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CIO & LEADER

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REIMAGINING INFRA

Understanding the
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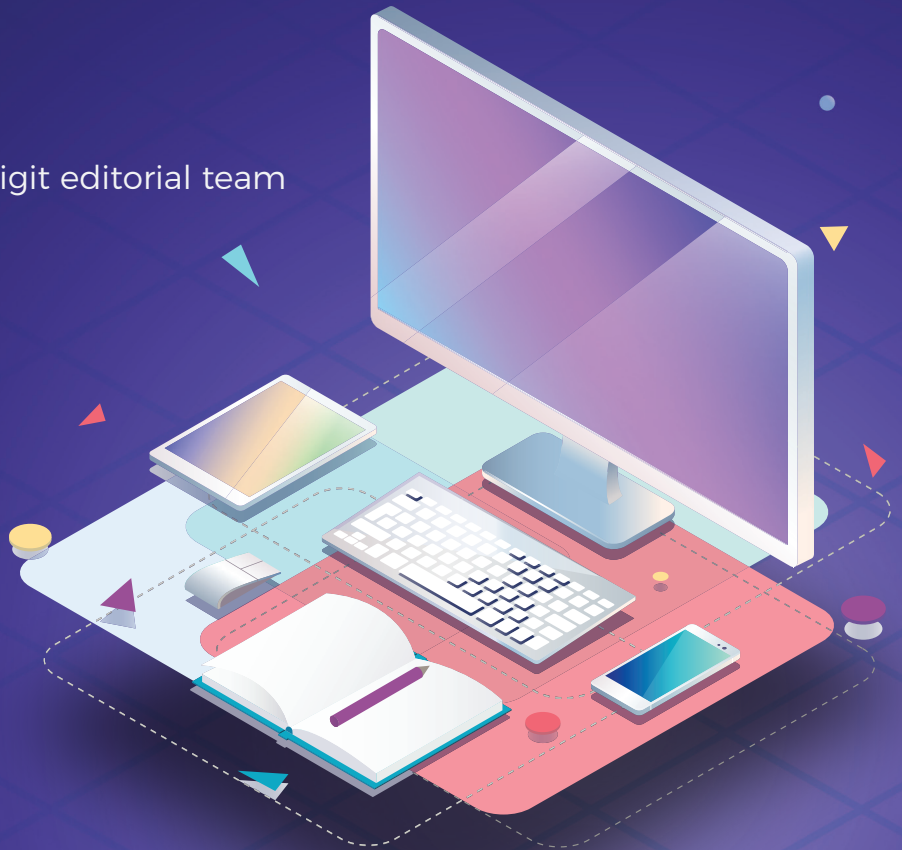


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Shyamanuja Das
shyamanuja.das@9dot9.in

Why Infra is back on top?

Eight-nine years back, one of my seniors, then a DGM of infrastructure, was lamenting that as an infrastructure manager, he was treated as a second class citizen in the IT department, while the 'SAP' guys got all the limelight. His reaction may be a little extreme, but few would dispute that even in companies where infra played a critical role, it was never considered very 'sexy', compared to applications, and what then became business IT. Gartner's two speed IT theory – while it did not exactly break it in terms of infra and applications – was interpreted so by many IT managers.

Suddenly, infrastructure, is back in fashion. Why? There are many reasons you can ascribe to this change. But let me try to break all of them into two buckets. The first is the change in the infrastructure model; read the shift to the cloud. The second is the rapid digitization leading to high volumes of IT transactions. Various factors have led to the expansion of digitization – in depth and breadth. This increased volume led to gaps in customer experience which itself arose from performance issues. That could be solved either by pumping more money into creating more and more similar infrastructure or looking for innovation in infrastructure. You know which path competitive businesses would take?

Let's look at some of the examples of specific drivers.

Growth required newer infrastructure. Better customer experience required better infrastruc-

Any innovation today requires some innovations in infrastructure. The new challenge for infrastructure managers is to recognize that and prepare for it not just by formulating long term plans but also talent strategy.

ture. Regulations – right from data localization to privacy – required infrastructure to be able to handle that. The advent of new technologies like AI, Edge computing and

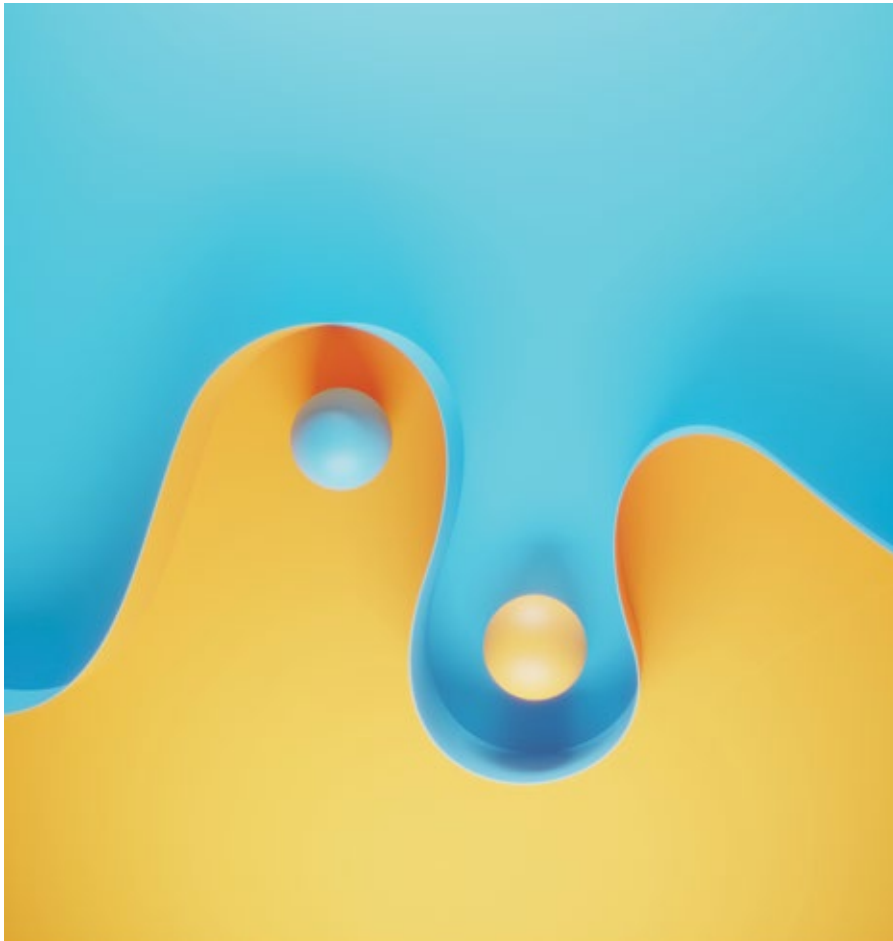


5G together called for new infrastructure models. Smart cities, and smart citizen services required disruption in infrastructure. Security needs dictated infrastructure. The pandemic-led disruption called for newer infrastructure. Now, there are already discussions on the infrastructure needs for the metaverse. Meanwhile, certain government policies pushed for changes in infrastructure strategy. I can go on and on.

Any innovation today requires some change in infrastructure. And the infrastructure guys are back in the centre stage. But the advent of cloud and newer technologies like containerization and microservices means that infrastructure, security, applications, etc., are no longer completely distinct from each other. The new challenge for infrastructure managers is to recognize that and prepare for it not just by formulating long term plans but also their talent strategy. Some of these are being recognized, as our cover story and the survey presented in this issue, will tell you.

One of the personal challenges many infra heads and CIOs point to is the lack of a forum to specifically discuss infrastructure issues. Any ideas? Please share with me directly at shyamanuja.das@9dot9.in, if you would like to take the lead in closing that gap. We are there to help ■

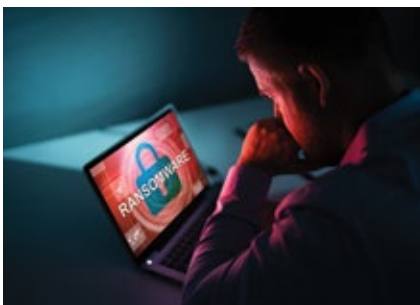
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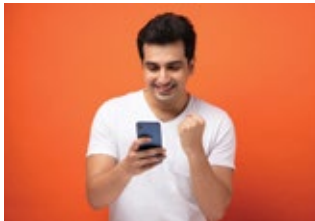
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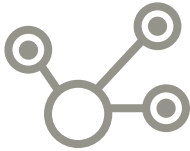
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Editor: **Vikas Gupta**





around the tech

KNOW
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TRENDS

82% of IT leaders say that they have adopted the hybrid cloud.

RESEARCH REPORTS

Indian PCS market to grow

The Indian public cloud services (PCS) market, which includes IaaS, PaaS, and SaaS solutions, generated \$4.6 billion in revenue in 2021, according to the International Data Corporation (IDC) Worldwide Semi-annual Public Cloud Services Tracker, 2H21. (July-December). From 2021 to 2026, the entire market for PCS in India is expected to reach \$13.5 billion, with a CAGR of 24%. In 2021, SaaS will continue to dominate the global PCS industry, followed by IaaS and PaaS. India continues to be one of the fastest-growing PCS providers markets.

CERT-In directive on cybercrime incidents

Computer Emergency Response Team (CERT-In), India's main cybersecurity body, has asked all service providers, intermediaries, data centre providers, corporations, and government institutions to report cyber incidents within six hours of their discovery. After CERT-In discovered certain loopholes that were "creating obstruction to incident investigation," the orders were given under the requirements of sub-section (6) of section 70B of the Information Technology Act of 2000.

Cloud lets AI raise CX to new heights

According to Frost & Sullivan's 2022 IT Decision-Maker Survey, the top three most important company goals are all about customers. It's shocking to see cost-related goals fall out of favour in the face of rising costs around the world. The top three objectives for 2022 are to improve customer experience (CX), improve brand equity, and promote digital commerce, putting the contact centre, which is frequently perceived as a cost centre, at the forefront of business growth.

Digital solutions can reduce global emissions

Digital technologies can reduce greenhouse gas emissions by up to 20 percent by 2050 in the three highest-emitting sectors – energy, mobility, and materials, according to the World Economic Forum (WEF). Climate change's effects are becoming more severe by the day, while commitments for 2030 are only expected to lower emissions by 7.5 percent. According to the World Economic Forum, we need a 55 percent reduction by 2030 to meet the Paris Agreement's targets. To close this gap, high-emitting sectors will need to be rewired around efficiency, circularity, and sustainability.

Global AI adoption grew 35 percent

Global AI adoption increased gradually over the last year, reaching 35% of those surveyed in 2022, according to an IBM report. The results of the survey indicate that AI adoption is set to accelerate as it matures and becomes more accessible and easier to apply. Other findings from Morning Consult's "Global AI Adoption Index 2022," conducted on behalf of IBM, show that firms recognised the value of AI as they recovered from the COVID-19 epidemic and engaged in their digital transformation while dealing with talent and skills shortages.

Over 1.5 lakh people are needed in 5G

Triggered by the rapid pace of digital transformation initiatives, the ICT industry is witnessing a massive demand for new talent in areas such as 5G, IoT, AI-ML, cloud computing, RPA and big data analytics, says a report by the Telecom Sector Skill Council (TSSC). There was a combined demand of 1.5 lakh roles in these areas in 2021, whereas the demand-supply gap stood at 28%. The talent demand in India's telecom sector is expected to grow due to widespread adoption of internet services, need for better telecom networks, and the rollout of fifth-generation or 5G technology.

Worldwide semiconductor revenue to grow 13.6% in 2022

According to Gartner, global semiconductor revenue is projected to total \$676 billion in 2022, an increase of 13.6% from 2021. Overall, the prediction for worldwide semiconductor revenue has been lifted by \$37 billion, to \$676 billion, from the previous quarter's forecast. Component supply restrictions in automotive applications will persist beyond 2023, particularly in microcontrollers (MCUs), power management integrated circuits (PMICs), and voltage regulators. Slowing growth in the PC, smartphone, and server end markets is predicted to decrease semiconductor revenue growth as supply and demand balances out in 2022.

India's data centers to witness a five-fold capacity increase by 2027

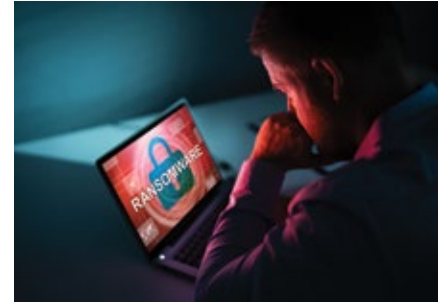
India's data-center industry is projected to grow fivefold over the next five years with investments totaling INR 1.05-1.20 lakh crore, according to ratings agency ICRA. According to ICRA, the industry's revenues are expected to increase at a CAGR of around 18-19% during FY22-FY24 after seeing a growth of 24% CAGR during FY18-FY21. The growth was supported by an increase in rack capacity utilization and the creation of newer data centers. Even though co-location services account for around 62%-65% of revenues, they have higher operating margins due to shared resources. On the other hand, managed services account for 28%-30% of revenues. Large hyper-scaling corporations that outsource their web-based storage needs to third-party data center providers drive the industry's development.

Banks and investment firms will spend \$623 bn on technology

According to a Gartner report, global IT spending by banking and investment services organisations is expected to climb 6.1 percent to \$623 billion in 2022. IT services, which includes consulting and managed services, is the largest spending area, accounting for 42 percent of total IT spending in the industry, or \$264 billion, according to the research. Software is expected to rise at the greatest rate, with spending rising 11.5 percent to \$149 billion. Artificial intelligence (AI), autonomous systems, and privacy-enhancing computation are three technology developments gaining popularity in banking and investing services in 2022, according to the study major. These trends will continue to increase in the next two to three years.

Major boost to 5G growth expected

The 5G network will witness a massive growth due to the increased demand of multi-access edge computing (MEC), private enterprise 5G networks and network slicing feature of the fifth generation technology, according to a recent Frost & Sullivan's analysis of the Asia-Pacific 5G market. The analysis notes the integration of new technologies such as AI, cloud computing, and robotics is rapidly increasing real-time automation, fostering more excellent connectivity in workspaces, and significantly expanding the monetization potential for mobile operators. According to the research firm, APAC 5G revenue is expected to grow from \$2.13 billion in 2020 to \$23.89 billion in 2025, at a CAGR of 62.2%. This exponential growth will be largely driven by 5G connectivity and improved performance over 4G.



Ransomware breaches increased by 13 percent

Global organizations have witnessed an alarming rise in ransomware breaches, which increased by 13 percent in a single year, representing a jump greater than the past 5 years combined. According to a Verizon Business 2022 Data Breach Investigations Report (2022 DBIR), as criminals look to leverage increasingly sophisticated forms of malware, ransomware continues to prove particularly successful in exploiting and monetizing illegal access to private information, it notes. Organized crime also continues to be a pervasive force in the world of cybersecurity.

Hybrid cloud is the de facto operating model

As businesses seek to improve business agility and scalability, hybrid cloud and multicloud have become the norm, however many enterprises are still grappling with challenges such as security, operational complexity and cost containment. These trends were highlighted in a recent report by Cisco. According to the report, eighty-two percent of organizations had implemented a hybrid cloud strategy that included at least one public cloud service for internal and customer-facing apps. Almost half of those use two or more public cloud solutions as part of their multi-cloud strategy. Only 8% of respondents surveyed utilise more than one public IaaS cloud service.

GOVERNMENT NEWS

Portal for biotech researchers launched

The central government has launched Biological Research Regulatory Approval Portal (BioRRAP), single national portal for Biotech researchers and Start-ups. It will cater to all those seeking regulatory approval for biological research & development activity in the country.

Kerala to launch app for managing lifestyle diseases

The Kerala government is launching an Shaili, a mobile app, aimed at diagnosing and controlling lifestyle diseases among people, according to the health minister of the southern state. The app will initially be available for Android phones.

Haryana launches app for tracking vehicle movement

The Haryana government has launched a Vehicle Movement Tracking System (VMTS) mobile app to help in tracking vehicles carrying sand and other mining material. The app will be used at different checkpoints across Haryana. Vehicle details such as vehicle number, vehicle type, moving from, moving to, along with driver details such as driver mobile number and driver license number, will be entered too. The entire travel history of the vehicle can be viewed through the app.



Revamped health account mobile app

The National Health Authority (NHA) under its flagship scheme of Ayushman Bharat Digital Mission (ABDM) has launched a revamped Ayushman Bharat Health Account (ABHA) mobile application. The ABHA app, previously known as NDHM Health Records app. The updated version of the ABHA app has new User Interface (UI) and added functionalities that enable individuals to access their health records anytime and anywhere. Existing ABHA app users can also update their previous app versions to the latest one.

The ABHA mobile application enables an individual to create an ABHA address (username@abdm), an easy to remember username that can be linked with the 14 digit randomly generated ABHA number. The mobile application also enables users to link their health records created at ABDM compliant health facility and view them in their smartphones. The application also allows self-uploading of physical health records in the ABDM compliant health lockers along with sharing of digital health records such as diagnostic reports, prescriptions, CoWIN vaccination certificate etc., after the consent of an individual through the ABDM network. ABHA mobile application also has new functionalities.

Odisha launches app for adolescents' skill development

Odisha has launched a mobile App Advika to support the state government's Advika program, a life skill initiative for all adolescent girls and boys in Odisha. It enables adolescents to exercise their rights and make informed choices with equal opportunities to grow, acquire knowledge, skills and access opportunities for an empowered future. UNICEF and Yuvaah have developed the App with technology support from Microsoft. The App will support 1.2 million adolescents who have joined the Advika program so far.

Telangana launches app for locating free diagnostic centers

Telangana health department has launched a mobile app that will help citizens locate nearest free diagnostic centres. The app, Telangana Diagnostics, will allow users to find the nearest government lab and other facilities.

Digilocker services are now available on WhatsApp

Indian citizens can now access numerous official documents via WhatsApp through the MyGov Helpdesk chatbot, according to India's Ministry of Electronics and Information Technology. By sending a message to 9013151515 on WhatsApp, users can receive access to their insurance paperwork, PAN cards, and driving licences, among other documents.

STARTUP NEWS

Ride-hailing firm BluSmart raises US\$25 MB in series A funding



Electric ride-hailing service BluSmart has raised \$25 million in its extended Series A1 round. The startup has raised \$50.7 million as part of its Series A round. The EV ride-hailing platform aims to add 5,000 electric cars and scale up its EV Superhubs across the Delhi-NCR. The business received a total of \$25 million in new capital, with \$15 million in equity and \$10 million in venture loans. BP Ventures and Green Frontier Capital led the equity round, including previous investors.

NoBroker to double its technology and product team

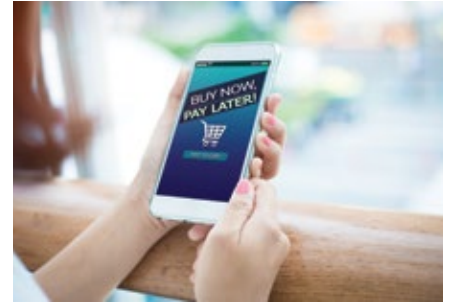
NoBroker.com, India's first proptech unicorn, is looking to double its technology and product team within the next two months. It plans to hire experienced professionals who can innovate best-in-class solutions. It grew exponentially during the pandemic on the back of its differentiated offerings. By hiring experienced engineers, it aims to consolidate the strong market position that it has built over the last couple of years. NoBroker's focus on rewarding merit and creating a growth-oriented work environment bagged them a place among the Top 25 Startups in India in 2021 by LinkedIn.

100th Unicorn for India

The number of unicorns in India has surpassed 100 as Open, a Bengaluru-based neobanking fintech site, raised fresh money to reach a billion-dollar valuation. In a Series D capital round, IIFL, Singaporean state holding company Temasek, American investment firm Tiger Global, and another Indian firm 3one4 Capital contributed \$50 million to the five-year-old Bengaluru-based Neobank. With a combined valuation of \$332.7 billion, India's startup ecosystem is currently the third-largest in the world in terms of unicorns. According to India's Ministry of Commerce and Industry, one out of every ten unicorns is born in the country.

Uber to hire 500 techies for its India tech centers

Uber Technologies plans to hire 500 more tech employees by December. The app-based mobility and delivery company has a 1,000-member tech team across its centers in Hyderabad and Bengaluru. Uber hired 250 engineers to its India teams in 2021. It has been expanding teams at all its tech centers across the globe, including the US, Canada, LatAm, Amsterdam, and at its twin centers in India. Uber has also inaugurated a new floor at its Bengaluru tech center. Uber's tech centers in the country are now the second-largest [for the company] globally, following its facilities in the US.



Flipkart's Pay Later user segment grew to 6 lakhs

E-commerce marketplace Flipkart's 'Flipkart Pay Later' credit facility has seen rapid growth, with the user base more than doubling to over six million in just seven months. According to the company, 'Flipkart Pay Later' provides customers with affordability and a comfortable buying experience, and monthly sign-ups are on the rise. Flipkart Pay Later has reached 6 million clients after seven months of robust adoption and growth, according to the firm.

Smytten raises \$15 million from its existing investors

Smytten, a product sampling and engagement platform for direct-to-consumer brands, has raised Rs 100 crore (around \$15 million) in its pre-Series B funding round led by its existing investors Fireside Ventures and Roots Ventures. According to media reports, Smytten intends to use the capital to employ engineering expertise and improve its digital infrastructure for brand building and client acquisition using artificial intelligence and machine learning. Smytten is likewise planning to increase its hiring. Currently, the company employs around 300 individuals.

CIO & CISO MOVEMENTS



ABHINAV ARYA has joined as CIO and CTO at India Shelter Finance Corporation. Before this, he has worked with organizations like Shubham Housing Development Finance Company, Hero FinCorp and Newgen Software.



ACHIN SHARMA has joined as VP – IT at Movin India. Immediately before this, he was Head of IT applications and operations at Godfrey Philips India. Before this, he has worked in Royal Enfield, Tata DoCoMo, EXL, Nokia, GE Capital, CyberMedia, and Electrolux.



ANUBHAV RAJPUT has joined as the CTO of PNB Housing Finance Limited. Immediately before this, he was the CIO and Head, of Digital & Operations at Cholamandalam MS General Insurance Co. Ltd. He has also served in organizations like Max Bupa and Tata Communications.



NEXT100 WINNER ARVIND SINGH has joined as Executive Vice President-IT, Chief Technology & Product Officer at Puravankara Limite. Immediately prior to this, he was the Head of IT at 7-Eleven India, as part of Reliance Retail. He has also served in organizations like Future Group and GlobalLogic.



HARCHARAN SINGH has joined as the CIO of Shalimar Paints. Prior to joining Shalimar Paints, he was with Blackberrys Menswear. He has earlier worked in organizations like Devyani International and Alchemist.



SURYANARAYANA GV has joined as CIO of Modenik Lifestyle. He was earlier serving as the Head IT (Applications and Infrastructure) at Tata Power (Renewable Energy Division). He has earlier worked in Cairn India.



SHARAD SADADEKAR has joined as the Head Cybersecurity and Data Protection at ICICI Prudential Life Insurance. Prior to this, he held various positions in his long stint at HDFL Life, the last position being Senior Vice President and Head Cyber Security.



SUBHAJIT DEB has joined as Chief Information Security Officer/Chief Information Security Officer at Envoy Global. Before this, he was Executive Vice President & Head - Information Security and Data Privacy at Dhani. Before that, he has served in organizations like Dr Reddy's, Max Life, and Sumitomo Mitsui Banking Corporation.



PRATAP PAT JOSHI has joined as EVP - IT & Chief Evangelist at Yotta Infrastructure Solutions. Immediately prior to this, he was CIO at Mercedes-Benz India. Earlier, he served in several leadership and managerial capacities at companies like JCB, New Holland Fiat India and DENSO

INDUSTRY MOVEMENTS



AMIT LUTHRA has been appointed as the Managing Director for Lenovo's Infrastructure Solutions Group (ISG) India.

He was earlier the Director & GM for Dell's storage platform solutions.



SHILADITYA MUKHOPADHYAYA is the new Global Head of Enterprise Solutions, Truecaller

Before this, Mukhopadhyaya was Vice President of Sales at CleverTap.



VISHAK RAMAN to head Fortinet's Business in India, SAARC, and Southeast Asia

Before Fortinet, he was Director of Security Business, India & SAARC at Cisco.



RAMDAS BALIGA has been appointed as the Managing Director of the Toshiba Software India Private Limited (TSIP), the software arm of Toshiba Group.

He joined TSIP in 2003 and also contributed to designing and developing IT technologies and solutions for Toshiba and overseas.



ARCHANA GULATI is the new Public Policy Head for Google India

Gulati was Joint Secretary, Digital Communications at NITI Aayog from August 2019 to April 2021.



SURBHI AGARWAL to head Global Marketing at Yellow.ai

Surbhi joins Yellow.ai from Google Cloud, where she led product and solution marketing for Data Analytics and Cloud AI portfolio, including Contact Center, AI.



MAHESWARAN SHAMUGASUNDARAM joins data security firm Varonis Systems as Country Manager for India

Before Varonis, he was the regional director at HelpSystems.

REIMAGINING INFRA

Understanding the contours of the post disruption infrastructure rejig

By Jatinder Singh

T

The pandemic-triggered disruption has compelled businesses to think more carefully about their long-term IT strategies. IT decision-makers haven't gotten enough sleep since the global health crisis. The traditional office as we know it has vanished, making way for the new 'hybrid workplace.'

To facilitate a smooth transition to new working practices, IT leaders and CIOs must ensure that their IT infrastructure is flexible, dependable, secure, and future-ready. As stewards of IT infrastructure, they play a crucial role in ensuring that their diverse and dispersed employees and customers have excellent experiences with no significant snags in this rapidly evolving digital world. Our recent CIO&Leader State of the Infra Management Survey reveals that enterprise IT decision-makers are considering significant investments in security solutions (33%) and services, Infra management tools (23%), public cloud (22%), virtualization/private cloud (20%), modernizing existing data centers (16%), networking solutions (14%), professional services for public cloud (14%) storage solutions (13%) and edge computing (11%), during the next twelve months.

Our research also found that IT decision-makers are under much pressure to meet changing customer demands, ensure network reliability for hybrid workspaces, avoid unplanned downtime, provide adequate storage, improve cybersecurity, and maintain service levels while reducing operational inefficiencies.

Overall, this month's cover story looks at the top of enterprise IT leaders' post-disruption agendas and their minds as they work to expand their software-defined capabilities, overcome substantial challenges, and focus on critical areas

for accomplishing transformation by reinventing their IT infrastructure.

REAL-TIME INFRA SCALING

Nobody could have predicted that a pandemic-triggered health crisis would have disastrous ramifications on the entire world. Even in their disaster management plans, organizations had not listed pandemic as one of the probable causes of a disruption that would need them to take unprecedented business continuity precautions and move their entire workforce out of the office into a work-from-anywhere setting.

Adapting to a growing hybrid workforce and developing infrastructure for rapidly increasing online collaboration has put severe pressure on the IT infrastructure of almost every organization. CIOs and IT leaders strive for reduced latency by utilizing many data centers and edge points to bring data closer to their users.

"For us, scaling infra to match the dynamic demand during peak or seasonal passenger and Cargo loads and ability to onboard newer airports within a shorter deployment period to minimize lead times and maximize revenue is a key challenge. We are looking to address this challenge by auto-scaling, and load balancing Software-defined DC or Cloud Hosted workloads," says Vinod Bhatt, CIO, Vistara.

Vistara is enhancing application availability by configuring SLA-based routing using SD-WAN and simplifying on-premise deployments that are data-intensive, requiring high-bandwidth, low latency, such as Flight Data Analytics Applications, leveraging AGS software.

Enterprises working closely with their software partners would predominantly focus on establishing business infrastructure



“For us, scaling infra to match the dynamic demand during peak or seasonal passenger and Cargo loads and the ability to onboard newer airports within a shorter deployment period to minimize lead times and maximize revenue is a key challenge. We are looking to address this challenge by auto-scaling and load balancing Software-defined DC or cloud-hosted workloads.”

VINOD BHATT
CIO, VISTARA

requirements and ensuring that the proper software-defined elements are incorporated into their ecosystem to meet necessary storage and compute capacity in real-time. As we go along, organizations will strongly emphasize combining networking, storage, and computing into a single platform to build the necessary infrastructure to meet customers' changing expectations.

THE GROWING APPEAL OF HYBRID CLOUD

Moving workloads to the cloud have become the topmost priority for all enterprises as it would help them rationalize expenses and fast-track their digital transformation goals. The hybrid cloud is gaining popularity because of its flexibility, scalability, and agility. According to the CIO&Leader Infra Management Survey, just about 6% of enterprises' infrastructure currently comprises a hybrid cloud with legacy systems, whereas 20% have a hybrid with a predominantly private cloud and 31% have a hybrid with a primarily public cloud. 26% have a mix of public and private clouds, with some legacy systems, and 17% have a balanced blend of all three.

This essentially indicates the growing trend toward an as-a-service consumption model – for everything from software to hardware. To secure business continuity and meet unique remote-work requirements, organizations are focusing on accelerating edge computing and distributed-enterprise network capabilities.

Many big companies are drifting away from their private data centers and moving their workloads to the public cloud. According to IDC, by 2026, 50% of organizations will use software and cloud-based infrastructures to create a 35% increase in sustainable efficiencies across workloads and datacenters.

The key drivers of the hybrid cloud adoption include the need to innovate and be competitive in different geographies, compliance, cost optimization, easy access to the latest technologies, and facilitation of application portability across all environments.

“Cloud infrastructure and hyper-scale architecture helped a lot during the pandemic. And that's where, you might have seen in the last two years, a good number of players have entered into the cloud. The challenge

was whether to go for open-source or off-the-shelf proprietary cloud software for many years. However, with companies adopting remote and hybrid work models after the pandemic and user experience a priority, proliferation adoption of open-source software is seeing a tremendous uptick,” says Mahendra K Upadhyay, CIO, BARC India.

Besides reliable connectivity, effective, scalable infrastructure monitoring solutions are becoming more critical since they provide IT teams with a quick overview of preparing for and adapting to their unique IT infrastructure requirements.

Despite the many advantages of the hybrid cloud, it also introduces new issues, such as mindset and culture, security management, application readiness, interoperability, and vendor lock-in, which must be addressed first.

“An important consideration for successfully adopting hybrid cloud is orchestrating seamlessly across cloud environments and resources. This orchestration layer also needs to provide visibility, control, and governance for the end-to-end infra and application landscape and help

“The challenge, for many years, was whether to go for open-source or off-the-shelf proprietary cloud software. However, with companies adopting remote and hybrid work models after the pandemic and user experience a priority, proliferation adoption of open source software is seeing a tremendous uptake.”

MAHENDRA K UPADHYAY
CIO, BARC INDIA



optimize costs while proactively monitoring security and compliance requirements. It is also important that the futuristic architecture be agile in continuously modernizing the applications, making them cloud-native and using the new-age digital transformation tools like the advanced DevSecOps,” says Ashish Bhagat, Head-Digital Transformation, Sify Technologies.

Ashish further adds an inherent need to have an AI-enabled Cloud Ops Intelligence and an All-Ops platform that can seamlessly manage a multi-cloud or hybrid-cloud environment and continuously monitor the cloud consumption, security, compliance, application performance, and overall viability of the digital transformation pursuits.

Technology leaders are also planning significant investments to employ infrastructure-management solutions. This is to ensure that they track the health of their IT infrastructure and keep a check on the historical patterns, resources demand, and supply across data centers, at the edge, and in the cloud in real-time. Many of these tools leverage AI/ML-based technologies and enable enterprises to deploy predictive software maintenance to timely address the potential issues.

BUILDING DIGITAL RESILIENCE

The recent upheaval caused by prolonged lockdowns has pushed

enterprises to focus on more robust risk management strategies to remain future-proof and manage newer risks and threats. During the pandemic, it became evident that the IT Infrastructure of many organizations was not equipped to deal with expanded and complex cyber threats.

Ransomware, phishing, and social engineering attacks increased dramatically during the epidemic. Identifying future risks and understanding their potential effects has become more important for technology leaders as businesses transfer their fundamental functions to the cloud. CIOs are still prioritizing the deployment of strict multi-factor authentication tools and securely configured cloud solutions.

At the pandemic's start, the switch to remote work was massive in both pace and scope. COVID-19 was also deployed at high risk, according to the EY Global Information Security Survey 2021, with 81 percent of CEOs admitting it caused them to skip cybersecurity standards, including fundamental cybersecurity hygiene.

CISOs and CIOs are tasked with accelerating their digital transformation efforts and developing a well-defined strategy to protect mission-critical systems, meet compliance, and secure data. Despite many organizations showing confidence in their preparation for an attack, IT leaders fear that the situation [related to security] may deteriorate as businesses prepare for

recovery and seek new ways to scale and thrive.

Our Infrastructure Management survey revealed that managing newer risks and threats is the top challenge for IT leaders and bolstering security architecture and investing in robust IT security tools is a top focus area for about 33% of organizations. Enterprises that have yet not incorporated security as a critical component of every transformational initiative are most vulnerable to new threat vectors and attacks.

IT Leaders stress the importance of fostering a robust digital and cyber risk culture within the organization ecosystem to strengthen resiliency and prepare for any insider and outsider threat to their technology infrastructure. The main focus will be implementing the appropriate security and governance tools and techniques to ensure that the evolving digital infrastructure can support a broader range of workloads while increasing agility and confirming compliance/governance requirements.

HIRING, TALENT UPSKILLING, AND RESKILLING

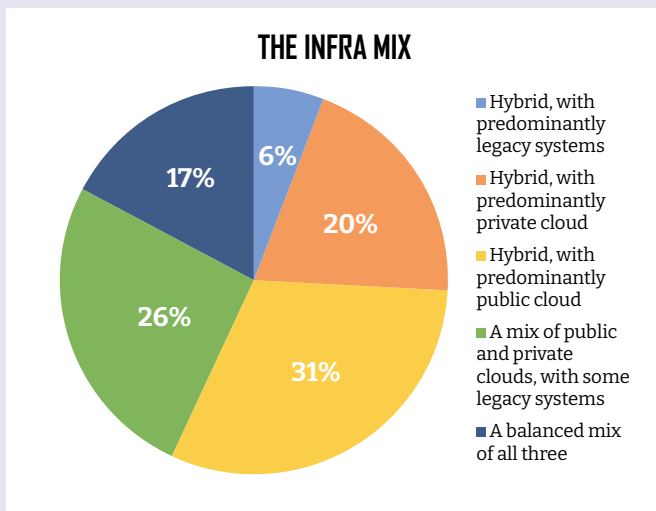
Most businesses face a fundamental difficulty in the post-disruption shift: developing a strategic roadmap around skill upgrades, identifying new growth areas, proactively educating staff, and

STATE OF THE INFRA SURVEY

State of the Infra survey was conducted by CIO&Leader in April-May 2022. It attracted responses from more than 110 respondents. The analysis is based on 96 responses from relevant and senior profiles. The respondent profile break-up is given at the end.

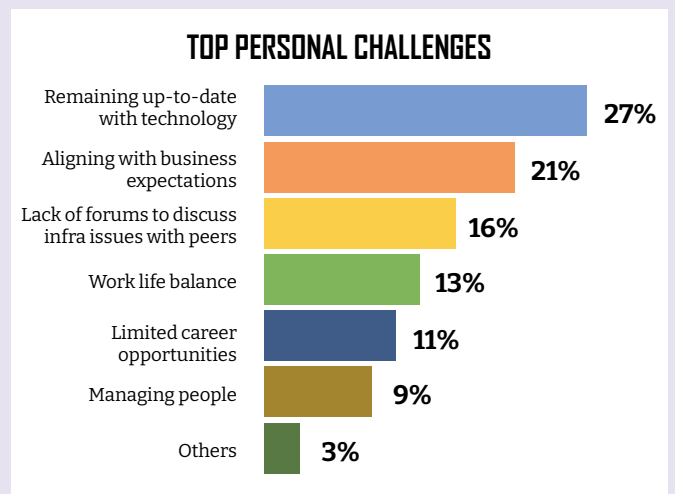
THE CURRENT STATE OF IT INFRASTRUCTURE

In an increasingly, cloud leveraged enterprise IT infrastructure, almost everyone is on cloud. Not too surprisingly, hybrid is almost ubiquitous. About every 3 in 4 respondents have presence in public cloud. Legacy still exists but is now minimal. Note that this survey was done among large and medium enterprises.



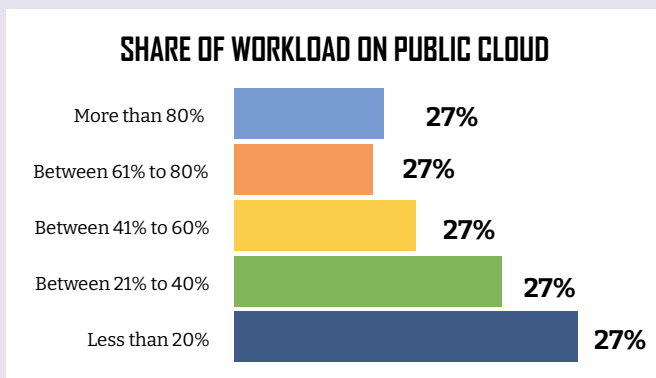
PERSONAL CHALLENGES

Despite the focus shifting to strategic management from operational issues, being on top of technology is still the biggest challenge. A surprise pop-up is the lack of forums to discuss infrastructure issues with the peers. There is acute need for such a forum to discuss issues at depth, not just at superficial levels.



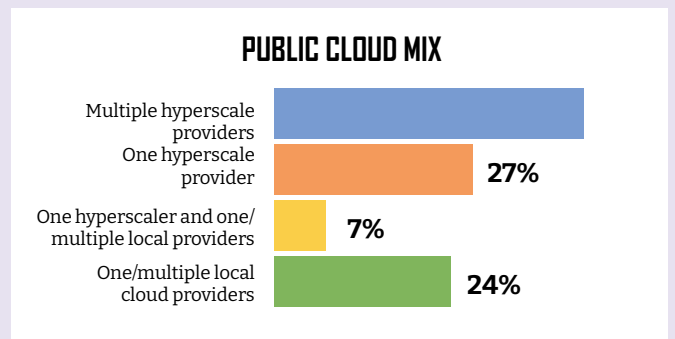
THE PUBLIC CLOUD QUOTIENT

While the presence of public cloud is ubiquitous, only about 2-3rd have more than 60% of workloads on public cloud. And remind you, this is a survey among large and medium enterprises.



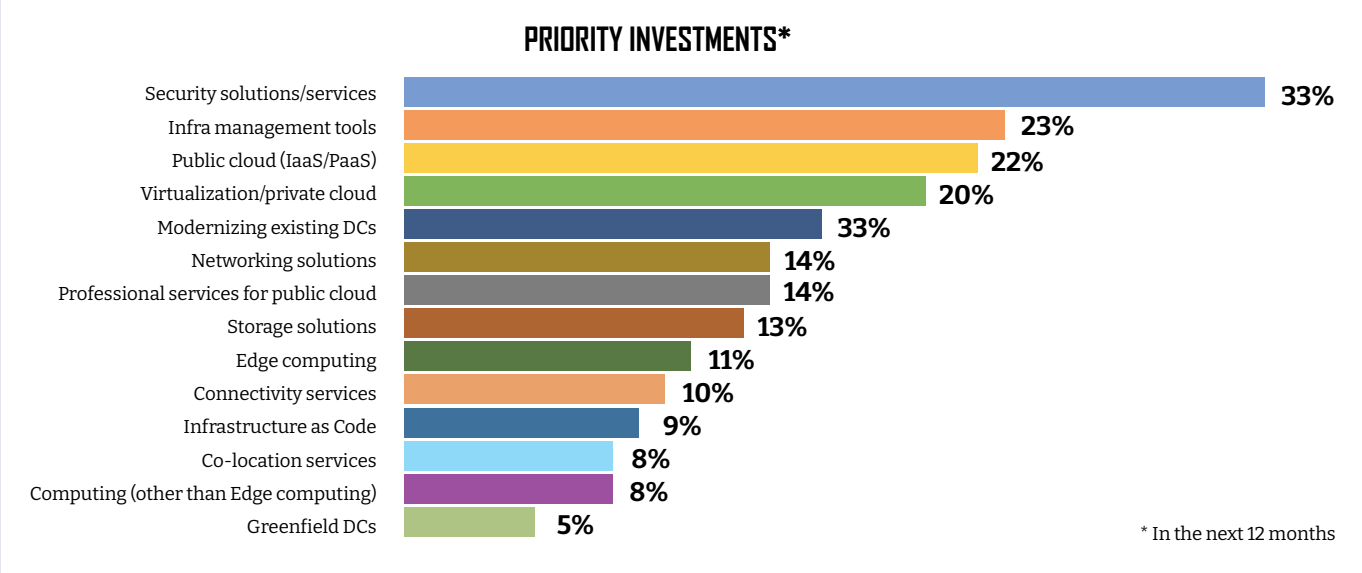
THE PUBLIC CLOUD MIX

More than 3 out of every 4 companies that are on public cloud are with hyperscalers. About half of them are surely on multi-cloud, with almost one-fourth likely in multi-cloud of local service providers. The shift is clearly towards hyperscalers.



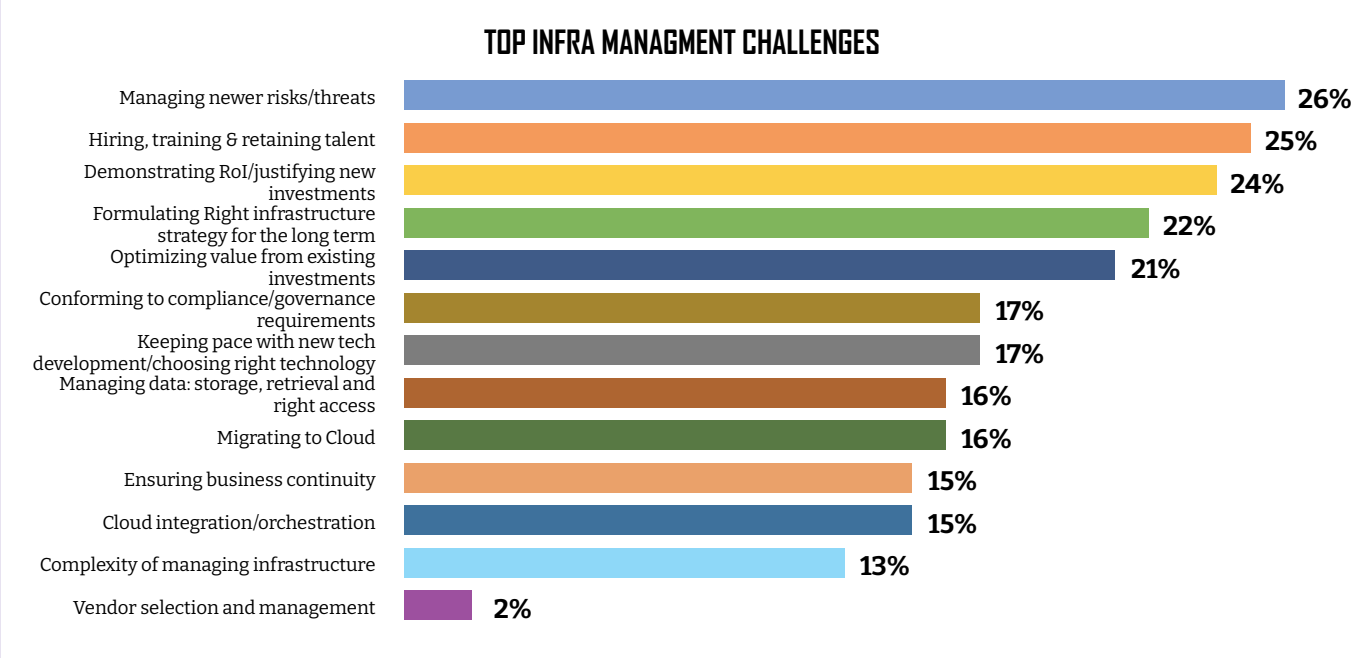
INVESTMENT PRIORITIES

Arguably the most revealing finding of the survey are the investment plans in the next 12 months. While security is not that much a surprise, infra management tools is a huge priority investment area – ahead of public cloud, virtualization, new hardware, and data center modernization. Along with the above finding, it just reaffirms that the CIOs and Infra Heads want to free themselves from managing operational complexities arising out of heterogenous systems and want to concentrate on management challenges.



TOP INFRA MANAGEMENT CHALLENGES

One thing is very clear from the findings: apart from security, it is the strategic management challenges that have replaced operational challenges as top challenges. Talent, Justifying ROI, formulating long term infra strategies, and optimizing value from existing investments rank far higher than integration/migration, business continuity planning and vendor selection and management.



establishing programs to build a future talent pipeline that can work in multidisciplinary teams.

According to the CIO&Leader IT Infrastructure Management Survey, One of the biggest stumbling blocks for IT leaders in driving their infrastructure management blueprints is a lack of cloud skills and capabilities.

With a diversified and dispersed workforce working in a hybrid environment from various locations and time zones, the new generation of talent requires an inspirational work environment.

According to McKinsey's report titled 'Six practical actions for building the cloud talent you need,' firms with high cloud ambitions often lack the expertise or culture to assist them in traversing complex cloud economics, operating-model changes, and technological requirements required to realize cloud value. The skills needed to manage rapidly changing IT infrastructure differ significantly from what is taught in schools and universities. To develop resilient, scalable, and secure solutions, firms must establish solid reskilling and upskilling training programs.

Compared to the conventional IT architecture, managing cloud infrastructure needs automation at scale and well-defined processes/tools to ensure real-

time collaboration between cross-functional teams.

McKinsey's study adds that upgrading the developer experience should complement a mindset of shared responsibility. "Developers should understand that their objectives aren't just to deliver new features but to do so securely and within regulatory bounds. They also need to understand the business context, the user personas, customer journeys (both current and future state), and product adoption so that the products and platforms they deliver support the organization's broader digital strategy," it says.

Most businesses face a fundamental difficulty in the post-disruption shift: developing a strategic roadmap around skill upgrades, identifying new growth areas, proactively educating staff, and establishing programs to engage and retain employees.

MANAGING MULTIPLE DEVICES, TOOLS, AND INTEGRATION

Businesses search for more agile and scalable cloud architectures to handle the demanding and growing workloads. While the hybrid cloud provides enormous agility, flexibility, security, and operational ease, many enterprises have struggled to integrate two independent ecosystems of on-premises and off-premises, cloud and non-cloud architectures.

For organizations, there has been growing stress on using various new tools and processes to properly run their systems in the hybrid multi-cloud ecosystem, responding to erratic demand from their users.

The organizational mindset shift and identifying relevant workloads for critical legacy workloads and hybrid architectures are significant areas of concern. The dependency on external cloud vendors is growing in the digital-first environment. Technology executives are searching for solutions that will allow them to provide reliable connectivity to a larger, scattered workforce while also providing real-time quality insights about diverse users specific to their business demands.

According to Mohan Malage, Head, IT Infra, Yes Bank, automation is no longer an option. It is a necessity, but the challenge also lies in the limited capability of individual tools. "Only a few tools can meet the full range of compliance needs. So far, we've discovered that with the smaller set-up, maintaining required compliance was relatively simple, even with manual operations. But, as the number of critical security patches grows, our focus is shifting to putting the necessary technologies in place and connecting them to ensure we achieve compliance deadlines precisely through automation. Regulatory guidelines require us to release important updates at a



"It is also important that the futuristic architecture be agile in continuously modernizing the applications, making them cloud-native and using the new-age digital transformation tools like the advanced DevSecOps."

ASHISH BHAGAT
HEAD-DIGITAL TRANSFORMATION, SIFY TECHNOLOGIES

specified time," Malage explains.

Not so surprisingly, according to a recent Infra Survey carried out by CIO&Leader, formulating the right infrastructure strategy for the long term is a key focus area and challenge for about 22% of the surveyed IT leaders.

To achieve business efficiency, technology leaders are increasingly looking at strengthening their next-generation capabilities, such as end-to-end automation and cloud. They are swiftly moving their infrastructure using SaaS, PaaS, and IaaS for accelerating workload deployment, minimizing costs, and achieving consistency across processes.

DEALING WITH GROWING TECHNICAL DEBT

Many firms had to expedite their technology implementations during the pandemic to keep their operations running while staying on budget and schedule. They were running multiple generations of on-premise and cloud systems, many of which were outdated and needed maintenance. This created a problematic situation for technology

leaders where critical technology updates and legacy system replacements have been outdated for far too long and may now be too costly to implement, risking the overall ROI and budgets and resources earmarked for innovation.

"We [IT Leaders] have to accept growing technical debt on hardware and software genuinely. The next step is to quantify the time and resources spent to fix the issue due to these technical debts. Further customer satisfaction also needs to be analyzed due to delays in fixing the issues. These problems have to be compared with the one-time additional time and resources spent during development to reduce this technical debt and subsequently, fix ongoing issues faster and increase customer satisfaction. There is no shortcut to long-term success, and we need to build a culture of spending appropriate time and resources to minimize technical debt at the start itself," says Gaurav Midha, CISO, General Insurance Corporation of India (GIC).

Using consumer-grade WiFi equipment instead of business-grade network equipment, legacy router and switches, and obsolete

servers are examples of technical debts that leave networks vulnerable to attacks and cripple businesses' ability to run the latest technology processes and compete. Because of this technical debt, proving ROI can be difficult, which is a significant barrier for IT decision-makers in reimagining IT infrastructure. About 24% of the IT leaders respondents in the CIO&Leader IT Infra Survey cited demonstrating ROI/justifying new investments as their most prominent area of concern.

According to a McKinsey study, 'Tech debt: Reclaiming tech equity', the complications created by old and outdated systems can make integrating new products and capabilities prohibitively costly. "Challenges hidden in the architecture can spring surprises that make projects run over budget and miss deadlines. Much of IT employees' time is spent managing complexity rather than thinking innovatively about the future. And disjointed data architectures prevent businesses from using advanced analytics to improve their decision making," it says.

Research firm Gartner expects that this requirement will increase

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MOHAN MALAGE
HEAD-IT INFRA, YES BANK





“We [IT Leaders] have to genuinely accept growing technical debt on hardware and software. The next step is to quantify the time and resources spent to fix the issue due to these technical debts. Further customer satisfaction also needs to be analyzed due to delays in resolving the problems.”

GAURAV MIDHA
CISO, GENERAL INSURANCE CORPORATION OF INDIA (GIC)

vendor merger and acquisition activity so that consolidation of tools could be possible. “As I&O moves toward integration and operations, various management and monitoring tools need to be brought under one comprehensive tool to drive agility and business value better. For example, application performance monitoring, digital experience monitoring, IT service management, and artificial intelligence (AI) operations. A comprehensive management tool will reduce overall costs, produce better returns on investment, and drive I&O agility hyper-automation,” Gartner says in its 6 trends impacting infrastructure and operations for 2022.

A company with little or no technology debt can invest its energies and money into innovation and future-proofing business.

DATA STORAGE AND MANAGEMENT

Data has become a critical component of today’s corporate strategy. Effective data strategy management must take advantage of future technologies like self-driving cars, wearable technology, and new business models like the sharing economy in the digital age.

Enterprises need virtualization and automation capabilities across many administrative domains to manage the complicated processes required to evaluate this massive volume of data and exploit it effectively for particular business objectives. Furthermore, the data collection and analysis process must be made simple and efficient. For businesses, inadequate storage capacity and poor data management can be pretty costly.

CIOs and IT leaders heavily consider installing unified data platforms with a data pipeline that scrubs and cleans data before storing it in a ready-to-use manner with tags and catalogs for various users. Managing costs, meeting regulatory and compliance requirements, selecting the right technology, data collection, and data integrity, establishing a data governance structure, and a lack of data management skills are the key challenges businesses face when developing a solid data strategy. About 16% of the respondents in the CIO&Leader Infra Management survey cited

Managing data: storage, retrieval,

and suitable access are significant challenges.

With most countries, including India, moving toward enhanced data privacy regulations, organizations also need to ensure a country-specific approach to collecting, storing and reporting data. There must be a judicial decision to support prevailing and emerging workloads with differing infrastructure requirements. The selection of supporting infra for any workload has to have a purpose and long-term vision. It has to be a healthy mix of on-premise, cloud, or colocation, automation, and integration.

To be relevant in current times, CIOs and IT leaders see it imperative to have a highly scalable, agile, available and secure IT Infra fully equipped to cater to ever-changing customer requirements. The focus is on having a great mix of the latest tools/technologies and supporting hardware infra. IT leaders need an innovative approach to adopting the right technologies and skilled resources with a long-term view of being the business driver rather than just a support system ■

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Enabling excellence @ speed

An AI system that we operationalized in 2010 has today become central to all customer engagement, and we are using it extensively.

By Amit Shukla



Globally AI has become deeply embedded in manufacturing industries helping businesses gain significant advantages such as better product designs, quick time-to-market, faster innovations, and simplified complex systems. At Kirloskar Brothers, we have seen the advantage it brings for achieving excellence at speed without sacrificing the quality when designing products for custom deliverables.

We started our journey with AI in business in 2008, when we began leveraging it for a project for intelligent pump selection. It entailed a lot of investment, but it was a strategic

decision and we were betting heavily on the benefits to loop it back to business. The AI efforts bore fruit after two years and it became operational in 2010, helping our product development efforts.

The pump selection solution provided a huge fillip to our customer engagement program, specifically in activities such as, product selection, product specifications, etc., to deliver the optimum outcome and efficiencies for customer delight.

The system has become central to all customer engagement, and we are using it extensively and even sharing access with partners to help customers make accurate selections using AI for custom-made pumps, such as selecting the right configuration for the pump head while mapping it with the fluid – and AI automatically picks up the chemical properties of the fluid to provide the correct recommendations for the configurations based on these considerations. The AI engine has helped our engineers become more efficient as it can compute far more variables and provide accurate design recommendations for enhanced data analytics ■

“The AI engine has helped our engineers become more efficient as it can compute far more variables and provide accurate design recommendations for enhanced data analytics.”

■ The author is, Group CIO, Kirloskar Brothers Ltd.

Anything that does not meet your business needs is legacy

Identify the most business-critical applications when you embark on the modernization journey.

By Amol Pai



Application modernization is being driven by two factors— to cater to the demands of the millennials and the management push. There is lot of pressure to take up digitalization on a large-scale, both for long-term gains and to deliver short-term benefits. The CIO is in a sweet spot as the demand and budgetary support are available and now selecting the right technology for specific purposes is the most important activity.

Legacy tends to have a negative undertone and identifying what is legacy can be a challenge but as a thumb rule, anything that does not meet your business need is legacy. Today a primary need of the busi-

“Today a primary need of the business is agility which became a stark requirement during the pandemic and people are looking at how to get things done fast.”

ness is agility which became a stark requirement during the pandemic and people are looking at how to get things done fast. Catering to this pressing need requires choosing and deploying the latest technologies, such as containerization, serverless, DevOps and micro-services architecture to have an agile framework for service delivery.

Ensuring application uptime and availability is a key driver for application modernization. In a monolithic set up, most applications are tied to the core and in case of instability in any one system, all applications go down. So, identify the most business-critical applications when you embark on the modernization journey.

In SBI, as business expanded, we added new service applications resulting in multiple cores and to deliver a seamless customer experience, we had to modernize each of the core and integrate into a single system. SBI YONO came out of this exercise and we are able to make continuous improvements and innovations to cater to the dynamic needs of customers ■

■ The author is CTO, State Bank of India

Binding experience & operations seamlessly

Digitizing the touch points and using the power of data to continuously improve our services is the cornerstone of our modernization strategy.

By Deepak Bhosale



Application modernization is being triggered at two levels—One is the dynamic macro-level changes such as COVID pandemic that has forced us to change the way we work, collaborate and engage with customers. The other is the ever-evolving needs of customers which are changing rapidly, and business offerings must adapt to cater on a dynamic basis. This calls for a certain level of agility to be wired into the organization, so you are able to deliver at speed.

At Asian Paints, we have been aggressively adopting technology and leveraged digital as a way to continuously innovate and reimagine existing business and add new means of reve-

“Application modernization is being triggered at two levels—the dynamic macro-level changes such as COVID pandemic that has forced us to change the way we work and the other is the ever-evolving needs of customers which are changing rapidly.”

nue. We are in the midst of transforming ourselves from being a paints only company to being a world-class décor company enabled by cutting-edge digital platforms. Our latest offering is the Beautiful Homes Services, which is an end-to-end home décor solution. This is a very digital-driven business which binds the entire ecosystem of contractors, interior designers, home décor brands, implementation partners, etc., to help deliver the dream home for our customers. We are bringing the power of new age modern architectures and AI/ML to create seamless, contextual, and personalized experiences across the physical and digital touch points.

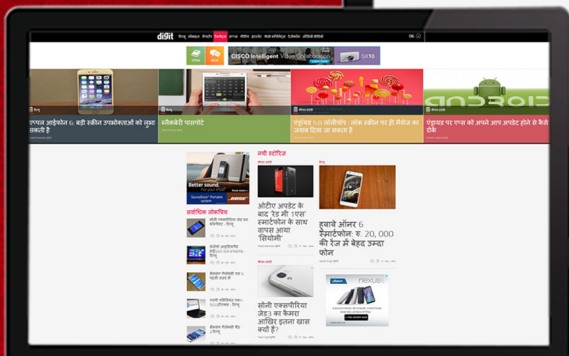
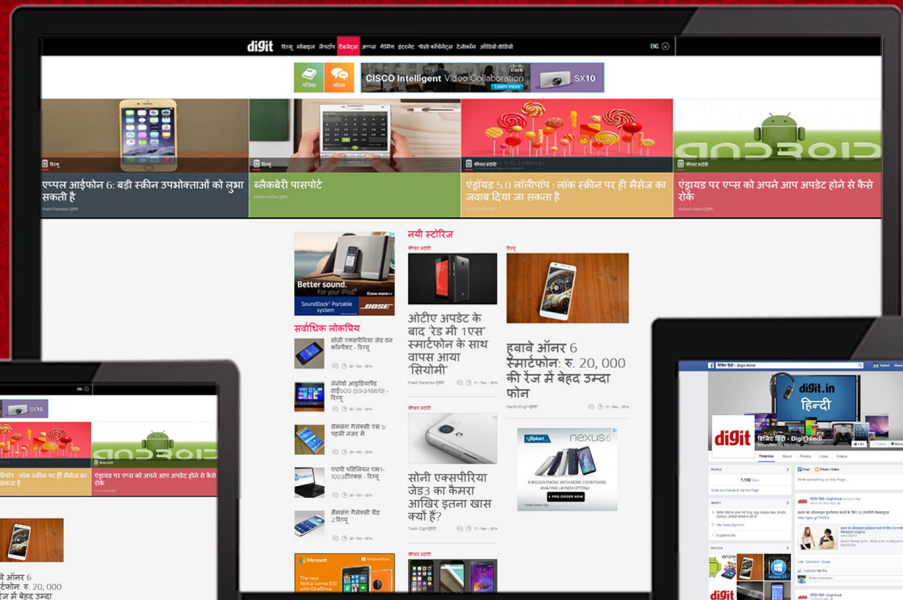
By virtue of being in the services space now for many years, our interaction touch points with our customers and our service partners have increased along all dimensions of length, breadth and depth. We have been digitizing these touch points and looking at using the power of data analytics to constantly improve our service offerings. We have robust processes to pick up feedback on the experiences offered (X) at these touch points and constantly feed it back into the operations (O). Our effort is to keep looking for opportunities for binding the XO together and keep setting higher benchmarks for ourselves ■

■ The author is GM - IT, Asian Paints

डिजिट अब हिंदी में

देश का सबसे लोकप्रिय और विश्वसनीय टेक्नोलॉजी वेबसाइट डिजिट अब हिंदी में उपलब्ध है। नयी हिंदी वेबसाइट आपको टेक्नोलॉजी से जुड़े हर छोटी बड़ी घटनाओं से अवगत रखेगी। साथ में नए हिंदी वेबसाइट पर आपको डिजिट टेस्ट लैब से विस्तृत गैजेट रिव्यू से लेकर टेक सुझाव मिलेंगे। डिजिट जल्द ही और भी अन्य भारतीय भाषाओं में उपलब्ध होगा।

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SPECIAL FEATURE



7 Top Priorities for Startup CTOs

Startups looking to scale in a post-pandemic world have been focusing more on talent management, customer experience, automation, data security, innovation, and reducing infrastructure costs.

By Jatinder Singh



A thriving startup segment drives innovation, disrupts the status quo, provides new employment opportunities, and significantly contributes to economic growth. India's startup ecosystem is currently the third-largest globally, behind the US and China.

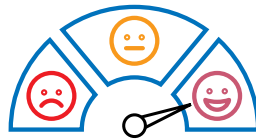
The country now has 100 unicorns (startups valued at \$1 billion or more), a number that is third only to the United States (1036) and China (253).

For startups, 2020 was a watershed year. Businesses began operating and functioning differently after the pandemic triggered lockdown. According to a KPMG report, The Indian Startup Ecosystem, this was when a large number of enterprises struggled, with many having to shut shop due to the pandemic. Numerous digital and digitally-enabled startups experienced significant growth during this period. Investors and customers alike have gained much trust in startups that were able to survive the pandemic.

In web-based startups, the CTO is the architect of the organization's vision from a technology perspective and enables the business to connect its unique idea with its users. CTOs are the brains behind almost every idea, process enhancement, and innovation in a startup. From developing products to providing quick and easy user interfaces and developing effective feedback mechanisms, they

have a massive role in the success of any startup.

We spoke with some of India's top tech startup visionaries to understand what they're thinking right now to scale their businesses. Based on our conversations, we've compiled the top 7 priorities for CTOs in 2022 to solve business problems and deliver tangible business value.



1. Delivering Exceptional Customer Experience

Customers are the foundation for any business. They are the ones who drive revenue, and if there are no customers, there won't be any business mod-

“ In the B2C space, for instance, if the user is unhappy, they share quick feedback through different engagement channels (social media, calls, chatbots). If something fails or your quality deteriorates, people know it immediately. But that's not the case in a B2B space where deals take longer, sometimes years, to materialize.”



MONISH DARDA
Co-Founder and CTO, Icertis

el. Every company understands that they have to treat their customers as a priority and design their strategy around that.

The accelerated pace of digital transformation has pushed businesses of all scales and sizes to design every bit of their growth strategies around customer experience (CX). The CX has become more crucial for startups and unicorns since this X-factor has helped them succeed throughout the pandemic.

The foundation of any startup's business model is based on driving loyalty by ensuring a personalized and real-time omnichannel service experience. However, creating this highly tailored relationship with varied customers is not easy. One of the top priorities for startup CTOs is to develop exemplary practices and tools to collect customer feedback in real-time and ensure that their concerns get addressed promptly.

Gaining trust and delivering consistent experience by employing actionable insights, tools, and strategies is the foremost priority for most startups. Most startup CTOs – healthcare, education, automobiles, and insurance – have extensively leveraged new-age tools and technologies such as intelligent chatbots to deliver a stellar user experience.

"Customer experience has to be great. No matter how high our infrastructure scales, our focus is on giving the same sub-zero millisecond latency and delivering a stellar user experience to our customers. For instance, when the lockdown happened, there was a massive surge in the traffic [of our website], but revenue was not increasing. But culture-wise, we were very clear about the customer experience, and even if the new leads were minimal and no new cars were getting launched, our brand has to commit to the same kind of experience to ensure our customers continue

to have a positive impression of our brand," says Naveen Gulati, CIO, Girnarsoft (Cardekho).

The online car marketplace company uses predictive analytics to delve deeper into customers' browsing behavior to deliver a personalized and relevant user experience. There has been a greater understanding among startups that customer experience is the way to strengthen a business's reputation, increase revenue, and enable product-led growth.

Leading a growing startup can be extremely challenging if there is an evident gap between what the customer wants and what is delivered to him. This is undoubtedly the biggest priority for CTOs as everything ensures that their platforms have a simple user interface, are easily accessible, available in different national languages, are intelligent, and can deliver personalized user experience and effective feedback mechanisms.

For B2B startups, the situation can be more intricate, as capturing timely feedback from their users can be a massive challenge. "We are inherently different from a business to customer (B2C) startup. In a B2C space, for instance, if the user is unhappy, they share quick feedback through different engagement channels (social media, calls, chatbots). If something fails or your quality deteriorates, people know it immediately. But that's not the case in a B2B space where deals take longer, sometimes years, to materialize. This involves a lot of people, processes, and budgets. The implementation cycle is long. Putting together everything takes a considerable time. So, from a tech perspective, you spent two to three months executing the deal and getting filtered feedback [as there are so many people and processes involved]. In that case, you are building something new, which probably was an issue for

“There has been an unprecedented change in customer expectations. The security and safety aspect has been added along with the convenience factor. We are transforming ourselves to become a company that is a technology company that happens to be in the protein food industry vs. the other way around.”



HIMANSHU VERMA
Chief Product and Technology Officer
Licious

“Customer experience has to be great. No matter how high our infrastructure scales, our focus is on giving the same sub-zero millisecond latency and delivering a stellar user experience to our customers.”



NAVEEN GULATI
CIO
Girnarsoft (Cardekho)

a customer six months back," says Monish Darda, Co-Founder and CTO of Icertis, a B2B SaaS startup.

Icertis says that the focus is on innovative and timely measures to capture customer feedback promptly and leverage several technologies to deliver an exceptional customer experience. "We leverage analytics and AI-based tools to analyze customer journeys and usage [such as visitors analytics, heatmap sessions recordings]," Darda adds.



2. Attracting, developing, and retaining quality talent

People are the foundation of success for any company. In startups, the CTOs play a pivotal role in hiring, training, and managing a team of developers and effectively enabling them to do their jobs. Since most startups are heavily dependent upon technology to do new and innovative things and outdo their competitors, there is tremendous pressure to attract quality talent, especially on the technology side, and then ensure they fit into the company's culture and have enough room to grow.

Unlike established enterprises, most startups operate with limited resources. The disruptive and expeditious environment of a startup may be so demanding for some employees who may not be able to adjust, especially if they get hired from large organizations. And hence it becomes critical for startups to have a solid talent management program – from hiring to onboarding people and do a periodic review of their processes by taking regular employee feedback.

Most startup CTOs would accord that talent management and having

the right people by their side is of utmost importance and a big challenge that occupies a significant portion of their time.

"Talent management is undoubtedly one of the most significant factors for the success of any company. There is a scarcity of people who know how to put everything together by leveraging tech and helping businesses solve a particular problem. In today's competitive era, startups need to reinvent their ways of building new products and services constantly. And while technology empowers businesses to do things differently, much time goes into making people productive and then retaining them," says Satya Kaliki, CTO, Infra. Market.

The B2B construction startup company is extensively focused on demonstrating its culture and the value it brings to the economy to the new age generation.

While many strongly focus on market-defining products and services, startups sometimes lack the necessary talent acquisition and retaining skillsets to attract and manage their talent. In addition, talent poaching by competitors and poor work-life balance could be major stumbling blocks to talent management effectiveness in any organization.

"Having a great product or an idea helps generate tremendous interest from investors, but scaling any business requires talented and hardworking people who should also believe in the company's vision. Your talent needs to be groomed regularly and ensure that they learn new things. Technology continues to change; say, when I was a developer, what I would have done may not be relevant now, so that means I need to learn something, so that means I need more people who can do these things," Kaliki adds.

“Talent management is undoubtedly one of the most significant factors for the success of any company. There is a shortage of talent who know how to put everything together by leveraging tech and helping businesses solve a particular problem.”



SATYA KALIKI
CTO
Infra. Market

“Best security practices get driven by culture and continuous education – be it a startup or a large enterprise. You can't secure your network in an ad-hoc manner without taking your people into confidence.”



RAM AWASTHI
CTO,
Gaana.com

The competitors and large enterprises focus on poaching startup best talent to add agility and innovative mindset to their teams, a trend that has negatively impacted startup companies with limited budgets. "You talk to any CTO of a startup today, and more often than not, he would point out hiring and retaining the right talent as the biggest focus area and a pain point," says Ajay Tiwari, CTO of HealthKart.

To address the above issues, hyper-growth startups focus heavily on leveraging hiring and assessment software tools, developing exceptional employee onboarding programs, getting feedback from new joiners and existing employees, and setting the right culture and talent practices. Some startups are also offering stock options, exciting training and development programs, and term-based bonuses to hire top talent and retain them for a longer duration.



3. Data security and governance considerations

Another top priority area for startup CTOs is to secure data access of their users. Startups are innovators who constantly strive to introduce revolutionary products and services to increase their market share and attract a new customer base. There is so much happening in systems and processes that generate tons of data at rest and in transit.

This data continues to grow exponentially and forms the base for them to drive monetization opportunities. However, most startups lag behind their large enterprise counterparts regarding cyber maturity, making them one of the most vulnerable segments for cybersecurity risks such as

“Data security is the core of whatever we do, and there are several innovations that we are working on in terms of data processing, incorporating artificial intelligence, and switching to machine learning.”



RACHIT CHAWLA
CEO
Finway FSC

“People, process, practice and platform are the four critical pillars for any organization. We try to do many things in these four areas. There are a few areas where we need collaboration from others also.”



RANA PRATAP SINGH
VP of Technology and Digital
Transformation
Pine Labs

phishing, ransomware, malware, and data breach. Over the past couple of years, many Indian startups have witnessed recurring data breaches. This has put tech leaders on edge to constantly monitor and implement the best data governance practices and identify who owns data governance to secure data from unlawful access. For CTOs, it has become critical to see the larger picture and redo and redesign their cybersecurity processes by spending quality time with their network engineers and teams.

"People, tools, and processes are the key components of robust cybersecurity architecture. Best security practices are driven by culture and continuous education, whether a startup or a large enterprise. It can not be accomplished in an ad-hoc manner. And that's what we've also learned over the last many years," says Ram Awasthi, CTO, Gaana.com.

Awasthi adds that they have a center of excellence and collaborate with researchers, who do vulnerability assessments of the company's applications. "We spend a considerable amount to design and develop strong cybersecurity practices and make our people learn the importance of adhering to it," he says.

CTOs of Fintech startups, in particular, have been spending an enormous amount of time preventing data leaks, information theft, and application downtime. According to The winds of

change - trends shaping India's Fin-Tech sector, a report by EY, data leaks, platform downtimes, and information theft has become quite rampant in the financial services space, and developing a reliable mechanism to protect data needs to be taken up as a top priority by startups.

Developing a robust mechanism to secure data has become critical with a massive uptake in real-time payments, on-demand loan disbursement, peer-to-peer lending, and buy-now-pay-later. The fintech CTOs will have to create a clear action plan to control the risk and comply with regulatory data-security requirements, which are becoming tough day by day.

"Data security is the core of whatever we do, and there are many innovations that we are undertaking in terms of data processing, incorporating artificial intelligence, and switching to machine learning technologies. Our business objective is to be the most competent, honest, and transparent Financial Services company in India for individuals and SMEs," says Rachit Chawla, CEO of Finway FSC.



4. Unleashing automation at scale

Process automation is next on the list of priorities for startup CTOs.

Businesses compete on data today because data is the most coveted currency. Data analytics and tools based on emerging technologies such as artificial intelligence (AI) and machine learning (ML) help businesses give the much-needed insights to identify consumer preferences, understand problems, spot trends, etc.

Automation has many benefits for startups, including executing ideas and delivering results quickly. However, choosing the wrong processes or a lack of goal clarity can lead to a huge failure of automation. The CTOs of startups today spend considerable time identifying the best ways to automate complex processes and monitor incongruities in real-time to get the most out of their digital transformation efforts.

"People, process, practice and platforms are the four critical pillars for any organization. We try to do many things in these four areas. There are a few areas where we need collaboration from others also. So here we are, trying to solve some of the problems from the platform perspective, making it robust in every aspect," says Rana Pratap Singh, VP of Technology and Digital Transformation, Pinelabs.

Singh adds that Pinelabs has been leveraging and embracing Robotic Process Automation (RPA) and BI dashboards to optimize its processes and get holistic insights from its operations.

Most startup CTOs agree that automation gives them greater flexibility, speed, and an opportunity to scale faster. However, the challenge is identifying which part of the [or the entire] process to be taken up on the SaaS platform first and to get their people ready for the transformation. Especially if everything is going well and the startup is in the early stage of the growth cycle, and things are changing quickly.

"Identifying and optimizing the right processes for automation is the most tricky aspect. One of the things that we tried earlier in the cycle was automating key processes. Given our growth, so many changes were happening that it was becoming tough to get anything automated. By the time you automate something,

the chances of changes are high, and if there is a lack of coordination, processes look fragmented [after automation] and have no value. So we took a call to solve this challenge by throwing this test at our people. We scaled up every team three times and focused on doing certain things manually in a people-intensive mode for at least a year," says Vineeth Narasimhan, Founder and Director of Kristal AI.

Narasimhan reckons that this experimentation has helped the company see the ROI in a shorter span, and this exercise helped them identify the processes that can be automated cost-effectively.

"Even if there is attrition, changing processes overnight could be extremely cost-intensive. Our teams also identified processes that were getting more complex and expensive through manual means and offered maximum room for growth through automation. So, that's when some of the teams went ahead and moved to the next stage, saying that let us document everything in an unambiguous manner so that we can automate it effectively. We are at the second stage currently, where we are focusing on spending the next six months just documenting, creating Standard Operating Procedures (SOPs), all the process flows across the board, and then one by one, we'll start taking up the more critical ones for automating," he adds.

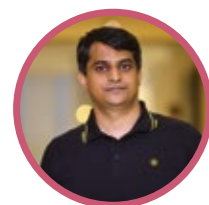
In addition to the above example, the startup CTOs are conscious of the fact that fear, regulations, and preparedness are the other factors that can break any organization's automation journey, and hence the focus and priority are on driving the culture change proactively, defining the ownership of the project and clarity of objectives for implementing any automation in their ecosystem.

“We scaled up every team three times and decided that we'll focus on doing certain things manually in a people-intensive mode for the next year or so. This exercise offered us a huge learning curve for automating certain processes and achieving greater ROI.”



VINEETH NARASIMHAN
Founder and Director
Kristal AI

“Bringing down the infrastructure cost is the key focus area for me to make my service more accessible to a larger set of people.”



KUNAL CHOURASIA
Head of Engineering
Curefit



5. Unlocking the power of data and emerging technology

Businesses compete on data today because data is the most coveted currency. Data analytics and tools based on emerging technologies such as artificial intelligence (AI) and machine learning (ML) help businesses give the much-needed insights to identify consumer preferences, understand problems, spot trends, and make themselves future-ready for any crisis or an opportunity.

For startup CTOs, investment in data and emerging technology has always been one of the top priorities. Startups such as Licious, Shaadi.com, Byju's, and Moglix, among others, have been building their exclusive business models by tracking and monitoring customer feedback and analyzing their user behaviors.

"The focus is on how do we assimilate data. There are different stakeholders involved in a particular transaction. There are customers, suppliers, and internal teams sourcing data, and then financial data moving to and fro," says Puneet Kumar, Vice President of Products, Moglix.

"We have given a lot of ownership and responsibility to individual product owners to drive adoption and

solve problems in their cohorts. There are products on the customer and pure supplier sides, and some solution has to be deployed on the warehouse side and logistics front. The key questions for any startup while building their data strategy are: how to bring all of that data together; how to generate insights to go to the next level, and how to leverage those data insights and consolidate them? That's the challenge and the focus area," Kumar adds.

The Noida-based B2B startup is experimenting with various technologies to manage data and the spikes between the business cycles while providing a consistent user experience.

Besides AI and ML, some startups such as Pepperfry are also increasingly focusing on technologies such as augmented reality and virtual reality (AR/VR) to enhance the shopping experience of digital consumers.



6. Product innovation and diversification

Throughout the pandemic, every company learned how important it is to keep on innovating and diversify their product and service offerings. Many businesses now realize that if they want to stay in the game for the long haul, they must develop new, differentiated ideas faster and diversify. Startup CTOs are concerned with visualizing and constructing the future for their digital businesses.

"For the next year, if we look at growth, we are focusing on creating a new brand while at the same time scaling the current brand that

“The key questions for any startup while building their data strategy are: how to bring all of that data together; how to generate insights to go to the next level, and how to leverage those data insights and consolidate them.”



PUNEET KUMAR
Vice President of Products
Moglix

Cloud platforms offer an excellent opportunity to grow, gather much-needed intelligence through specialized intelligence tools, extract operational efficiencies and deliver value to the end customer. However, their [IT] maintenance cost can prove costly if not monitored

“ We are focusing on creating a new brand while at the same time scaling the current brand that we have. So obviously, we'll keep increasing the top funnel, focus on conversion, and create new brands and diversify our offerings for growth.”



AJAY TIWARI
CTO,
HealthKart

we have. So obviously, we'll keep increasing the top funnel, focusing on conversion, creating new brands, and diversifying our growth offerings," says Ajay Tiwari, CTO, HealthKart, India's largest omnichannel specialty nutritionist platform.

The company says that it is adding new products and services by encouraging an entrepreneurial mindset. HealthKart has an Entrepreneur in Residence (EIR) model under which a designated brand head acts as an entrepreneur and is responsible for building a product or a service. "We've created this framework so that until their [of EIR brand heads] hypothesis is proven to a particular level, we won't encourage them to have an in-house technology team. Under the EIR model, we'll not invest in having an in-house technology team and infrastructure and ask the responsible teams to use as much as low code and no code and SaaS software first to prove whether their brand or strategy will work," Tiwari adds.



7. Reducing infra cost

Cloud platforms offer an excellent opportunity to grow, gather much-needed intelligence through specialized intelligence tools, extract operational efficiencies and deliver value to the end customer. However, their [IT] maintenance cost can prove costly if not monitored or judiciously. In the age of rapid innovation and reinvention, the CTOs of startups focus on diversifying their revenue streams while also linking their infrastructure cost with performance.

"We had to reinvent ourselves during the COVID period. For instance, our primary business was offline, which suddenly became zero. So, we built a complete online digital fitness solution. Now, this is a monetized service, and the goal is to make fitness accessible to everyone, say to a homemaker who can't go outside their house. And it would be best if you made it very engaging, and that's where the whole technology comes into the picture," says Kunal Chourasia, Head of Engineering, Curefit.

Chourasia adds that while scaling up, the company realized that it has to keep the price low, say, Rs 99, for which a consumer buys the paid subscription of an OTT platform. "Bringing down the infra cost is my key focus area to make my service more accessible to a more extensive set of people," he adds.

Startups with an expanded horizon of services emphasize the transition from monolithic to microservices architecture. CTOs would continue to develop effective cloud strategies tailored to their specific business needs in the year ahead ■

Indian startups in numbers

- **25K-26K** founded between 2011-21
- **2250+** tech start-ups founded in 2021
- **100** unicorns, third only to the United States (1036) and China (253).
- **71%** are based in established hubs: Delhi-NCR, Bangalore, Chennai, Pune, Hyderabad, and Mumbai
- **48%** are building solutions for India 1 and India 2 income group
- **39%** cumulative growth rate (10-year CAGR)
- **29%** based outside established hubs
- **25%** of total investments in BFSI
- **US \$24.1 bn** raised in 2021, up by 3x from 2020
- **10-15%** have at least one-woman founder/co-founder
- **12%** of all start-ups are leveraging deep-tech to build solutions for local and global markets
- **US \$6 billion** has been raised via public markets with 11 startup IPOs in 2021

Source: Indian Tech Start-up Ecosystem: Year of The Titans, Nasscom-Zinnov

SILLY POINT

By Akash Jain



Spotlight: Augmented Reality

IT has travelled the path from big Data Centres to the cloud to data capture at the source. Computing at source is the inevitable next step



You are in an electronic showroom because it is time to buy a 50-60" TV for your wall. The showroom manager is all over you trying to convince which model will look best at your wall. And (s)he hasn't seen your wall/ room. So, this is all imaginary visualization. Now change it to Augmented Reality visual. Before you decide, you can see how different TVs will look in the room; and will you have to move some furniture around. The story goes back to basics; the family fighting over what will look nice.

Augmented Reality (AR) is not Virtual Reality; it does not need special equipment. Just search for it on iStore or Android Play. Do be warned that the high-quality stuff costs money; the free ones give you a taste and some fun.

NOW, take this an office scenario. How many times have we wasted monies because we could not foresee. Augmented Reality may be the answer to see in future; not like Aladdin, but at least what it will look like in a WHAT-IF scenario building. The scenarios will no longer be personal guesswork; they will be seeing them. And the way AR science is going, even smell/ taste the possibilities

Now the flip side; to quote MIT Sloan Management Review, "T.S. Eliot wrote that "humankind cannot bear very much reality." Will it be any easier to bear with extended reality, with its high risks and potential rewards?" And therein lies the rub. Will Augmented Reality, as separated from Virtual Reality, be a boon or a loss...

Will we be smarter in using AR than we were in using atomic energy. AR lets us see multiple What-Ifs and then take a call on the best way forward. It can help us in remote surgery, logistics planning, consumer experience, IT maintenance, and much

■ *The author managed large IT organizations for global players like MasterCard and Reliance, as well as lean IT organizations for startups, with experience in financial and retail technologies*



And this is where IT Departments must step up. AR is unlimited in its possibilities. Just as we say that today every company is a technology company, AR is what every company will use. It is already reaching the masses with Apps...

more. The possibilities are limitless; we can do millions of scenario-building to see the physical impact of possible pathways.

There are already very smart applications being used by marketing: be it virtual nail polish to fragrance selection to maintenance estimation. Gartner reports that “Where once augmented reality was a marketer’s party trick, something to catch the attention of browsers and buyers, it’s fast becoming a real e-commerce tool. Similarly, where once Pinterest was a vision board, it’s now transforming into a digital mall, thanks in part to augmented reality. While retailers like Wayfair, IKEA, and Warby Parker rolled out 3D augmented reality versions of their products years ago, Pinterest’s movement into the technique is still notable, as it marks what could be a new era of shopping for several brands, all at once.”

At the end of the day, AR is about experience prediction. And that is leading the science into personal items like fashion and cosmetics, and into children. That is where AR is heading. It is also heading into core industrial applications, especially repair and maintenance. And it is ALSO

exploding into other experiential areas like tourism. AR is turning into the most extreme form of “try before you buy”, and mainly for personal/ experiential purchases. It will, therefore, soon gain great momentum in sectors like retail and financial services.

And this is where IT Departments must step up. AR is unlimited in its possibilities. Just as we say that today every company is a technology company, AR is what every company will use. It is already reaching the masses with Apps available on mobile devices; rudimentary as they are, they work. And the day is not far when ANY customer (B2B or B2C) will walk in and see how the product service will look/ feel/ smell. On the spot. Corporate IT should be one step ahead of that.

This author had once written that Future will always be in the future. AR might be changing that, even if only for short term future. And for both consumerism and industrial work. It will also change how corporate meetings are conducted and IT makes its plans.

It is a slow and steady revolution in the making. It is up to us to join it or not ■



4 Ways 5G Will Personalize Retail Shopping Experience

The rollout of 5G has a greater impact to transform the retail industry and to usher a new era of connectivity and experience.

By Rajdip Gupta



The connected retail new technologies are enabling us to unleash the new era of customer-centric, data-driven, and personalized experiences. After years of waiting and mounting, 5G technology has become a reality and is all set to realize the potential of the connected world and connected experiences. 5G has accelerated omnichannel e-commerce, providing an immersive digital experience with the help of Augmented Reality (AR) and Virtual Reality (VR), AI-enabled chatbots to provide instant support to customer queries.

The rollout of 5G has a greater impact to transform the retail industry and to usher a new era of connectivity and experience. 5G comes with high bandwidth and low latency which allows connecting with more devices with internet access at the same time. The retail industry has been continuously disrupted by e-commerce for over two decades, but now 5G will be the driver in transforming the retail as well as the online stores. Retailers will be able to gather more data about their customers and prospects with the help of AR and AI by integrating them with the digital possibilities and thereby creating an omnichannel experience tailored for them.

Here's a deep dive into how retail stores can personalize their customer's shopping experience

Creating an Immersive Shopping Experience

It can create a host of new shopping experiences as it supports AR and AI. This can enable brands to showcase their products in such a way that they can visualize them with high internet speed. With the 3D experience, the customer can just sit in their living room and visit the home store to order what they want. Retail stores can aim to create seamless shopping experiences with these AR solutions and take advantage of 5G by taking this experience to the next level.

Delivering Hybrid Shopping Experience

We all know that the future of shopping is hybrid which means a seamless blend of physical and digital to provide a comprehensive shopping experience. For instance, the mirrors in the changing room will be replaced with virtual shopping assistance to provide real-time assistance to the customers. In the retail sector, brands can start with no checkout stores and encourage customers to start with 'Just walk out' technologies. They will even leverage the concept of BYOP – Bring Your Own Payments giving

Retailers will be able to gather more data about their customers and prospects with the help of AR and AI by integrating them with the digital possibilities and thereby creating an omnichannel experience tailored for them.

shoppers a safe and contactless way of shopping.

Adopting an Omnichannel Retail Strategy

Gone are the days customers used to visit stores for now and then things. Omnichannel retailing is not just being there but where your customers are. Adopting an omnichannel retail strategy will benefit both customers and retailers – by giving retailers greater efficiency, while enabling customers to view the products and experience the brands consistently across all the channels.

The Rise in AI- Enabled Chatbots

Advancements in Natural Language Processing (NLP), have enriched customer query solving in real-time. Users who are increasingly moving away from traditional phone inquiries and want everything accessible from their mobile phones can easily access chatbots. Chatbots have potential in the customer service industry and will encourage retailers to understand their future uses for several other aspects of business operations.

The advent of the 5G network offers a glimmer of hope for the retailers, encouraging them to be ready for the next-gen connectivity and to accelerate their efforts in augmented reality (AR), virtual reality (VR), AI-enabled chatbots, and omnichannel communications. It's the best time for businesses to engage with their customers and target audience and access new revenue streams. At the start, businesses will think about the initial investments required but later once it's matured, they will witness a transformation in their operations ■

– The author is MD & Group CEO, Route Mobile.

How to migrate data successfully during M&A



There are many aspects to consider while migrating data during a merger or acquisition.

By Oskar Grondhal

After the merger has been finalized, you would typically need two CIOs whose primary focus is collaboration. It's also important that the project is supported by top management because you need to have full transparency into a system when merging.

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While mergers and acquisitions originally tapered down at the start of the pandemic, the recent funding rush and current geopolitical situation is seeing M&A activity pick up again. India, in particular, has seen an increase in the number of mergers and acquisitions that have taken place in 2021. There were 598 deals worth US \$112.8 billion, with technology, media, telecom and financial services sectors leading the fray in terms of activity and value. All of these sectors are data-rich and since their businesses are driven by data, the success of a merger or acquisition literally rides on how well the migration process is handled.

For one, getting people to collaborate and unite as one is probably the hardest part in making this a success. That said, there are many aspects to consider while migrating data during a merger or acquisition.

First, one needs to know what is absolutely imperative for any data migration project to be a success.

Work with trustworthy data: It's important to ensure that your data is always up to date so it can set the foundation on which to start building your combined data governance framework. There is a lot of knowledge and data exchange that goes on

between the companies in question, related to things like revenue, overhead, employees, etc. But you need to ensure that these numbers are correct and are being sourced from the correct place.

Implement strong data governance:

When it comes to more long-term wins, ensure you have a strong data governance framework. With the knowledge that your data is always accurate, along with the ability to track your data throughout your landscape, you are able to build a solid foundation for high-quality governance.

Set clear leadership roles: The CEO or CFO are typically involved in the early stages of a merger or acquisition, focusing on investigating company figures and the true value of the business opportunity. After the merger has been finalized, you would typically need two CIOs whose primary focus is collaboration. It's also important that the project is supported by top management because you need to have full transparency into a system when merging and migrating.

Avoid common pitfalls in M&A migration projects

You also need to be prepared to tackle possible pitfalls during the course of the migration. From a data migration perspective, it's crucial to ensure that the data landscapes are united in such a way that all the data and KPIs follow the same logic. For that, one would need to keep a few things in mind so as to avoid some of the common pitfalls in M&A migration projects:

■ **Evaluate & Validate:** From an early stage, before the merger has even taken place, you need to be able to evaluate and validate the figures that are presented to you – so you can properly determine where the KPIs actually come from, how they are connected, how they are calculated and how they are interpreted.

■ **Pre-empt the impact on the data landscape:** When you merge data landscapes, it's often extremely complicated. It's crucial that you, early on in the process, understand what impact the merger is going to have throughout your entire data landscape. This is why it's entirely necessary to establish a thorough overview of your landscape, including all its integrations, before tackling this type of migration.

■ **Adhere to one type of logic:** It's also quite common that the companies in question have different ways of measuring, using and calculating data. This presents a further challenge as it is entirely essential that the final landscape adheres to only one type of logic.

■ **Be prepared for the unknown:** An organization may even have built in-house add-on systems, e.g., time reporting, budget forecasting system, etc. These types of systems can be difficult to identify in advance and often come as a surprise when you are already midway through the project.

■ **Factor in cultural and language differences:** Often, documentation and software will be presented in a local language – creating challenges



Another important thing to consider is the innate compatibility of the landscapes. Are the companies using similar systems from the get-go or will further migrations be needed?

when it comes to understanding KPIs and the overall data landscape. Cultural differences can be an obstacle when it comes to decision-making styles, leadership, ability to change, how people work together and beliefs regarding personal success and teamwork. In cases like this, data lineage can reveal the truth about the company's real status.

■ **Discover 'bad' data:** Unfortunately, surprises like these happen a lot – especially when you are dealing with two or more separate landscapes. Usually, when you choose to embark on any type of migration project, you will use that opportunity to clean your data.

■ **Automate the landscape-mapping process:** There is a lot of impact analysis that needs to take place before anything can be migrated. As you

begin to merge your landscapes, you will need to first map the individual data environments in order to fully understand what elements will be affected by the migration and what will need to properly integrate with the new combined landscape. But manually mapping these landscapes and their dependencies is very time-consuming, and you also don't get a comprehensive overview of the entire solution. So it's important to have an automated solution that can help you instantly see where all the dependencies exist.

Estimating the cost and time needed to migrate data

This entirely depends on the size and complexity of the data landscapes in question. Another important thing to

consider is the innate compatibility of the landscapes. Are the companies using similar systems from the get-go or will further migrations have to take place to achieve the final result (e.g., BI or ERP migrations)? A good place to start is by mapping the landscapes in order to fully understand what it is you are dealing with.

It is also important to look at the long-term effect of a project. Data quality, data cleaning, mapping and documentation are key factors for an efficient project. If that is not done properly from the beginning, further problems and costs will occur later.

Improving the project's ROI

IT projects generally tend to become larger than initially predicted and this applies here as well. Subsequent needs for further investment often stem from bad project management and incorrect prioritization.

But instead of trying to calculate a specific number, you can look at it in terms of the number of resources you were allocating to different BI tools and teams, as well as different data landscapes prior to the migration. This acts as one parameter. But another important thing to consider is the quality of your solution(s). By uniting all the data in one landscape, you can ensure that you are basing your business decisions on the correct KPI (rather than having two or three separate versions to choose from).

The key to maximizing ROI and success lies in automating the mapping of your current data landscapes, as well as employing a documentation process that is automated and up to date. Ultimately, I would say the ROI is split between direct savings, less software and manpower costs, and (perhaps most importantly) indirect savings, as well as the quality of your data solution ■

— *The author is Senior Sales Director - Oracle Applications*

What can CTOs do to improve a company's ESG?



CTOs can make ESG an essential component of their digital transformation plans.

By Prosenjit Dutta



ESG (Environmental, social and corporate governance) is gaining popularity across the corporate landscape, especially with the COP26 event. Companies are under high pressure to showcase how they plan to achieve their climate change targets. Technology leaders and CTOs should consider the critical factors of ESG to scale the next generation of the company from day one. A comprehensive ESG framework will enable the companies to create value for the business. This will also help the enterprises be accountable for their newfound responsibilities and promises.

Over the years, there has been an uptick in companies setting and aligning long-term sustainability goals and their profits. However, it is the responsibility of the technology and operations team to bridge the gap between these aspirational and long-term goals by implementing the ESG program shortly. Chief Technology Officers are a crucial part of the ESG planning and implementation of a process that helps the organization improve its overall ESG target. CTOs identify and analyze the gaps and constantly monitor areas for improvement.

Here are a few steps that the technology leaders and CTOs can adopt to achieve the sustainability goals and make an ethical impact.

■ **Culture for Transformation** – Chief technology officers and technology leaders are the driving force behind the ESG initiatives of an organization. However, it is also vital to get employees of the organization on board for the digital transformation project. Understanding the company's vision helps employees and other stakeholders positively adopt the new ESG practices. It's up to the CTO to help the employees, customers,

and other stakeholders change their mindset and prioritize the sustainability goals and how it benefits the business overall. In today's marketplace, it's imperative to understand that technology strategies and ESG are intertwined and highlight that these digital tools will help implement the company's strategy.

■ **Implement Change** – The CTO has critical responsibilities that directly impact the ESG of the company. For instance, how technology, in general, is procured, maintained, and deployed, how new products are designed and built can have a significant impact on ESG and how energy and data connect with data center services. The company can leverage the ESG data, but it must be placed into an explicit context by the CTO and devise a strategic plan to improve the overall business.

■ **Digital Transformation and Bridging ESG** – The perfect time for companies to plan a sustainable future by adopting emerging technologies is now. Strategy and well-planned transformation methods are the two significant parameters that will help businesses implement successful ESG initiatives. It is critical for CTOs of the organization to support the entire team train and adopt the new technologies and make the best use of them in the present and the future without disrupting the process. Lack of knowledge is one of the most significant barriers to adopting digital transformation from an ESG perspective. It is crucial for the organization that the CTOs drive this digital transformation process and support the employees in the development.

■ **Cyber Security** – Businesses need to consider Cyber Security as a crucial part of ESG. Today, cyber risk is the prime and most immediate challenge for organizations from a financially material sustainability risk prospective. Businesses will be less sustainable and resilient if

there is no integration of good governance with cybersecurity. It has to be implemented using appropriate metrics and tools.

■ **Societal Benefits** – While designing a product for the organization, the CTO or technology leader should ensure that the product is practical and useful, prioritizing the societal benefits and sustainability. For instance, if you are a health or fintech CTO, the product roadmap should include features that will serve the underserved population. There is an opportunity to differentiate the business in socially beneficial ways with societal impact and sustainability as the core element of product innovation.

■ **Efficient Workloads** – It's essential to understand and analyze the connection between greenhouse gas emissions, power consumption, and computing. As more consumers use cloud services and devices and as more businesses digitize, the energy consumed by data centers are on the rise. However, continuous adoption of cloud computing will help prevent the emission of carbon dioxide. There are new emerging technologies like serverless computing that help manage your business's infrastructure efficiently. This will help reduce the workload's carbon footprint while making your app or product cost and energy-efficient.

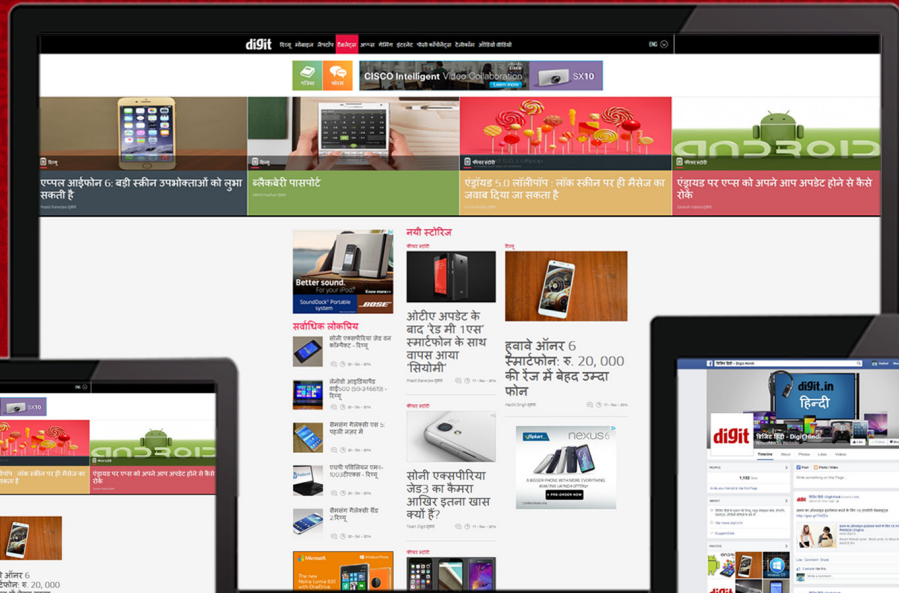
As we move into the post-pandemic business landscape, Environmental, social and corporate governance (ESG) has become an essential component of profitable business. Technology can be leveraged to form the foundations of an ESG enhancement strategy with the much-needed data and insights. The CTOs and technology leaders can deploy the strategy as an integrated component of a more comprehensive digital transformation plan ■

—The author is CTO, Treeni Sustainability Solutions

डिजिट अब हिंदी में

देश का सबसे लोकप्रिय और विश्वसनीय टेक्नोलॉजी वेबसाइट डिजिट अब हिंदी में उपलब्ध है। नयी हिंदी वेबसाइट आपको टेक्नोलॉजी से जुड़े हर छोटी बड़ी घटनाओं से अवगत रखेगी। साथ में नए हिंदी वेबसाइट पर आपको डिजिट टेस्ट लैब से विस्तृत गैजेट रिव्यू से लेकर टेक सुझाव मिलेंगे। डिजिट जल्द ही और भी अन्य भारतीय भाषाओं में उपलब्ध होगा।

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