial Services) Risk, Grant Thornton Bharat LLP

economy. It underlines how the Indian start-up ecosystem has maintained its growth even during turbulent times of COVID-19. If we look at the tech start-up ecosystem, it grew from about 10,500 start-ups to 12,500 from 2019 to 2020. The unicorns were the best to watch for – from 26 to 38 (2019-2020). Potential unicorns have risen to 55 in 2020. However total funding changed from USD 6.6 billion to USD 3.5 billion. But the report also underscores that potential pipeline of unicorn club has expanded in a significant way. There is a clear recovery evident in deal value and investor interest as well. As to corporate M&A pace and investments, they are showing a gradual recovery.

Emerging scions are also creating new contours in the fintech landscape. Consider insurtech, for instance. India's share in the global insurance market stands at 1.7% and is expected to grow to 2.3% by 2030, according to Swiss Re group.

According to a Medici India InsureTech Report, India's insurance penetration is around 3.7% to 4%. In the fiscal year ending March 2020, life insurance companies in the country showed an 11.36% growth in their collective premium income at USD 684 billion. Gross direct premiums, underwritten by non-life insurers, exhibited a growth of 11.67% in this period, according to the report. That's why the acceleration and penetration brought in by insurtech players is a big help for the overall industry. The pie is attractive and huge. As per ResearchandMarkets, the global insurtech market revenue can reach USD 1,119.8 million by 2023. Overall, the fintech industry has many such mini segments to explore and branch out into.

THE BIG FAANG CLICK

The recent few months have manifested a strong surge of interest and partnerships from a not-so-



LARGE BANKS AND INCUMBENTS WILL LOOK AT ALLIANCES OR ACQUISITIONS AND CONTINUE TO STAY RELEVANT. THEY WILL NOT BE REPLACED. YOU CANNOT DO THAT.

– **Arun Jethmalani**, Founder & MD, ValueNotes

FINTECH HOTLIST

INSURANCE

- **Acko:** It claims to be India's first digital insurer and has partnered with almost every point of customer-interaction possible, like Ola, Oyo, Red Bus and Amazon. Numbers like 50 million unique customers in three years iterate its confidence in jazzing up and shaking up the insurance market. It has also started exploring the sachet-insurance segment with partners like Ola.
- **PolicyBazaar:** An insurance aggregator formed with the intent of transparent and accurate insurance information and comparison tools to consumers. It claims to be India's largest online insurance aggregator. It says it has been growing consistently at the rate of 100% since 2008 and the platform constitutes 25% of India's life cover with 10 million unique customers won by 2019. There is ample competition around though.

FINANCE MANAGEMENT

- **Fyle:** Yes, these are companies that make it easy to crunch those Excel sheets and ledgers. This Bengaluru-based expense management start-up uses AI to track expenses and create audit ready reports. It proudly shares numbers like about two million expenses claimed so far and \$6 million savings for customers. Yes, TigerGlobal is an investor here with fresh funding injected last year.
- **Khatabook:** There is Khatabook, for small and medium businesses. It claims to register an impressive number of merchants that are uploading data here and doing millions worth of transactions every day. As per media reports, it has on-boarded about 80 lakh SMEs in less than two years only. Names like Sequoia, YCombinator and MS Dhoni stand out in its investor list.

related quarter. Companies that had nothing to do with the BFSI industry are getting interested for a share of the market that is being redefined and catapulted due to fintech. Does this mean more competition or better collaboration?

As to the interest that tech giants like Facebook, Google and Amazon are showing in this space, Jethmalani reckons that it will drive faster adoption. "In India, UPI is a good layer that government has cemented and whether it is Google or something else, they eventually sit on top of UPI."

Gupta avers that the tech players have a big edge in some way. "Honestly, they are the ones that are changing the scenario. These giants bring a large user base and integration strengths here. Most of the big ones except the likes of WhatsApp are doing well. The ones who are not able to crack it yet, struggle to find use-cases beyond p2p interactions and to generate awareness."

As per 'The State of Fintech: Q3 2020' report from CBInsights, tech industry segment FAMGA (an acronym for the usual suspects: Facebook, Microsoft, Google, and Apple) was seen active in fintech this quarter with patent approvals, partnerships, and investment activity. Case in point: Apple's acquisition of Canada-based mobile payments company Mobeewave for USD 100 million.

Anti-competition laws are going to assume a lot of focus, given the acquisitions of innovations by the FAANGs (that's Facebook, Amazon, Apple, Netflix and Google in short), reminds Iyer. "The FAANGs would need to look at managing stakeholder expectations in a more sensitive manner. Big Tech suffers from a trust deficit today and it is important that the group address the same."

STRAGGLERS OR STRUGGLERS OR?

Wait! What happens to the incumbents? Consolidation? Harakiri? Slow sunsets?



CONSOLIDATION WOULD BE A KEY TREND TAKING SHAPE NEXT. MORTGAGE COMPANIES AND BROKERAGES SEEM TO BE POPULAR ACQUISITION TARGETS. GLOBAL EXAMPLES SHOW THAT WELL.

Why fintech players can get an easy foot in the door

- Demonetisation and pandemic-led digital adoption
- Room to remove operational friction in legacy alternatives
- Leaner operating models
- Possibility of leveraging big data, AI and machine learning
- Untapped market with less competitive clutter
- Potential for experimentation
- Rs 1,500 crore incentive (in the Union Budget 2021-22) to promote digital payment and create a robust and dynamic payments ecosystem

Gupta notes that there is tremendous improvement seen in areas like customer engagement and digital experiences in many banks now. “Especially 2016 onwards, there is a new emphasis and attention to digital experience. Indian banks have come a long way in that sense. They are innovating in areas like API stacks, adjacent services and more.”

Jethmalani reasons that existing financial players and banks are not going to be knocked out. “They have all the capabilities to survive and adapt. They are not rolling over that soon. Ultimately everything in fintech has to go through them only in some way, whether it is a bank

Fast and fintech

- The tech start-up base continues to expand at 8-10% YoY (2019-2020)
- 12 unicorns were added in 2020, of which 58% are B2B start-ups
- H2 2020 funding went up by 90% over H1 2020
- Almost 35% of retail investors in India are using fintech

Source: Nasscom Tech Start-up Report

account or UPI or a demat account. But fintech has pushed them to think in the new-age language like apps, speed and internet. Technology will come out strong on the back-end of payments and that’s where fintech start-ups can have an edge. Large banks and incumbents will look at alliances or acquisitions and continue to stay relevant. They will not be replaced. You cannot do that.”

Consolidation would be a key trend taking a clear shape next. Mortgage companies and brokerages seem to be popular acquisition targets. Global examples show that well, like how Mortgage analytics firm Black Knight acquired Optimal Blue for USD 1.8 billion, ICE acquired EllieMae for USD 11 billion, and United Wholesale Mortgage is set to go public in a USD 16 billion SPAC deal (as cited in a CBInsights report).

So it looks like fintech will not elbow everything away or be trampled by anyone either. It will grow with all stripes of players together. Some of them may be cousins, and some may be spouses. The big family tree, meanwhile, keeps getting strong and wide.

Top tech trends that will define fintech this year

Technology in financial sector is evolving rapidly to offer solutions and stay ahead of the curve. A clutch of tech trends will shape the fintech space this year



It is difficult to imagine modern finance without technology, which is helping players navigate its complicated landscape more efficiently. While bigger and older organisations adopt technology at their own pace, start-ups are blazing new trails – and the two are more often partners than rivals.

India is one of the fastest-growing fintech markets. In the new year, the fate of fintech will be shaped as much by evolving regulatory and policy frameworks as by new

technologies. Here are some of the trends that will define the fintech industry:

CLOUD AND BIG DATA ANALYTICS

With cloud computing banks can eliminate redundant tasks and work more innovatively. Its other services include storing, managing and accessing information. Fintech companies that utilise secure cloud-based technology can also help banks find unique



AI LEARNS AND ADAPTS TO WEED OUT FRAUD CASES. WITH ML, RISK ASSESSMENT SYSTEMS ARE CONTINUOUSLY UPDATED TO BETTER PROTECT CONSUMERS AND BUSINESSES IN FINTECH.

– **Akash Sinha**, Co-founder & CEO, Cashfree

solutions for better user experiences, personalisation and automation.

This also means that scaling up business to higher user demand is much easier as it only needs upgrading the data package that the company is contracted to use: no need to hire, train and re-train employees. On the other hand, payment gateways that are not on cloud suffer from slow and complicated payment processes.

Usage of big data in fintech is more than a trend. The exponential increase it recorded in recent years will continue, especially due to further adoption of mobile technologies and IoT.

Jatin Bhasin, VP Product, Capital Float says that fintechs have largely been cloud-friendly companies. With the advent of cloud solutions such as AWS, GCP and Azure, and the possibility of hosting a private or public cloud system, many traditional financial institutions (FIs) have started to migrate sizable portion of their data to digital formats.

One of the cloud's main advantages for FIs is storing and keeping track of large data sets that are used for verification of transactions. This makes them agile and fast-paced. This opens up their reach to various different and remote markets, regardless of their location.

An analysis of GlobalData's Market Opportunity Forecasts Model reveals that cloud revenue in the BFSI sector will grow at a CAGR of 8.2% during 2019-24 to reach USD 27.8 billion in 2024. Banks, fintech companies, lenders and insurers are leveraging data-sets to maximise customer understanding and gaining a competitive advantage. The fintech industry will also create innovative models for assessing risks.

AI/ML AND IOT

With AI, fintech companies are developing new ways in which users can process information. Users can make use of complex information to improve their financial decision making. The use of AI, ML, and IoT technologies



BLOCKCHAIN IS NOW BEING USED TO AUTHENTICATE LENDERS, CONSUMERS AND TRANSACTIONS, AND ALSO PLAYS A MAJOR ROLE IN PREVENTING UNAUTHORISED ACCESS AND CYBERCRIMINALS.

– **Jatin Bhasin**, VP Product, Capital Float



THE NUMBER OF PEOPLE WHO VISIT THE BANK IN PERSON WILL GO DOWN, AS PER A REPORT, BY 36% FROM 2017 TO 2022, MOSTLY BECAUSE OF THE RISE OF DIGITAL-ONLY BANKS.

is rapidly changing the financial sector, especially by allowing greater insight into the customer behaviour.

Fintech is combining industry IoT and AI to test banks in using immediate support to customers. Smartphones can function as signs by notifying account supervisors in FIs when a customer arrives at the branch. This way, fintech firms can assist her promptly as well as save her time. AI and ML offer fintech exceptional benefits like more efficient processes, better financial analysis and customer engagement. Fintechs are creating a sensation by employing NLP-based chatbots and innovating conversational user interface (CUI) to reform mobile banking.

According to Akash Sinha, Co-founder and CEO of Cashfree, fintech organisations are increasingly adopting AI and ML to gauge risk and assess fraud. “Algorithms can be created to analyse data across a set of parameters and AI tools can learn and map out user behaviour and find patterns to identify potential fraud. Over a period of time, AI learns and adapts in order to weed out fraud cases. With ML, risk assessment systems are continuously being updated to better protect consumers and businesses in the fintech ecosystem.”

For B2C fintech companies, IoT makes the process of data collection, management and sharing more accessible. IoT will help manage data streams with a very large number of data entries. Distributed stream computing platforms have emerged as the future of IoT by helping with real-time analytics and pattern identification. While IoT in banking is still in infancy, it can already be seen making KYC and customer on-boarding processes faster. The next decade will see IoT grow exponentially by introducing new possibilities and end points for payments and optimising branch operations.

Microfinance start-ups are further fuelling ML and AI developments because of the high quantities of data

produced, historical records and financial transformation. Experts point out that AI will enable smarter lending and make credit more accessible to the unbanked and underbanked population of India. Instead of being limited to credit repayment history for loan approvals, AI will allow lenders to use alternative data sources such as regularity of utility bill payments, business reviews, digital wallets, psychometrics and more to determine an individual’s credit-worthiness.

ROBOTIC PROCESS AUTOMATION

Robotic process automation (RPA) is the new tool of choice for financial market players seeking to automate manual processes. With profit margins thinning, increasing regulation and interest rates stagnant, using RPA in finance to enhance competitive edge is one way to keep up with the slew of fintech start-ups crowding the market.

RPA in finance differs from traditional automation — instead of relying on APIs to integrate several systems into one platform and perform set routines, RPA notes a user’s actions in a graphical user interface and then repeats those actions in the same GUI. This allows human-like automation of repetitive tasks. The correct implementation of RPA in fintech helps in bridging the gap between different applications present in the legacy system.

Sandeep Wirkhare, MD and CEO at Indian School Finance Company Private Limited (ISFC) highlights that RPA provides quick alternatives to manual workloads and helps organisations avoid huge investments in automation or changes to the core systems. “With the USP of the faster time to market (within weeks or days) and to keep lean manpower structure, RPA will remain a vital tool for organisations to deliver more in less. In coming years, the spread of RPA is expected to go



THE NEXT DECADE WILL SEE IOT GROW EXPONENTIALLY BY INTRODUCING NEW POSSIBILITIES AND END POINTS FOR PAYMENTS AND OPTIMISING BRANCH OPERATIONS.

beyond operations and penetrate deep into usually less explored functions like finance and HR,” he says.

3D PRINTING AND BIOMETRIC SECURITY SYSTEMS

3D printing is a process for making a three-dimensional object of almost any shape starting from a 3D model or other electronic data source. Biometric scanning is one of the most essential aspects of any security system, some of which rely solely on it to identify authorised users. While biometrics might be more secure than passwords, the hacker community’s capabilities should not be underestimated. 3D printing is considered a promising trend to prevent card-present fraud in the event of point-of-sale systems and ATMs.

Rohit Garg, Co-Founder and CEO, Smartcoin says: “The rapid proliferation of mobile banking and other financial services amongst the mainstream masses has also resulted in a number of growing cybersecurity concerns for banks and financial companies. In 2021, it is possible that numerous companies will graduate from touch-based fingerprint readers towards adopting contactless biometric security technology to effectively secure customer information and confidential data in a post-COVID business milieu.”

DECENTRALISED FINANCE OR BLOCKCHAIN

Blockchain offers exemplary features like transparency, immutability, traceability, and auditability. It is able to provide a high level of security when it comes to the exchange of money and sensitive information, allowing users to draw off its transparency while lowering operational costs.

Bhasin explains: “Unlike being originally used for crypto-currencies, blockchain is now being used for authenticating lenders, consumers and transactions,

and also plays a major role in preventing unauthorised access and cybercriminals from trying to poach financial transaction information. Cross chain technology in blockchain brought scalability and stability through Defi [decentralised finance] in 2020. Defi allowed individuals access to financial services such as borrowing, lending and investing.”

Defi applications work through the distribution of functions. Individuals using these applications are responsible for any unsanctioned action as every computer, server, or IP makes its own decisions resulting in the final behaviour.

DIGITAL-ONLY BANKS

Digital-only banks, in one or the other form, have a huge potential. Raj N, Founder and Chairman, Zaggle says: “Digital-only banks are the banks that provide various virtual banking services like P2P transfers, contactless transacting and no transaction fees. These banks are equipped to buy various cryptocurrencies like Bitcoin and Ethereum and have gained popularity in the market in a short time. This is majorly because it offers utmost convenience to their customers by eliminating tedious paperwork, and the traditional way of working, waiting in long queues, and the need to visit a bank physically.”

The number of people who visit the bank in person will go down, as per a report, by 36% from 2017 to 2022, mostly because of the rise of digital-only banks.

Of course, the RBI does not allow a fully digital bank yet, so such neo banks are required to partner with traditional banks. This year will see the rise of hybrid banking, with banks offering online and offline solutions and services. Collaboration with innovative fintech companies will ensure banks can offer unique products to a larger customer base in India. In 2021, banks that leverage efficiency, flexibility and convenience of digital



DIGITAL-ONLY BANKS ARE EQUIPPED TO BUY VARIOUS CRYPTOCURRENCIES LIKE BITCOIN AND ETHEREUM AND HAVE GAINED POPULARITY IN THE MARKET IN A SHORT TIME.

– Raj N, Founder & Chairman, Zaggie

banking while reaping the benefits of personalisation, relationships, and in-person experience that digital self-service cannot provide, will stay ahead.

REGULATORY TECHNOLOGY

Regulatory technology (regtech) have established a solid foundation within the fintech ecosystem and has come up with solutions for new and complex regulations, litigation and regulatory remediation areas faced by FI, combined with overall reduction in cost compliance. The regtech marketplace can be split into many areas: risk and compliance management, identity management, regulatory reporting, fraud management and regulatory intelligence. Experts say regtech applications will continue to provide popular, embedded solutions for firms in areas such as compliance monitoring, financial crime, AML/CTF, sanctions and regulatory reporting.

Sinha of Cashfree says: “Banks and financial organisations operate in a highly regulated environment to safeguard the financial systems and various stakeholders, and data of the customer. The pandemic has also brought specific regtech opportunities to the limelight – online onboarding, data privacy, personal data protection, customer interest, identity risk management, online dispute resolution and much more.” With the RBI’s bolstered vision for regtech and Supervisory Tech (suptech), entities like commercial banks, cooperative banks, rural regional banks, payments companies and non-banklenders among other actors will be monitored to avert risks.

There are, however, certain drawbacks associated with the implementation of regtech, such as substantial direct costs, lofty obstacles and barriers to entry

associated with critical services. The way fintech players address these concerns will be critical in aiding the regtech industry to evolve and become an important regulatory solution.

OPEN BANKING

The new banking system is proliferating technology within digital banking around the world, forcing banks to change their business models. Instead of competing directly against fintech and third-party institutions, incumbents can leverage open banking to partner with them, and thereby remain competitive in the rapidly evolving industry. Open banking made things easier for them as they could use banking services from banks through APIs and build better customer engagement and value proposition for their customers. Before getting into the advantages of big techs having others to fast-track their financial services, it is essential to look at the transition made by some of these big techs into banking.

Open banking is reshaping financial services, says Wirkhare of ISFC. “Open banking enables customers to select from a broad portfolio of applications developed by third parties for their own financial benefit. It allows financial organisations to modify these applications to specific individual preferences and requirements, enabling financial establishments to innovate.”

Experts indicate that open banking will overhaul the financial ecosystem into digital powerhouses functioning profitably. There is significant scope for open banking to grow in the foreseeable future. In 2021, open standard of banking is likely to be created using API, fintechs would be able to use data from banks using secure protocols built on sharing models via API.



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MUKUND VENKATESH
Managing Director India, Gain Credit

*Here is a UK fintech major that has been adopting many technology advancements but the way it picks and prioritises them has nothing to do with technology. **Mukund Venkatesh**, Managing Director India, Gain Credit, an alternative lending company with operations in North America, Europe and Asia, explains this new fintech formula for IT investments that he has been following for juxtaposing ‘Tech’ with ‘Fin’ at the right angles.*

How tough is to be a fintech player today when your topmost proposition has to be speed and simplicity; and at the same time you cannot afford to turn a blind eye to compliance, customer data privacy and security? For the last eight years, we have been a leading alternative digital provider of credit in the UK market. Our entire operations and customer experience are seated online. We aim to serve those segments that struggle with access to credit; and sometimes, the speed of decisions has to be as minimal as we



FINTECH IS GOING TO RISE IN A BIG WAY IN THE NEXT 20 YEARS

can manage. So, yes, customer experience and simplicity are tenets that we thrive on. When you are dealing with people's finances there is a heavy (and rightfully expected) degree of regulation too. But before we think about technology, we think of other aspects – customer experience, regulatory frameworks, fairness and positive outcomes. Technology can then come in and solve the problems for these areas.

You have recently rolled out major IT changes like the virtual contact centre or chat-bots or the cloud-side investments. Did the COVID-19 crisis trigger these decisions or were they already building up?

We had been looking at AWS for quite some time and were excited about expanding the infrastructure. When the pandemic hit the world, like many other companies our goal condensed to one word – quick recovery. This recovery entails the right balance of government permissions and customer experience. When we looked at these solutions from AWS, we felt encouraged to turn on the recovery buttons and offer faster service options. The COVID-19 situation catalysed and accelerated existing plans and intentions. We are happy with the speed of deployment.

What specific circumstances did you solve with these efforts?

Our tech and engineering teams are based in India, and we had to close contact centre operations in Gurgaon for a brief period as a result of the lockdown that was announced in India. The company's on-site call centre was in a payment card industry (PCI) zone. That means that contact centre agents needed to come into the office to connect with customers, but this was not feasible once the lockdown began. Gain Credit's (GC's) customers started experiencing limitations in contacting GC's agents through calls or chats and had to depend more on the email channel. After seven days, GC was able to upgrade its remote operations when it deployed secured cloud-based customer operation applications and Amazon Connect. We implemented AWS services to build a virtual contact centre with Amazon Connect. This is how we continue to be able to provide customers in the UK the core services of providing loans for people whose credit scores do not usually allow them to borrow from traditional financial institutions.

Did you evaluate any other options? What were your evaluation criteria?

Yes, for the call centre initiative, we considered other

options. What appealed to us about AWS was the fact that a lot of our infrastructure is already in AWS. To expand it in these new areas was, hence, a natural choice. We also liked the self-service nature of the solution. Another good part was that these solutions needed limited training. We could also build additional services on the top of AWS technology.

How well has this worked?

Within a week of moving to secured cloud-based customer operation applications and deploying Amazon Connect, GC restored 40 percent of its incoming interactions from customers. The deployment happened in one week and we immediately began handling thousands of interactions per day. Since then we have added continuous enhancements to the system. We are able to better serve customers and provide them with the solutions to their queries. During the rollout of the system and the rapid growth in interactions, GC was able to scale easily with less effort.

Is your move towards machine learning with Textract a way to balance compliance with speed?

Yes, we adopted Amazon Textract, as it is a fully managed machine learning service to automatically extract text and data from scanned documents. It goes beyond simple optical character recognition, and addresses many physical customer documents in three days. All the services and steps we are moving towards are better ways of serving customers – with adequate security and speed factors. With Textract, we have the benefits of doing something in an automated way, avoiding intensive manual labour (that can be put in other priority areas), increasing compliance strengths – everything. With better search algorithms we can flag customer issues, deliver services efficiently and do it all in a scalable way. This was not done, particularly, from a compliance stand-point but yes it does serve that purpose in a good way.

Are these solutions more than unbox-and-slap category of IT? Did you get any ramping help or other support here? What was your team's role here?

AWS has a really strong support capability. They helped in getting a peek into how a solution would look in our context. They provide enough resources and room to play around. Such partners are not looking at just signing a contract and moving on. They want to sit and solve a problem. That's the kind of partners we need too.

While AWS has a good suite of chat, voice and bot services, an off-the-shelf chat application (user interface)



BEFORE WE THINK ABOUT TECHNOLOGY, WE THINK OF OTHER ASPECTS – CUSTOMER EXPERIENCE, REGULATORY FRAMEWORKS... TECHNOLOGY CAN THEN SOLVE PROBLEMS FOR THESE AREAS.

tailored for GC's needs was also needed. That's where the 'geeks of GC' stepped in. They whipped up a cutting-edge chat application that is highly customisable and configurable for GC's digital lending customer support needs. This chat application easily integrates with AWS Connect. It is strong enough to enable an end-to-end fully digital financial services customer support chat-bot experience in just a few days. The chat-bot and voice-bot that we built collectively handled close to 75 percent of incoming customer queries.

What spurred the move towards Lex universe?

Lex is from the Alexa lineage and we are excited to replicate what Alexa has done on the consumer side of voice assistance. The remote working situation which began in late March meant that GC had an increasing number of customer queries. That's why we implemented Amazon Lex. There is a lot of promise stored for the future and we could build more and more services that are intelligent, cost-effective and collaborative with other platforms.

Any other imminent IT investments that you can talk about?

At the heart, we are a technology company. We have a 300+ strong team in India which is working non-stop to improve digital experiences via smart channels. We are working on improving back-end side of loan management, predictive risk models, technology for credit assessment and risk-management algorithms. As to the recent call-centre initiative, with AWS as a reliable partner, we strive to strengthen the self-service part – which is what customers actually want at the end of the day.

Do you think fintech disruptors can retain their technology-driven edge when everyone from legacy

institutions to technology giants are getting in the fray now, using digital powers?

I think it is a space large enough to accommodate all kinds of players. There are so many experiences to create and so many customer pain-points to solve. It is a vast area to dive in – be it a large player, a new-age lender, a technology company or an API developer. There is space for everyone here. The core focus should be on improving customer experiences. Our edge in the UK is in alternate customer segments and you need time to refine your models. We do not look at our edge from a technology view but from a customer view. We have invested a long time in understanding the customer. We have honed our models and technology to help them. Fintech is going to rise in a big way in the next 20 years and we will see leap-frog moments like the recent Open Credit Enablement Network (OCEN) progress in India.

Any advice to other CIOs who are still hesitating on the kind of solutions you have invested in?

I am excited about innovation and infrastructure providers like AWS in the BFSI space. You can come up with really cool things if you look at technology in a fresh way. People are coming to us to ask about our experiences with these solutions, and other lending companies are asking – tell us more about what you did. Companies like AWS are there to support us in building what we want. They are good partners. Most lenders do not have the kind of IT teams they might need. We are ready to help. Technology will power the next decade of fintech and I am excited about creating cool customer outcomes. The current crisis has been a silver lining. It has catalysed and pushed forward digitisation. That said, we think of compliance, security and ease before we think of technology. I would say it is better to go slow and build lasting value than to rush at things. The heart and focus must always stay on customer outcomes.



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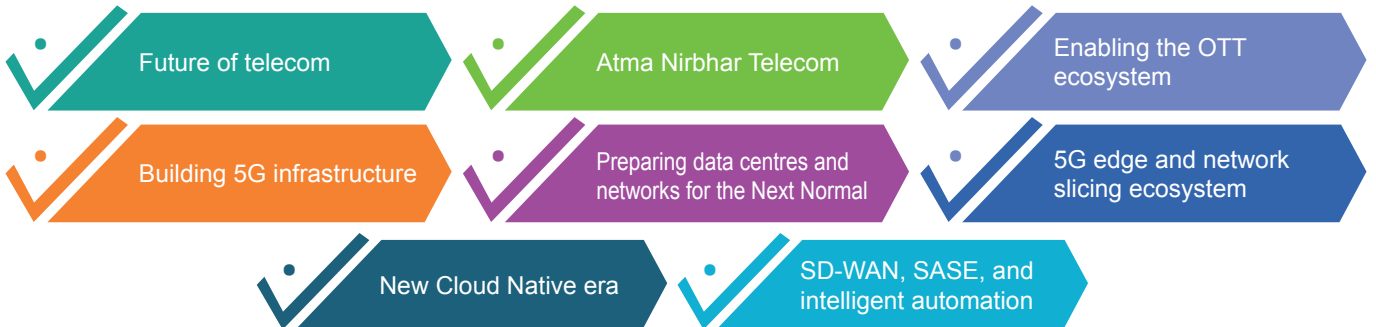


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Scaling up UCB cybersecurity practices

Taking the RBI guideline forward, UCBs can draft their own technology vision framework to enhance cybersecurity measures

The banking, financial services and insurance (BFSI) sector has been witnessing dramatic changes in technology. Digitisation of services in banks and insurance organisations has led to accumulation of big data, making the sector a major target for threat actors. The monumental growth in online banking in India and the steady growth of cashless transactions have brought to light the urgency for strengthening cybersecurity postures. Apart from banks, banking consumers are also vulnerable to cyber threats like malware, formulated to steal confidential financial credentials. The increasing need for quicker BFSI transactions, especially the ones dealing with across the border, is under cybercriminals' scanners.

The security threats on BFSI have increased manifold and taken critical turns to affect these organisations. And one of the primary factors is the increasing workload on the cloud, as most of the enterprises have already or are undergoing rapid digital transformation. As per industry estimates, Coronavirus has been blamed for a 238% rise in attacks on banks globally, and if we go by the Kaspersky Security Network (KSN) report, the number of local cyber threats detected and blocked in India from January to March last year is 52,820,874.

The need to rapidly relocate to the Infrastructure as a service (IaaS) cloud ecosystem has brought newer risks that are created from the misconfiguration of access points. Organisations have opted for third-party integrations to sustain the required IT environment to assist online banking. And while deploying multi-vendor solutions, enterprises may sometimes have various vendors stationed across their environment. This obviously leads to integration inadequacy, making enterprises face the unwanted scenario of data forfeiture.



RBI'S FOCUS ON STRENGTHENING UCB CYBERSECURITY

Public sector banks (PSBs) and urban cooperative banks (UCBs) across the board underwent massive centralisation in the past year. However, all of them had to keep pace with the increasing demand for speed and comfort. Unless they followed a strict protocol and focused on security, integration gaps could have left security postures broken and vulnerable.

This is one of the reasons why the RBI introduced a vision framework to enhance the cybersecurity measures



THE NEED TO RAPIDLY RELOCATE TO THE INFRASTRUCTURE AS A SERVICE (IAAS) CLOUD ECOSYSTEM HAS BROUGHT NEWER RISKS THAT ARE CREATED FROM THE MISCONFIGURATION OF ACCESS POINTS.

of UCBs. It is currently based on a five-pillared strategic approach, GUARD, which focuses on providing an insight into UCB governance, strategies to impart technical skills to manage IT, and raising awareness for all UCBs, regulating the reporting framework and providing appropriate guidance for implementing practices that are secure from the core.

Digitisation of every other business has eventually found its way to banking as well in the form of internet banking, mobile banking, and ATMs. UCBs can, therefore, formulate their technology vision framework that outlines their propositions to include IT solutions in their business operations with complete security. They can also upgrade their IT repository with supported IT infrastructure to ensure that the cyber ecosystem is not vulnerable to risks due to outdated software/hardware.

WHY IS THE GUIDELINE IMPORTANT FOR UCBs?

Cybercrimes continue to expand and are becoming persistent by the minute. Threat actors are getting stealthier and their attacks even more critical to beat. It is time for UCBs to get a grip over their existing security infrastructure and adopt a full-fledged proactive approach. The RBI's objective is to place stricter guidelines and align the current framework with global best practices while keeping in mind the context of the national financial system.

However, the concern whether India's UCBs will be ready on the dot to align with this vision is something that cannot be shelved anymore. The urgency to align with RBI's cybersecurity vision calls for UCBs to buckle up and place their best foot forward through constant reinforcement of global best practices, so as to strengthen the UCB network ecosystem and to stand strong against the emergence of an array of cyber threats. It might sound far-fetched for UCBs to completely align with RBI's vision framework, but with the correct guidance and tenacity, the result will prove far more beneficial than the pain.

PRESCRIPTIVE MEASURES BETTER THAN REACTIVE

Given such a critical security landscape across enterprises, cybersecurity has become the go-to industry for banks for the technology they provide. UCBs can optimise investments to safeguard their network peripheries by heavily investing in systems and people. In order to enhance security posture, the most critical assets that a UCB can own are newer solutions, systems, and people. State-of-the-art technology that includes machine learning (ML), artificial intelligence (AI), and big data must be deployed at the very foundation to effectively detect distrustful transactions. UCBs can, therefore, look at prescriptive measures to scale up their cybersecurity practices. Digitally intelligent technology tools are bringing cybersecurity companies to the forefront and are currently carrying the torch when it comes to securing the bank's assets.

Cybersecurity companies take a proactive security approach that UCBs can deploy as their avant-garde perimeter defence. They are instantly alerted of potential intrusions inside the IT environment, the ones that have already bypassed other security tools. AI and ML algorithms can detect unusual network behavior in real-time, eliminate false positives with its learning capabilities, and enable security practitioners to detect and respond to stealthy attacks.

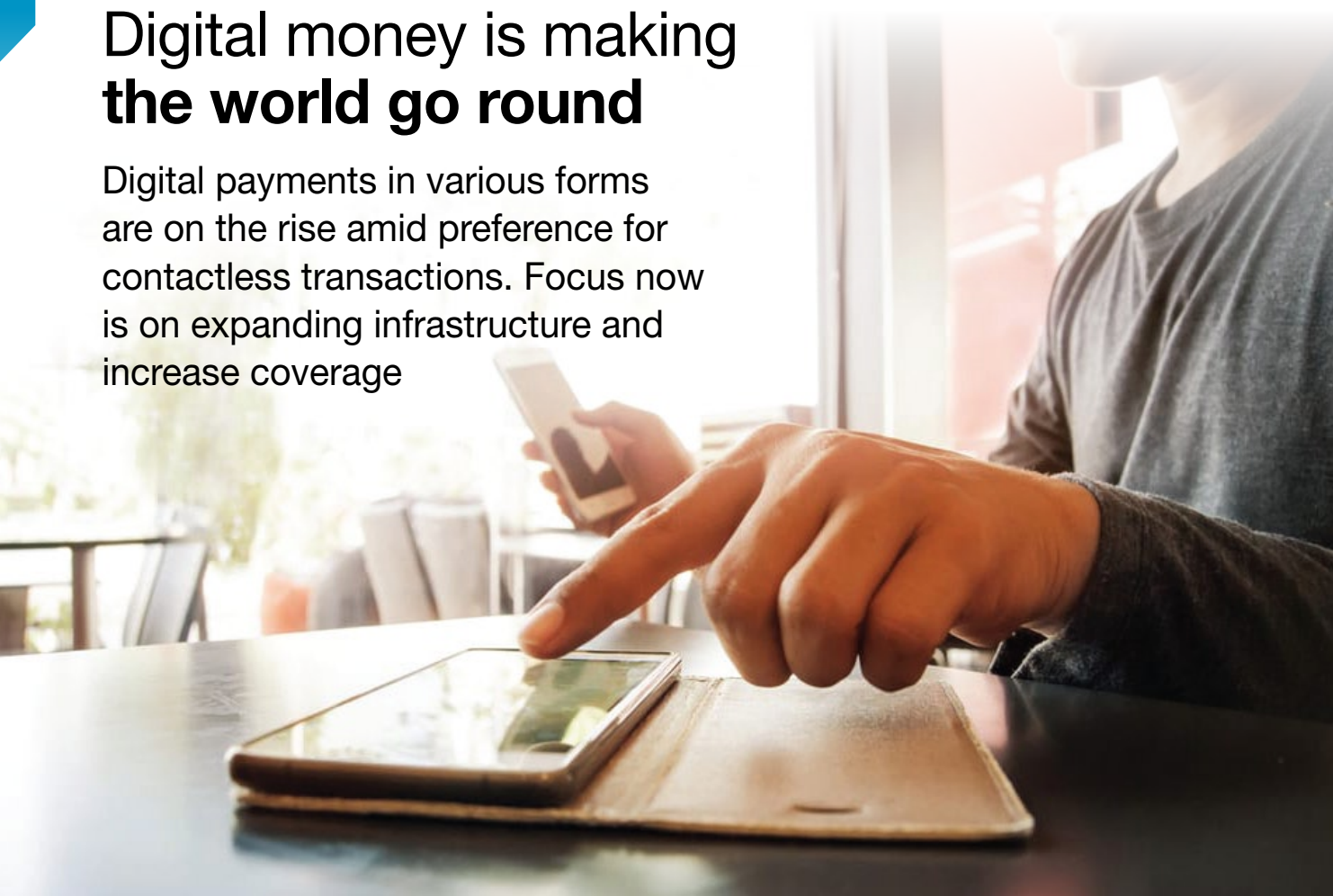
Companies today are developing solutions that are built to help UCBs maintain stringent compliance with industry regulations as well as provide robust and resilient performance from the day of deployment. Going forward, these companies will play a pivotal role in helping financial institutions scale up and provide seamless services to their consumers.

Jaiswal is a Co-founder and Director, Vehere



Digital money is making the world go round

Digital payments in various forms are on the rise amid preference for contactless transactions. Focus now is on expanding infrastructure and increase coverage



Consumers all over the country have been embracing digital payments like never before. With COVID-19, contactless and cashless transactions have become the preferred choice among consumers and merchants alike. While consumers are ordering groceries and paying utility bills through e-commerce modes from home, retail and online merchants are deploying multiple frictionless and asset-light solutions. The European leader in the payments and transactional services, Worldline, which analysed Indian digital transactions available in public databases as well as transactions processed by themselves in (July-September) Q3 2020, corroborated that and showed several payment products witnessed V-shaped recoveries during that period.

“The Reserve Bank of India has announced several initiatives to enhance the digital payments space in India; the opening of the first cohort under the regulatory sandbox with ‘retail payments’ as its theme, setting up of a self-regulatory organisation for payment system operators, streamlining QR code infrastructure and setting up of the Reserve Bank Innovation Hub among others. These initiatives are being welcomed by industry players as they are expected to leverage technology, spur innovation, enhance system efficiency and strengthen the acceptance infrastructure,” said Deepak Chandhani, MD, Worldline South Asia & Middle East.

Now, for digital payments to increase in a sustainable way, merchants across the country need to have the infrastructure to accept all payment instruments. But



RBI'S INITIATIVES ARE WELCOMED AS THEY ARE EXPECTED TO LEVERAGE TECHNOLOGY, SPUR INNOVATION, ENHANCE SYSTEM EFFICIENCY AND STRENGTHEN ACCEPTANCE INFRASTRUCTURE."

– Deepak Chandnani, MD, Worldline South Asia & Middle East

the Points of Sale (PoS) infrastructures in India still are concentrated in the larger cities only – largely because of cost issues related to both logistics as well as low usage by merchants outside such cities. A Payment Infrastructure Development Fund (PIDF) could break that barrier down.

On June 5, 2020 the RBI announced the creation of a PIDF to encourage acquirers to deploy PoS infrastructure (both physical and digital modes) in underserved areas such as tier-3 to tier-6 centres and the northeastern states. The size of the fund is to be Rs 5 billion with the RBI putting in half and the other half to come from the card schemes and card issuers.

There is optimism that this fund could provide that much needed fillip to the PoS infrastructure in the country. Citing a similar instance, Sunil Rongala, VP-Strategy, Innovation and Analytics, Worldline, explains, "To understand the potential impact a fund like this can make, we need to look at Malaysia where a Market Development Fund was introduced in 2014 with the primary aim of increasing the number of PoS terminals in the country – the goal set was to reach 800,000 terminals in 2020 from 233,000 in 2014. By most measures, this seems to be a success; the number of PoS terminals reached 407K in 2017 and 669,000 in 2019 with a full expectation of reaching the target in 2020. The success is also reflected in the number of per capita e-payment transactions made; it is up from 49 in 2011 to 111 in 2017 and 144 in 2019."

Malaysia, of course, is far smaller compared to India and its population is about 33 million compared to 1.3 billion in India. It is also worth noting that the Malaysian fund was expected to channel RMB 455 million (Rs 8.25 billion) which is significantly higher than the fund announced in India, he added.

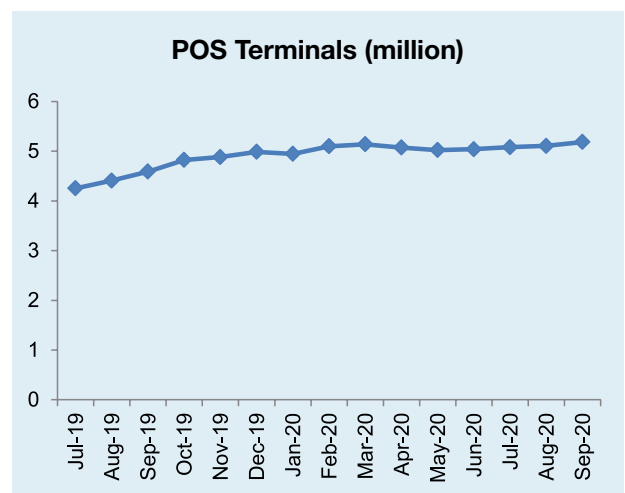
Here are some unique digital payment-related insights derived by Worldline.

MERCHANT ACQUISITION

In Q3 2020, there were over 5.18 million PoS terminals deployed by merchant acquiring banks, up 13% as compared with Q3 of the previous year. There was a mild dip in the number from March 2020 but in September 2020, it crossed the March number of 5.13 million.

Overall transactions at physical touchpoints in Q3 2020 were up by 40% in volume and 51% in value as compared with Q2 2020. For Worldline India, at physical touch points, groceries, petrol stations, clothing and apparel, specialty retail, pharmacy and medical, restaurants, and departmental stores together accounted for 65% in terms of volume and 55% in value in Q3 2020.

In the online space, e-commerce (shopping for goods and services) and the education sector contributed to



over 65% in terms of volume and value in Q3 2020. An observed trend is that the travel and hospitality sector is witnessing growth with each passing quarter.

CARD ISSUANCE

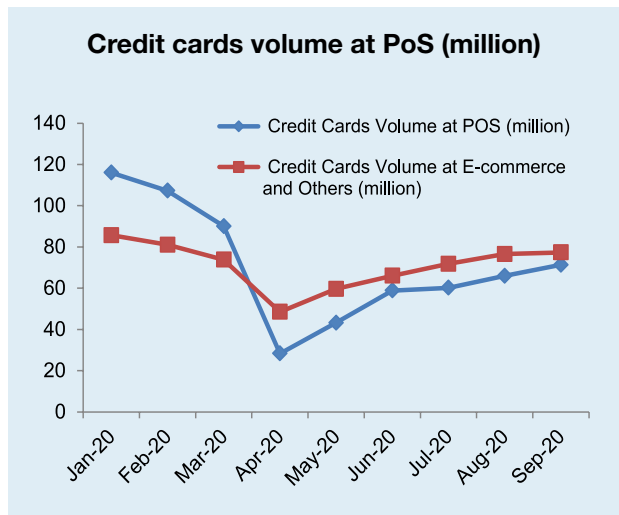
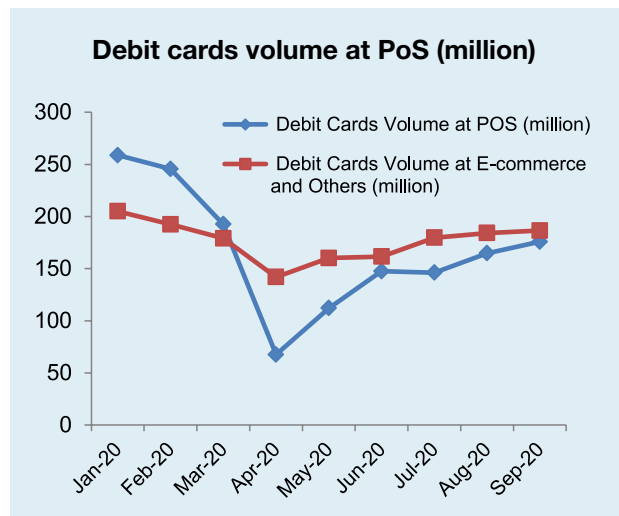
Interestingly, debit card issuance has been on the rise since the beginning of the year. While over 13 million debit cards were added in the system in Q3, the number of outstanding credit cards grew by over 1 million in the same quarter. As of September 2020, there were 865.43 million debit cards and 58.69 million credit cards in the country.

The increase in debit card issuance can be attributed to a significant number of new accounts opened under the Pradhan Mantri Jan DhanYojana (PMJDY) scheme. About 5.68 million RuPay cards were issued to PMJDY beneficiaries via banks under the scheme in Q3 2020. Replacement of magnetic stripe cards with EMV chip cards to existing customers, upgrade to contactless cards, pent-up demand for card issuance post lockdown and business as usual could be other reasons for this rise.

Debit card transactions volume and value in Q3 2020 were 1.03 billion and Rs 2.13 trillion respectively. Debit card transactions volume in Q3 increased by 20% and 4% at POS and e-commerce respectively. In terms of value, debit cards recorded 18% and 10% at POS and e-commerce respectively in Q3.

Credit card transactions volume and value in Q3 2020 were 423.15 million and Rs 1.47 trillion respectively. Transactions volume of credit cards in Q3 increased by 19% and 8% at POS and e-commerce respectively. In terms of value, credit cards recorded a growth of 9% and 15% at POS and e-commerce respectively in Q3.

Insert graphs: 1. Debit cards volume at PoS (million); 2. Credit cards volume at PoS (million)



PREPAID PAYMENT INSTRUMENTS

The number of prepaid payment instruments has been growing at a steady pace since the beginning of 2020. As of September 2020, there were 1.9 billion prepaid payment instruments in the country, of which, 167.24 million were prepaid cards and 1.82 billion were mobile wallets.

Prepaid card transactions volume and value in Q3 2020 were 275.60 million and Rs 98.64 billion respectively. Prepaid cards, which are primarily used for online transactions rather than physical merchant places, recorded 15% growth, while the number of mobile wallets saw an uptick of 4% in Q3 over Q2. However, value of transactions is 33% lower compared with the same period of previous year though there is a recovery happening from the low seen in April 2020.

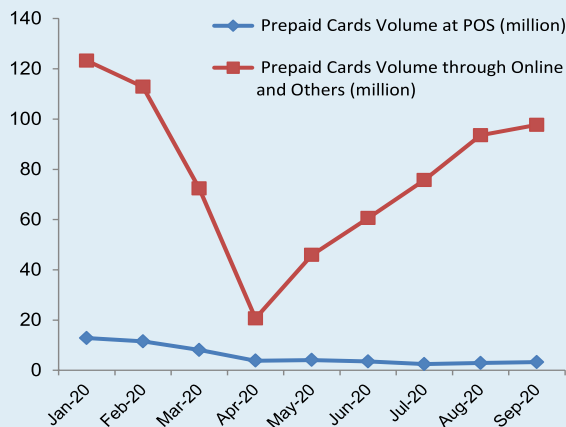
Transactions through mobile wallets are also growing steadily. The number of transactions through them in Q3 2020 was 727.91 million and the value was Rs 391.05 billion. This includes purchase of goods and services and fund transfer through wallets. In Q3 2020, it recorded a 4% increase in volume over Q3 of 2019. However,



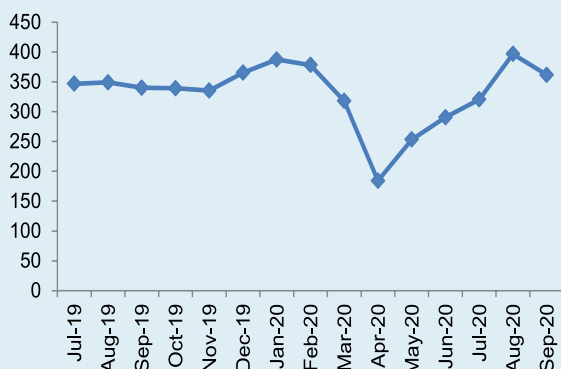
IN Q3 2020, THERE WERE OVER 5.18 MILLION POS TERMINALS DEPLOYED BY MERCHANT ACQUIRING BANKS, UP 13% AS COMPARED WITH Q3 OF THE PREVIOUS YEAR.

value of transactions is 33% lower compared with the same period of previous year though there is a recovery happening from the low seen in April 2020.

Prepaid cards volume at PoS (million)



m-Wallet volume (million)

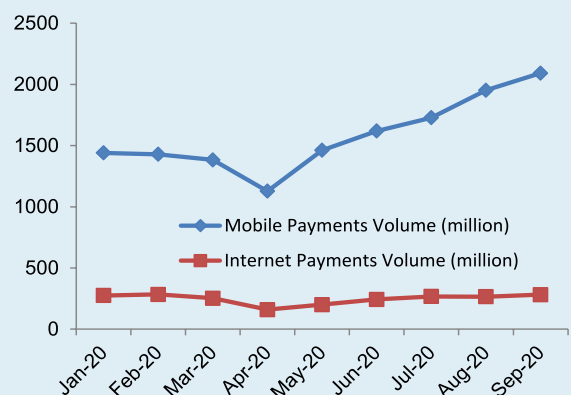


OTHER PAYMENT CHANNELS

In Q3 2020, 5.77 billion mobile app-based transactions were recorded while net-banking/internet-browser-based transactions were over 814.71 million. It is evident from the data that consumers prefer mobile apps frequently for small transactions and net-banking/browser-based channels for high-ticket transactions.

Mobile app-based transactions recorded 37% growth while net-banking/internet-based transactions witnessed over 35% increase against the previous quarter. The value of mobile app-based transactions grew by 38% while net-banking /internet-based transactions grew by 23.52%.

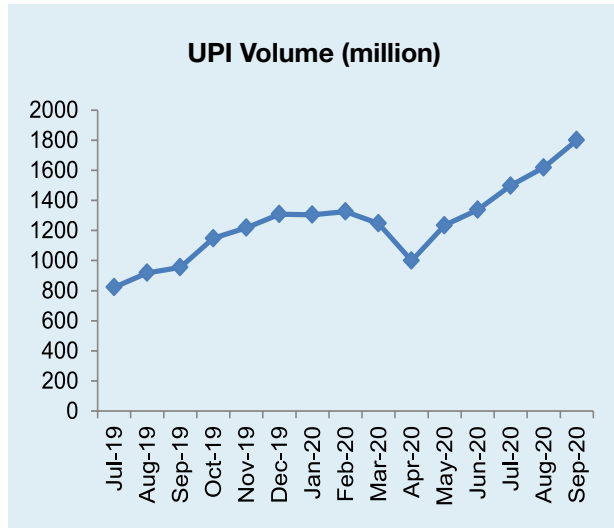
Mobile payments volume (million) & Internet payments volume (million)



UNIFIED PAYMENT INTERFACE

In Q3, 2020, UPI recorded an 82% increase in volume and 99% increase in value as compared with Q3 of 2019. In September 2020, UPI clocked over 1.8 billion transactions in volume and breached Rs 3 trillion in terms of value. In Q3 2020, transactions via Immediate Payment Service (IMPS) recorded 747.83 million transactions volume and

Rs 7.09 billion. It grew by 26% in terms of volume and 5% in terms of value as compared with Q3 2019.



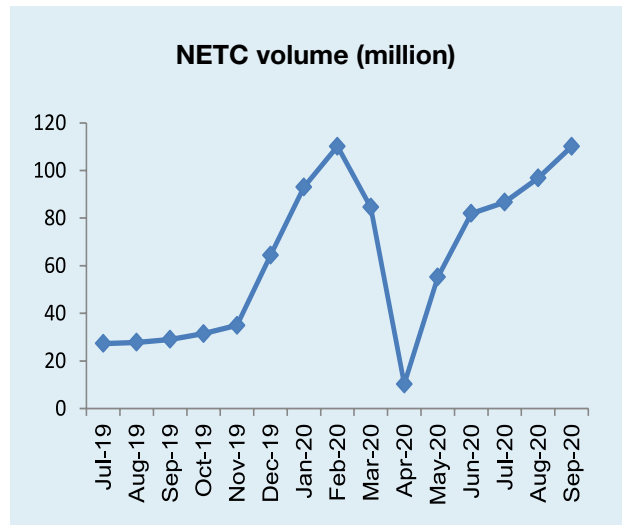
Nineteen banks joined the UPI ecosystem in Q3 2020 bringing the total number of banks providing UPI services to 174 as of September 2020 while the BHIM app from the National Payments Corporation of India (NPCI) was available for customers of 146 banks. The number of BHIM app downloads stood over 158 million as of October 13, 2020.

NPCI has taken some initiatives like creation of secondary/backup UPI ID to improve customer experience, guidelines on usage of UPI APIs, merchant system enhancements and introduction of B2B as a separate category among others in the recent past. NPCI has recently given approval also to WhatsApp to go live with UPI in a graded manner, starting with a maximum registered user base of 20 million. It has issued a cap of 30% of total volume of transactions processed in UPI, applicable on all Third Party App Providers (TPAPs) effective from 1 January 2021. However, the existing TPAPs processing over 30% transactions will get a period of two years from January 2021, to comply with the norms.

In other developments, UPI auto pay functionality was introduced for recurring payments. NPCI also launched NPCI International Payments Limited (NIPL), its wholly owned subsidiary firm with a primary focus to internationalise UPI and RuPay.

NATIONAL ELECTRONIC TOLL COLLECTION

NETC transactions in Q3 2020 stood at 293.53 million, an increase of 84% over Q3 2019 and its value of transactions was Rs 29.01 billion, an increase of 181% during the same period of previous year. As of September 2020, 19.40 million Fastags were issued since the inception of the NETC programme and about 2 million tags were issued in Q3 2020.



The Union Ministry of Road Transport and Highways has taken several measures to make Fastags mandatory. Fastag has been made mandatory for four-wheelers from January 1, 2021. Moreover, Fastag has been made mandatory for new third-party insurance with effect from April 2021 and even the renewal of fitness certificate will be done only after the fitment of Fastag for transport vehicles.

NPCI is enhancing NETC enabled use cases like contactless and interoperable parking solutions in major cities.

BHARAT BILLPAY

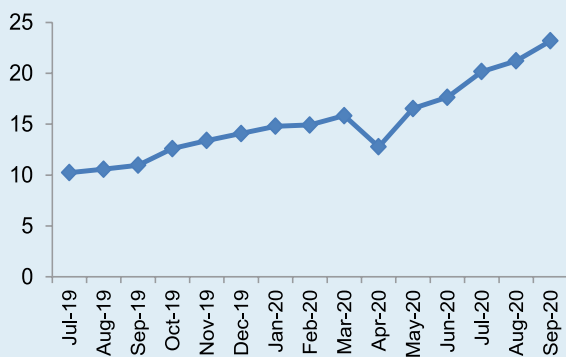
Transaction volume and value of Bharat Billpay reached all-time high figures in September. The transaction volume passing through Bharat Bill Payment Central Unit (BBPCU) in Q3 2020 stood at 64.56 million while the transaction value was Rs 114.10 billion. It registered a growth rate of 103% and 109% in volume and value respectively against Q3 2019.



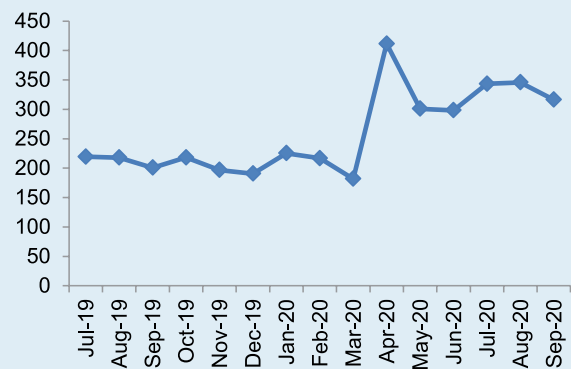
AS OF SEPTEMBER 2020, THERE WERE 1.9 BILLION PREPAID PAYMENT INSTRUMENTS IN THE COUNTRY – 167.24 MILLION PREPAID CARDS AND 1.82 BILLION MOBILE WALLETS.



Bharat BillPay Volume (million)



AePS volume (million)



Bharat Bill Payment System added about 927 billers in Q3 bringing the total number of billers to 1,172 as of September 2020. There are around 15 biller categories live which includes major recurring payment categories like loan repayments, insurance, education, housing societies, Fastag recharge, cable TV subscription and hospitals.

Bharat Billpay allows customers to pay their bills anywhere and anytime through multiple channels such as internet banking, mobile banking/app, website, agents, business correspondents (BCs) and branches using multiple modes such as cards (credit, debit and prepaid), NEFT, net banking, UPI, account transfer and e-wallets.

AADHAAR-ENABLED PAYMENT SERVICE

AePS transactions – ONUS, OFFUS, DEMO AUTH and eKYC – recorded a substantial volume of over one billion transactions in Q3 2020, registering about 58% growth over Q3 2019. It processed transactions worth Rs 548.93 billion, an increase of 92% over Q3 2019. AePS transactions volume and value has grown by 74% and 71% respectively as compared to the quarter ending March 2020.

It facilitated government direct benefit transfers (DBT) to beneficiaries during the quarter and several banks provided services at the customer’s doorstep through BCs.

Not so 'digitally' mature yet!

COVID-19 did accelerate the pace of digitisation, but many organisations are still struggling to move up the curve and become truly digital



Amidst all the gloom and doom of the COVID-19 crisis, a significant change that quietly crept into our lives in 2020 was the massive adoption of digital platforms. With unprecedented lockdowns and restrictions on movement, 'digital' offered the only route for survival. Almost all companies, big and small, were pushed into the online mode virtually overnight.

The digital transformation that CIOs and business leaders had been trying to achieve for a long time was suddenly accelerated and how. However, despite such high levels of digitisation, the kind of digitally smart world that should have emerged seems nowhere in sight.

Why is it that so many companies are struggling with their digital initiatives and many are itching to get back



AN EFFECTIVE DIGITAL STRATEGY IS NOT ABOUT IMPLEMENTING TECHNOLOGY FOR THE SAKE OF BECOMING MORE DIGITAL BUT ALSO INVOLVES AN OVERALL TRANSFORMATION.

to their old ways of working? What is it that makes an organisation more digitally successful than others?

Studies have shown that as much as 70% digital transformation initiatives fail to achieve their desired objectives. The reasons behind such a high failure rate could be many: internal resistance, change management issues, existing work structures or other people-related issues. But the fact is that most organisations lack the maturity to drive a transformation of this scale. In a recent HBR survey, 95% companies said their drive for digital transformation has grown in importance in the last two years; however only 20% rated their transformation strategies as effective.

An effective digital strategy is not about implementing technology for the sake of becoming more digital but also involves an overall transformation in the organisational structure and working styles of people. In a hurry to get onto the digital bandwagon, many just start implementing technology without proper planning or preparation. As a result, even after getting the best systems in place, they are unable to become 'truly digital' in thought and action.

CREATING A DIGITAL CULTURE

IT leaders often fail to realise that a high investment in technology would not necessarily yield the desired results unless the organisation creates a strong foundation by cultivating a digital culture among its people. The culture of any organisation is usually driven by the vision and management style of its senior leadership. Besides the overall work structure and approach to doing things, the collective experience and capabilities of employees also play an important role.

It is often seen that the existing structures and old ways

of doing things are so deeply ingrained in the system that it becomes a challenge to bring about any largescale transformation. Professor Deborah Ancona of MIT Sloan School of Management shares her own experience of working with clients on digital transformation: "The leadership neglects, underestimates or misunderstands the importance of culture in their digital transformation planning. "Peter Drucker's quote, "Culture eats strategy for breakfast," continues to be relevant as always.

While the younger employees (digital natives as they are called) are more digital in their temperament, the older ones might find the new ways risky or complicated, sometimes even 'hindrances' in their productivity. This could lead to an internal tussle or lack of commitment among the people. Moreover, the leadership usually does little to empower or incentivise employees to shift to new models.

In order to achieve any meaningful progress in a digital transformation drive, it is essential to ensure that all the employees are well aligned with the digital vision of the organisation. People should be ready to discard obsolete processes and old habits, and must have the willingness to adopt new work structures. The organisation, on its part, must also invest in nurturing talent and developing the required skills among its employees. A digital mindset has to be gradually built in. Unless the people are motivated to using technology, unless the key business functions are driven by IT, achieving a truly digital organisation would not be possible.

A big factor that comes in the way of digital transformation is also the disconnect between leadership and employees, states a recent survey by Capgemini on Digital Culture. At times leaders believe they have created a digital culture, but employees may disagree.



ACCORDING TO DELOITTE'S 2020 DIGITAL TRANSFORMATION SURVEY, COMPANIES WITH HIGHER LEVELS OF DIGITAL MATURITY REPORTED HIGHER REVENUE GROWTH AND PROFIT MARGINS.

For example, in the survey, just 41% employees believed their organisation had a collaborative culture, while 85% of senior executives felt that the culture was collaborative.

Some of the key attributes where digital culture can be embedded into the working of an organisation include data-driven decision making, cross-functional collaboration and use of technology for networking with partners and customers, innovation and creation of new products.

THE 'MATURITY' FACTOR

According to Deloitte's 2020 Digital Transformation Survey, companies with higher levels of digital maturity reported higher revenue growth and profit margins (45%) as compared to those with lower maturity (15%). Higher digital maturity ensures better financial performance through greater business efficiency, customer satisfaction and employee engagement. It also allows companies to focus better on innovation, thereby impacting product/service quality and overall business growth.

An oft cited example here is the case of Volvo Cars that is known for its engineering excellence and high-quality products. The company's digital strategy not only focused on improving its core business of building new cars, but also brought about changes in how it approached design, innovation, collaboration with partners and governance. This result: a highly connected car that provided customers much greater flexibility to accommodate new enhancements and applications.

Deloitte enlists several factors or 'digital pivots' that reflect an organisation's digital maturity level. These include flexible and secure infrastructure, data mastery, digital savvy open talent networks and intelligent

workflows, unified customer experience and business model adaptability.

A majority of digitally mature companies are already using digital solutions to improve their productivity and performance across different business functions. In fact, being digitally mature enabled Volvo to wade through the Coronavirus pandemic as it already had the right systems and processes in place. Digitally maturing companies intentionally cultivate their digital cultures in support of critical business initiatives, says Deloitte.

Microsoft is another example of how a company can completely switch to a digital mode without hampering its business activities. During the Covid-19 crisis, the company not only fast-tracked its own digitisation efforts, but also actively supported customers and partners to adapt to 'a world of remote everything'. CEO Satya Nadella has often talked about the need to collaborate and to adopt a growth mindset and continue refining business practices for remote work. However, Nadella has also expressed his concerns about the problems that may emerge by doing all work remotely.

While the COVID-19 crisis forced companies to operate completely on a remote work format, it would be more prudent to have a balanced or hybrid structure in the long term. Developing a digital culture is an ongoing process and will continue as companies continue to grow and evolve. What is important is to ensure an inclusive, agile and open work environment that has the maturity to adapt to changing market situations.

Verma is former Executive Editor, Dataquest and an independent content development consultant



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Safe home for the rising piles of data

Rising digitisation has made data centres the cornerstone of ICT landscape. We speak to industry leaders about tech options, challenges, policies, and market prospects



This is the age of digitalisation and the pandemic has only speeded up the trend. More people are turning to ICT for all that can be accomplished virtually: work, shopping, financial transaction or entertainment. But every keystroke creates data, and increasing digitalisation means an increase in the data, each piece of which is potentially crucial for business. The pandemic-pushed digitalisation thus translates into the rising demand for warehousing and maintaining a humongous quantity of data. That's where data centres come into the picture: the dedicated physical spaces, usually buildings or whole parks, full of routers, switches, firewalls, storage systems, servers, and

application delivery controllers. Their critical significance at the crossroads of business and technology cannot be overstated, and in the days to come India is going to need more and more of them.

India's data consumption will be about 25 GB a month per user by 2025, according to Ericsson Mobility Report, June 2020. That is a lot of data, and it will continue to grow, by machines and devices, rather than humans. Where this data is stored and analysed will be the key. Data centres (DC) will be at the epicentre of this disruption. As digitisation supports in adapting to the new normal and the emerging technologies are being utilised, the increasing volume of data is being generated. Data



WE SEE A CLEAR SURGE IN HYPER-SCALE DATA CENTRES THAT HAVE RESULTED IN HIGHER DEMAND FOR RESOURCES SUCH AS POWER, WATER, SKILLED MANPOWER AND LAND.

— **Sudipta Sanyal**, CTO, Data Center Business, Sterling & Wilson

tonnage has been creating obstacles in the concentration and distribution of data. Edge computing is one of the solutions to keep a check on it.

A Gartner study suggests that by 2022, 70% of data will be created outside of the DC or cloud. With technologies like AI, ML, robotics and automation becoming more common, data will be generated by machine-to-machine (M2M) technologies and will require large investments for it to be managed and moved. Therefore, data tonnage is definitely expected to be a real challenge, especially in terms of distribution and concentration of data.

DCs are expected to be the next real growth opportunity across the country due to the global pandemic, says Sudipta Sanyal, CTO, Data Center Business, Sterling and Wilson Pvt Ltd. The lockdown has forced the nation to accelerate the shift to online, driving a massive spike in data needs. The pandemic challenge is creating the need for data centres to provide rapid, high availability of data centre services. This will enhance the speed of cloud adoption. More and more enterprise will encourage their employees to WFH. This will require better bandwidth connectivity for reduced latency. This will also enhance the application of edge to bring the services close to the demand.

The opportunities created by the pandemic are, however, also accompanied by new challenges. As with the whole of the technology sector, the data centre infrastructure industry is undergoing a transformation. The business scenario remains buoyant, but international investors may delay their plans, which can create hiccups in the short term. In the mid- and long-term, the investment would be back on track.

DCs are very high on the technology spectrum in terms of design, engineering, and execution. The need for a specific focus with high-performance teams that have relevant know-how on standards, equipment design, understanding of uptime and electrical and IBMS makes

this space very complex. The pure DC EPCs have an upper hand on the generic EPC players as the industry clients are very demanding and involved in the complete value chain.

Sanyal says: “We can foresee fast-tracking of projects as the economy crawls back to normalcy. We are trying to mitigate challenges in execution by creating awareness among our site staff, providing PPE, and providing a conducive and safe environment. This will increase the service cost, specifically for the site works, which comprises a significant cost for the conventional brick-and-mortar data centre. It will lead to more demand for pre-fabricated system and subsystem of DC infrastructures, including, modular pre-fabricated DCs.”

DATA TONNAGE CHALLENGE GETS REAL

Now that the pandemic has been here for nearly a year, do the DC players see the data tonnage challenge getting real?

Vinil Menon, Senior VP, Enterprise Applications, Citiustech, says that in the healthcare space, there has been a profound shift towards telehealth, remote patient monitoring, and consumer-generated health data. The pandemic has accelerated the adoption of these technologies. Healthcare organisations globally are using cloud infrastructure, virtualisation and other approaches to ingest, store and process massive volumes of patient-generated data coming through millions of connected devices. Data tonnage is a real challenge in the healthcare industry and will continue to be so in the years to come.

Sanjay Motwani, Business Head, Legrand Data Center Solutions (LDCS), agrees that data tonnage is now real. COVID-19 has come as a catalyst and led to a rise in data consumption in the other online areas, such as entertainment, shopping and education. Managing this and meeting customer expectations for quality experience is one of the biggest challenges.



COVID-19 HAS COME AS A CATALYST AND LED TO A RISE IN DATA CONSUMPTION IN THE OTHER ONLINE AREAS, SUCH AS ENTERTAINMENT, SHOPPING AND EDUCATION.

– Sanjay Motwani, Business Head, Legrand Data Center Solutions

Nikhil Rathi, CEO and Founder of Web Werks India, adds that the question should more appropriately be phrased as: Are there enough data centres to handle the challenges of increased digital workflows? India remains a severely under-served market when it comes to data centres. We have a large, young, mobile-first population that uses technology on a daily basis. When you couple that with the pandemic situation, it requires greater use of technology. You find that we simply don't have enough of digital infrastructure to serve their needs at a level that is optimal.

“Yes, the challenges are real and we will have to speed up the availability of data centre space across the country. We are optimistic that supply will catch up with demand eventually, given that both the central and state governments are taking steps forward to incentivise the setting up of digital infrastructure across the country,” he says.

Santosh Kulkarni, Country Manager, Business Development, Smart Solutions, Vertiv India, says that while COVID-19 has played a significant role in the increased volumes of data being created, this trend had started before the pandemic. In early 2019, the World Economic Forum had suggested that the amount of data being generated was increasing exponentially and will touch 44 zettabytes by 2020.

AI RACE ALTERING COMPUTE EQUATION

Going forward, it is quite likely that the AI race will alter the compute equation. Motwani identifies three factors driving AI: algorithmic innovation, data and the amount of compute available for training.

The amount of compute used in the largest AI training runs has been increasing exponentially with a three-four-month doubling time (by comparison, Moore's Law had a two-year doubling period). The trend represents an

increase by roughly a factor of 10 each year. It's been partly driven by custom hardware that allows more operations to be performed per second for a given price (GPUs and TPUs), but it's been primarily propelled by researchers repeatedly finding ways to use more chips in parallel and being willing to pay the economic cost of doing so.

On the other hand, cost will eventually limit the parallelism side of the trend and physics will limit the chip efficiency side. Given the precedent for exponential trends in computing, work on ML-specific hardware and the economic incentives at play, it would be a mistake to be confident this trend won't continue in the short term.

Kulkarni says companies across the world have been adopting AI in various aspects of their businesses to ease the workload on their employees, and achieve faster results more efficiently. This also helps organisations analyse data and derive relevant insights. OEMs providing AI hardware to support businesses need to focus on creating solutions that efficiently compute data.

With AI, data can be handled, extracted, or analysed, for precise and quick results, notes Manish Israni, Executive VP and CIO at Yotta Infrastructure. AI makes products more efficient, hence enterprises must include AI-based innovations in their IT strategies. Various sectors have made use of AI algorithms to manage their data and get valuable insights and business analytics. For instance, consider monitoring securities market and fraud detection in the banking and finance sector or analysis and simplification of data collected by sensors and devices in healthcare. However, to boost AI/ML workloads, high-performance computing (HPC) also plays an important role. With HPC and AI/ML, go-to-market for companies improves drastically.

Sanyal adds that while COVID-19 has been a 'black swan' event, it has been a defining moment for the cloud. Besides accelerating the pace of digital transformation, the



INDIA REMAINS A SEVERELY UNDER-SERVED MARKET WHEN IT COMES TO DATA CENTRES. WE SIMPLY DON'T HAVE ENOUGH DIGITAL INFRASTRUCTURES TO SERVE THE NEEDS AT AN OPTIMAL LEVEL.

— Nikhil Rathi, founder & CEO, Web Werks India

crisis has also redefined people's habits, compelling them to dive into the rapidly-expanding ocean of digital services. This, along with the increased use of AI, automation, robotics and predictive analytics by organisations, has led to an unprecedented demand for DC that supports cloud storage, and the wide spectrum of digital services run by governments and enterprises. Collectively, these play a pivotal role in keeping the lights on for businesses and supporting people to keep up with the 'new normal'.

"Technically, more application of AI will demand a fast CPU with more cores and a larger implementation of GPU, which will increase RACK kW, demanding the planning of the electrical and cooling infrastructures for high-density data centers within the same footprint more efficiently. This will provide benefits in terms of space utilization, and higher speed and less latency for the compute-intensive workload," he says.

EDGE COMES INTO PLAY

Today, the DC industry is split, not about whether edge computing will be useful, but whether it will be profitable. Menon says that particularly in the healthcare space, the IoT ecosystem is flourishing. This is partly sensor and biometric data that has been in use for some time now. We can easily understand and incorporate new use cases arising from patient-generated data and consumer apps. Another aspect unique to the healthcare industry, especially in advanced markets like the US, is the development of value-based care models that depend on real-time streaming data to be effective. Within these markets, there is likely to be sufficient demand for edge computing to make data sharing and data processing faster, more efficient, with the added benefits of security and privacy.

Kulkarni says companies across the world are increasingly seeing the benefits of adopting cloud-based

technologies and edge computing. Edge computing has positively impacted the productivity and growth curve of companies, especially in times of the new remote working. It has enhanced security and helped reduce costs for businesses.

As companies increasingly move their workload to cloud-based technologies, the overall edge computing market is expected to reach USD 13 billion globally, according to a Gartner study. Another report by Grand View Research states that the market volume of edge computing is expected to touch nearly USD 43.4 billion by 2027 globally, with crucial role played by technologies like 5G and IoT.

It is safe to say that while edge computing has proven to be useful and is gaining popularity, there is no doubt as far as the profitability of the market is concerned. With the surge in companies adopting cloud-based solutions, the market is bound to increase in volume and size.

However, Rathi notes that edge computing in India is still some way off. At the moment, it is simply not profitable, as services that rely heavily on edge computing haven't been implemented in most parts of India. These services will take place eventually and customers will also require edge computing at that point. The economics will make it a necessity. DC players will have no choice but to move with the times and deploy edge DCs.

Motwani adds that whoever looks at edge computing shouldn't look at each site as an independent site. It has to be visualised as part of a larger network, and what is the mileage one is getting by extending one's reach using an edge DC. It is a business decision. If you are not to expand to an extended location with an edge DC, you may impact your overall business. Hence, the edge DC has to be visualised as a part of a portfolio. Moreover, if one is able to offer the right value, one can monetise the opportunity well.



CUSTOMER DEMANDS, MARKET COMPETITION AND THE PERPETUAL CHANGE IN THE DYNAMICS OF THE DC INDUSTRY ARE KEEPING THE PLAYERS ON TOES. INNOVATIONS ARE NEEDED.

— Manish Israni, Executive VP & CIO, Yotta Infrastructure

Sanyal notes: “We see a clear surge in hyper-scale DCs that has resulted in higher demand for resources such as power, water, skilled manpower and land. The scarcity of these resources has led to a shift towards the cloud for IT services. Many enterprises are shifting to clouds for IT services, as they like to opt for the Opex model, rather than the Capex model. This trend will increase multi-fold post-COVID-19 as more and more employees adopt WFH. This is helping to de-risk the business.”

The other benefits that CIOs are getting are out of regular day-to-day IT operations and maintenance, and devoting quality time aligning with business needs. This trend is increasing the demand for hyper-scalers like Amazon and Microsoft, who are setting up large DC facilities across the various geographies. These hyper-scalers also setting up DC in colocation facilities increasing demand for colocation providers.

Sanyal adds that emerging technologies such as Big Data, AI, ML and IoT will be the key drivers in increasing demand for the data storage system and hyper-converged infrastructures. Eyeing the growth potential, the government might look at establishing specific DC parks with prescribed power and water availability and tax incentives to attract foreign investment and accelerate growth. This may help in setting up campuses in class B and C cities.

The 5G rollout will accelerate the demand for edge computing. Automotive and large-scale manufacturing industries are expected to take the position of early adopters. Application of remote, secured modular and micro DC is among the emerging trends for the data centre infrastructure.

“Edge will be an essential part of this hyper-scale environment for last-mile integration to meet the needs of the industry for distributed computing, storage, and better connectivity for reduced latency and increased

client delights. Hence, the success and profitability of edge cannot be separated from the complete hyper-scale environment,” says Sanyal. That leads to hyper-scaling. We need to look at how the hyper-scale companies are deploying their own fibre and subsea cables, and SDN-powered cloud connectivity.

Motwani says that hyper-scalers have had their foot in the fibre and subsea cables for a while. As the amount of traffic that they are now carrying and its potential in future, it makes more sense for them to have their own infrastructure, and optimise it as per the type, volume and nature of data that they carry. They do not have to share all this with third parties, thereby maintaining greater security and confidentiality.

Carrying data through a network requires some hardware and some software. Splitting the software from hardware and further splitting the software into control plane and data plane, and storing into the cloud makes the most logical sense. By doing this, hyper-scalers are able to manage or tweak the element which needs focus. At a basic level, it allows for greater responsiveness and flexibility. The result is cost-effective agility for customers.

There is also a need to manage this software-defined everything in the data tsunami. Menon says that many of their healthcare customers prefer to migrate to best-in-class cloud vendors to drive their SaaS and micro-service strategies.

DATA CENTRE MODERNISATION

Robust DC modernisation plans are taking place now. According to Israni, customer demands, market competition and the perpetual change in the dynamics of the DC industry are keeping the players on toes. Various IT and conventional businesses have declared permanent remote working for a proportion of their workforce. Innovations are needed to enhance the performance, meet their increased



THE MICRO DATA CENTRE MARKET SIZE WAS VALUED AT USD 4 BILLION IN 2019 AND IS EXPECTED TO CROSS USD 15 BILLION BY 2026. THERE ARE IMMENSE GROWTH OPPORTUNITIES.

– Santosh Kulkarni, Country Manager, Business Development, Smart Solutions, Vertiv India

requirements, and keep up with the modern upgrades to retain the customers, as building the right IT infrastructure is among the top priorities of the enterprises.

At the same time, enterprises are now jumping to cloud rapidly. This calls for the latest and updated hardware infrastructure to serve their needs. What differentiates a quality infrastructure from the regular ones are the certifications and tier rating. An Uptime Institute Tier IV-rated DC will score over others in terms of robustness and providing failsafe infrastructure.

“Apart from IT systems, other DC infrastructure, such as cooling systems and power sources need to be robust and redundant. For instance, as the youngest and latest entrant, our DC features latest and updated hardware/servers. We also use Li-ion battery banks for UPS’s, and these are more power-efficient and have low recharge cycles. As a DC provider, improvements, or enhancements to make the IT facilities easier to maintain will be ongoing. It offers a better-managed infrastructure to our customers and brings in cost efficiency for us to operate,” Israni points out.

Sanyal says that virtualisation, the most important aspect of DC modernisation, has enabled the creation and deployment of applications faster and store data easier than ever, which has helped grow data exponentially. More the data gets generated, more important it is to preserve and protect it with backup and replication, driving the demand for storage. These results in serious challenges for IT departments, especially for those who want to consolidate IT infrastructure with cloud-based applications, virtualisation and file sharing. In such a scenario, rebalancing is of utmost importance.

He adds that DC companies are achieving the rebalancing by capacity augmentation, within the same space, and performance enhancement. This means that data processing time can be reduced from hours to just

minutes. Thus, organisations need fewer servers, hard disk drives and fewer software licences.

There is compatibility to create a truly unified storage environment. Usability (fit for purpose) gives you the ease of use, to optimise virtual machines with just a few clicks so you can easily deploy as many shares per minutes, not hours. There is reliability. Look for systems that have no single point of failure architecture and data protection. Look to keep your applications online to improve recovery in the event of a problem. All these need to pair with a meticulous study on the cost economics and financial viability of the strategies in consideration of the problem at hand to get a winning solution.

On the physical infrastructure front, a lot of developments are taking place in form of the use of clean fuel and renewable energy, application of liquid-cooled servers, more granular infrastructures for making the Industry more sustainable and viable both environmentally and commercially.

MARKET FOR MICRO DATA CENTRES

As the history of the size of the mobile phones shows the trend is always towards making things smaller, faster, better and cheaper. This trend will continue in the DC market with micro data centres. Having said that, India has not reached that stage, just like the case of the edge DC. Rathie says that the market for it at the moment seems limited to university or government research centres that require high-performance computing, the military, and perhaps, certain organisations that require it for R&D purposes.

Kulkarni says that a micro DC is a flexible and quickly deployable solution. Moreover, they are within the vicinity of commercial spaces, are easily portable and can be managed remotely. Micro DCs are available in the ranges of a single rack DC of 3.5kW to a range of multiple rack solutions of up to 90 kW. They are mostly customised

to user requirement and computing needs along with modular expansion and upgrades.

“The compact and portable nature of micro DCs helps organisations carry out efficient management and data security. The micro DC market size was valued at USD 4 billion in 2019 and is expected to cross USD 15 billion by 2026. There are immense growth opportunities, especially with the kind of technological advancements we are witnessing,” he adds.

On the other hand, Menon notes that scale and cost advantages that hyper-scale DCs offer is tougher to achieve using micro DCs. There is an increasing focus on privacy and security, especially, with more organisations wanting to do more with their data as part of their ML initiative. When combined with privacy concerns, this space will benefit tremendously from micro DCs. Often, the comparison will be made between smaller DCs and simpler to manage a private cloud or hybrid cloud variants, when it comes to meeting custom storage, network and compute needs.

However, a modular solution, for example, hyper-converged infrastructure (HCI), makes it easy to replicate and deploy, especially if you are an ISV in a regulated space, and where compliance is a key requirement. Within these markets, there is likely to be sufficient demand for edge computing on public/hybrid cloud to make data sharing and data processing faster, more efficient, with the added benefits of security and privacy.

Motwani believes that while vendors have made products available for the micro DC, providers will have to educate the consumers about its benefits and advantages before we see real growth in this segment. MDC is more for the business side, rather than the IT side. Its application has to be thoroughly understood before we see real growth in this space.

Sanyal also feels that micro DCs are a growing market. The global market is relatively small in terms of value, but growing at an impressive rate of 52.7% as per a study of 451 Research. Post-COVID-19 growth will be much higher.

Compact micro DCs are mostly application-oriented, and hence edge or micro DC as a proposition must be very strategic. Any company needs to first define its operation methodology, and then make a go-to-market combination of conventional and edge or micro DCs, which is optimal to meet its business goal. An edge or micro DC can cater to applications where latency needs mitigation. At the

same time, it needs to exchange data with a conventional setup to upload the generated data.

WHAT NEXT, DATA CENTRE DISTRICTS?

A whole district of data centre is a concept that's time has come. In the union budget 2020, the government outlined the plans to help enable private sectors to build data centre parks in India, a market that is likely to reach USD 4 billion by 2024, according to the government estimates. The new policy is expected to incentivise setting up data centres, similar to some US states that have relaxed taxation on DC providers. In the past few months, there have been many companies who have opened their data centres in India.

Reduction in latency is also becoming a criterion for better user experience when users are accessing various online platforms. This will trigger distributed infrastructure development closer to users. Thus, new DC districts will get developed based on user demographics and data consumption patterns.

Motwani says that different states are at different levels of realisation of their DC plans. Due to COVID-19, a lot of state funds have to be diverted to healthcare, and that may have impacted their DC district plans a bit. The changing economic situation has also shifted priorities for different states. There is a clear shift happening, the timeline of which cannot be predicted at this point, he adds.

Sanyal says that for a region planning a DC districts should have enough power availability, no water scarcity, access to talent and good connectivity. Looking at these filter points, there are not more than four or five regions in the country, like Navi Mumbai, which has close to 40% of the commissioned DC capacity and is growing at a rapid pace, followed by Chennai that has an abundance of land at affordable prices, besides proximity to SE Asia. The other likely candidates are Hyderabad, Bangalore and Delhi NCR. Although these regions have most of the required elements, a lot more needs to be done on grid stability, fibre-optic connectivity and incentives to attract further investments.

The state governments need to play a critical role in providing the infrastructure for the DC industry. Since sustainability for this industry relates to its ability to move fast, it is essential for governments to facilitate in creating these infrastructures and provide real single-window clearance based on the success stories in many countries in SE Asia and China.



HEALTHCARE ORGANISATIONS ARE USING CLOUD INFRASTRUCTURE, VIRTUALISATION AND OTHER APPROACHES TO INGEST, STORE AND PROCESS MASSIVE VOLUMES OF PATIENT-GENERATED DATA.

— **Vinil Menon**, Senior VP, Enterprise Applications, CitiusTech

DC districts are already forming up as we speak Rathie points out. Though not in the shape of a formal DC park created by a state, there are clusters DC players have started building. A stretch in Airoli, Navi Mumbai is home to a number of DCs, and more are coming up. This is thanks to several factors, such as land availability, power availability, connectivity, and locations that are less prone to disasters. According to Israni with the increasing investment in DC by real estate players and the awareness of its economic benefits, the government has been supportive and focused on creating the digital infrastructure for the future.

REMOTE, UNSTAFFED DCs NEXT?

Again, the crisis that has created the opportunity is not without challenges. Given the mobility restrictions that led to WFH becoming the norm other industries, will there be unstaffed DCs? Rathie says that remote management takes place in some form already. However, the day of unstaffed DCs is still a long way off. DCs are simply too critical to be left without human oversight. Some manual tasks have been automated, but in order for a DC to be totally unstaffed, it would require a level of automation, AI and robotics that today seems more like science fiction.

Adds Israni: “DCs are meant to function without the interference of humans, once of course, the IT infrastructure is setup. COVID-19 has highlighted and made remote management of DCs necessary. Companies that had their own captive DCs, that is, on-premise, were most affected as they could not access their set-up during the lockdown. Moving to a multi-tenant third-party DC ensures a minimum service level for the hosted set-up.”

Companies have been working towards creating a DC environment which would work smoothly with minimal

human intervention, as the number of servers to be taken care of is way more than the staff on the ground. Machines or automation will not impact the importance of workforce at DCs. They add value and give you a more controlled environment.

Kulkarni says the social distancing norms have forced many companies to have minimal staff managing their DCs. Therefore, companies have had to adopt technologies like AI and ML and automate processes accordingly, to adjust to the new normal. The new DCs, or the ‘lights out’ DCs, are being managed by automation, making the process more efficient, reducing the need for manpower, and ensuring employees’ health safety.

“As DCs are being monitored remotely, ML plays a crucial role in their management. Technologies like AI and ML will provide the companies with all the information and insights about their DCs, right from the amount of power being used to any anticipated risks. At Vertiv, we have strong solution offerings in the area of remote monitoring of DCs,” he says.

Motwani says the DC floor on its own has been pretty empty. It is always about the people in the building, working on various projects that are accessing DC. How much of the on-site staff would you move to remote working is the question. Depending on the kind of applications and processes the data centre is running, there is a potential security risk element with remote access.

“Given the current times, there has been a need to shift some of the routine tasks of DC management to the remote environment. So, yes, we will do more remote management, and this will need special tools like KVM. Being a strongly secure product allows data centre administrative staff to access the data centre securely and remotely,” he concludes.

Open Sesame: How OS technologies turbocharge enterprises

Open source, a revolutionary idea for ICT innovations, also makes sense for business. The key is its adoption to an organisation's culture and budget



If one were to make an internet search for the very active Information Technology and Communication (ICT) areas of innovation, the usual suspects likely to show up are intelligent machines like Artificial Intelligence (AI), Machine Learning (ML), and Deep Learning (DL); human-machine interactions like bots, augmented realities, voice and gesture enabled interfaces; ubiquitous computing like resilient cloud and quantum computing; and autonomous machines that includes the like of drones and self-driving vehicles.

Compared to the pace of development a couple of decades ago, today all these areas continue to develop at extremely high velocities. A deep dive into any of the technical areas will show up a common thread: open source.

Open source is not something new. In January 1998, Netscape decided to make "Netscape Navigator", their flagship software. In a single stroke, this much sought-after internet software enabled multitudes of non-techies to adopt the internet. It would prove to be a watershed moment in the history of personal computing, as some



WHILE THE IMPACT OF OPEN SOURCE ON MAINSTREAMING THE INTERNET IS UNDERSTOOD, ENTERPRISES HAVE NOT FULLY UNDERSTOOD THE IMPACT AND THE NEED TO EMBRACE OPEN SOURCE.

of its components went on to inspire the now popular Mozilla Firefox and Google Chrome. If Netscape Navigator had chosen to remain 'closed source' like Oracle or DB2, the progress and adoption would have stayed with a privileged few.

Now imagine working from home during the current pandemic and its lockdown scenarios without your android devices, ecommerce sites, and collaboration tools ranging from chats to storages to call apps. Would it have been possible? Truth be told, No.

In fact, if you have run a Google search today, checked your email, chatted with friends, streamed music online, shared a file on Dropbox, played multiplayer video games, or used an Android phone to stalk your competitor for disruptive ideas, you have connected to a global network of computers that are using open-source software to route and transmit data to your local device.

See the far-reaching effects of open source?

While the profound impact of open source on mainstreaming the internet or the digital way of life is fully understood, enterprises have not fully understood the impact and the need to embrace open source. Many organisations were 'allowing' the use of select open-source software. Realities though appear to be changing.

Red Hat prepared its 2020 'State of Enterprise Open Source' report by interviewing 950 global IT leaders. The report highlights that 95% agree open source as important (up from 80% in 2019) and 75% as extremely important (up from 69% last year). Similarly, 42% using proprietary software today think usage will plummet in a year's time. To the question, what attributes are associated with enterprise open source, over 86% respondents indicated that it is used by the most innovative companies while 83% said it was instrumental in an organisation's ability to take advantage of cloud architecture.

But open-source technologies are no longer the preserve of disruptive companies as traditional companies are increasingly pushing their developers towards the open-source ecosystem. In fact, Google's Android (a Linux derivative) is the world's largest open-source project with 13 million lines of code. Microsoft in 2016 announced SQL server (its corporate data software) would run on Windows and Linux.

Actually Linux, the most notable creation of the open-source system, powers 80% of the web and 95% of the top 500 most powerful supercomputers today.

Mind you, the driving force is not cost saving, but innovation.

With an army of global committers, open-source suites like Hadoop, Spark and Kafka are revolutionising the way in which organisations are addressing the data explosion. The so-called 'closed source' or 'proprietary software' are finding it difficult to address even a fraction of the data and compute performances that these software suites can reliably deliver on commoditised hardware.

Is it manna from heaven? Almost!

IS THERE A CATCH?

While the software is available free to use, they are so advanced and sophisticated that you can hurt yourself or your business unless you have an ecosystem of internal experts, vendors, and partners. This is where the business model of Freemium and Cloud has met OSS.

Some of the committers of the OSS packages have started offering expertise services which help adoption. RedHat, MySQL and many others offer support, implementation, and other services. Some of the cloud providers have gone ahead and married commodity hardware to OSS suites and made their adoption not only easy and risk-free but provided economic models



WITH AN ARMY OF GLOBAL COMMITTERS, OPEN-SOURCE SUITES LIKE HADOOP, SPARK AND KAFKA ARE REVOLUTIONISING THE WAY ORGANISATIONS ADDRESS THE DATA EXPLOSION.

so compelling that every enterprise now has a cloud adoption strategy.

The catch is having an adoption ecosystem which suits an organisation's culture, style, and budget.

INCLUSIVE MERITOCRACY

Open-source ecosystem today touches and significantly transforms areas as varied as cloud computing, AI, ML, internet of things, AR/VR, microservices and blockchain. The benefits of using Enterprise open-source technology makes for a compelling cost case, namely, higher quality software, lower total cost of ownership, better security, ability to leverage the latest innovations and designed to work in cloud and cloud-native technologies.

The reason for OSS's ubiquity is tied to a singular fact – It is a movement with a way of working (open, collaborative, and modifiable) that promotes a decentralised production model continually finding innovative ways to solve problems across communities and industries.

In fact, the beauty of open source is evidenced as a huge ecosystem of innovators that no longer competes for scarce resources but rather shares knowledge to create new resources and opportunities used to solve problems, which are not necessarily only technology challenges but social and political ones as well. For instance, TensorFlow, Google's AI framework (open sourced 2015, downloaded 40 million times), allowed an army of companies and developers to build machine learning based applications that today is used by researchers to detect breast cancer and forecast earthquake aftershocks. It is used by developers to build apps that help reduce obesity and diabetes and by businesses from eBay to Airbnb to enhance the user experience, PayPal to spot complex fraud patterns, and Coca Cola, Airbus and GE healthcare to kick start delivery of their next generation business capabilities.

TURBOCHARGING INNOVATION

Notwithstanding the perceived barriers to enterprise adoption of open source (code security, support levels, compatibility, and lack of internal skills to manage), the OSS promise of easing developer concerns and be a springboard to innovation holds true for a number of key reasons.

- **Control:** Developers today examine code to ensure its not doing anything they don't want it to do and also use the software for any purpose they wish – and not how it is mandated
- **Security:** As anyone can view or modify OSS errors and omissions, they can be spotted and corrected. Also, the hive of programmers does not need to seek permissions from the original authors, they can fix, update and upgrade, OSS quicker than proprietary software
- **Community:** OSS is fast turning jobs into hobbies and is becoming a talent beacon for companies as developers today produce, test, use, promote, and ultimately shape the software they love
- **Training:** Publicly accessible open source codes promotes deeper study, work sharing, inviting feedback, on-the-spot critique, and ultimately faster skill development

In sum, beneath the innumerable complexities of the open source technologies that power our collective computing culture today, is embedded a DNA-of-simplicity, much like the 21-words post of a Finnish software engineering student named Linus Torvalds who wanted to develop an operating system (Linux, August 1991): "I'm doing a (free) operating system (just a hobby, won't be big and professional like gnu) for 386(486) AT clones."

*Ramapai is Executive Director,
Maveric System*



Security, physual workspace, data lake to rule in 2021

The pandemic-pushed digitalisation in hurry was the theme of the last year. Now it's time for consolidation which will see certain trends take the forefront

The year 2020 was a period of hectic digital transformation. As topline came under pressure, all organisations – big or small – started or in some cases sped up their digital transformation journey. While we now see light at the end of the tunnel with the ongoing vaccination rollouts, the technology shift will continue to gather pace and some new tech trends will start to emerge.

Here are the top five tech trends, in no specific order, those that will gain strong momentum in 2021.

Security: The onset of the pandemic also saw a sudden increase in cyberattacks. Organisations, irrespective of size, geography and domain were targeted. This led most companies to start taking security seriously. However, attacks will continue to get more sophisticated and gather high volume. This will require greater countermeasure with both predictive and reactive capabilities. Wide area file services (WAFS) will get more sophisticated as they often bear the brunt of most attacks. AI-based security tools for predicting attacks and automatically countering them will see greater adoption.

Physual workspace: The year 2021 will see workforces partially returning to offices. Most offices will realise 100% remote working is not sustainable. This will lead to hybrid models, physical + virtual or physual work spaces. Following tech trends will accelerate as a result.

- Internet of Behaviour (IoB) will become increasingly more relevant. Computer vision combined with various other devices will be used to monitor and learn, for example, whether social distancing is maintained, masks are being used, etc. In factories such tech can be used to check if protective gear is being used or not and warn accordingly.
- Conferencing tools will continue to evolve to mimic physical setups as much as possible. Specific modules for sales, education, video tours, office meetings etc. will surface.

- Although hyper automation probably deserves to stand out as a separate point, in the context of physual workspaces, any workload that can be automated and help avoid engaging in a physical environment will be automated.

Data lake house paradigm: The past decade made data lakes very popular as they helped in creating central and single sources of truth. However, the emerging lake house paradigm will be adopted rapidly as it has many advantages such as reduced data redundancy, decoupling of storage and compute, ease of data governance, transaction support on top of object storage and so on.

5G technology: 5G will just begin to emerge, so arguably it may not be a trend. But a list of technologies for 2021 would be incomplete without mentioning it. The developed countries may start the rollout of 5G as well, leading to dramatic change in the way internet is experienced. Multiple gigabytes would be downloaded in under a minute allowing deeper and more immersive experience on apps and websites.

AR/VR: Experiences based on augmented, virtual and extended reality will gain significant momentum to simulate real-life experience remotely. Housing.com is geared up to release its full blown AR experience for real-estate. Sports entertainment and OTT will also start innovating and investing in this.

This list is definitely not the end-all and be-all of possible tech trends in 2021. I believe quantum computing and nanotechnology will have major breakthroughs and will come ever so close to being available for the masses. 2021 is indeed poised to be an exciting year for technology.

Thakur is Group CTO, Housing.com,
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Not just sight, video analytics also provide key insight

The watchful eye of CCTV cameras not only augments security arrangements, but also enhances efficiency in logistics, manufacturing, retails and other sectors



“Within infinite myths lies the eternal truth who sees it all? Varuna has a thousand eyes, Indra a hundred; you and I, but two.”

There’s more to this quote by Indian mythologist Devdutt Pattanayak than meets the proverbial ‘eye’, for one doesn’t gain omniscience merely through sight. Those in the business of analytics equate the ubiquitous CCTV cameras seen in urban settings to ‘eyes’, while the analytics applied to the video feed serving as the ‘brain’. Devoid of real-time video analytics, relying merely on

human sight to monitor the feed wouldn’t be the most judicious use of such powerful hardware.

There are 770 million CCTV surveillance cameras in use today, which is set to cross the one billion mark by 2021, estimates London-based IHS Markit. Increased focus of governments on public safety can be attributed to this rise which in turn swells the video analytics market to touch USD 11 billion by 2025. While surveillance is the primary use case, we shall explore in this article how cities and business establishments



INCREASED FOCUS OF GOVERNMENTS ON PUBLIC SAFETY CAN BE ATTRIBUTED TO THIS RISE WHICH IN TURN SWELLS THE VIDEO ANALYTICS MARKET TO TOUCH USD 11 BILLION BY 2025.

are using CCTVs and video analytics to become more liveable and efficient respectively.

HOW CITIES BENEFIT FROM VIDEO ANALYTICS

The city of Gurugram in the National Capital Region (NCR) has been capturing real-time video feed using over 600 rotating CCTV cameras and relaying it to an Integrated Command and Control Centre (ICCC) through a 400-km wide optic fibre network.

The Gurugram Metropolitan Development Authority (GMDA) has been using video analytics for helping the traffic police in e-challenging traffic transgressions such as helmet, no-entry, speed and parking violations through automatic number plate recognition. Besides vehicle counting for better traffic monitoring and control, video analytics also enable the police in the city to identify vehicles by type and colour. This feature comes in particularly handy in identifying and tracking down stolen and getaway vehicles used by criminals.

Other usages in the city include pothole detection and illegal obstruction on roads, in addition to identifying and fining illegal garbage disposal. The crowd alert feature of video analytics has the potential for monitoring congregations in public spaces and adherence to social distancing norms.

According to a July 2020 report by UK-based tech firm Comparitech, Hyderabad has the distinction of being the city with the most number of CCTV cameras in India – 5,80,000 with plans of doubling it to one million

very soon. This averages out to one camera for every 10 citizens, thereby making it the 16th most surveilled city in the world.

Besides monitoring the video feed for traffic violations, AI-based video and image analytics have been used in delinquency mapping, voter identification during local elections and pension disbursement.

As for other countries, let's take the example of cities in UAE – Abu Dhabi, Al Ain and Al Gharbia where nearly 7,000 school buses are being fitted with cameras behind their stop signs to ensure motorists stop five metres away from them while children on-board or de-board the bus. The camera feed will not just track and fine violators using video analytics, but also raise alerts and fine the school bus driver on over-speeding or failing to deploy the stop sign at designated bus stops.

Through e-challans and parking tickets, video analytics enables city administrations to augment their revenue collections.

APPLICATIONS BEYOND CITY ADMINISTRATION

From a surveillance standpoint, we have seen CCTVs becoming important tools in enhancing security in indoor settings such as houses, residential and commercial complexes. The video feed in such cases need manual intervention and used usually post-facto, i.e., manually analysing the feed after a crime has taken place. The real value kicks in with real-time video analytics, reducing the manual intervention and thereby helping in quantifying



AI-BASED VIDEO AND IMAGE ANALYTICS HAVE ALSO BEEN USED IN DELINQUENCY MAPPING, VOTER IDENTIFICATION DURING LOCAL ELECTIONS AND PENSION DISBURSAL.



AFTER THE LOCKDOWN, FACTORIES OPENING UP HAVE BEEN USING VIDEO ANALYTICS TO MONITOR SOCIAL DISTANCING AND WEARING OF MASKS BESIDES MANDATORY SAFETY GEAR.

and enhancing user experience in various indoor and outdoor settings.

Education campuses: CCTVs in education institutions are becoming an important aide to teachers and the administration staff for tracking attendance, indexing student engagement, misbehaviour, security and safety etc. In the US, schools are seen adopting video analytics for gun detection, gunshot and fire detection, crowd behaviour and fight detection to improve response time for law enforcement, without needing someone to initiate a phone call or push an emergency button manually.

Power transmission and distribution: Engineers have to physically climb power transmission towers to assess the condition of critical infrastructure. Drones fitted with cameras and sensors can obviate the need for this reducing the associated risk, accelerating the inspection process covering the entire power line spanning long distances without inconveniencing customers with power cuts. Video analytics can help in identifying foreign objects, tree contacts, damaged insulation, loose parts and corrosion damages.

Ports and airports: Besides surveillance of passengers, crowd management and detection of abandoned objects and harmful substances, video analytics can be used for monitoring critical infrastructure such as cargo depots, hangars, runway health and surrounding areas for preventing illegal entry. While CCTVs capture the feed indoors, drones fitted with cameras are being used for monitoring external assets.

Logistics: AI-based video analytics is making supply chains smarter by recognising aberrations and sending real-time alerts in order to improve efficiency along the chain. By monitoring loading and unloading of goods, driver wellness, and tracking truck utilisation patterns, video analytics can improve safety, timeliness, and productivity.

Manufacturing: The fourth industrial revolution is taking place in the manufacturing sector with IoT-enabled smart machines helping improve and speed up productivity and reducing wastage. Quality assurance (QA) plays a key role in limiting manufacturing defects. While many manufacturers still use manual intervention for inspecting products, the ability to spot these defects isn't foolproof.

As products are becoming more complex and varied with custom configuration, it is impossible for human eyes to spot the variances. That is where video analytics comes in to automate the quality assurance process; identifying mismatches ranging from missing components, scratches and damages etc. After the lockdown, factories opening up have been using video analytics to monitor social distancing and wearing of masks besides mandatory safety gear.

Retail: A loyalty card or even a phone number alone can give retailers an idea of what people buy and when, but video analytics can give them an edge in improving the overall customer experience. CCTVs have been traditionally used as a deterrent to theft in retail. Today, the use cases are far more diverse. In a grocery store, CCTVs that capture movements through the aisles can help optimise floor design and arrangement of merchandise; crowding at checkout counters can help determining scheduling of employees and through a combination of facial recognition and mobile, shoppers can get personalised recommendations.

So, the next time you walk across the road and look at a digital signage showing an advertisement of your favourite brand, it may have just been programmed for you!

*Salem is the CEO
of Quantela Inc and
Shanbhag is the Founder &
President of Graymatics*



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Five tech trends that put customer first

Digitalisation that came with COVID-19 raised customer expectations. Now organisations will need to focus on technology tools to enrich their experience

The dwindling high street has long been the subject of discussion in the retail and tech industries, as businesses seek to better understand changing consumer habits in a new convenience-first landscape. However, in this current COVID-19 environment, with an increased reliance on digital channels, customer experience (CX) has been fundamentally challenged.

A harsh light has been shone on stagnant designs, siloed rationale and a complicated customer journey that has left customers exasperated – a reaction that can quickly affect a company's bottomline. Consequently, the winners' circle comprises organisations that have integrated and automated their digital channels and connected them to the ecosystems that their customers, both old and new, occupy.

In 2021, we expect to see the race to provide an effective, digitally focused customer experience accelerate as it becomes a clear priority for businesses. In fact, our 2020 Global Customer Experience Benchmarking Report found that a positive customer experience is a clear business priority, with 70.5% of organisations citing improved CX as the top factor driving their digital transformation.

Outlined in our 'Future Disrupted: 2021 Technology Trends' predictions, there are five key trends redefining the future of customer experience.

TREND 1 : COVID-19 HAS MADE CUSTOMER BEHAVIOURS ACROSS ALL DEMOGRAPHICS MORE DIGITALLY FOCUSED

It is no secret that the COVID-19 pandemic has changed many lives and livelihoods around the world. A significant part of that change is the restricted access to brick and mortar stores and in turn, the seismic shift to digital delivery. Subsequently, a digitised offering has become the only way for customers to experience a brand. This



'new normal' has accelerated the importance of an experience-centric business transformation to deliver an effortless, on-demand and intuitive customer experience across all channels.

The remodelling of the digital shopping experience, from convenience to necessity, has also fundamentally impacted customer behaviours by diversifying the demographics. What used to be a customer journey reserved for 'digital natives' has now become an avenue for all customers, including those that would previously avoid shopping online. Now people of all generations, not just 'digital natives', have become more confident and comfortable with online engagements and transactions.



IN 2021, WE EXPECT TO SEE THE RACE TO PROVIDE AN EFFECTIVE, DIGITALLY FOCUSED CUSTOMER EXPERIENCE ACCELERATE AS IT BECOMES A CLEAR PRIORITY FOR BUSINESSES.

TREND 2: RICH AND PERSONALISED CONTENT WILL BE KING

With this newfound and varied customer base, it is becoming more crucial than ever for businesses to hone in on their customer experience strategy, to create greater value for both the customers and the business. Guaranteeing a seamless and personalised experience throughout the customer journey is critical and data analytics will be integral to this success.

Customers may not realise it, but personalisation is the crux of meaningful communication in the digital world. Business need to be able to meet and serve customers where they choose, when they choose and how they choose to connect. Today's customer wants to be offered products and services that they want or need in a dynamic way. This kind of integrated delivery is rooted in cohesion from design, to content through to technology with location and analytics greatly affecting your ability to deliver rich, auto-personalised content. But all of these capabilities combined create a differentiated experience that directly links you to the customer and excites people.

TREND 3: A MOVE TOWARDS A CX ENVIRONMENT THAT BALANCES VIRTUAL AND PHYSICAL PRESENCE

Over the years we have seen the CX environment expand beyond just the physical into the virtual, and the past nine months has seen this rapidly evolve. Over the seasonal period and into 2021, businesses must think about how best to balance both the virtual and physical CX communication for the best customer exchange.

Understanding the customer journey will be critical to deciding whether each customer is best addressed via a digital assistant, self-service technology or by a human in a call centre. These decisions need to be made seamlessly and across multiple platforms for the best outcome.

TREND 4: CORE CX COMPETENCE WILL HINGE ON HAVING A DATA-DRIVEN AND WELL-DOCUMENTED STRATEGY

Leading organisations are gathering and understanding data to gain visibility into customer behaviour and aggregating this information across different verticals to identify effective points within the service experience or to market relevant offers. Once a company has a full picture of the customer behaviour, the data can then be utilised to address individual customer needs in a systemised way – this is where automation comes into play.

Automation goes a long way towards improving efficiencies to streamline and provide an enhanced real time experience. This is likely to come with a greater adoption of chatbots and AI-driven natural language processing bots that will increasingly undertake businesses' first- and early-stage interactions with customers.

TREND 5: ONGOING PERFORMANCE MANAGEMENT OF INFRASTRUCTURE TO MEET CUSTOMERS' EXPECTATIONS, WILL BECOME CRITICAL

Ultimately, streamlining the customer journey through data insights and automation will be essential to securing economic viability. A 'digital-first' mindset; secure, cloud-optimised networks and infrastructure; smart use of artificial intelligence, automation, open APIs and analytics; and data management, collectively, lay the foundation for creating and sustaining a positive customer experience.

With customer experience as the defining theme over the next 12 months, the winners will be those who pay close attention to the power of the customer journey and do everything within their control to make the virtual customer interaction an unforgettable one.

Allman is Global SVP Customer Experience at NTT



Making it big, and managing it too

Handling big data is not always easy and requires new approach of defining metadata and data entry. Here is what managers need to know about data management



A research report from IDC forecasts that sales for business analytics and big data solutions would be approximately USD 200 billion by the end of 2020. The report, IDC Forecasts, 2019, also suggests that the sales will see a compound annual growth rate (CAGR) of 13.2% till 2022. It was also reported that at USD 77.5 billion, IT services was the largest category of this market in 2019; the next largest category was hardware purchases (USD 23.7 billion), followed by business services (USD 20.7 billion). The Gartner Trends, 2019 also point towards large sales volumes in big data solutions and software. Evidently, there seems to be increasing importance of data in today's enterprises.

There are three primary reasons identified for this trend. One, there is a need for data management and data governance in the modern enterprises. This is evident from the fact that the software market for end-user query, reporting, and relational database management software holds a business of about USD 25.7 billion (IDC Forecasts, 2019). Two, there is ongoing shift of data from on-premise to the cloud. Three, machine learning (ML) and artificial intelligence (AI) are growing as enabling technology in the software for data management and analytics and management.

Apache Hadoop provides big data capability with collection of several open source applications that



THE SOFTWARE MARKET FOR END-USER QUERY, REPORTING, AND RELATIONAL DATABASE MANAGEMENT SOFTWARE HOLDS A BUSINESS OF ABOUT USD 25.7 BILLION.

use a network of machines (computers) to manage a large amount of information and data. The storage and processing of data is done in a distributed environment and, thereby, the storage and processing is immensely improved. As enterprises continue to look at technologies like Apache Hadoop to make informed assessments, information management professionals also need to be adept at using such technologies.

In this context, we deliberate on relevance of big data technology in data management and administration. We also draw attention to specific challenges and relevant solutions in big data technologies. We also discuss prospects and benefits of big data technology in the context of record management and administration and technologies to monetise data (data analytics methods).

THE BARRICADES AND ROADBLOCKS

The challenges relate to maintaining data quality and systems for data cleansing, maintaining consistency in metadata and ways to remove data redundancy. Management and technology strategies to reduce cost of maintaining records also remain a significant bridge to cross. Other impediments include the handling of semi-structured and unstructured data including video, text, and audio. In data management, the role of SQL and NoSQL databases is quite critical as they are the data repositories. SQL databases include the ones developed and marked by software providers like Oracle, IBM (DB2), Microsoft (SQL Server). They are relational based and store data in relational and tabular format. NoSQL databases like MongoDo, Redis, Neo4 and DynamoDB are capable of storing non-textual data like images, and video in a cost-efficient manner.

So what exactly is the data that we are talking about? According to ARMA guide to Information Profession, data is any symbol or character that represents raw facts or figures and forms the basis of information. Similarly, big

data are information assets that demand cost-effective, innovative forms of information processing since the data is high in volume (size in terms of number of records in a file), variety (types of data – text, numbers, images, video) and velocity (speed at which data gets collected).

There is no fixed threshold in terms of number of records in a file or size in terms of Giga Byte, Tera Byte or Peta Byte that defines the threshold of big data. It is a moving target and the data which is fairly large even for database management systems falls in the realm of big data.

Enterprises need to ensure that the data quality is suitable level before any analysis can be done. Better methods of defining metadata and data entry can help improve data quality. This will, in turn, lower the cost of data cleansing. As an example, let's consider procurement data for any company which has a large ecosystem of suppliers and vendors. Vendor details are usually entered in vendor master, invoices, PR, PO data in ERP systems. If names of vendors are entered in different ways – Amit Kumar, Kumar Amit, A. Kumar, or Kumar A. – it may make it difficult to identify a vendor by a unique name. Any data analytics software would recognise a vendor by a unique name. If the name and surname of a person are entered in two different ways, the software would consider the same person as two different people. Unless this data is uniformly consistent data analytics, if applied, would give results which are faulty and cannot be relied upon.

A significant challenge in data relates to implementation. Executives are not knowledgeable on how each application in Apache Hadoop is related to others within the big data ecosystem and what benefits can be obtained from these individual applications. A major challenge for enterprises is to determine the most appropriate solution provider to employ. In a survey conducted globally, almost all the CXOs surveyed mentioned that big data technology is important to their enterprises' growth.



EXECUTIVES DO NOT KNOW HOW EACH APPLICATION IN APACHE HADOOP IS RELATED TO OTHERS WITHIN THE BIG DATA ECOSYSTEM AND WHAT BENEFITS CAN BE OBTAINED FROM THESE.

THE SOLUTIONS

Data need to be organised and analysed to achieve the purposes for which it is kept. As an example, we cite a case of data related to commercial vehicle electronic toll charges (FASTAG data) available with National Highway Authority of India (NHA). The accompanying table presents an extract of this data. It contains multiple variables such as date, time, financial transaction type,

unique transaction ID and point-of-sale (POS) location. An analyst investigating the owner of this vehicle for under-declared income would need to calculate the distance between the POS, i.e., toll gates, and to obtain a valid average market rate for this type of vehicle. Rates differ for different classes of vehicles like heavy commercial vehicles, light commercial vehicles and buses. The expected income can be computed by multiplying the

Electronic toll charge: Commercial vehicle					
Date	Time	Activity	Transaction description	Amount (in Rs)(CR)	Amount (in Rs)(DR)
09-03-2020	20:10:14	Trip (RRN No/Trip No)	Plaza Name:Kusgaon NH48 Toll Plaza-Lane ID:W01	—	265
07-03-2020	15:59:09	Adjustment	Transfer from CUG Account to Prepaid Tolls	1,700.00	—
07-03-2020	12:31:41	Trip (RRN No/Trip No)	Plaza Name:Kusgaon NH48 Toll Plaza-Lane ID:E01	—	265
07-03-2020	10:58:32	Trip (RRN No/Trip No)	Plaza Name: Khalapur Toll Plaza-Lane ID:E02	—	1,166.00
06-03-2020	20:59:12	Trip (RRN No/Trip No)	Plaza Name: Kusgaon NH48 Toll Plaza-Lane ID:W01	—	265
03-03-2020	23:30:43	Adjustment	Transfer from CUG Account to Prepaid Tolls	1,700.00	—
03-03-2020	23:21:20	Trip (RRN No/Trip No)	Plaza Name: Kusgaon NH48 Toll Plaza-Lane ID:E01	—	132.5
03-03-2020	22:12:50	Trip (RRN No/Trip No)	Plaza Name:Khalapur Toll Plaza-Lane ID:E02	—	1,166.00

CR = Credit; DR = Debit



HIRING AND INVESTING IN SKILLED DATA ANALYSTS AND PROVIDING RELEVANT TRAINING WOULD IMPROVE DATA LITERACY OF THE TALENT. VENDOR SUPPORT IS VITAL FOR IMPLEMENTATION.

two factors, rate and distance and correlated with income declared to the income tax authorities.

A large variety of technologies are now available to run such data analytics programs. Many are in the class of commercial off-the-shelf (COTS) which are sold and maintained by software companies. They include the likes of SAS, Tableau, Qlikview (Qlik) and several others. This is just an indicative list and does not cover exhaustively all the applications. A significant development has happened in terms of open source programs like Python that holds wide variety of libraries to run analytics and machine learning programs. Also, there have been several open source developments for Add-ins to MS Excel which are used for variety of data analytics programs in MS Excel environment as spreadsheets. Evidently, these do not provide large scale analysis as MS Excel has data limitation of 10,00,00 rows.

Spreadsheets such as MS Excel are used extensively as they are available on desktops and relatively cheaper to procure and maintain. Text analytics software are used to analyse documents and various records of communication (like emails) to discover themes through analysis of the content (ACL, iDEA). Then, there are relational database management systems like Microsoft SQL Server, Microsoft Access, DB2 and Oracle. Thematic analysis and social network analysis on both numeric and text data is done to uncover networks and patterns.

Visualisation software are used to have a bird's eye view and graphical view of data. These are connected to real-time systems and provide visual reports to managers and executives at decision making level. Examples of such visualisation software are Tableau, Spotfire and QlikView. Predictive analytics tools include econometric analysis applications like SAS, SPSS and Python. Increasingly, unstructured data like voice recordings are analysed

to find patterns and detect white-collar crime, using technologies such as Nexidia.

Enterprises would be able to make better use of their data if they build on talent pool and also the pipeline. In this case, hiring and investing in skilled dataanalysts and providing relevanttraining would improve dataliteracy of the talent. Vendor support is vital for implementation. Since this is a relatively new area, the vendor market is not too crowded. There are a few large ITES firms like Cloudera, AWS, Infosys, TCS and Wiprowhich have big data implementation capabilities.

Another important challenge is that of the top management or board buy-in. Getting the board buy-in is not easy as this is technological intervention and consultants need to articulate its value in pure business terms. Executives also feel that there is still significant untapped potential of leveraging operations. While the benefits of big data in operations are well recognised, the innovation capabilities of big data are still in uncharted territories for many firms. It could be useful if enterprises providehigh incentives to executives for data-driven innovations.

In summary, we may conclude that big data technologies and analytics are increasingly finding acceptance. If firms invest in big data capabilities they become competitively advantaged. Executives realise that there is promise in big data but they also appreciate the fact that there are certain challenges as well. Overcoming the challenges would need investment in high-end hardware, talent and training. There is significant work being carried out in practice and research to understand what works and what does not.

*Dr Singh is Professor,
Operations Management,
IIMRanchi and Gujral is
CEO, GEICO*



Alternative cloud makes better sense for SMBs

Instead of mega clouds, small and medium businesses have a simpler and more affordable option with alternative cloud, which takes care of their needs better



In recent months, many small and medium-size businesses (SMBs) in India have invested in cloud computing, security tools and process automation in order to maintain business continuity and hasten recovery from the hardships caused by the global coronavirus pandemic. Indeed, the 'silver lining' of the pandemic for these SMBs is that they are much further down the road towards digital transformation than they would have been had the pandemic not forced their hand. Those SMBs at the cusp of digital transformation have a distinct advantage in the marketplace of today and

tomorrow because they are far better equipped to serve socially distanced customers who increasingly require a digital-first customer experience.

Fortunately, the timing for moving to the cloud couldn't be better. For the first time in the 12-year history of cloud computing, SMBs have a wide array of choices for cloud computing services. With the rise of alternative cloud providers, the choices are no longer limited to the mammoth, hyperscale cloud firms. Here are five reasons SMBs should strongly consider alternative cloud providers for their cloud services:



ALTERNATIVE CLOUD PROVIDERS FOCUS ON CORE SERVICES COMPANIES REALLY NEED, AND PROVIDE SIMPLE, INTUITIVE INTERFACES THAT EASE ACCESS AND ON-DEMAND PROVISIONING.

COST SAVING

The cost savings from using an alternative cloud provider versus a mega cloud provider can be up to 50% annually, even though the technology and global networks which handle the workflow of data are essentially the same. Furthermore, in contrast to the infamously complex pricing schemes of mega cloud providers, many alternative cloud providers offer transparent pricing that is straightforward with no surprises. For companies shifting from a Capex to an Opex model, having a clear line of sight into costs is the key.

NO VENDOR LOCK-IN

Being locked into large proprietary cloud ecosystems has a very real impact on budget and control. It's easy to get lured into the hundreds of proprietary services that, once engaged, lock you in as well. Companies should avoid lock-in to maintain freedom of choice, optimise costs, and facilitate competitive agility. Linode, for example, gives developers the ability to reuse their code, no matter which cloud provider they choose. Development happens in the open too, with all documentation stored on Github so that it can be improved upon by the community.

EASE OF USE

While the expectation of the cloud making things simpler is often assumed, it's not the reality in many cases. Mega cloud providers offer far more services than most SMBs will ever need, which introduces immense complexity in managing cloud services, so much so that hiring certified in-house cloud specialists is often required.

In contrast, alternative cloud providers tend to focus on the core services that companies really need to run their businesses, and they provide simple, intuitive interfaces that ease access and on-demand provisioning. This approach is far better suited to SMBs, which typically have a small technical staff who would rather focus on getting

work done than navigating the pitfalls and distractions of too many bells and whistles.

HUMAN-CENTRIC CUSTOMER SUPPORT

A key differentiator with alternative cloud providers is the level of support and responsiveness they provide in comparison to the mega cloud providers. In fact, some alternative cloud providers offer a live human interface 24x7, irrespective of how big a customer you are.

NO DEPENDENCE AT ALL

A select group of privately owned alternative cloud providers offer SMBs a more subtle but valid advantage over doing business with hyperscale cloud providers: a shared business ethos. Alternative cloud providers that are privately owned and 100% independent are free to stick to their business principles, such as loyalty, serving their customers rather than catering to the whims of venture capitalists, resolving to never compete with their own customers and partners, and supporting open source technology and open APIs.

Although SMBs today have many alternatives for meeting their cloud objectives, alternative cloud providers are perhaps the best suited to their business. By focusing on core services, alternative cloud providers typically offer SMBs the same or better performance at a much better price than the larger industry players. Alternative cloud providers also provide the scale and quality of infrastructure needed for most enterprise workloads. More importantly, alternative cloud providers offer SMBs highly responsive customer service and a cloud computing experience that is simple, affordable, and accessible – what cloud computing should be.



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SCOTT MULLINS
Director, WW Biz Dev-FinServ, AWS

*The way **Scott Mullins**, Director, WW Biz Dev-FinServ, AWS, explains the legacy-to-cloud problem confirms that he has indeed been in the trenches as a user before he wore his current hat. In these excerpts from a chat during the Re:Invent hustle, he tells us what we can learn from NASDAQ, JP Morgan, Goldman Sachs and Standard Chartered about cloud, BFSI, and also why he feels like a child on a Christmas morning.*

You sound so excited! Anything very interesting for your vertical that was rolled out at Re:Invent this year?

Oh yes! We are busy unwrapping new toys that are coming out of AWS Cloud kitty. So many new features and functionalities! But the best part is that almost every announcement that comes out at the keynote is preceded by the words 'because our customers told so' or something to that effect. We are not a product company. We are looking to



WE'VE TO LOOK AT LATEST TECHNOLOGY THE WAY TEENAGERS DO

solve customer's real problems. That's what keeps us driven all the time.

Cloud has definitely been about cost savings and elasticity; but especially for sectors like BFSI, CIOs have struggled with the productivity clog that comes up because translating legacy application workload and data to the cloud contours takes a lot of unexpected downtime. Do you think that legacy modernisation is going to help in ironing out this kink? Incidentally, 90% legacy apps were on a faster path to modernisation in 2020.

Cloud represents a tool. It is not the only tool. But it is a modern tool-set. I see that more and more organisations are going to reinvent a lot now that they have this tool. Designing something better with a new tool is both practical and attractive. At my home, for instance, the latest phone in the market always belongs to my wife. I am the one left with the old version. So I am stuck with legacy. We have to look at the latest technology the way teenagers and tech-enthusiasts do. Like developers and builders in an organisation family. New tools would be a major driver for change. I love how a Brazilian bank has recently migrated legacy apps to cloud. I love how so many banks are leaning in to AWS tools and are getting nimble, plus, reinvented.

You have had a hands-on career path that way. You have worked from scratch on projects like Fintech Sandbox (a non-profit) and NASDAQ FinCloud. As the founding team member of NASDAQ OMX's FinCloud, what do you think is the relevance of such movements for BFSI CIOs today?

Yes, Sandbox was something we started at Boston to help start-ups get access to data-sets, which form the lifeblood of any financial services company. This was not so easy for small companies earlier due to access-related hurdles and prohibitive costs. We strengthened this idea a lot. We could experiment and explore. That's the beauty that I love about cloud. If an idea fails, you can shake the dust off and start again. At NASDAQ also, it was a cool idea to store specific type of data. We were up against issues like data-centre scale and costs. But we picked a platform and scaled it. Today, NASDAQ has a lot of work in the cloud. I also recall how Goldman Sachs has created new ideas like Digital Banking – the 'idea to execution' part was finished in just 11 months!

Incidentally, Standard Chartered is also using cloud for new avenues and personalisation of services. So

do cloud-native services mean a new turning point for BFSI firms?

I do not exactly think in terms of cloud-native vs. cloud-non-native apps. I prefer to look at cloud as a tool-kit that helps any bank to build elasticity. Yes, all the heavy-lifting can be done easily for higher-level cloud services with new tools today.

Since compliance, data-integrity and sovereignty are big factors for BFSI CIOs. What does the recent spurt of new availability zones from AWS mean for them, especially the new regions that have come out in India and Switzerland this year?

Obviously these new regions have some interest for financial services space. But they have a broad interest too. Our regions in Hyderabad and Switzerland are a continuation of our strong focus on local availability. There are many financial institutions in both India and Switzerland where we have seen a huge interest.

What do you want to say to CIOs here?

I know that CIOs have their own concerns and ideas which need to be addressed with the right technology. They are wondering, how to reconcile existing investments with new tools? So AWS is offering them the possibility of making hard decisions with new tools. We are making room for experimentation, for exploration. Our new regions and launch of Outposts are big moves in that direction. And there is more to come! In fact, if you look at some estimates, cloud is still making about four percent of Global IT spends, with 96% being in the on-premise space. We are still in early stages when it comes to cloud – especially in the zone of financial services. But there is not a single workload in any area – be it insurance or capital markets or banking – that is not already there or planning to be oncloud. I am excited for the future.

Any quick word on the great financial reset debate that is going on? Will de-financialisation be that easy even if we want to do it – changing models that have stood deep and tall for decades and decades now?

I do not have any opinion on this debate, per se. But in general, when people want to experiment with anything, the 'execution' part matters a lot. Cloud allows you to test new ideas in a cost-effective, resilient and secure way. You do not have to be stuck at just thinking of an idea. You can experiment on it and scale it if it works. Or go back to the workbench if it fails. That's possible with cloud.

Checklist before moving ERP to cloud

Shifting ERP to cloud makes sense for organisations but it's not a straightforward choice. There are four questions that will help the decision-making process



The cloud has ushered a transformational journey for enterprise applications. While the cloud offers the obvious benefits of 'as-a-Service' usage, it can offer much more for enterprise applications. Often termed as modernisation, every enterprise application can enhance return on investment and augment the value it provides by leveraging the cloud.

An ERP application is no different. It enables the business users and technology teams to leverage the ERP cloud providers for upgrades and for keeping the application 'current'. The security of the ERP is taken care of by the cloud vendors such as Oracle. Hence, the benefits of moving your ERP to the cloud are immense. However,

the decision is not as seamless as it may theoretically appear. Here's a list of questions that you might want to go through before considering a cloud ERP:

WHAT IS THE COMPELLING NEED TO MOVE ON-PREMISES ERP TO THE CLOUD?

An on-premise ERP like Oracle EBS might be working perfectly fine for your business. It might be giving you the desired strategic insights and reports. However, if it is burdening the technology team in your organisation with the constant customisations, integrations, report creation and building relevant analytics, and system upgrades, it could be a cause of concern. Moreover, if the bandwidth



THE DECISION TO MOVE TO THE CLOUD SHOULD BE TAKEN AFTER GAUGING IF THE BANDWIDTH CONSUMPTION OF TECHNOLOGY RESOURCES IS SUCH THAT IT HINDERS INNOVATION.

of the technology team is utilised in the above, it could lead to a delay in adoption of new-age technologies and digital initiatives.

In today's digital age, it could impact both revenues and brand building. Depending on the answer to the above, a cloud ERP could be a good choice as it could ensure that it is the last migration, it can also ensure seamless integration with other modules or enterprise applications on-premises or on the cloud through secure and out-of-the-box integration. The decision to move to the cloud should be taken after gauging if the business is being impacted due to the on-premises ERP and if the bandwidth consumption of technology resources is such that it hinders innovation.

SHOULD I JUST 'LIFT AND SHIFT' TO THE CLOUD OR IS THERE ANOTHER WAY?

A 'lift and shift' approach enables one to move the on-premises ERP to the cloud. In such a modernisation exercise, the modules are moved as it is and subsequently, the business users run the ERP on the cloud. Any further customisations, upgradations, integrations, etc. are managed after moving the ERP to the cloud.

The 'lift and shift' strategy can be considered during three scenarios. The first one is when the existing IT infrastructure is approaching a hardware refresh. Second scenario is when the existing ERP application and the surrounding custom code has evolved to a large extent and you want to retain it as it is on the cloud. Lastly, 'lift and shift' is a good option if you want to take a measured approach to cloud adoption by stabilising the existing ERP on the cloud for a year or two before considering a complete SaaS ERP implementation.

'Lift and shift' is best adopted by consulting a service provider with significant expertise and experience in having implemented this strategy for other organisations. This will enable your organisation to avoid mistakes and

enhance the probability of success of such a strategy.

IF I MIGRATE MY ERP TO THE CLOUD, WHAT WILL I DO WITH THE EXISTING LICENCES?

Depending on the size of the organisation and the number of business users accessing the Oracle ERP, the licences could take a heavy toll on the organisation in terms of cost. However, with the cloud, the subscription model comes to such an organisation's relief. Before making such a move, it is critical to understand if the cloud providers such as Oracle and Microsoft can optimise cost and provide value basis the already procured existing licences with BYOL option. This cost optimisation is crucial in empowering the organisation to take the plunge towards adopting a cloud ERP.

SHOULD I MIGRATE ENTIRELY ON THE CLOUD?

An important question that many organizations as is whether they need to migrate the entire on-premises ERP to the cloud or can they retain it on-premises and integrate the desired modules from the cloud. A cloud service provider must ensure that select and relevant modules can be procured on the cloud. The vendor must also provide tools and the technology (PaaS) to seamlessly integrate with the on-premises ERP to ensure that the organisations can enjoy the best of both worlds.

This hybrid deployment model can also enable organisations to make the ERP more robust by integrating the ERP with powerful data analytics systems, new-age technologies such as internet of things and blockchain. This will ensure that the deluge of data is channeled towards the ERP and the ERP can deliver cutting-edge business insights that empower the strategic and tactical management teams to take well-informed decisions.



Navelkar is Director, Clover Infotech

*From smart feeding systems, IoT-run trucks, cloud-based hatcheries, 100% traceability and a 'mystery audit system' to hatching plans for using AI, ML and cloud, here's a company that has never chickened out on deep-frying IT. Nandu's, which claims to be Karnataka's largest omni-channel chicken brand, marinates all its core propositions in IT, whether it is the promise of farm-to-fork agility or integrated ERP for production data or transparency for the customer. It is also using new strategies to redefine an industry that has been predominantly an unorganised one. Incidentally, it is also an industry where customers are becoming more and more environment-conscious. Its founder and CEO **Narendra Pasuparth** talks about how and where IT helps in the recipe that the company is betting on.*

NARENDRA PASUPARTHY
Founder & CEO, Nandu's



**OUR INCUBATORS
ARE IOT-ENABLED**

Can you share an overview of your IT strategy and roadmap so far, and as outlined for future? What are the core building blocks that define your IT environment?

As India's largest hyperlocal and omni-channel meat brand, Nandu's has fully-integrated and farm-to-fork operations. We own and operate the entire supply chain – right from the feed mill breeding farm hatcheries and broiler farms to the slaughterhouse and retail. Our IT strategy, since inception in 2016, has been to invest strategically in scalable technology that will shape the future of business.

The core building blocks of our IT ecosystem entail a robust and state-of-the-art technology stack. To begin with, we have an operational Enterprise Resource Planning (ERP) across the enterprise to ensure 100% traceability and transparency in our operations. All operational data as well as production data through the supply chain is captured into the ERP.

Any use of IT on the upstream side?

We also have our own point-of-sale system, developed in-house to capture the retail operations data at the stores, as well as the e-commerce platform to record online data. In order to ensure easy access to seamless data across the enterprise, the e-commerce platform, the point-of-sale platform and the operational ERP are completely integrated.

Going forward, our plan is to leverage the best of cloud-based technologies, business analytics, AI and ML for better inventory management and data-based decision-making. Our business vision is to make fresh, healthy and high-quality meat and meat products accessible for all. And the right technological infrastructure is instrumental in making that a reality!

How important is technology for the industry you are in? Is retail in India evolving from a technology standpoint?

Traditionally, meat retailing has been the most underserved market, especially in a country like India. Branding and customer experience are not factors that one associates with the traditional butcher's shop. What's more, in this day and age, ours is one of those rare industries where traceability is essentially zero.

Our value proposition to consumers is that they should know what they're eating; how the ingredients are grown; how they are processed; how they are finally brought to the customers' homes. And that's possible only with the smart adoption of technology.

Our experience tells us that technology plays a critical role in ensuring that customers have a delightful shopping experience. Thanks to customer relationship management (CRM) tools, the moment a customer walks into our store or shops for our products online, we connect beyond a transactional level. We not only address the customer by name, but also try to customise our offerings based on their unique preferences.

Retail is ever-evolving and technology can help retailers deliver the experience that modern-day consumers expect. As the first-ever meat retail brand in India to successfully deploy Net Promoter Score (NPS) to gain valuable insights into customer experience, Nandu's is paving the way for greater technology adoption in the meat retail space. Our unique loyalty programme, powered by technology, has witnessed a phenomenal response, boosting the brand image as well as customer experience.

How exactly do you ensure the promise of no-warehousing and no-middlemen in a space like this? Does technology play any role here?

Technology has been the catalyst that helped us, as



TRADITIONALLY, WE HAVE BEEN A BROILER BREEDING COMPANY SO WE PRODUCE LIVE CHICKEN. NOW WITH THE HELP OF TECHNOLOGY, WE ARE ABLE TO REACH THE CONSUMER DIRECTLY.



COLD CHAIN MANAGEMENT IS A CRITICAL COMPONENT IN MEAT HANDLING AND ALL OUR TRUCKS CARRYING PROCESSED CHICKEN TO THE RETAIL OUTLETS ARE POWERED BY IOT AND GPS DEVICES.

poultry farmers, to take our produce directly to the end consumer, sans any middlemen or warehousing. Operating retail stores across Bengaluru, venturing into e-commerce, and integrating all this into an organised system was possible only because due to application of technology.

Based on solid sales trend data over the last four years, technology helps us predict the quantum of produce that is most likely to sell in a particular outlet during particular working hours. This helps us get the right quantity of material into the stores and ensure that there is a minimum carry-over stock. Hence, there's no need for warehousing. We don't store any of our produce. We process chicken every single day based on data analytics of what the consumption will be on that particular day.

As far as middlemen are concerned, we have been determinedly building our omni-channel brand, through online and offline operations, in order to be self-sufficient in the truest sense of the term. Traditionally, we have been a broiler breeding company so we produce live chicken. Now with the help of technology, we are able to reach the consumer directly to deliver a delightful meat-buying experience.

Any examples you can share – on feeding, cold chain infrastructure sides and wearables/sensors?

We were the first poultry business in India to implement automated feeding systems to ensure that the chickens are efficiently fed on a daily basis in a fraction of the time that manual feeding entails. The robotic feeding systems have facilitated cost optimisation, minimised wastage, and optimal efficiency. Given that cold chain management is a critical component in meat handling, all our trucks carrying processed chicken from the factory to the retail outlets are powered by IoT and GPS devices. Right from

constantly monitoring the temperature of the produce to raising an alarm if something is amiss, smart technology applications help us ensure that we maintain the right cold chain infrastructure.

What about other areas – feed optimisation and egg-grading, or use of nano-tech for virus detection?

We use automated devices for weighing and grading the eggs in a consistent and prompt manner. The eggs are then either taken into the incubation process and the hatchery to produce broilers or table eggs, which are retained for customers. Our incubators are IoT-enabled to help us monitor the incubation process accurately. This has a direct effect on the quality of the broiler, which in turn impacts the quality of the meat that our customers consume. Our hatcheries can be monitored from anywhere in the world, courtesy the cloud-based system they run on.

What has been your best project or investment so far? Which IT shift made you learn the most?

I would like to mention two IT projects at Nandu's that have been remarkable in terms of their return on investment as well as the learning experience. First is the operational ERP, which empowers us to deliver total transparency to the consumer. Say, you want to know the complete life cycle of the chicken that you bought from Nandu's today, we can give you that information because of the operational ERP that spans the entire supply chain!

Technology adoption has been an integral part of our transformation from a B2B business to a B2C business. As an omni-channel meat retailing company, we had to develop the point-of-sale system in-house in order to meet our specific business needs. Integrating the e-commerce platform and other technology components with the



OUR VALUE PROPOSITION TO CONSUMERS IS THAT THEY SHOULD
KNOW WHAT THEY'RE EATING; HOW THE INGREDIENTS ARE
GROWN; HOW THEY ARE PROCESSED.

sale system was a challenging yet incredibly-rewarding experience. Eventually, it is about our customers having the convenience of placing their order on our website, app or through Dunzo and Swiggy, or else, just walking into our stores.

Tell us something about the technology side of your competitive differentiation, as also about the recent CRM initiatives and NPS concept.

In terms of competitive differentiation, I believe that transparency and trust set us apart from the competition. If you walk up to any of our competitors and ask for traceability, they won't know anything beyond the supplier because they buy readymade-chicken. We own the hatcheries, feed mills, breeding farms, processing centre, food factory, cold chain infrastructure and retail stores. We have the technology that gives us traceability across our supply chain, so we can vouch for the health, hygiene and safety of all our products.

Nandu's is the only meat brand in the country to have a technology-enabled CRM and loyalty programme. Club Nandu's helps us profile the consumer purchase behaviour, acting as a seamless feedback collection methodology that empowers our vision to offer tailored offerings to each customer.

As an organisation, we are continually looking at ways to understand our customers and cater to their unique needs. The net promoter score (NPS) is a good way to measure customer satisfaction and loyalty. Currently, this programme is offered to our offline customers. We are hoping to extend it to our online customers as well. Apart from that, we also have Mystery Audit System (MAS), which is a tech-based evaluation system to assess and monitor the quality of services provided from the point of view of the customer.

Does IT help a lot in streamlining supply-chains and handling a crisis like the one we are all going through now?

IT is the foundation that holds the organisational systems together. If you have a strong foundation, unexpected changes and setbacks are not as destabilising as they may be for others. That has been our experience during the current pandemic.

Our robust end-to-end technology infrastructure that includes ERP, sale system, e-commerce system and the loyalty programme, came together seamlessly to ensure operational continuity, despite the uncertain times. We could not only get the operations up and running quickly, but could also manage the huge surge in demand over the last six months.

When you are operating in a crisis situation like the COVID-19 outbreak, it's critical to have real-time access to data. It empowers businesses to make prompt data-based decisions to help streamline the supply chains, handle logistic issues, or whatever it's that needs to be done in that moment to weather the storm.

As you plan expansion to more stores and regions, how will you use IT to support this growth map?

We have been working on a strategic growth plan to strengthen our position as India's fastest growing and largest omni-channel meat brand. IT has been a key component of our growth map since day-one of operations. In order to disrupt the traditionally unorganised meat market in India, we have invested in scalable and agile technology that supports our business vision. The go-forward strategy is to continue building our cloud-based tech platform to adapt and develop new functionalities to keep up with changing customer demands and market realities.

Wikipedia embraces digital era code of conduct

The new code signals the foundation's commitment to diversity of thought, religion, sexual orientation, age, culture, and language

Wikimedia Foundation, the non-profit that administers Wikipedia, has launched a Universal Code of Conduct that expands on the project's existing policies to create a global set of community standards for addressing negative behavior on the site.

More than 50% of the global population has access to the internet, an increase that has been linked to polarisation and rising violence from online speech against marginalised groups and ethnic communities according to a report from the Council on Foreign Relations. "Given these trends, it is more important than ever for the Foundation and the volunteer community to strengthen accountability for content on Wikimedia projects including Wikipedia, the world's largest online encyclopedia, as well as the policies that govern user behavior," the Foundation stated in a press release.

"Our work is built around a radical premise that everyone should be able to participate in knowledge," Wikimedia Foundation CEO Katherine Maher said. "Our new universal code of conduct creates binding standards to elevate conduct on the Wikimedia projects, and empower our communities to address harassment and negative behavior across the Wikimedia movement. Through this effort, we can create a more welcoming and inclusive environment for contributors and readers, and a more representative source of knowledge for the world," she added.

More than 1,500 Wikipedia volunteers from 19 different Wikipedia projects representing five continents and 30 languages participated in the creation of the universal code of conduct. In addition to its global and inclusive development process, the new code is transparent. Unlike other longer and more opaque community standards in

the tech industry, the new code is 1,600 words, where the Foundation and the community clearly define harassment and unacceptable behavior.

"The Universal Code of Conduct marks an important step in the evolution of our mission to create a welcoming, safe, and inclusive environment for our contributors, and a more open and powerful movement for free knowledge," Wikimedia Foundation Chair of the Board María Sefidari said. "In order to build effective guidelines, we collaborated closely with our global volunteer communities to learn their challenges and discuss ways to address them. The final code codifies their ideas and feedback in order to improve equal access to knowledge around the world."

The new universal code of conduct clearly defines what an acceptable behavior is and what constitutes harassment on and off the projects for all Wikipedia participants. It also focuses on preventing the abuse of power and influence to intimidate others, combating deliberate introduction of false or inaccurate content, and aims to provide consistent enforcement process and shared responsibility between the Foundation and volunteer communities.

Aligned with Wikipedia's 20-year anniversary, celebrated on 15 January, the launch of the new Universal Code of Conduct marks an important step in the evolution of the site's mission of creating a civil public square that captures the sum of all human knowledge. "While there have previously been standards implemented by volunteers governing individual Wikimedia projects, there were no universal rules governing all projects. The new Code also signals the Foundation's commitment to creating spaces that foster diversity of thought, religion, sexual orientation, age, culture, and language to name a few," the release stated.



DIGITAL INDEX: RANKING OF INDIA'S TOP ENGINEERING COLLEGES LAUNCHED: DECEMBER 2020



Top 100 Tech-enabled T-Schools

INSTITUTE NAME	CITY	RANK
Birla Institute of Technology	Pilani	1
International Institute of Information Technology, Hyderabad	Hyderabad	2
College of Engineering Pune	Pune	3
Dr B R Ambedkar National Institute of Technology	Jalandhar	4
Maulana Abul Kalam Azad University of Technology	Haringhata	5
Indraprastha Institute of Information Technology	New Delhi	6*
International Institute of Information Technology, Naya Raipur	Raipur	6*
National Institute of Technology Silchar	Silchar	7
Chitkara University Institute of Engineering & Technology	Rajpura	8
R.M.K. Engineering College	Chennai	9
Reva University	Bangalore	10
DIT University	Dehradun	11
Koneru Lakshmaiah Education Foundation	Vaddewaram	12
Galgotias University	Meerut	13
Maharaja Agrasen Institute of Technology	Delhi	14

Top 10 Zone Wise Institutes

NAME OF INSTITUTE	CITY	RANK
Maulana Abul Kalam Azad University of Technology	Haringhata	1
International Institute of Information Technology, Naya Raipur	Raipur	2
National Institute of Technology, Silchar	Silchar	3
Gandhi Institute for Technological Advancement, GATEWAY	Chennai	4
Amity School of Engineering & Technology, Amity University	Delhi	5
Kalinga Institute of Industrial Technology	Bhubaneswar	6
Talant Academy of Technology	Hyderabad	7
School of Engineering, SRM Institute of Science and Technology	Kattankulathur	8
SRM Institute of Science and Technology	Kattankulathur	9
SRM Institute of Science and Technology	Kattankulathur	10

Top 10 Government Institutes

NAME OF INSTITUTE	CITY	RANK
International Institute of Information Technology, Hyderabad	Hyderabad	1
College of Engineering Pune	Pune	2
Dr B R Ambedkar National Institute of Technology	Jalandhar	3
Maulana Abul Kalam Azad University of Technology	Haringhata	4
Indraprastha Institute of Information Technology	New Delhi	5
International Institute of Information Technology, Naya Raipur	Raipur	6
National Institute of Technology, Silchar	Silchar	7
National Institute of Technology Manipal	Manipal	8
Thiruvananthapuram College of Engineering	Thiruvananthapuram	9
Thiruvananthapuram College of Engineering	Thiruvananthapuram	10

Top 10 Private Institutes

NAME OF INSTITUTE	CITY	RANK
Birla Institute of Technology	Pilani	1
Chitkara University Institute of Engineering & Technology	Rajpura	2
R.M.K. Engineering College	Chennai	3
Reva University	Bangalore	4
DIT University	Dehradun	5
Koneru Lakshmaiah Education Foundation	Vaddewaram	6
Galgotias University	Meerut	7
Maharaja Agrasen Institute of Technology	Delhi	8
SRM Institute of Science and Technology	Kattankulathur	9
SRM Institute of Science and Technology	Kattankulathur	10

AT A GLANCE

- Ranking of Top 100 tech enabled engineering colleges
- Top 10 Zone wise engineering colleges, • Top 10 Government colleges
- Top 10 private colleges, • Profiling of Top 20 tech enabled engineering colleges
- 20+ Views & opinions of leading Industry Leaders, • Circulated to leading corporates
- Circulated to the engineering colleges pan India

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HCL, Alteryx announce global strategic alliance

HCL Technologies (HCL) has signed a global strategic alliance with analytic process automation (APA) company Alteryx, Inc. As part of this strategic engagement, HCL has been named an Alteryx Elite Alliance Partner, the company stated in a press release, adding that the two companies will also develop and execute a variety of go-to-market initiatives to reach clients worldwide.

The alliance is driven by the large and growing market opportunity for enterprise-wide data analytics, data science and process automation. Some initial areas of joint solution focus include citizen-led advanced analytics, data science, machine learning (ML) and artificial intelligence (AI) to drive initial quick wins and pave the way for continuous innovation.

The companies will focus on data-driven process automation and orchestration across distributed hybrid and multi-cloud environments to help organisations accelerate value from data platform modernisation initiatives. In addition, they will complete data and analytics automaton with deep application expertise to deliver insights across business functions and industry sectors. With HCL's broad expertise in transforming IT and lines-



of-business, the alliance will also accelerate Alteryx usage in Amazon AWS and Microsoft Azure to meet customers' hybrid cloud modernisation needs and strengthen HCL's portfolio of data science and transformative analytics automation.

HCL and Alteryx's collaboration on customer transformation priorities began in 2020 and the success of the relationship paved the way to forming an Elite-level strategic alliance, which included global joint go-to-market (GTM) activities, a scaled competency on Alteryx within HCL and company's ability to act as a value-added reseller (VAR) of Alteryx solutions.

ThoughtWorks acquires Gemini Solutions

Software consultancy firm ThoughtWorks has announce that it is acquiring Gemini Solutions Inc., a privately-held software development and consulting services firm. "The acquisition will strengthen the ThoughtWorks' foundation and overall European expansion," the company said in a press release.

The acquisition will help ThoughtWorks establish its presence in Romania with the Gemini Solutions team at its core. The team will provide nearshore support for ThoughtWorks' clients in the UK and Germany as well as continue to support Gemini's existing clients in North America, France, and Germany. Serban Tir, previously the chief technology officer of Gemini, will serve as the general manager (GM) of the company's operation in Romania.

Speaking on the decision, ThoughtWorks President and CEO Guo Xiao said that the team from Gemini Solutions brings with them a wealth of experience that will also the joint company accelerate growth in key strategic focus areas of digital transformation, enterprise modernisation, data, and customer experience. "Gemini's talent, cultural fit, commitment to delivery, ability to grow, and existing client relationships fit nicely with our own," he said.

Founded in 2005 by a group of Silicon Valley technologists, the software product development company Gemini Solutions has over 170 team members in Romania covering a broad spectrum of technologies across the entire software product development lifecycle.

Fujitsu, Hokkaido University develop explainable AI



Fujitsu Laboratories Ltd. and Hokkaido University have developed a new technology based on the principle of “explainable AI” that automatically presents users with steps needed to achieve a desired outcome based on AI results about data, for example, from medical checkups.

“Explainable AI represents an area of increasing interest in the field of artificial intelligence and machine learning. While AI technologies can automatically make decisions from data, explainable AI provides individual reasons for these decisions,” the organisations stated in a press release. “This helps avoid the so-called ‘black box’ phenomenon, in which AI reaches conclusions through unclear and potentially problematic means,” it added.

While certain techniques can provide hypothetical improvements, these do not provide any concrete steps when an undesirable outcome occurs for individual items. For example, if an AI that makes judgments about the subject’s health status determines that a person is unhealthy, the new technology can be applied to first explain the reason for the outcome from health examination data like height, weight, and blood pressure. According to the release, explainable AI can additionally offer the user targeted suggestions about the best way to become healthy, identifying the interaction among a large number of complicated medical checkups items from past data and showing specific steps to improvement that take into account feasibility and difficulty of implementation.

The new technology offers the potential to improve the transparency and reliability of decisions made by AI, allowing more people in the future to interact with technologies that utilize AI with a sense of trust and peace of mind. Currently, deep learning technologies widely used in AI systems requiring advanced tasks such as face recognition and automatic driving automatically make various decisions based on a large amount of data using a kind of black box predictive model. In the future, however, ensuring the transparency and reliability of AI systems will become an important issue for AI to make important decisions and proposals for society. This need has led to increased interest and research into “explainable AI” technologies.

Movements

BIKRAM SINGH BEDI TO HEAD GOOGLE CLOUD IN INDIA

Google Cloud has announced that Bikram Singh Bedi will succeed Karan Bajwa as its new Managing Director for India. Bedi is a senior leader with over 26 years of leadership experience, and will be



responsible for leading Google Cloud’s sales and operations teams in the country. He joins Google Cloud from Grofers where he served as President Strategy and New Initiatives. Prior to that, he set up the AWS business in India and was the head of India and South Asia for 6 years. He also held various leadership positions at IBM and Oracle.

Speaking on his new assignment Bedi said: “I’m excited about this new challenge and I look forward to extending Google Cloud’s momentum in India. The true test of 2021 will be how enterprises will leverage cloud computing to modernize and scale for growth and Google Cloud is committed to help them accelerate their digital transformation to build a strong foundation for the future.”

VMWARE APPOINTS GURU VENKATACHALAM AS CTO

VMware, Inc. has appointed Guru Venkatachalam as Vice President and Chief Technology Officer for Asia Pacific and Japan. Prior to the new role, Venkatachalam was working with the company as its Cloud



Architecture CTO. He will lead VMware’s efforts in Asia Pacific and Japan to build trusted partnerships with customers and partners and deliver solutions aligned to their strategic priorities. He will also play an integral role in the further developing the company’s cloud, app modernization, networking, security, and digital workspace platforms.

With over 28 years of experience in IT, Venkatachalam has deep expertise in financial services sector, where he led several large enterprise transformations, as well as global engineering teams supporting the transformation of end-user computing.

Barco unveils single-chip G100 projectors

Visualization technologies company Barco has announced the launch of three G100 series projectors. The G100 is a single-chip projector with native WUXGA resolution and comes in three brightness variants: 16,000, 19,000 and 22,000 lumens. This high-brightness power enables advanced image quality to impress with pioneering projections both indoor and outdoor, the company said in a press release.

Sharing more details, the release highlighted that the G100 projectors feature carefully selected components that lower the power consumption of the device, extend the light source lifetime, and, accordingly, limits the ecological footprint of the units. “As a result, the ecoscoring team has granted the projectors an A-score and a Barco ECO product label.”

Up-to-date with the most recent technological needs and signal capabilities, the G100 supports all of the latest input sources, including HDMI 2.0, to enable deep color palettes. The new projector series further stands out in the industry with a future-proof design and exceptionally low noise levels, which is an important differentiator for indoor installations especially.



The company also announced that to ensure full operational versatility and effortless implementation, it was launching a new extensive GC-lens range to the market for the G100 models. The GC-lenses have a throw ratios going from 0.38 up to 10.8 and a large shift capability. With the excellent onboard cooling, the G100's can withstand a maximum ambient operating temperature of 50°C (122°F).

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI

Deemed to be University, BITS Pilani was established in 1964 with Shri GD Birla as the Founder Chancellor and was developed in association with Massachusetts Institute of Technology, USA. It was conferred the distinction of Institution of Eminence in 2020 by the Ministry of Education. Ranked #2 in the Dataquest T-Schools listing in March 2020, the institute has a well-structured digital infrastructure, including the cloud infrastructure, to support its about 17,000 students (overall) and 850 faculty members across the four campuses.

While it is already using artificial intelligence, and have executed blockchain, IoT, IIoT, and AR/VR pilot projects, the institute is exploring options of introducing robotic process automation in the campus. On the infrastructure front, it has implemented pilot projects to explore the benefits of Platform as a Service (PaaS), hardware/Infrastructure as a Service (HaaS/IaaS). The institute with four established campuses and 13 academic departments focuses on higher education and research in engineering, sciences, pharmacy, management studies and humanities and social sciences.

Established: 1964

Status: Deemed to be University



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