
FUTURESCAPE
45 CIOs' VISION OF ENTERPRISE TECHNOLOGY 2022
POWERED BY
Hewlett Packard Enterprise
intel
A BRAND OF
CIO&LEADER
IT NEXT

FUTURESCAPE

45 CIOs' VISION OF ENTERPRISE TECHNOLOGY 2022

POWERED BY Hewlett Packard Enterprise | intel

A BRAND OF CIO&LEADER IT NEXT

FUTURESCAPE

PUBLISHER
Vikas Gupta

EDITOR
Shyamanuja Das

EDITORIAL ADVISORY BOARD
R Giridhar, Sachin Nandkishor Mhashilkar

RESEARCH & WRITING
Balaka Baruah Agarwal, Jatinder Singh, Shyamanuja Das

COPY
Dipanjan Mitra

ART & DESIGN
Anil VK, Shokeen Saifi

PARTNERSHIPS
Mahantesh Godi, BN Raghavendra, Pratika Barua

TECHNOLOGY
Dhiraj Srivastava

OPERATIONS
Vandana Chauhan, Nitika Karyet,
MP Singh, Rakesh Upadhyay

FutureScape
CIOs Vision of Enterprise Technology 2022

PUBLISHED AND PRINTED BY
9.9 Group Pvt Ltd
121, Patparganj, Mayur Vihar Phase 1
New Delhi-110 091

ISBN
978-93-93651-66-2

Content

Editor's Note

FutureScape, the book, is based on insights obtained from a program that comprised a series of intense CIO deliberations. The entire program, also called FutureScape, was organized jointly by HPE and CIO&Leader. It followed our extremely well-received program and book, Future of Enterprise.

As they say, if you want to control the future, better build it. FutureScape, as the name suggests, is based on this principle. Here, we have leveraged the power of the community to help out the community.

FutureScape was a program for the community, of the community and by the community. The book is the culmination of that program.

Before you get into the sections of the book, it is only apt that we should give you a little more information on how the book has come into being.

Making of the book

The program started by selecting five of the areas that most enterprises are now investing their money, time and energy on or will do so in near future. Those areas are 5G, Artificial Intelligence, Application Modernization, Data Management, and Hybrid Cloud management. These five areas are dealt with in the five sections of the book, one each in one section.

In each of the areas, a technology advisory committee comprising selected CIOs was formed. The idea was to get them interact with each other intensely before deciding what is relevant for the Indian enterprises in general. Realizing that a single discussion would not be enough to get that kind of insights and agreement, the program was planned as three meetings in each technology area.

In the first meeting, the CIOs met to discuss the scope of the technology, discussing the drivers, use cases, considerations, questions to ask before implementing or optimizing the technology for addressing specific business needs, and outlined the challenges that the organizations need to overcome.

The second meeting took off from where the first meeting left. After a presentation by HPE representative on the company's point of view on the challenges discussed in the first meeting, CIOs too joined by offering their solutions to the challenges outlined by fellow committee members.

The third meeting was focused completely on making the discussion more useful and meaningful for the readers of the book. The CIOs prioritized and classified what the book should cover, in the limited space, so that the learnings can have optimal value for the readers.

But the program was far from over. Each participating CIO took it upon themselves to highlight some aspects that are close to their heart, in signed articles. Some chose to focus on the entire journey, some highlighted a specific aspect, which they thought to be the most important, and yet others shared their individual experience and learnings. Similarly, the HPE leaders shared their POV in dedicated columns.

The lead article of each section was put together by the CIO&Leader edit team, based on the discussions.

Each section of the book has a lead article, the POV of the HPE participant and individual articles by each of the participating CIOs in that committee.

How to use the book?

The book is for anyone who is helping his/her company to transform leveraging technology. All the five technologies are go-to technologies in today's tech led transformation of enterprises.

The CIOs articles—as many as 45 of them—are something that would give you the most important insights. It is a peep into the heart of their minds. You can get ideas, lessons of experiences, advices, use cases, challenges and how to solve them and more. Each of the article could be immensely useful, in more ways than one.

If you are new or comparatively new to an area, the lead article gives a good overview of the topic. If you are a seasoned practitioner of that technology, it gives you a way to benchmark, see if some new ideas prop through or how others think about the same challenges and use cases as you also have pondered over.

The HPE perspective provides lessons and insights drawn from dealing with 100s of customers like you inside and outside India. They also help you go through the practicality filter, while apprising you about the solutions of HPE.

The CIOs articles—as many as 45 of them—are something that would give you the most important insights. It is a peep into the heart of their minds. You can get ideas, lessons of experiences, advices, use cases, challenges and how to solve them and more. Each of the article could be immensely useful, in more ways than one.

Endnote

An exercise like this is neither easy nor quick. Apart from planning the meetings, summarizing them, deriving insights from the discussions, writing and editing each article, and finally putting them together requires the vigor and sensibilities of an academic project, at the same time ensuring that it withstands the test of usability.

Without active cooperation and enthusiasm of the participating CIOs, it would not have been possible. I cannot thank them enough.

The involvement of HPE leaders and subject matter experts in planning the agenda of the meetings, creating presentations based on what was discussed in the first meeting to writing their POV, is immense. I must thank them from the bottom of my heart.

My colleagues, the moderators from 9.9 Group, who steered the discussion in the meetings, prepared the highlights and put it up for discussion in the final meeting, while addressing any query that the CIOs had, also deserve appreciation.

Last but not the least, the HPE marketing executives and my colleagues in the brand, sales and edit teams who worked in the background to make the program successful, deserve all the credit for successful rollout of the program. My sincerest thanks to them.

As we enter 2022, with a lot of hope, after some extraordinary times, and digital has become far more important than ever before, we hope this book will be useful for you.

Shyamanuja Das
Editor

5G: Accelerating enterprise innovation and transformation

5G will strengthen enterprise efficiencies by generating actionable insights in real-time from anywhere. However, the industry will need to overcome several hurdles to unleash its full potential.

AUTHORS

5G will broaden the entertainment opportunities

ABHISHEK GUPTA
CIO & CDO
DishTV

Bringing a new era of digital media delivery

KISHORE KARMAKAR
VP - IT
IBC24 News

5G will be a game changer for video experiences

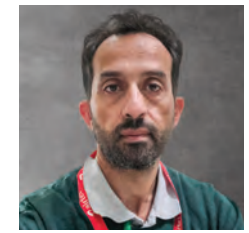
MANISH PAINULY
Director (Digital Transformation, Cloud & Web Scaling), Viacom18

The three-dimensional 5G strategy

MUDIT AGARWAL
ex-EVP - Technology,
Vodafone Idea

It matters to test your business readiness

PALLAV PALIWAL
Ex-Head - SDN/NFV
Strategy & Architecture
Bharti Airtel



Success of 5G wireless services hinges on strategic planning

PANKAJ CHOPRA
SVP & CTO
Bharti Airtel

Edge computing strategy will play a critical role in 5G success

RASHIM KAPOOR
Senior Vice President -
Core Network
Bharti Airtel

5G will amplify the adoption of Edge to drive innovative use cases

ROCHAK KAPUR
EVP & Head - Enterprise
Products & Business
Operations, Vi Business

5G will push innovations in real-time video and virtual gaming

SANJAY NAGPAL
CIO
TV Today

Spectrum harmonization is critical

VIKRAM TIWATHIA
Deputy Director General
Cellular Operators
Association of India (COAI)

Not just another voice and data wave!

VIVEK DIXIT
VP & Head (Packet
Core & IoT), Reliance Jio
Infocomm

Moderator

R GIRIDHAR
Group Editor, B2B Tech
9.9 Group

Invest early in Multi-access Edge Computing (MEC) to leverage 5G later

While mobile subscribers will be the first to benefit from this new generation mobile connectivity, it is enterprises, who will experience the true potential of 5G. On one hand, 5G brings in a unique opportunity for operators to develop network platforms that can be monetized, with more private networks it helps industries realize difficult to deliver use cases – creating a distinctive sense of enthusiasm amidst masses & enterprises alike.

Governments globally are increasing investments into digital initiatives – partly due to geopolitical reasons & partly finding themselves amidst the need to strengthen the infrastructure to brave pandemic. Connectivity is central to this ambition; hence governments are extending supports to ease 5G adoption & make it viable for telcos.

HPE sees this as an opportunity to innovate & collaborate more with our customers to deliver better value for both operators & enterprises, keen on adopting & leveraging this new wave of connectivity change. Our cloud native, open, secure & web-scale ready telco solutions built on our established infrastructure & communications portfolios, are available as a service for industries to adopt this change & evolve with times.

5G coupled with edge computing will revolutionize almost every industry. While edge use cases are being explored in parallel to 5G adoption, HPE with its extensive expertise in the technology space can help industries to try & build robust Multi-access Edge Computing (MEC) strategy that is rolled out on existing networks but is completely portable to 5G whenever it is commercially ready. HPE's networking portfolio with WIFI6 & 6E, SDWAN solutions etc. help make it best placed to solve all enterprise needs in this evolving landscape.

In Conclusion, Service providers and Enterprises don't have to wait for full 5G implementation. Early investments in MEC services and Wi-Fi 6 will integrate with 5G networks as they are deployed. Digital transformation is about accelerating innovation and a big part of that speed will come from the way technology is consumed and delivered. In the near future, different operating models will evolve, we believe everything will be delivered as a service, further accelerating innovation—and operational efficiencies.

Digital transformation is about accelerating innovation, and a big part of that speed will come from the way technology is consumed and delivered.

Himanshu Gupta
Country Manger - CME,
HPE India

Nidhi Pandey
CTO-Industry Verticals
HPE India

The fifth generation of wireless technology, or 5G, is more than just a linear extension of earlier cellular networks. 3G gave us basic mobile computing, and 4G brought high-speed mobile data services on mobile. However, 5G networks are a colossal change, a far more superior, reliable, and efficient than the previous wireless standards that will reinvent the way we communicate in various aspects.

Many countries across the globe have already tested and launched consumer-centric commercial 5G networks. Besides speed, at least ten times faster than the existing Wi-Fi or the LTE networks, 5G networks will bring powerful capabilities such as ultra-low latency (the transmission time between sending and receiving information), higher capacity, and network slicing to deliver an unrivaled real-time user experience, driving several new and innovative services.

More than providing speedy connectivity to consumers, 5G has been designed to help enterprises transform their data-driven ecosystems by increasing their ability to control various services and generate real-time insights for exceptional user experiences.

For instance, the next-generation wireless networks will change how cities manage public traffic, medical professionals provide telehealth services, manufacturing enterprises automate their factory operations, and broadcasters deliver real-time content? It can make supply chains more robust and get them round-the-clock visibility and, with efficient data analysis, can predict real-time outcomes in seconds.

5G is a tremendous opportunity for both service providers and enterprises to create and deliver new services and experiences in real-time and at a much lower cost.

A status check – benefits and opportunities

According to International Telecommunications Union (ITU), there are three prominent use cases or service categories that 5G offers: enhanced mobile broadband services (eMBB), massive machine-type communication (mMTC), and ultra-reliable low latency communications (URLLC).

While the first application performance indicator, eMBB focuses on significantly augmenting the speeds of the prevailing 4G LTE services, the mMTC focuses on the massive number of connected objects and URLLC on providing efficient wireless connectivity to latency agnostic devices for applications such as factory automation and remote surgery. Driven by multi-access edge computing, mMTC will drive a more significant change compared to eMBB or URLLC.

Enabling new services, Multi-Access Edge Computing (MEC): 5G Technology can play a unique role in transforming how enterprises connect and deliver services. It will enable enterprises and service providers to create unprecedented opportunities and help them develop new and exciting use cases that require instantaneous response time. It brings automation at all levels and enables users to access many applications without having dependencies on fixed-line networks. 5G will allow businesses to achieve outstanding capabilities to compute and analyze internet and data services at the edge, closer to the points where data is generated instead of sending data to servers in the cloud.

While previous generations of wireless technologies essentially created a high-speed data ecosystem for consumers, 5G can transform business efficiencies remarkably. 5G will be the mainstay for critical IT applications such as IoT, robotics, and AI, enabling enterprises to reinvent their processes, increase productivity, and unlock new revenue streams.

For outdoor, 5G will be a preferred form of enterprise connectivity in the future. However, for the indoor enterprise networks, a robust convergence of Wi-Fi 6 and 5G will be needed. They will co-exist and work collectively to support a diverse set of enterprise use cases.

Network slicing (core and radio): The most significant advantage of 5G is network slicing that enables service providers to create a virtual environment to prioritize specific services or applications from other services. In 5G, network slicing can be applied on the core network as well as RAN. This gives an exceptional connectivity experience to users of applications that have stringent bandwidth requirements.

Support for more devices & IoT: While every sector has earmarked a wide array of 5G use cases in their mind, the IoT deployments-based use cases are in focus for most enterprises. From delivery drones, connected cars, smart factories, and healthcare devices, superfast 5G networks will spearhead IoT adoption across agriculture, education, healthcare, and manufacturing sectors. Access to real-time

data will help businesses make better-informed decisions and provide tailored experiences to their customers.

The manufacturing industry, especially, will achieve tremendous cost savings by integrating their machines and equipment with 5G. By harnessing a vast amount of data in real-time, they will strengthen their operational and quality processes. Significant application scenarios for 5G-based IoT include supply chain management and orchestration, predictive maintenance, private campus networks, and process enhancements.

An EY survey titled, Maximizing the 5G opportunities for Enterprise reveals that various industries are currently at the different stages of their 5G investment curves. "By entering the very fabric of business processes, 5G can supercharge IoT to deliver the next wave of industrial transformation. 5G is only just now appearing in many markets, but adoption levels will grow substantially in years to come. Currently, 15% of enterprises invest in 5G, with an additional 54% planning to invest in the next three years. By the end of 2022, the proportion of organizations investing in 5G will be on a par with IoT itself," the survey states.

Lower latency, better user experience: The low latency properties of 5G will accelerate the performance of AR and VR applications which are extremely sensitive to network performance. For instance, by leveraging AR/VR technology, enterprises can reach out to consumers even in distant areas to demonstrate their products and service capabilities to consumers who can receive high bandwidth through 5G networks. Immersive gaming could be a new revenue stream for broadcasters. Another case in point is telehealth. The 5G networks will enable doctors to diagnose, treat and monitor the health of their patients remotely at a faster speed. It will be easy to perform analysis in real-time by leveraging cloud and analytics.

Key pain points

Despite huge promises and benefits, one should not forget that 5G networks have several shortcomings and need a cohesive approach to make it a success. While launching a tech is easy but generating and optimizing networks is a challenge. The critical challenges for the successful 5G deployments include lack of relevant use cases, costly hardware upgrades, integration and operations processes, limited device availability, network security, spectrum availability, harmonization and regulation, and lack of efficient collaboration models.

QoS evaluation in real-time: The 5G networks will evolve on two fronts: 5G New Radio (NR), a new globally standardized radio access technology, and the core network architecture redesign. From an enterprise and telco perspective, the running of cloud-native 5G is very different from previous generation wireless networks. The openness of 5G architecture enables several vendors, systems, and open-source elements in the user and control planes.

Efficient network slicing is essential for the success of different use cases. It's critical to have a cloud-native 5G core network that is quick to recognize and remediate the QoS degradations, continuously monitor and analyze where specific workloads need to be executed, and make necessary provisions in real-time.

Consistency and network reliability: The consistency of speed and network reliability will be pivotal to ensure the performance is tuned to the needs of applications. There

Efficient network slicing is essential for the success of different use cases. It's critical to have a cloud-native 5G core network that is quick to recognize and remediate the QoS degradations, continuously monitor and analyze where specific workloads need to be executed, and make necessary provisions in real-time.

are also concerns about sustaining 5G and positioning it with legacy infrastructure, which might require significant business investments.

Standalone vs. Non-Standalone: Indian telecom operators are testing standalone (SA), and Non-standalone (NSA) tracks for transitioning from 4G to 5G. While NSA architecture enables telcos to leverage their existing 4G investments, SA architecture drives new services specifically to Industry 4.0. The challenge with SA architecture is that it would need fresh investments in building new sites from the service providers, which might be time-consuming and expensive.

In light of the above, industry experts anticipate that 4G and 5G networks will co-exist for a reasonable time, and hence a solid roadmap is needed from the service providers to ensure the quality is not compromised.

Security threats: High-speed connectivity also brings along new security threats. The 5G networks demand significant improvements related to IT security to circumvent the risks of hacking and network breaches. It can be a massive risk to use IoT devices for public 5G network organizations without technical know-how, robust encryption, and network monitoring solutions.

5G will enable the cloud more efficiently, enhance enterprise performance, and create a better-connected world. It will push the envelope of the digital enterprise strategy of public safety, manufacturing, transportation, retail, agriculture, education, broadcasting, and healthcare – taking IoT applications to a new level altogether.

Sustainable 5G rollouts: The 5G rollouts can also dramatically increase the energy consumption levels of mobile networks, which would need more power to run existing sites and build new sites. All stakeholders are required to come up with efficient strategies for sustainable 5G rollouts.

High investment: The amount of investment needed for 5G is high. The use cases currently are not yielding relevant results – both from impact and RoI perspectives. Over the next few years, a significant focus will be on creating new use cases to generate new revenue streams around autonomous vehicles, drones, track & trace, intelligent factories, smart infrastructure and edge computing, telemedicine, field service, remote monitoring, physical security, VR/AR, entertainment, sports, and virtual gaming.

The way out

With 5G, enterprise users will be ushering in a new era of automation and AI to create exceptional customer experiences. 5G will enable the cloud more efficiently, enhance enterprise performance, and create a better-connected world. It will push the envelope of the digital enterprise strategy of public safety, manufacturing, transportation, retail, agriculture, education, broadcasting, and healthcare – taking IoT and manufacturing applications to a new level altogether.

5G will give us the benefit of moving data across industries. However, to reap the advantages that the technology offers — such as ultra latency and extreme throughput — the entire ecosystem needs to work cohesively as a unit and execute well to deliver the relevant use cases. Latency and coverage are significant challenges for IoT. Wi-Fi can be the substitute where 5G isn't available.

A practical 5G strategy demands complete redesign of the core network, radio, assurance, monitoring, business operations, and use case models. A well-thought-out plan is also needed to ensure efficient convergence of multiple networks such as 3G, 4G, and 5G together. Enterprises should know about possible 5G use cases and concepts specific to their organization or industry. They need to collaborate with their technology partners to get a clear and purposeful 5G deployment vision.

Businesses also need to delve deeper into creating robust data management strategies encompassing variability and variety of data, data security, data recovery, and backup and monetization of data. A comprehensive action plan is needed for AI-driven security policy, analytics and management, compliance, risk management, service monitoring, and availability.

Communication Service Providers' (CSPs) ambitions to develop new use cases would require new charging models and bring down the cost of connectivity services. Their collaboration with independent software vendors (ISVs) would be critical to test and experiment with new and innovative business models to help the industry capitalize on the 5G opportunity. The enterprises should further explore the benefits of software-defined networking (SDN) and network function virtualization (NFV) to control the IT infrastructure costs.

The Indian government also needs to allocate the necessary spectrum across low, mid, and high bands and support the infrastructure required for 5G in the country ■

Abhishek Gupta
CIO & CDO
DishTV

"Enterprises ahead in adopting the new technology will be the first to reap the benefits of the new business opportunities."

5G will broaden the entertainment opportunities

The impending launch of 5G technology is an evolutionary change and will open up tremendous opportunities for India's DTH industry. The beauty of 5G is the low latency that it offers. It will lead to greater efficiency in the conventional broadcast value chain and trigger new ways to empower customers and businesses.

The media distribution industry is already witnessing a sea change in the way it works. There has been a growing demand from subscribers to also consume content digitally and even on the go. With 5G, you will see substantial improvements in terms of the way content is developed and transported to the users.

Today, the satellite remains the mode of choice for cost-effective consumption and a wide choice of paid content. 5G will help to broaden the entertainment opportunities among the masses further. Many use cases are emerging. Organizations that are ahead in adopting the new technology will be the first to reap the benefits of the new business opportunities.

At DishTV, we are committed to providing the best of both worlds, i.e., Satellite & Digital. For instance, at DishTV, we've introduced SMRT Kit and d2H Magic that allow our subscribers to convert their existing set-top box into intelligent devices and additionally run OTT and online entertainment apps. 5G will enrich the customer experience by providing tailored, interactive services and real-time gaming or virtual reality sports.

The transition to 5G, however, will face several challenges. The industry will need to find out the relevant use cases and ROI around 5G-driven services. The ability to seamlessly converge and deliver multiple formats of content will be the key priority for most broadcasters and DTH players. New startups and more robust collaboration models will continue to evolve and help solve the industry's challenges ■

Bringing a new era of digital media delivery

The fifth-generation wireless technology could transform how content is being produced and transmitted concerning today's evolving needs. For instance, the biggest challenge in the current-day content creation for news broadcasters is that they depend heavily on the live feed from news reporters and stringers from across the nation. You cannot have wireline connections when on the field. At times, generating audience responses and interacting with them in real-time can be difficult if there is a network lag or broadband speed issues at any level.

Much deliberation goes into providing a consistent experience. At IBC24, we use multiple SIMs of different service providers to boost internet speed while doing live reporting from any part of the country. Due to technical limits such as bandwidth fluctuation, streaming live feed is often not possible. On the user side as well, poor buffering of the videos impacts revenues.

5G capabilities can augment the experience and bring quality action live to the audience without delay consistently in an omnichannel approach. The technology will also reduce the dependency on OB Vans to a large extent in the coming days.

By combining technologies, such as AR and VR, 5G could be a stepping stone to create innovations in the field of virtual gaming, audio/video streaming, and Over-The-Top (OTT) space.

5G will support exceptional quality streams in 4K Ultra-High Definition (UHD) delivered directly to consumers. The integration of AI and big data can further help broadcasters understand the unique needs of their subscribers. These changes will help broadcasters strengthen their relationship with their audience and partners, helping them generate new revenue and growth opportunities.

However, these are still very initial days, and the success of 5G, when launched, will be hugely dependent upon factors such as service providers' efforts to modernize their backbone, networks infrastructure, broadcasters remote monitoring capability, and robust network security to circumvent any cyber-attacks or data breaches ■

"Driven by the decreased latency, superior bandwidth, and extended coverage, 5G can make the broadcasting experience far more innovative and interactive."

Kishore Karmakar
VP - IT
IBC24 News

5G will be a game changer for video experiences

Manish Painuly
Director (Digital Transformation, Cloud & Web Scaling),
Viacom18

While 5G is yet to be launched in India, there is a tremendous enthusiasm around it. This is due to the mind-boggling speed, lower latency, and greater capacity compared to the previous generation of 4G wireless standards.

One of the best features of 5G technology is that it is incredibly agile and highly programmable. Its network slicing feature enables service providers to provide defined optimized resources to a specific user or area.

If we specifically talk about the broadcasting industry, 5G has great potential to transform the audience experience and bring new revenue streams for media transmitters. From live event streaming to the real-time immersive experience, along with innovative advertising set-ups, 5G can be instrumental in creating a whole set of a new gamechanging ecosystem. It gives broadcasters an edge to expand their capabilities to reach out to millions of mobile subscribers directly, making their content more accessible than ever.

The transition to 5G will empower media producers to stay mobile while creating, transmitting content, and capturing live-action without wired networks restraints. It will enable subscribers to stream higher quality Ultra-High-Definition (UHD) content seamlessly, refining their viewing experience. Through advanced analytics and algorithms, media companies will be better equipped to provide tailored audio and video feeds to their subscribers on their smart devices. The industry might witness concepts such as exclusive content broadcasting for their premium customers in the next few years.

However, to make 5G dreams a reality for India, it is critical accelerating nationwide fiberization and make aggressive network infrastructure investments so that even rural India can experience the next level of entertainment without any interruptions ■

"The transition to 5G will empower media producers to stay mobile while creating, transmitting content, and capturing live-action without wired networks restraints."

"To unlock the potential of 5G, telecom operators will need to drive simultaneous change along the three dimensions – re-imagine the technology stacks, re-define the partner engagement system, and re-think the operating model and win capabilities."

Mudit Agarwal
ex-EVP - Technology
Vodafone Idea

The three-dimensional 5G strategy

To unlock the potential of 5G, telecom operators will need to drive simultaneous change along the three dimensions – re-imagine the technology stacks, re-define the partner engagement system, and re-think the operating model and win capabilities.

First, re-imagine the technology stacks - from closed 'siloed' systems to open shared platforms; from dumb 'transport' pipes to agile, intelligent, responsive (on demand) slices; from manual provisioning cycles to interactive self-provisioning service catalogs; from 'reactive response to demand' to real-time analytics deciphering and delivering user expectations pro-actively; from mere carriage to intelligent APIs; from the deployment of static 'box' configurations to agile, adaptable, efficient platforms.

This technology stacks transformation will drive unprecedented spectrum and equipment efficiencies and multiply investment yields. Improved cost lines will suddenly make a series of 'latent' business cases viable, such as private networks - that were hitherto unviable and sitting on the investment waitlist. The momentum in new revenue cases will lead to a new wave of growth, rewarding economics for all the ecosystem participants.

Second, re-define the new partner engagement system. Bring in the real dev-ops to networks. Institute a 'trust' CICD pipeline where the partners can propose real-time improvements. Taking out the cost of delays, the risk of change, and making the change process agile, automated, and remotely controlled, create a new efficiency level.

Third, re-think the new win capabilities and operating model. As intelligence moves into software, applications move to open platforms, and computing moves to edge - it provides an opportunity to engineer the platform and application components - innovate and deliver differentiated, contextual solutions, and identify new efficiencies ■

Pallav Paliwal
Ex-Head - SDN/ NFV Strategy & Architecture
Bharti Airtel

It matters to test your business readiness

5G delivers faster data throughputs, lower latency, network slicing, and exceptional capabilities to connect the cloud with different data sets and devices in real-time – bringing enormous opportunities for enterprises. However, for organizations, the challenge is identifying which parts of their businesses are ready for 5G deployments?

Industries witnessing rapid transformation, such as manufacturing, healthcare, and education, will likely reap rich dividends from 5G investments. The role of technologies such as the Internet of Things (IoT), analytics, and Artificial Intelligence (AI) will become more prominent in concepts, such as remote patient monitoring, factory management, e-education, public safety, and intelligent surveillance.

Unlocking 5G use cases may still take a while to succeed. 5G trials are already in progress. We should try to see innovation and digitization, for example, open cloud, multi-tenancy, and zero-touch provisioning of the entire service facilitated in the 5G trials.

With network slicing, service providers will deliver innovative services and play an essential role in the use cases. The success of the innovative use cases will rely upon the robust network infrastructure, including spectrum, open Radio Access Network (RAN) infrastructure, core networks, and transmission.

5G is complex and composed of several network layers that leverage technology with various maturity levels. Launching a technology is easy but generating and optimizing networks is a challenge. There will be much more focus for enterprises on automated operations and agile methods to achieve efficiencies from 5G networks.

For service providers, it will be critical to develop new monetization platforms, fast-track innovation, and support their customers growing needs through collaborations with different partners. Ensuring interoperability, overhauling the core, and enhancing APIs to support 5G features will be equally important ■

"The success of 5G will depend upon what enterprise customers want to achieve and how unique are their use cases."

Success of 5G wireless services hinges on strategic planning

There's been a lot of buzz about 5G lately, and it is understandable. The next generation of wireless technology holds tremendous potential to transform the way we live and work. However, to reap the advantages it offers — such as ultra-latency and extreme throughput — the entire ecosystem needs to work as a unit and execute well to deliver the relevant use cases. Equally critical is the privacy and security of connections, devices, and applications that run on the 5G networks. A robust cybersecurity foundation is crucial from the network user standpoint and a national security perspective.

One needs to understand that the amount of investment for 5G is high. The use cases currently are not yielding relevant results. There will be new use cases and revenue streams for mining, manufacturing, retail, and education industries as we progress.

In terms of deployment, 5G first needs to integrate with the already established 4G LTE networks. Some of the first rollouts of 5G networks are likely to be on non-standalone (NSA) tracks that focus on integration with existing 4G networks to provide superior data bandwidth and connectivity. In NSA, the existing 4G LTE network assets leveraged for everything, excluding the 5G data plane. The selection of 5G deployment options – whether NSA or standalone (SA) – by service providers will depend on their investment appetite, business goals, and the individual use cases of their networks.

5G networks need comprehensive network testing on parameters, such as latency, throughput, and availability. However, there are limited trial licenses currently. As we look forward to an ultra-fast connected future, it's essential to define the right strategy from the network rollout perspective and the customer standpoint. The ecosystem of all the innovators – related to devices, applications, ISVs – will have to come on one platform to lead the charge to develop and unlock the true value of 5G ■

"It's essential to create right strategies around network rollout, customer requirements, privacy and security and ROI."

Pankaj Chopra
SVP & CTO
Bharti Airtel

Edge computing strategy will play a critical role in 5G success

Rashim Kapoor
Senior Vice President
- Core Network
Bharti Airtel

The next generation of mobile communication technology, 5G, can support a 20x increased traffic capacity than 4G with exceptional speed and efficiency. The core architecture of 5G is significantly different from the 4G architecture. Considerable data processing augmentations are required to manage high-speed communications and network slicing.

In 5G, compute will become highly critical. 5G New Radio (NR) air feature, for instance, holds the capability to deliver faster and more responsive broadband experiences. A massive amount of data will be on edge. While we talk about transport and core convergence, there will also be a significant convergence between Radio and Core.

The growing number of connected devices would require enterprises to change their data center strategy. The increased pressure on servers can put enormous stress on the data centers and the number of services on data centers.

The compute strategy with the speed that 5G will generate or the traffic that 5G will generate would be a key point of deliberation. Data traffic at the edge can overburden the access network capacity.

In a Multiservice Edge System (MSE), the most prominent use case, in my view, would be the RAN. Hosting radio workloads on MSE would become a significant use case. Both in terms of the number of computing required and the criticality around that. In that sense, skills around how to compute would be critical.

On the operations side, how the resource orchestrators transform into service orchestrators or performance management systems transform into service assurance systems to achieve autonomous operations need to be handled carefully. Businesses also need new and improved security and trust models before transitioning to 5G ■

"The growing number of connected devices would require enterprises to formulate a cohesive and future-looking compute strategy to unlock the actual value of 5G."

"Combining 5G and edge computing will enable enterprises to get real-time network visibility and drive new data-driven use cases hitherto not possible."

Rochak Kapur
EVP & Head - Enterprise Products & Business Operations
Vi Business

5G will amplify the adoption of Edge to drive innovative use cases

The fifth-generation wireless technology is designed to be a multi-service network and primarily brings three key capabilities: enhanced mobile broadband, ultra-reliable low latency, and massive Internet of Things (IoT) opportunities.

The above capabilities can be translated into business use cases that require edge computing and network slicing not just on the core but also on the radio network to give hybrid networks to enterprises.

This emanates from having multiple network slices and each slice running for different enterprise requirements locally but also at the same time giving the capability of a public network to the organization through the remaining set of slices.

Many of our customers currently with a private network, whether 4G LTE or 5G shortly, are looking to develop strong capabilities in the space of automation, Industry 4.0, robotics, smart factory management, and high payload requirements such as security and surveillance.

In addition, 5G will be instrumental in pushing more and more compute and capability to the edge. While it's the use case in an enterprise that will drive the decision about edge location, for the success of any high bandwidth capabilities scenarios across enterprises, the telco edge and enterprise edge would be of equal importance.

As a country, we have got a very imaginative and innovative workforce. There is no dearth of use cases. We need to build market-specific use cases which have business viability leveraging the agility and flexibility of the future-ready networks. 5G holds tremendous potential to impact societies, lives, and businesses positively ■

Sanjay Nagpal
CIO
TV Today

"Broadcasters will leverage 5G connections to stream live events and deliver engaging, interactive entertainment effortlessly."

5G will push innovations in real-time video and virtual gaming

The arrival of 5G could bring a wealth of exciting new opportunities for the media industry. With high data capacity and low latency, the technology will transform content creation and consumption in the Indian market. Leveraging cloud and SaaS-based solutions, enterprises will have a chance to build pathbreaking applications to revolutionize broadcast, enhance video quality and deliver exceptional user experiences.

5G will help broadcasting firms interconnect media across devices and services in real-time. For example, many new and exciting use cases could emerge, such as journalists covering events from remote and far-flung locations even without wireline connectivity and providing real-time news reports and edited packages without network disruption. Consumers will be able to download hours of HD-level content in seconds.

The network slicing ability of 5G standards will enable broadcasters to reserve exclusive high-speed broadband capacity for the areas of importance, even when the public networks get swamped. It will drive the adoption of the Internet of Things (IoT), through which broadcasters will create detailed profiles of customers, helping them offer personalized content on various screens and platforms.

As we all know, 5G networks can handle much more data than any predecessor wireless standard and create new possibilities for e-sports and virtual gaming. Real-time, fast-paced virtual gaming will be possible where two distantly located people could get a smooth and uninterrupted high-quality gaming experience, driving substantial bandwidth consumption. Cloud gaming might replace heavy console games altogether, which could be a massive opportunity for broadcasters. That said, every industry and enterprise has its unique needs and should find out appropriate use cases and RoI models to unlock new revenue opportunities from 5G deployments ■

Spectrum harmonization is critical

The fifth generation of technology offers exceptional transmission speed, lower latency, and incredible network reliability to connect everything and move data remotely.

5G technology will enable India to shore up its capabilities to address the evolving needs and reimagine the way services are delivered. Through 5G, which relies extensively on the enhanced software component in the networks, you can exploit the potential of the enormous reservoir of talent available in the country.

One must note that the global 5G ecosystem is developing faster than 2G, 3G, or 4G. Many countries have already gone ahead and implemented 5G successfully. India is too slow in its 5G roll-out plans despite the technology's vast potential. Developing a 5G ecosystem needs to be shared between individual companies and governing bodies.

The Steering Committee of the National Broadband Mission must monitor the achievement of the targets specified and take due measures to facilitate timely achievement with support from the States and local authorities.

While announcing 5G auctions, the Indian government should also ensure that the financial viability of the telecom sector is not compromised.

5G ecosystem success depends on three crucial things: The availability of harmonized spectrum for economies of scale, making right of way and street furniture assets conveniently available, and affordable device availability across form factors.

While 5G technology can impact every sector, the government should consider a Digital Readiness Index (DRI) for each vertical industry in India to facilitate and monitor the digitalization levels across verticals. Besides making investments for spectrum acquisitions and network roll-out, the telecom sector must fiberize the existing and new towers and upgrade security architecture. A consortium approach is needed for a low-cost affordable model for the Indian telecom industry ■

Vikram Tiwathia
Deputy Director General
Cellular Operators Association of India (COAI)

"Cost and affordability can only be enhanced through uniform standardization and an adequate quantum of harmonized spectrum."

Not just another voice and data wave!

The 5G revolution will transform how we work, collaborate, and connect to create new offerings for business (B2B) and consumer (B2C) markets.

5G is not just another voice and data wave! It's something that can transform the whole ecosystem. For Communication Service Providers (CSP), this technology transformation opens up new avenues in B2B business while enhancing value for B2C business, a vast but challenging opportunity. IoT would be the first gainer for enterprises. 5G will be a massive leap for the manufacturing sector, which will leverage it for IoT applications.

The true advantage of 5G, a cloud-native technology, would be the standalone (SA) mode functioning, powered with network slicing and end-to-end network orchestration and automation. Use cases specific to the Indian ecosystem would be the key to exploiting its potential.

The intersection and integration of 4G and 5G will be challenging. 4G has taken a massive leap, so 5G adoption and frictionless integration with 4G would be crucial in evolving the mobility network. The industry needs to find various combinations and technology approaches to deliver the best-always connected experience.

The co-existence of private LTE and 5G is another area enterprises will be focusing on to get ultra-low latency and incredibly high bandwidth connections, supporting numerous AI and IoT-based applications. The process of service continuity needs to be streamlined.

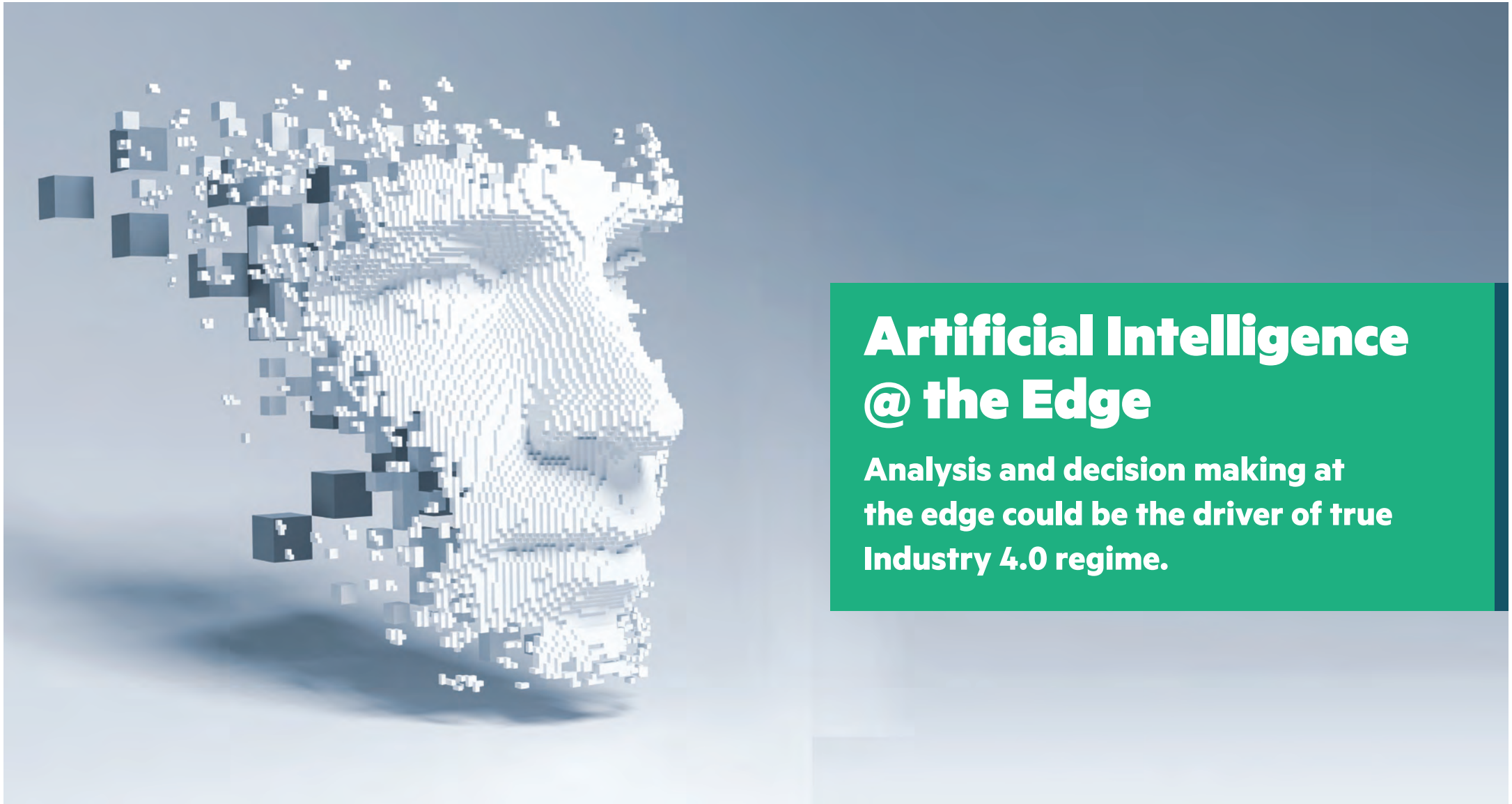
Developing a winning 5G ecosystem would require stakeholders to work together to identify relevant use cases. The government has a significant role in taking 5G technology benefits to the rural area. A collaborative approach can ensure that agriculture, education, medical, and healthcare sectors immensely benefit and leverage 5G for resource availability even in the remotest areas ■

Vivek Dixit
VP & Head (Packet Core & IoT),
Reliance Jio Infocomm

"A well-defined roadmap, policies, and infrastructure development efforts are needed to create a winning 5G ecosystem."

“When wireless is fully applied, the earth will be converted into a huge brain, capable of response in every one of its parts.”

—Nikola Tesla, Engineer and Scientist, known for designing the alternating-current (AC) electric system



Artificial Intelligence @ the Edge

Analysis and decision making at the edge could be the driver of true Industry 4.0 regime.

AUTHORS

AI across the value chain

AMAL KRISHNA
GM - IT
ONGC

Enabling excellence @ speed

AMIT SHUKLA
Group CIO
Kirloskar Brothers Ltd.

AI can transform pharma!

ANJANI KUMAR
CIO
Strides Pharma

Context is king

ATANU PRAMANIC
Joint President & CIO
Hindalco

Need for upskill!

MAITREY MODHA
Head - ICT Technology,
CNH Industrial India

Have confidence, will win!

PK JHA
CGM
SAIL

A good number of use cases

PRASAD BADIWALE
Joint President
Birla Management Centre
Services Ltd.

Automotive: Compelling use cases

PRATAP PAT JOSHI
CIO
Mercedes Benz India

AI @ the Edge for semiconductor industry

SUBRAT KUMAR KANUNGO
Director & Head - IT
Samsung Semiconductors

KRISHNAN V
CDO & CIO,
Titan Company

Moderator

SHYAMANUJA DAS
Editorial Director, B2B Tech
9.9 Group

AI at Edge

Rapidly increasingly computing capability, development of new algorithms and approaches that improve accuracy of ML-based applications, greater data capturing ability in the form of inexpensive sensors, and creation of software that make building and training ML applications substantially easier are some of the reasons that are driving greater adoption of AI and ML.

Two other factors often get overlooked.

- A reduction in cost, and increase in performance, of chips doing AI inference "at the edge"
- The development of middleware allowing a broader range of applications to run seamlessly on a wider variety of chips

These two are especially driving adoption of AI by manufacturing industry.

This leads to all new AI model that is tailor fit for what is to come, which is

- **Build & Train:** Which will continue on ever more powerful compute at datacenter or cloud.
- **Inference:** Inferencing will perform at the edge

AI @ The Edge

The edge is the new evolution of AI technology because of the physical constraints, the cost constraints, and the practical constraints of running all AI applications in the data center or cloud. It simply doesn't make sense to send the end data sets for things like video and audio streaming to the central location and back down for every situation, every endpoint.

There isn't enough bandwidth in the world to transmit everyone's images to the central hyperscale systems, have it interpreted, and the result sent back. In doing so you would break the internet. So "AI at Edge" is way to go.

Across the globe many AI tools are helping manufacturing industries to solve their problems to improve efficiencies and faster go to market. During our discussions, panel identified few application areas where AI at Edge can play critical role.

- Quality Control and Audit
- Production planning
- Maintenance
- Customer experience
- Safety and compliance
- Retail
- Supply chain

To accomplish the above application areas and to support existing investments organizations are creating concept of "Edge Framework". Under the edge framework the thought process is around standardization across plethora of de-separate OT systems, horizontal and vertical integrations (IT and OT), security and along with that it limits the dependencies of transporting larger data sets and capabilities of compute to inference right there right then with limited dependencies.

Key takeaways during the discussions that helped evolve to a framework to proceed were based on few fundamentals:

- **Digital framework journey:** In this approach, it is important to understand various data sources which are sitting at the edge of an enterprise and then creating framework to bringing these data sources to a central single source of truth.
- **Standardization:** Very critical aspect for data capture, storage, and with API based data exchanges for scaling. Open standard based architecture is need of hour.
- **Proven models:** Following proven model like Purdue Model for integrating with various plant assets and following journey of edge to cloud.
- **Process optimization:** Data lifecycle management, governance, data access and security framework.

There isn't enough bandwidth in the world to transmit everyone's images to the central hyperscale systems, have it interpreted, and the result sent back. In doing so you would break the internet. So "AI at Edge" is way to go.

Daljeet Singh
Country Solutions & Business Development Lead, Industrial IoT
HPE India

Nilotpal Kumar Datta
Director & Country Manager,
HPE GreenLake Cloud Services

Discussions around Industry 4.0 began quite some time back. Some progress was made in terms of implementing isolated IoT solutions. However, the full-fledged move to smart factories have still remained largely as discussions.

A few factors seem to be changing that state finally. With the large-scale digitization boost that manufacturing industry got in the wake of the pandemic also had its impact. Compelling industrial applications in the area of plan efficiency, better quality production, plant safety have finally caught the attention of the manufacturing system owners. With many such use cases, that require low latency, have created a demand for edge computing, it is the imminent advent of 5G that has finally set the ball rolling. Innovative commercial solutions by vendors have tried to catalyze the move.

IoT-enabled Artificial Intelligence (AI) at the edge is still at a nascent stage with many organizations deploying it to achieve specific business outcomes. Broader, horizontal solutions are yet to make their presence felt as the industry is grappling with a range of issues, such as inter-operability, standards, security, and compliance.

AI at the edge is enabling IT to offload data processing to different layers in the enterprise architecture such as Cloud, central data center and to the edge. As data explodes with IoT enablement, this approach helps data management and processing, conserves bandwidth and expedites outcomes in business processes. Specifically, fleet tracking, asset tracking, precision cutting of metal sheets, autonomous vehicles, warehousing and inventory management, all of which have embedded chips and provide real-time inputs, have enabled to offload network bandwidth to deliver enormous business impacts.

Some areas where businesses have benefitted with edge AI include quality control and audits; maintenance of systems and industrial equipment; achieving safety and compliance requirements; enhancing production and yield on the shop floor; enhancing customer experience; managing supply chain (logistics/transportation); and boosting retail sales.

Most of these activities depend on real-time data to deliver meaningful outcomes and the latency associated with Cloud Computing hampers deployment. Edge computing combines compute, networking, and other resources with IoT devices to create a framework that works in a rugged environment. Also, embedded chips and IoT sensors require less memory and power compared to traditional GPUs and other integrated circuit and can easily be deployed at the edge where network and infrastructure are not always available.

Existing infrastructure do not support the business needs to process data at the edge and so much of these IoT deployments are working in some sort of silos. At the same time, deploying edge AI in the Cloud is inherently flawed as the time lag for data transit between device and Cloud and back again gives rise to latency which is not suitable in scenarios that require decision-making at high speed. Not to mention Cloud-based AI becomes a hugely expensive proposition, given the volume of IoT data that is being generated.

The industry needs an operational edge architecture which addresses the needs of digitalization and offers a framework that can abstract edge compute, leverages DevOps and containers, supports different security standards and latest connectivity options, such as Wi-Fi 6, 5G, etc.

Successful use cases have overcome implementation barriers and achieved high impact business outcomes. HPE and Mercedes Benz have collaborated to help the F1 Team of Mercedes- AMG Petronas Motorsport achieve high performance in the racing track using millions of data points to power its drivers, delivering an average improvement of 2 seconds per season with continuous improvements in design implementations.

Texmark is modernizing chemical plants with IoT technologies to achieve new levels of automation, worker safety, monitor facilities, predictive maintenance, using computer vision, remote guidance and augmented reality. Results are evident in improved uptime and lower maintenance costs; enhanced employee safety and equips employees to focus on delivering value instead of getting mired in operational nitty gritty.

Challenges in Implementing AI on the Edge

AI running autonomously on the edge has enormous potential in business applications and is already showing promising results. Yet it is not a silver bullet, and running deep learning technologies in real-world environment with inconsistent data inputs and bandwidth constraints has many challenges and clearly, the industry is still figuring out strategies to create impact at scale.

Some common challenges that AI on the edge implementations are faced with include the following:

Security: The distributed nature of edge computing increases the surface area and makes security that much more challenging to implement, manage and monitor. Although information is stored locally but a number of devices operating simultaneously and independently are difficult to secure and monitor. Primarily the challenge relates to defining security policies as devices are context, application and user dependent. The edge vendor can help secure the local network by ensuring native data encryption of edge devices and providing hardened equipment to protect chips from changes in temperature, dust and humidity. Apart from physical security, logical security at the application and data layer must be implemented.

Integration of IT and IoT: Integrating of IT and IoT layer gives rise to interoperability issues wherein proprietary devices may not be able to connect amongst each other, back-end IT systems which host legacy systems may not be compatible with new standards used in edge devices. Integration challenges also relate to security and data integration as the IoT infrastructure is an amalgamation of sensors, gateways, hardware, and application software, it makes the entire IT system vulnerable to security breaches, and harvesting data from thousands of sensors has its own set of challenges.

Lack of quality data: As enterprises continue to grapple with copious amounts of data streaming in from disparate sensors and devices, cleaning and scrubbing data sets by eliminating unusable or repetitive data is hugely challenging. Organizations are struggling to ingest, normalize, align, and then use data for actionable insights. Getting this right is critical as poor quality or insufficient data inputs will result in poorly trained data models. Edge-based IoT solutions move computing closer to where data is generated and address the issue of data quality but ensuring sufficient computing power for processing is challenging.

In general, API-based IoT networks make it easier for smart devices to communicate and reduce data discrepancies.

Lack of skill set availability: As with all emerging technologies, there is a gap in availability of skill sets and demand. Only 47% of survey respondents in a 2019 Microsoft IoT Signals Report believed that the market had individuals for the necessary IoT jobs. Along with IoT-enabled AI implementations, businesses must also upskill employees in new technologies.

Unrealistic expectations: Setting the right level of expectation amongst stakeholders is important, especially since these are new technology areas and AI initiatives are wading into uncharted territories. Sometimes there may be set-backs but this must be taken as the learning curve, and AI program must be robust enough not to get hindered by temporary pauses.

Cultural barriers: It is important to create an awareness program and educate all stakeholders. Sometimes, employees resist new technologies as they perceive job loss; are wary of relinquishing control and not ready to embrace a new way of doing things. Different teams must come together to facilitate IT & IoT integration. With multiple third-party people involved in the initiative, absence of cooperation will make it falter and even fail.

Some areas where businesses have benefitted with edge AI include quality control and audits; maintenance of systems and industrial equipment; achieving safety and compliance requirements; enhancing production and yield on the shop floor; enhancing customer experience; managing supply chain (logistics/transportation); and boosting retail sales.

Next Steps

Employing AI at the edge brings many benefits that extend well beyond efficiency improvements, opening doors to new business opportunities. Taking the correct first steps are important to build confidence and give a fillip to the edge AI initiative. Below we summarize the learnings from early adopters.

Ask the right questions: Knowing what you want to achieve with AI is really important. For example, many manufacturers hit a glass ceiling in process optimization and some inefficiencies do not have any obvious cause and this is where AI can help with inputs such as automated root cause analysis.

Once the use case for AI is identified, it provides important clues for the direction and strategies to employ. Considering that AI implementations are essentially point solutions, identifying use cases become critical in decisions regarding tools, technology and architecture and the kind of challenges to expect.

Above all, AI effort must be clearly linked to clear business targets, giving business units and functions a joint interest in making the transformation successful.

Start small, prove the value: Select small projects where you can demonstrate the value, showcase the ROI, and get the buy in of stakeholders. When prioritizing use cases, companies should take into account the feasibility and time to value and critical factors such as the competitive advantages associated with decreased time. As the team acquires experience and expertise, use cases that are difficult to implement can be taken up.

While the ultimate goal should be to build horizontal solutions to the extent possible, it is imperative to demonstrate successful solutions in somewhat narrow contexts. When you achieve something concrete, it becomes easy to bring on complex projects with critical business impacts and accelerate the AI journey.

Talent strategy: The AI initiative will run into roadblock without a well-laid out talent development strategy aided by a Center of Excellence to groom employees with training, define common standards and build a central repository for best practices and knowledge.

The CoE must comprise people from different domains including business and operations, R&D, process and equipment engineers and team members play a critical role in identifying use cases and act as ambassadors for AI solutions within the organization.

Scalability: While designing use cases, it is important to keep scalability in mind from the beginning of the design phase. A critical aspect for ensuring wider impact is that the use case must seamlessly integrate into an end user's digitized workflows to ensure adoption.

Endnote

AI at the edge is increasingly becoming relevant for IT managers and operations managers as more sensors, cameras and automation comes into play with IoT at the edge. The launch of 5G will turn this compelling proposition to a reality.

Ultimately, the impact of AI initiatives on the edge will be judged from use cases wherein the system is able to process information in real-time and provide insights that impact business outcomes ■

Amal Krishna
GM - IT
ONGC

"Edge computing, instead of processing at remote data centers, has also helped us reduce carbon footprints."

AI across the value chain

The Oil and Gas industry is very technology intensive fraught with uncertainties and AI has been used to help overcome some of these challenges. The success of oil exploration lies in accurately characterizing the reservoir and advanced AI with Deep Learning capabilities is used to achieve this.

The most critical AI deployments are in the upstream segment as it is the most capital-intensive part with enormous number of uncertainties in each stage of discovery, identification and extraction. Whether it is sub-surface study of the Earth, reservoir engineering, drilling optimization and production enhancement, AI-based software assists humans in informed decision-making.

AI-based algorithms provide accurate and precise intelligence to guide drills on water and land and this helps in reducing risk of accidents, oil spills, fires, and enhances the rate of penetration. Due to the remoteness of the data sources or regulatory restrictions, it is not always possible to transport the data to the AI servers. In such scenarios, Edge AI provides the benefits of AI. However, Edge AI is still evolving and still not able to fully meet the requirements of intensive AI computing algorithms.

Aside from the challenges, AI is helping the Oil & Gas industry improve efficiencies by streamlining operations with predictive maintenance of equipment, better managed hazardous situations with advance recommendations and scheduling, minimize outages and root cause analysis. IoT-based sensors are enabling segregation of monitoring from controls; hence the security concerns are also addressed.

After extraction, AI and IoT further help to manage storage facilities which are sensitive to temperature and environmental conditions and prevent accidents due to corrosion of storage facilities. Edge computing, instead of processing at remote data centers, has also helped us reduce carbon footprints.

AI and other digital technologies have enabled the Oil & Gas Industry to take up the exploration and production of Hydrocarbons with renewed enthusiasm ■

Enabling excellence @ speed

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

We started our journey to leverage AI in business in 2008 wherein we started with a project for intelligent pump selection. It entailed a lot of investment, but it was a strategic vision 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 to help the 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. that will 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 will automatically pick 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 to be more efficient as it can compute far more variables and provide accurate design recommendations for enhance data analytics ■

Amit Shukla
Group CIO
Kirloskar Brothers Ltd.

"The AI engine has helped our engineers to be more efficient as it can compute far more variables and provide accurate design recommend-ations for enhance data analytics."

AI can transform pharma!

The effectiveness of its comparatively new digital adoption by the pharmaceuticals industry has been amply demonstrated while rushing to deliver cure & prevention for COVID.

The imperative for doing AI on the edge comes from practical needs, such as agility in response time, possibility of repurposing the drug, handling large volume of data, complex what-if analysis and finally finding the effective drug without compromising the patient safety, fulfilling compliance and privacy regulation from multiple compliance bodies across the globe.

Most of the data we have today has been generated in the last five years or so. An important consideration for most of the born analog companies are figuring out which data is real "oil" (DATA is new OIL) and which data is liability. The newer systems are designed keeping the usage of data layer.

MES coupled with IIoT, ERP and LIMS (Laboratory Information Management Systems) are major data generators for pharmaceutical manufacturing set up.

AI for visual inspection of tablets wherein each and every tablet is scanned for accuracy in shape, size, thickness and color, as opposed to the earlier practice of sample analysis. This requires great speed of execution where thousands of tablets are inspected per minute and doing this at edge makes sense. Golden batch and predicting manufacturing techniques are another similar example. "Review by Exception" for electronic batch record and even further automation of it using previous batch data for the same formulation is next set of automation in pharmaceutical industry.

It is also helping pharma companies to bring resiliency to the supply chain. Digital control tower concept has matured to the next level where supply of raw materials as well as finished goods could be synced with upcoming demand and capacity of the manufacturing plans using AI-based predictive solutions.

We strongly believe in Digitization and Data Democratization. Using Cloud-based data lake, a data concept is being worked out which will form the basis for most of the Analytics and AI/ML based solutions

Anjani Kumar
CIO
Strides Pharma

"Most of the data we have today has been generated in the last five years or so. An important consideration for most of the born analog companies are figuring out which data is real "oil" (DATA is new OIL) and which data is liability."

"With so much hype around the subject. it is difficult to assess the ROI but the key is to understand that AI is effective in the right context. The challenge is to identify the right context and use unique AI solutions to achieve specific business objectives."

Atanu Pramanic
Joint President & CIO
Hindalco

Context is king

During initial exploration of leveraging data in real-time in early 2019, telcos made a hard pitch for storage in the Cloud or third-party data centers. But, latency challenges crippled some of the initiatives and AI on the edge was found to be a better available option. For example, visual inspection of products is simply not possible to do when data is not accessible locally. Therefore, from a practical perspective, AI on the edge is the preferred solution for many of the things which requires real-time data processing.

In some areas where AI is adopted includes visual inspection in the production line for quality purposes, video-based visual identification to ensure safety of employees on the production floor and facial recognition for employee attendance. All these use cases require very high response time and so AI on the edge is the ideal solution. Deploying AI in quality control reduces the margin for human error and also it is done on a continuous basis.

Ensuring employee safety within the manufacturing premises is a very challenging area to monitor and manage & we have found AI-powered cameras to be immensely helpful. Software monitors through camera feed and alerts if people are detected in no zone areas such as highly magnetic areas and keeps a check for compliance if people are wearing proper PPE kits for personal safety.

However, deployment of AI at scale is still a discussion across the Group. With so much hype around the subject, it is difficult to assess the ROI but the key is to understand that AI is effective in the right context. The challenge is to identify the right context and use unique AI solutions to achieve specific business objectives ■

Maitrey Modha
Head - ICT Technology,
CNH Industrial India

"To effectively harness AI at the edge, manpower availability and training are important, we must upskill employees and ensure the organization is sufficiently equipped to cope with new technology and services to manage day-to-day operations."

Need for upskill!

It is important to have a basic underlying infrastructure that supports automation. And this is where the integration of IT and IoT becomes critical. While integration is one issue, there is also the challenge of security. There is a thin line of demarcation between IT and IoT and this is where security gets dropped as IoT exposes the enterprise and significantly increases vulnerability to attacks.

Quality inspection and assurance; manufacturing process optimization are some of the use cases where we use edge computing.

We use AI in critical areas in manufacturing to achieve accuracy and precision. For example, the dimension of a large equipment has to be robust as there should be no component failure, failure is not an option at a construction site where machine is used in rugged environment. So right from material intake, we employ visual inspections and material input is also checked via pre-defined algorithms as human eye cannot check the entire sheet and AI visual inspection is more precise.

We use robotic machines with intelligent algorithms for precision in cutting the raw material to minimize wastage. Robots are used for welding and quality inspection to assure defect-free product. Lot of automation and intelligence is used for raw material input and manufacturing process.

Agricultural equipment is exposed to harsh weather conditions and so we employ AI visual application for paint application to detect differences in texture, shade, thickness. Paint inspection is a specialized job and requires experience and AI helps to ensure consistent quality. Lot of edge computing is there – for fast decision making, so selection and rejection has to be instantaneous.

To effectively harness AI at the edge, manpower availability and training are important, we must upskill employees and ensure the organization is sufficiently equipped to cope with new technology and services to manage day-to-day operations ■

Have confidence, will win!

AI is making rapid inroads into the steel industry and the industry is witnessing a range of benefits achieving efficiencies in production, enhancing quality of output, predicting maintenance and cost savings.

One of the challenges in AI deployment in the steel industry is data collection, storage and scrubbing data for the desired quality. Steel companies install sensors across systems and processes to collect data and train the algorithms, so data preparation is a crucial part to create a reliable framework of reference.

There is high degree of complexity in steel making with numerous stages such as blast furnace which produces molten iron, SMS converts iron into steel of desired quality in the form of slabs, blooms and billets which are further processed for end use. During these processes, there is a lot of variability such as the quality of material inputs and various operational parameters which has impact on quality of output. Using AI during these processes can ensure better control for compliance, quality and safety of people and equipment.

SAIL is the sole supplier of Rails for Indian Railways for which we have to meet very stringent quality specifications and we are moving forward for harnessing AI and analytics to achieve key strategic goals.

It is challenging to build the infrastructure for Industry 4.0 particularly where old technology is in use and the cost and timeline for their replacement is huge. However, the most important thing is to have the confidence in using the technology for short and long-term goals. Security and compliance must also be ensured effectively while collecting and processing data.

Another area where AI has tremendous scope is the maintenance of equipment as the cost of failure is huge in steel-making plants. AI and Industry 4.0 will help us to reduce/mitigate certain risks for which we need to figure out ways to collaborate with industry partners; select those with best and relevant competencies. Despite the challenges, the direction is very clear that we have to embrace new technologies to survive and thrive in the industry ■

PK Jha
CGM
SAIL

"It is challenging to build the infrastructure for Industry 4.0 particularly where old technology is in use and the cost and timeline for their replacement is huge. However, the most important thing is to have the confidence in using the technology for short and long-term goals."

A good number of use cases

Prasad Badiwale
Joint President
Birla Management Centre Services Ltd.

We started the AI initiative within the Group about four years back and developed a number of use cases which is working very well.

One of the challenges we face in deploying AI at the edge is the quality of data as we are collecting it from multiple sources and sensors installed across processes and data has to be trained from historical data to make sense for the algorithms to deliver desired results but when quality of data is poor or there are changes in the system and deviations in data, the models become inconsistent. So, we have learnt that data preparation is a crucial input into the system.

One of the major AI implementations is VEDA – Video Enabled Decisions and Alerts– for security purposes to recognize employees by identifying them through face analysis, mark attendance and monitor presence on the floor. As we work with a lot of contract employees and during shift changes, employees entering and leaving happens simultaneously, it is difficult to keep track of employees and AI based facial recognition works well. We have also deployed computer vision techniques to monitor safety of employees and it has enabled us to minimize accidents.

Initially, we tried to bring data to a central data center and even deployed links with high speed but even then, there was a lot of latency, so we built edge infra within factory which gives much faster speeds and overall results are far superior. Where camera and video analysis are required edge is the things to do but where data is not going in a stream it is perfectly okay to have offsite data. For example, we have built an AI solution to identify the shortest route and reduce logistics cost. But in this case, we don't need edge ■

"One of the major AI implementations is VEDA – Video Enabled Decisions and Alerts– for security purposes to recognize employees by identifying them through face analysis, mark attendance and monitor presence on the floor."

"As the industry gears up to embrace a new generation of autonomous and semi-autonomous cars, investing in hi-tech is hardly a choice."

Pratap Pat Joshi
CIO
Mercedes Benz India

Automotive: Compelling use cases

The automobile industry has long been investing in advanced technology including AI and high-performance computing. As the industry gears up to embrace a new generation of autonomous and semi-autonomous cars, investing in hi-tech is hardly a choice.

Amongst other applications area, a widely adopted use case has been the M2M deployment for connected vehicles to gather information about the vehicle for predictive maintenance and to get insights into design, performance enhancements and safety of riders. Advanced driver-assist features, powered by AI systems, alert drivers about hazardous road conditions, monitor blind spots in the driver's view, assist with steering, and take automated actions to help vehicles avoid accidents and dangerous situations.

Recently, one of the most exciting use cases has resulted in the Mercedes Benz-AMG Petronas Formula One Team winning the F1 racing season in March 2021 beating the season's favorite by a mere fraction of a second. Employing a mix of edge-computing, analytics and sensor technologies, the Mercedes F1 team crunched millions of data points on every car and driver in the run up to the competition and continued even as the contest got underway to adapt the data and continuously enhance performance.

We are using deep learning algorithms to enhance the quality of core design and execution systems, hydraulic engine by collating a wide range of data including data on fuel consumption and evaluating hundreds of parameters on a continuous basis. We also employ visual inspection of cars for superior finish such as painted car bodies which is a highly specialized field and AI helps to detect differences in texture, shade, thickness ■

Subrat Kumar Kanungo
Director & Head - IT
Samsung Semiconductors

AI @ the Edge for semiconductor industry

One of the most critical areas where Semiconductor companies deploy AI is in manufacturing, in order to increase the yield in fabrication. All new generation process (nm) technology manufacturing constitutes major chunk of capital in fab equipment, and AI in this equipment is helping enhance the yield to improve cost efficiencies.

Companies use sensor data such as electric currents in the etching process, light intensity in lithography and temperatures in baking to achieve greater accuracy in production. The models thus generated reduce processing time to optimize production and improve yield. AI is also helping enhance the yield by automatically detecting defects on wafers.

Leading semiconductor companies have started using AI during the design phase, as well, to eliminate defects at an early stage and reduce the number of iterations to accelerate the development process and time-to-market.

AI at the edge needs careful design considerations. Any AI application that is sensitive to latency and requires high speed of response is a fit case for edge processing, either at the Access Edge or Aggregation Edge. Whereas AI applications that are relatively more tolerant towards latency and speed of response could safely be processed from the Enterprise's Regional Cloud Hosted Zone or its Central DC Zone.

Data ingestion and its processing, more for unstructured than structured, play critical decision-making points for setting up a unified control plane architecture for Compute, Storage and Network due to big data characteristics. This helps in the data preparation which is critical to provide high quality data to train intelligent models, otherwise outcomes may not deliver trustworthy results.

Security plays an important consideration for edge and hence deployment of security components could correlate directly with the topological (network) architecture and technology (connectivity) deployed for edge scenarios ■

"AI at the edge needs careful design considerations. Any AI application that is sensitive to latency and requires high speed of response is a fit case for edge processing, either at the Access Edge or Aggregation Edge."

“To me, the edge is the next frontier. It is easier to move the cloud to where the data is, not the data to where the cloud is. It is just economics and physics.”

—Antonio Neri, CEO, HPE

Application Modernization

In an apps driven economy, accelerated by rapid digitization post pandemic, application modernization gives organization the flexibility to respond to market changes quickly. But it must be done right.

AUTHORS

Anything that does not meet with business needs is legacy

AMOL PAI
CTO
State Bank of India

Binding experience & operations seamlessly

DEEPAK BHOSALE
GM - IT
Asian Paints

Shareable services through API should precede modernization

KERSI TAVADIA
CIO
BSE

Not an 'if', but 'when'

KRC MURTY
Senior VP - Head of RTB and PMO (IT),
Kotak Mahindra Bank

Long term needs should dictate modernization

PHIROZE VANDREWALA
CTO
Yes Bank

Business process must go hand in hand!

SRINIVASA RAO MUPPANENI
Group CIO
Telangana State Cooperative Banks

It's all about user experience!

SUPRIYA DATTA
Consultant at NSEIT / Ex-Sr. VP at NSE

Moderator

SACHIN MHASHILKAR
Executive Director,
B2B Tech
9.9 Group

Application modernization in motion

To capitalize on the advantages of the cloud experience, companies are grappling with complex modernization strategies that offer many possible paths. Companies need to weigh whether to create cloud-native systems or transform non-cloud native apps without rearchitecting, all with the goal of building applications once – so they can be deployed anywhere and in any model as business requirements change.

The key factors that enable a cost-effective and accelerated application transformation should include:

- **Strategy -** for Application evaluation and preparation for modernization
- **Technology choices -** Single Platform for cloud-native and non-cloud-native apps
- **Focus on data driven transformation -** Easy connections to data, specially meeting persistent storage for stateful apps
- **Security -** Enterprise-grade security and control
- **Cloud dynamics -** for economics, scalability, ease of use and management
- **Cultural issues -** Organizations need champions at both the executive and grassroots level to foster the cultural change necessary for advancing next-level digital transformation and modernization.
- **Making the transition -** moving from pilot to production

The need to make application modernization a continuous and steady strategy is important, and organizations need to ensure that their technology stack helps them to provide the right mix for of modernization strategy, mapping applications to business services and identifying SLA, compliance, and latency requirements as well as the workload's relationship to core business needs. Considering services that help determine the best endpoint for applications using automation and a data-driven approach can help identify potential first-mover applications and accelerate overall migration.

Determining where data resides and data dependencies in pursuit of an intelligent data environment provides frictionless access to data as part of a cloud-like experience. Throughout this exercise, organizations need to address key governance and lifecycle management issues while offering seamless data access across a hybrid and multi-cloud landscape.

Evaluating organizational IT talent bench to identify key competency gaps, shoring up expertise through upskilling and reskilling of internal employees along with targeted hiring is important. Partners and consultants can also deliver the requisite competencies and skills at critical junctures as short-term capacity, which can be more cost-effective than investing in expensive full-time resources.

In summary, application modernization is the arrowhead for digital enterprises of tomorrow and now it the time to start the journey!

The need to make application modernization a continuous and steady strategy is important, and organizations need to ensure that their technology stack helps them to provide the right mix for of modernization strategy.

Devika Nayyar
Country Manager - BFSI
HPE India

Ranganath Sadasiva
CTO
HPE India

The imperative for digital transformation has been made stark by the COVID pandemic which showed that digitally transformed organizations and cloud-native businesses were better prepared to navigate the crisis. The pandemic came as a wake-up call to have responsive systems and processes and importance of adaptability for survival.

Businesses processes are supported by applications and IT systems which must evolve as processes mature and scale as organizations expand and add new lines of business. At the same time, the rapidly changing external environment calls for a high level of agility as new players jump into fray with disruptive business models.

Monolithic applications are not equipped to respond to dynamic conditions or scale at speed to keep pace with growth. Therefore, application modernization is no longer a choice and organizations are urgently undertaking modernizing initiatives. According to IDC's 2020 APEJ Enterprise Services Sourcing Survey, most enterprises in APEJ indicated no spending cuts or plan to increase spending on modernizing legacy applications.

What Exactly is Application Modernization

Is it the same as digital modernization? What does IT modernization mean? These are interesting and overlapping questions worth exploring to get a grip on what the organization wants to achieve. It helps to plan the budget, develop a strategic roadmap, source required skillsets and design and implement initiatives with measured outcomes.

Digital modernization entails upgrading existing systems and processes with new technology to streamline business operations and create new customer experiences while IT modernization is the engine which propels digital modernization by leveraging extensive automation; Cloud and mobile-first approaches.

These overlapping initiatives are brought to fruition with application modernization and calls for a comprehensive approach. It may start off as a need or desire to upgrade the application with new capabilities but equally important to consider whether the operating environment can support those capabilities and how effective the outcome will be if application modernization is approached as a stand-alone initiative.

Therefore, application modernization must be accompanied by business, process, digital and IT modernization. It is not just about rewriting software code but a collaborative approach wherein systems architecture, security and IT infrastructure teams work in unison to fulfill shared goals.

Often these goals are the very basis of the modernization initiative. Such as the imperative to enhance customer experience; achieve agility, scalability, security and compliance requirements. Agility to launch new products and services at speed; scalability to support business growth and expansion; elasticity to weather business unpredictability, and strengthening the security with code-based automation and advanced monitoring tools.

A digital transformed organization with modern applications and systems becomes agile with adaptive capabilities and design architectures that empower with built-in resilience and responsive capabilities. Underlined by DevOps practices, modern applications leverage a microservices architecture and propelled by advanced technologies such as containers and serverless.

But application modernization is not just about technical upgrade—it requires transformation of everything it touches from technology, tooling, architecture, business processes, and organizational structure. A central monitoring office such as a PMO must plan, manage and implement the application modernizing initiative within the organization.

Meticulous planning in consultation with business leaders and other stakeholders for short-term gains and long-term sustainability keeping organizational needs and selecting the right technology is important as there is business risk and disruption with frequent changes.

The Right Start Goes a Long Way

Selecting the right set of applications to modernize is crucial as it sets the pace and becomes the fulcrum of success. Given that the existing systems and processes are up and running on monolithic applications it does not make sense to rip them all apart. Instead, a careful and through assessment of the IT environment taking into account application complexities and dependencies and which ones can be easily modernized is desirable.

Apart from technology assessment, mapping it with business considerations such as which applications are most business-critical and which ones can have the most

far-reaching impact should be considered. One practical approach while assessing the application portfolio is to keep a karma score of each application to understand how much is being used, how much value it is delivering, and how much more value can be extracted when the application is enhanced with a modern flavor.

Business goals have a critical influence in selecting technology and tools. Identifying business needs such as scalability, elasticity, high availability, reliability, you can select the hosting environment—corporate datacenter, public cloud or private cloud—the architecture, tools and technologies. The kind of architecture and tools you use becomes a key determinant for successful modernization.

Customer Experience Drives App Modernization

Customer service is the foundation of businesses yet too often organizations lose sight and take decisions based on other considerations. A key driver for application modernization is enhancing customer satisfaction, increasing engagement and anticipating customer need. Digital native organizations are already setting the pace and organizations relying on traditional IT are rapidly adopting modernization initiatives.

Serving customers across the spectrum requires different technologies and flexibility as serving rural customers who have basic connectivity is different from serving urban customers. It also entails inherent unpredictability and modern applications have capabilities to be flexible, scalable and responsive to allow frequent changes.

Addressing the needs of millennials and responding to changing environment arising from COVID pandemic pushed organizations to embark on modernization as legacy systems do not accord the agility and flexibility to support new business and customer initiatives. Finding new ways of engagement forced many organizations to migrate applications to modern environments and re-platform and refactor them to leverage scalability and flexibility in a secure manner.

Millennials are key influencers to embark on new business initiatives—different modes of engagement, new products and services and modern applications help with inherent agility and flexibility and provide more visibility into customer touch points. At the same time, modern applications trigger new business opportunities with innovative approaches such as aggregating services around the core offering; and offering subscription-based services. This is possible as modern applications expose APIs allowing third parties to integrate and build new services. These services operate independently with inherent scalability and flexibility.

Enabling Technology Facilitate Application Modernization

Different cloud platforms offer a range of services with pay-as-you-go model, advanced automation, including managed services to eliminate routine administrative tasks. This makes deployments easy with code-based standardized environments. Automating build and deploy processes are ushering in new paradigms in development eliminating the hassles of manual testing and long wait times for releases collapsing the time from code to release, making processes agile.

Security is deemed integral to the development process with DevSecOps and helps to unleash high quality

Application modernization must be accompanied by business, process, digital and IT modernization. It is not just about rewriting software code but a collaborative approach wherein systems architecture, security and IT infrastructure teams work in unison to fulfill shared goals

application code at speed by tightly integrating coding, testing, security and deployment into the fabric of organizational processes.

Advanced technologies such as containers and serverless along with micro-services are accelerating the time-to-market, allowing developers to focus on the code and not worry about underlying infrastructure. Advanced technologies such as serverless and containers offered as a service, application manageability and performance is getting a significant boost. For example, Amazon Web Services has AWS Lambda, AWS Elastic Kubernetes Service, AWS Elastic Container Service, AWS Fargate, while Google offers Google Kubernetes Engine and Microsoft Azure Kubernetes Services.

One of the outcomes of application modernization is that organizations are spawning massive amounts of data and challenged to provision storage in traditional environments while Cloud's scalable and cost-effective storage facilities come to the rescue to usher in a new paradigm of data storage and usage.

The need for increased security is driving application modernization by providing more visibility and transparency, facilitating governance and strengthening security with increased automation. This includes codifying infrastructure, log tracing, role-based access to resources, data encryption at rest and transit, network security groups and VPNs aiding and supporting application modernization initiatives.

Challenges in Application Modernization

The application modernization journey is challenging as it requires meticulous planning. Based on the experience of our panelists, five key areas have been identified. This includes the following.

CIOs have to tread the fine balance between executing the modernization journey while ensuring business operations are up and running on monolithic applications.

Junking everything and moving to the Cloud is not an option since much of the infrastructure and systems are working, so it is important to modernize the existing data center and ensure applications which cannot be migrated are running well with some modernization efforts in the existing data center.

Application modernization is not just about technical upgrade—it requires transformation of everything it touches from technology, tooling, architecture, business processes, and organizational structure. A central monitoring office such as a PMO must plan, manage and implement the application modernizing initiative within the organization

A third challenge relates to setting up disaster recovery along with business continuity, and ensuring modernization encompasses DR and BC in a cost-effective and viable manner becomes a key result area.

Modernization is not cheap but the challenge is to keep costs under control. A typical scenario in the Cloud where anyone can spin up virtual machines and forget to shut the VM when not in use results in costs spiraling out of control.

Ensuring that you find the requisite skill sets—both in-house and external partner. Careful partner selection is critical to leverage the experience and knowledge and have a trusted advisor by your side who understands business needs and can help align appropriate technologies ■

Amol Pai
CTO
State Bank of India

Anything that does not meet with business needs is legacy

Application modernization is being driven by two factors—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 with business need is legacy. 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. 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 up 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 ■

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

Binding experience & operations seamlessly

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 revenue. 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 eco-system 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 touchpoints.

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 upon our service offerings. We do 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 ■

Deepak Bhosale
GM - IT
Asian Paints

"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."

Shareable services through API should precede modernization

Modernization is a business initiative and is accompanied by application modernization to support those processes. Rationalize the services that exist within the organization and create a common set of services that everyone can use. For example, take the case of simple SMS service which is so critical in trading and financial services. Earlier, each department had tied up with separate gateway service provider. Now we have built an internal app, which sends to the gateway and ties up with several vendors, so each department can access many providers. Similarly, for verification via PAN and Aadhaar card, we have made the APIs available, so all departments have access to a common repository.

Modernization must be preceded by a mindset to set up a common set of sharable services, to make services extensible by exposing APIs. However good a process may be, it is important to let go as the processes are embedded in legacy systems which does not provide the scalability and agility of modern systems.

At the implementation level, app modernization is not just about rewriting software code as everything is software defined. It is not just about writing the code of an application but also where it will reside, which environment it will be placed and the ecosystem it will interact will impact the performance it will deliver. At BSE, we started off with a software application group but since app modernization requires complete architecture modernization and you are talking about so many things, we soon rechristened it as software architecture group ■

Kersi Tavadia
CIO
BSE

"It is not just about writing the code of an application but also where it will reside, which environment it will be placed and the ecosystem it will interact will impact the performance it will deliver."

"You must combine the experience of legacy with modernization efforts as a lot of learning and experience is associated with legacy and it must be blended with a practical approach to create new service offerings for the millennials."

KRC Murty
Senior Vice President - Head of RTB and PMO (IT),
Kotak Mahindra Bank

Not an 'if', but 'when'

Application modernization is a double-edged sword as you have to understand why you are doing what and make the right choices at every point. A primary driver for application modernization is to serve the millennials and you have to think like a millennial to be able to do that. But that does not mean that everything in legacy is bad and you must rip and replace everything.

Legacy seems to have a negative connotation but you must remember that all applications and business functions are tied to the core which is monolithic. While modernizing applications, it is important not to disrupt existing systems and processes that are functioning well and therefore, modernization efforts must be rooted in an understanding of what comprises digital transformation.

You must combine the experience of legacy with modernization efforts as a lot of learning and experience is associated with legacy and it must be blended with a practical approach to create new service offerings for the millennials.

Another important aspect in the modernization journey is the careful selection of technologies and systems. It is important to understand the demands of the millennials and select tools that will enable to best meet those needs.

For dynamic organizations, application modernization is no longer a question of "if" but "when and how". Top management believes in the value of modernization and there is pressure to deliver and the CIO is in the spotlight to ensure modernization efforts take off well and demonstrate quick benefits, so there is no scope for failure or hiccups on the way ■

Phiroze Vandrewala
CTO
Yes Bank

Long term needs should dictate modernization

"An important aspect of modernization journey is to consider disaster recovery and business continuity as integral of strategy and the organization must design and implement DR plans in conjunction with application and infrastructure modernization."

Application modernization is a continuous journey of evaluating needs and designing an appropriate strategy. At the very basic level, one has to carefully choose the building blocks to lay the foundation of a robust, reliable framework for digitalization.

Choosing the application transformation journey is another tricky area as deciding what is legacy is a funny thing. It is a holistic assessment of the existing IT environment, selecting which applications are in use and which ones are adding business value. Keeping long-term organizational needs and selecting the right technology for the core is important as there is business risk and disruption with frequent changes.

Applications in banking are historically monolithic and folded into the core but there is increasing pressure to have agile systems to cater to an expanding profile of consumers. The need of the hour is to use advanced technology practices such as service-oriented architecture and leverage containers and go serverless to tap into the banking system of records and offer new services in an agile manner while creating an environment where we are able to deliver high performance and consistent customer experience.

An important aspect of modernization journey is to consider disaster recovery and business continuity as integral of strategy and the organization must design and implement DR plans in conjunction with application and infrastructure modernization with a comprehensive approach that considers all aspects including re-factoring, re-hosting and re-platforming. The third aspect of the modernization journey is to identify the right set of technology and implementation partners to help achieve the over-arching goals of scalability, reliability, redundancy, and recoverability in a smooth and cost-effective manner ■

Business process must go hand in hand!

The banking sector operates in a highly regulated environment, so application modernization is important for us to keep pace with changes. Yet we must keep pace with evolving customer needs and stakeholders. When operating in a sector that caters largely to rural population, the demands, and challenges are different from others in the industry. For instance, we need to keep network connectivity in mind when we cater to branches in remote areas where there are no leased lines or broadband and bank employees connect to the Internet through mobile phone networks. Security is another important consideration while operating under extreme conditions.

As an apex cooperative bank, we have 24 banks under us with a total of 834 branches and 3,500 cooperative institutions—all of which are independent but operate under our umbrella.

Over the last 10 years or so, we have embarked on the modernization journey but the sudden onset of the pandemic was a huge disruption in our operations. Yet we had to make basic banking services available to customers. We took this as an opportunity to migrate our core banking solution, instituted robust security solutions, moved away from legacy applications and used a lot of open source systems and modernized a lot of infrastructure. While planning modernization, one must plan for business continuity and disaster recovery and it is important to ensure that they are on the same platform.

An important aspect in application modernization is that business processes must go hand-in-hand. Recently, the Telangana government transferred agricultural input credits and people received SMS well before the transfer was done and this created a panic amongst customers who had not yet received ■

Srinivasa Rao Muppaneni
Group CIO
Telangana State Cooperative Banks

"With so much hype around the subject, it is difficult to assess the ROI but the key is to understand that AI is effective in the right context. The challenge is to identify the right context and use unique AI solutions to achieve specific business objectives."

It's all about user experience!

Supriya Datta
Consultant at NSEIT/
Ex-Sr. VP at NSE

The most important aspect of application modernization is the consumer experience. It should be agile, intuitive and easy-to-use, such that users are actively able to engage with the service and participate with the business to become co-creators of more relevant services. Prosumers wherein consumers are producing services and nudging businesses into new directions is becoming an increasingly popular trend and app modernization must take such flexibility into consideration.

In the Exchange space, we must ensure that the customer is able to flow through the system in a seamless manner and access trading facilities quickly and easily, given that financial implications are closely linked with service availability. We have facilitated member onboarding via the Web and mobile app and are experimenting to deliver an intuit experience catering to the millennials who are shaping new consumer experiences.

Further, to provide a holistic customer journey, application modernization has to factor in the data explosion to provide data driven analytics and insights.

At the same time, it is important to remember that application modernization is not just a tech initiative and approaching app modernization as a stand-alone initiative to be delivered only by the technology team will not taste success. It has to be a collaborative approach comprising business leaders, enterprise architects, software technology team, cybersecurity professionals, all of whom are critical stakeholders and contribute towards the strategic vision. For best results, a central monitoring office such as a PMO must plan, manage and implement the application modernizing initiative within the organization.

Finally, the modernization journey requires careful calibration by the PMO to standardize practices and to keep costs under control. Otherwise, there is a tendency to overuse tools, complicate architecture and spin up infrastructure leading to delays, overspending and creating scenarios when costs spiral out of control, making the initiative unviable ■

"Modernization has to be a collaborative approach comprising business leaders, enterprise architects, software technology team, cybersecurity professionals, all of whom are critical stakeholders and contribute towards the strategic vision"

2011

‘Software is eating the world’

—Marc Andreessen

2021

It is still eating the world, only much faster.

Data Management

As data volumes grow and become more complex, enterprises need intelligent data strategy management to extract new value and drive innovation

AUTHORS

Use cases must define the architecture

ABHINAV SRIVASTAVA
CIO, Diamler India
Commercial Vehicles

Unlearn and learn continuously

BASANT CHATURVEDI
CIO
Perfetti

It's all about monetization

HARISH NAVARATHNA
Head - Corporate IT
Britannia

Need for a coherent data management policy

LB SHARMA
GM - IT
BPCL

The new oil is crude too...it needs refining

POORAAN JAISWAL
Global CTO
Entero Healthcare

Great opportunity, but challenges galore

SACHIN GUPTA
President & Chief Information & Innovation Officer
Usha International

Making data intrinsic to business culture is key

SANJAY KOTHA
Joint President & Chief Digital & Business Transformation Officer
Adani Group

Data management needs a holistic approach

SHRIRANGA MULAY
Senior Vice President - Engineering,
NTT Global Data Centers & Cloud Infrastructure

Gross Data Product: The new measure of business value

VENKATESH NATARAJAN
President - IT & CDO
Ashok Leyland

Moderator

SACHIN MHASHILKAR
Executive Director,
B2B Tech
9.9 Group

Towards a new data experience!

Today's Indian businesses are data-driven and nearly every business is in some phase of data-driven digital transformation. As a larger percentage of business operations become dependent on digital initiatives, the efficient usage of Data, AI, and Cloud enabled technologies will become a competitive differentiator and an enabler to success, a DATA REAPER.

Data management encompasses the lifecycle of both data and data infrastructure, spanning how businesses create and extract value from data to how IT teams manage the infrastructure foundation that stores data.

An effective data management strategy encompasses how data is stored, accessed, governed, mobilized, analyzed, protected and secured. It impacts the success of companies of all shapes and sizes and influences the productivity of different personas from IT Ops to developers to data scientists to CIOs and beyond.

The data challenges that all enterprises are faced include the Volume, Value, Variety, Veracity, and others along with siloed technology options, compliance, process, people and governance needs. In fact, the storage and data management complexity are impeding digital transformation. The need to ensure accelerated and greater Data Accessibility is where transformation will happen to enable both business operations and opportunity.

In a growing world of data and data storage technologies, the need to focus on data is the most important action to recommend. Ensuring that the technology elements are used more 'as a Service' enables a dynamic strategic vision that can unify Data Management and address most common problems with traditional approaches that we see today. With the need to automate many operations there is a need to have AI-driven IT Operations everywhere which created the New Data Experience. Bring the cloud experience to manage data enables utilization for Business and its stake holders for faster innovation across products and services.

To truly accelerate and thrive as a data-driven enterprise, businesses need to recognize their data management challenges, and take concrete steps to act. Some effect guidelines are:

1. Bring the cloud operational experience everywhere
2. Unify Data Management across the entire lifecycle
3. Accelerate IT Operations with AI-driven insights and intelligence

By taking these steps, businesses will have achieved an entirely new data experience that's both simple, automated, and on-demand.

Bringing the cloud experience to manage data enables businesses and their stakeholders to accelerate innovation across products and services.

Ranganath Sadasiva
CTO
HPE India

Kamal Kashyap
Director – India – Storage Business Unit
HPE India

The planet is getting overwhelmed with data—World Economic Forum estimates that by 2025 we shall be generating 463 exabytes of data on a daily basis. And what overwhelms must be managed or must risk getting buried under its sheer impact.

Data-savvy new enterprises are setting a new pace of urgency—by leveraging big data and analytics from multiple sources these companies are creating sophisticated data models to gain competitive advantage, forcing traditional enterprises to dramatically change business models. Now smart brick and motor companies are evolving into technology companies leveraging digital channels and injecting digital into every aspect of operations including the product design and offerings. So pervasive is technology in today's world that every product is evolving into a smarter version or risk becoming obsolete. This in turn is creating more data and more opportunities for companies.

While many companies are adopting a data strategy to work smartly, some are getting left behind due to an inability to leverage data effectively. This is creating distinct categories of companies—those that are data-based and those that are data-driven. A data-based company is one which has a business model dependent on the storage and processing of data, such as an insurance company. While data-driven companies use data, analytics and Artificial Intelligence as a basis to make better decisions, make processes leaner, faster and more customer-oriented.

Data management strategies have suddenly received a boost during the COVID pandemic, aided and abetted by digital transformation. Digital transformation efforts itself accelerated during the pandemic to adapt to changing working environments and companies simultaneously leaned on a data-driven strategy to overcome the challenges of sudden deceleration of business activities. Organizations that had a solid data foundation were able to pivot quickly to streamline operations and identify growth opportunities.

For example, retailers aggressively leveraged omni-channel approach to reach customers wherein digital footprints of customers was closely monitored and analyzed and insights leveraged by making offers at the physical stores. Similarly, entertainment and insurance companies which had tons of in-house data leveraged insights from existing records to design innovative, personalized offers to customers.

So what is it that some companies did right to monetize data and how can the success be replicated. Below we summarize the key drivers and challenges of a data management strategy that some early adopters had experienced.

Business Imperative for Data Management

Data strategy management is a pre-requisite in the digital era to effectively harness emerging technologies such as self-driving cars, wearable technologies and new models of business such as the sharing economy. Having a rock-solid data strategy has rapidly progressed from 'good to have' to 'must have' emerging as a strategic asset to unlock new value and drive new paths to innovation. Some business drivers that have created the need for a comprehensive data management strategy include the following.

Volume and velocity of data: The rate at which large amounts of data is being generated creates a lot of noise, creating manageability issues. There is a need to shift relevant and valuable data from irrelevant data using advanced tools and technologies, otherwise value of useful data will be lost. The sheer volume and variety of the data requires distinct and different processing technologies with special algorithms than traditional storage and processing capabilities.

Innovation and monetization: The promise of innovation and monetization is latent in data and data-driven organizations recognize the potential and harvest it with a proper foundation, which includes establishing processes and policies for gathering, cleansing, organizing, and accessing the data. At the same time, data-driven companies understand that to extract the most value from data, processes must be adaptable to changing needs and able to create a data pipeline that places a premium on analytics.

Competitive Advantage: Best-in-class organizations industries understand the critical role of data in achieving competitive advantage and are actively fostering a culture that prioritizes data and promotes collaboration. As connectivity and smart products become pervasive, data-enabled learning is being used to enhance capabilities for competitive advantage. However, to consolidate the positions, data quality must be high offering lasting value that lead to significant improvements and create service differentiations.

Regulatory Compliance: The need for compliance

requirements is a key driver for data management strategies. To protect and safeguard data, the management strategy should have policies that define how data is handled from the moment it is created and moved from the point of creation to the storage centre. Leverage privacy by design and security by design architectures. Questions such as what data need to be retained, and for how long for. If it does not need to be retained, what should be done, and if it does, where should the data be stored?

Technology Booster for Data Management

In addition to business drivers, the need to adapt to technology developments have bolstered a robust data management strategy. This includes the following scenarios.

The need for an integrated data platform: A cohesive data platform where all data sources are pooled into a single repository, with a data pipeline that scrubs and cleans data and stores it in a ready-to-use format with tags and catalogues for different kinds of users.

Inherent benefits of Cloud ecosystem: Cloud flexibility and scalability along with an ecosystem of open-source tools that can easily extract, cleanse and store data. Easy access to high-powered processors that can crunch large data systems in distributed systems to deliver fast results in a cost-effective manner pushed the adoption of comprehensive data strategy. Cloud also meets with the organizational need for DR and data back-up in an efficient and reliable manner.

Data Security and Remote Access: The need to provide access to data remotely in a real-time basis to support business operations in a secure manner requires a comprehensive approach wherein security is an integral part of the data strategy.

Overcoming Implementation Challenges

Implementing a comprehensive data management strategy that works is easier said than done. There are a variety of challenges in moving initiatives from boardroom discussions to practices that work. First, enterprises need to figure is why the organization needs a data strategy as many applications and systems capture data but the organization fails to extract value and apply the insights in a relevant manner.

Technology challenges include building the physical infrastructure to move data from different sources and between multiple applications while meeting performance, scalability, timeliness, security and data governance goals all the while managing costs which can quickly spiral out of control.

Specifically, key challenges include the following:

Creating a data-driven culture which captures and relies on data to make decisions on a day- to-day basis. Many organizations falter in the transition from a data-based company that captures data to evolving into a data-driven company wherein organizational data is translated to insights and analytics and are used for business and operational decision making to gain leverage.

Data security is a top priority in data management as the risks dramatically increase when data is collected and

Data must be available in a combat-ready mode and the organizational culture must boost a data-driven approach to facilitate innovation, decision making and to be able to connect the dots to become disruptive game changers

stored in a single repository and therefore technology solutions such as identity and roles-based access must be mapped with processes and systems along with automated monitoring and alert management systems.

Meeting regulatory and compliance requirements across geographies is a tall order as each region has specific laws. For example, the period required to store data varies from 8 to 10 years in different countries. New data privacy regulations such as GDPR have been popping up all over the world making compliance that much more difficult.

Managing costs is a serious operational challenge as enterprises use existing data consumption metrics to estimate the costs of their new big data infrastructure. Cloud becomes a good option to scale elastically and meet the variable processing needs. Even in Cloud it is important not use fixed cost resources and to implement fine-grained control over queries.

Selecting the right technology as a wide range available. Start by considering current and future trends such as streaming and batch processing. Pertinent questions include what kind of data preparation capabilities are required, what platform is appropriate and where should the data be processed. If data needs to be processed locally and application has low tolerance for latency, edge computing can be considered along with Cloud infrastructure to access scalable resources in a dynamic and elastic manner to meet unpredictable needs.

Data collection and data integrity are complex management and operational issues as data must be continuously collected and updated and stored in a transparent and secure manner. Maintaining secure and granular access to a variety of sources while cleaning and scrubbing the while ensuring that the data available to the user has not been tampered are critical to deliver accurate analytical insights.

Putting in place a data governance structure is critical to avoid a data swamp. Therefore, defining policies for data ingestion and extraction policies, defining granular access to different data sources and having a data architecture comprising a Data Lake with a sophisticated data pipeline that gathers data, processes and stores in data warehouse helps address this problem.

Lack of data management skills and resources is a serious limitation and inertia of leadership with regards towards skill development does not help matters. Even when companies step out to source skill sets, it is not readily available. Define roles of all data-related tasks such data collection, data entry, quality control, metadata creation, backups, data preparation and archive submission to understand skill gaps.

Having a rock-solid data strategy has rapidly progressed from ‘good to have’ to ‘must have’ emerging as a strategic asset to unlock new value and drive new paths to innovation

Having a strategic approach to data management is a survival imperative as data the opportunity is no longer a myth. There is increasing realization that data is the greatest asset to innovate continuously and create delightful customer experiences by taking informed, insightful decisions. And so data must be available in a combat-ready mode and the organizational culture must boost a data-driven approach to facilitate innovation, decision making and to be able to connect the dots to become disruptive game changers.

Data analytics is reshaping operations, monetizing data and facilitating new revenues where data is the business and analytics is at the core of business. Data is enabling to work smarter, not harder. Clearly, the currency of the digital economy has arrived ■

Abhinav Srivastava
CIO
Diamler India Commercial Vehicles

Use cases must define the architecture

Where is data generated, how it is collected and processed is an important consideration in designing and implementing a data architecture. For example, take the case of connected cars where data is collected from on-board diagnostics and sent to the cloud to ingest data and provide real-time transformation, augmentation, and analytics for applications such as predictive maintenance and to get insights into design, performance enhancements and safety of riders.

Although there has been lot of hype with 5G, but it has not become a reality and therefore certain use cases require high response time and data processing must take place right there and then. This includes applications in the factory floor for quality inspection, precision manufacturing, painting, employee safety which must be done in real-time and edge computing becomes the ideal solution in such use cases.

The imperative for speed of response time, security compliance and privacy issues mean that computing must be done locally as the inherent latency in ingesting data in the cloud and bringing it back for processing makes the outcome unpredictable. Things like visual inspection requires data streaming in real-time and this can be achieved only via local storage and processing.

Edge computing is a critical deployment in the data architecture to achieve different kinds of goals. In addition to combating latency challenges, it also helps to optimize network performance and bandwidth utilization as data processing is done locally.

There is no one case that fits all and we need a judicious mix of data architecture aligning the most appropriate use case with the technology that best meets the outcome. Data architecture can well comprise a combination of corporate data center at a central location, public cloud and edge computing, leveraging IoT devices ■

"There is no one case that fits all and we need a judicious mix of data architecture aligning the most appropriate use case with the technology that best meets the outcome."

Unlearn and learn continuously

From our experience as a global organization with presence in 140 countries, data management has two aspects – data access and data retrieval. With operations spread across geographies, it is important to have full understanding of which data is relevant, how do we process that data and how to make it available to people who need that data. So, an important aspect of the strategy is to have a data fabric, a data layer which democratizes data and enables easy access to everyone.

The second important aspect relates to data retrieval. Across geographies, we have different requirements for data retention. One challenge is to store vast quantities of data, but the bigger challenge pertains to data retrieval. When you store data for 8 to 10 years, storage technology changes drastically and when the time comes for data retrieval, the technology has become obsolete and nobody knows how to use it or extract the data.

Considering that technology changes fast and IT professionals operate on the mantra of 'unlearn and learn new things', finding someone with the requisite skill sets is challenging at that time. For example, earlier, in one of our episodes where we needed to retrieve data from older Novellware platform, we couldn't find anyone. Although the data was available with us and we had to find retired personnel who had worked on the platform before to retrieve the data.

Data portability is another issue with data being stored in different platforms including legacy systems which are not compatible with modern systems and therefore difficult to provide access. With remote access increasingly becoming a norm, these systems also pose a security threat as legacy systems are far more vulnerable to intrusion ■

Basant Chaturvedi
CIO
Perfetti

"When you store data for 8 to 10 years, storage technology changes drastically and when the time comes for data retrieval, technology becomes obsolete and nobody knows how to use it or extract the data."

It's all about monetization

Harish Navarathna
Head - Corporate IT
Britannia

The key thing in the ability to monetize data is to deliver business value by creating a data mash up from different sources to facilitate a new service, offering or capability. So much of data with open APIs is available in the public domain and combining existing data sources help in creating useful new functionality or dashboard-like aggregations which provide insights for business decision making. These insights, thus created, facilitate in understanding the big picture which are compelling inputs for strategic roadmaps.

Enterprise applications, such as ERP and CRM are delivering value to a limited extent compared to the infinite possibilities a mash up of enterprise data with public data can create to identify trends, opportunities, threats and challenges. Data monetization kicks in when an organization begins to view data as a product and data in its original form is mashed and blended to create something that you can take to the market as a new offering. Data monetization within the organization will mean use of 3D insights combining external data for business decisions. This will even enable routine decisions to be automated, for example change in market trend demanding a pricing decision or inflation indexing for price can be automated if external data is combined with ERP/CRM data.

Similarly, within the organization, simply storing, accessing and looking at data from a 2D perspective will deliver limited value. People must be trained to delve into the data for 3D insights: how to combine different data sets to get an insight that was previously unavailable and deliver customer value. Leveraging data effectively is a cultural issue, a thought process, and a way of life. It is not a technical capability as much as an ability to think and extract value from the data. Once the idea is generated, designing an application to make it happen is the easier part ■

"Leveraging data effectively is a cultural issue, a thought process, and a way of life. It is not a technical capability as much as an ability to think and extract value from the data."

"So far, the focus has mostly been on business applications but because of pandemic, there has been a spurt in digitalization, and we have lot of unstructured data. We need to figure out how much of these unstructured data to store and for how long to meet strategic goals."

LB Sharma
GM - IT
BPCL

Need for a coherent data management policy

As a public sector organization providing essential commodities, we have security, compliance, and regulatory requirements. We have started our data management journey but have been grappling with issues such as identifying critical data, master data management, storing data in a secure manner and technical issues, such as data architecture, data recovery and disaster management.

First, data management starts with a definition of data, as digital systems has started generating a lot of data. We have plenty of data from SCADA system, Industrial Control System and Distributed Control System. We need to figure out how much of these unstructured data to store and for how long to meet strategic goals.

So far, the focus has mostly been on business applications but because of pandemic, there has been a spurt in digitalization, and we have lot of unstructured data. For example, when a lorry leaves the premises, we give several copies of papers, and that data is now given in a digital format which is required to be stored for 20 years. Also, there are logs and other things which is essential for analysis or for compliance and statutory requirement.

Then there are other data such as email, and enterprise applications which we use for communication and that information is used for making business decisions. But we do not have a common platform, and so we need a single uniform system to collate all that data.

Another aspect of data storage is the master data as there is lot of redundancy and multiple versions of the same data leading to a challenge of maintaining a single source of truth and maintaining the sanctity of data.

Data retrieval and data backup are important considerations wherein we must also define policies for retrieval of unstructured data within a specified time frame ■

Pooraan Jaiswal
Global CTO
Entero Healthcare

The new oil is crude too...it needs refining

"The data we collect, and gather is equivalent to crude oil and unless we refine it to usable formats, it is largely garbage and irrelevant."

We are in the healthcare sector and the metrics that define operations require tracking of what medicines are sold, demands and supply trends to identify the need and fill in the shortage. During the COVID pandemic, the shortage of oxygen was largely due to the gap in data and lack of visibility in demand and supply. If there was an optimized system in which data is gathered and distributed, much of the crisis during the pandemic could have been avoided. It was not a supply issue as much as distribution and optimization issue.

The data we collect, and gather is equivalent to crude oil and unless we refine it to usable formats, it is largely garbage and irrelevant. Unless we scrub, clean and analyze data by asking the right questions to solve a specific problem or seek insights to find specific answers, it is of little value. Data availability and the capability to use data in innovative ways is equipping start-ups to disrupt the market and challenge traditional players.

One of the requirements in healthcare is the need for live data but it is challenging to make sense of data in real-time. We leverage data to track and fight counterfeit drugs and to determine drug pricing and ensure that the market adheres to the optimum price. Often, retailers sell drugs at higher price points and pharma companies need to monitor market closely.

The most critical aspect of data deployment in the pharma sector is to map the demand for specific drugs and move it at speed to deliver where it is needed the most. Data availability and quality critically impacts the decision-making in terms of price management and discounting mechanism. We at Entero act as the facilitator in the sector by collecting and collating data, clean it up and provide a steady stream of readily available data for pharma companies to base the decision making ■

Great opportunity, but challenges galore

Data is a great opportunity. But you have to overcome many challenges before tapping the opportunity.

First challenge is data hygiene - how do we create clean set of data, so that we have a single source of truth for all the data. Whether it is in data lake or data mart or data warehouse, the data must be consistent.

Then, how do we back up this data set and restore the data when it is needed? As data keeps growing, RTOs and RPOs become a big challenge. Data is oil but it is also very greasy until it is hygiene and intelligence is mined from it.

More than that, we are surrounded with data, we do not even know where it goes,. Now with PDPA coming, it's going to pose huge challenge for us.

There are tons of tools to analyze data. You can create reports and dashboards which are descriptive, prescriptive, and predictive, but getting users to use them is a big challenge.

How do we create insights in real-time and put it in an application and enable to make business decisions is a big challenge as AI/ML takes a lot of processing and that doesn't come cheap. If it is not adding business value, that investment gets questioned internally.

Data also brings the visibility to various aspects of business which makes some users very jittery, and they get scared of data shown directly from the system. They do not want to create visibility.

The big question remains...how do you create a framework which is acceptable for data/dashboards and insights? There is no point in creating insights which no one will use. It is a cultural issue which has to be addressed at the highest level of the organization ■

Sachin Gupta
President & Chief Information & Innovation Officer
Usha International

"Data also brings the visibility to various aspects of business which makes some users very jittery, and they get scared of data shown directly from the system. They do not want to create visibility."

Making data intrinsic to business culture is key

The hype around data as the new oil is real and manufacturers need a modern data management approach to reduce cost while improving quality. Manufacturing organizations are generating a lot of data especially with Industrial 4.0 gaining adoption, but the challenge is to tap it effectively. There is no doubt data exists everywhere but how do we capture, store, process data and then use it innovatively to create new products and services is what will determine market leadership.

With increasing digitalization challenges related to data management surmounting, such as breaking down data silos and consolidating data, integrating new data sources with organizational data repository, enabling partners to access the digital eco-system, and merging the physical with digital in a seamless manner has become important.

Best-in-class organizations are monetizing data with new opportunities and re-positioning themselves from legacy manufacturer of equipment and products to value-added service providers.

The second aspect of data management is data governance which is a critical success factor. As data pours in from many sources and there are many stakeholders, it is important to define the taxonomy of data, cleanse, catalogue and categorize it for ready usage. With easy accessibility to a trusted source of information, different business units can access the right set of data to get insights and increase responsiveness.

At the same time, we must ensure that data is properly utilized, backed by a data-driven culture and on a foundation of high-quality data, supported with the right skill sets. Transforming the organization to rely on data at all times for decision-making and making that data available is the key indicator of success. The shift from using data periodically to weaving data science into the fabric of the organizational culture is what the data strategy should aim for ■

Sanjay Kotha
Joint President & Chief Digital & Business Transformation Officer
Adani Group

"The shift from using data periodically to weaving data science into the fabric of the organizational culture is what the data strategy should aim for."

"AI is being used widely to optimize processes and gain efficiency, which can also be applied for the data stored and help in improving the quality of decision-making and in turn the business outcomes."

Shriranga Mulay
Senior Vice President - Engineering,
NTT Global Data Centers & Cloud Infrastructure

Data management needs a holistic approach

Before choosing right storage platforms and solution, we must need to decide on the use cases and specific requirements of the storage, not just limited to capacity but also in terms of performance.

As a service provider, our customer does store a lot of data due to statutory requirements, backup or other reasons. Many a times, the data is dumped periodically. However, with the standard storage offerings, there is no visibility into what data is stored and for how long. This leads to a huge data growth and in turn has a repercussion on the cost as well as data management and also identifying the right data during retrieval when required.

Technology choices are important, given cost and scalability issues, the volume of data and also expected performance. Data tiering can help categorize data based on what is required to be accessed faster with lesser latency and what can relatively wait for a higher latency.

Third is the need to get a visibility into what kind of data is being stored. Does the platform support adding custom meta data tags for the data being stored, so that we can we use those tags to classify the data? An Analytics solution or an e-discovery which can read this additional meta data stored will help analyze and manage the data better. AI is being used widely to optimize processes and gain efficiency, which can also be applied for the data stored and help in improving the quality of decision-making and in turn the business outcomes.

The more data points we have, the better it is for decision making. For example, in IT infrastructure management, it is important to collect logs for trouble shooting and preventive management. At the same time, it is also necessary to decide how long do we need to retain the same and recycle that data periodically to remain efficient and more proactive ■

Venkatesh Natarajan
President - IT & CDO
Ashok Leyland

"In investor conversations, the primary interest is now centered around data, its ownership, creating differentiated services from connected vehicle data and the allied monetization strategies. That is a paradigm shift"

Gross Data Product: The new measure of business value

From being called the new oil, data is now being called the new soil. Value of companies are being measured by 'GDP' which stands for Gross Data Product.

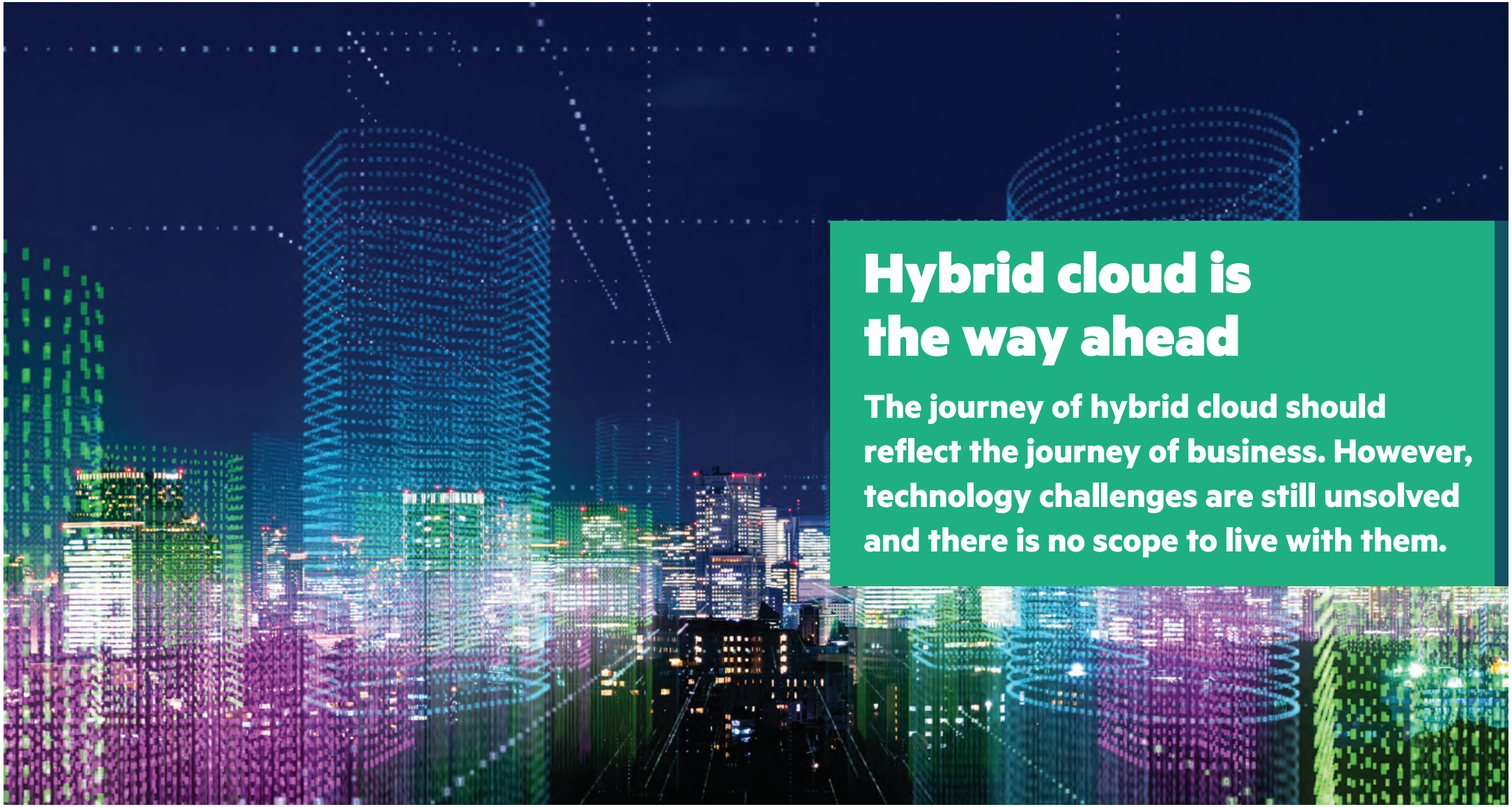
Recognizing this, at an organizational level, we have a detailed roadmap for maturing into a fully data-driven company. We are identifying all our data sources and creating a connected data lake for business-critical datasets. While data discovery is the foundation, more complex 'new-age' requirements like Industry 4.0 also need to be handled - how do we capture and harness that data is a critical consideration. Secondly, we are figuring out how to make people conversant with data and move people from a 2D perspective to a 3D perspective. Third, we have to keep the data accessible in a combat-ready mode to provide instant value to business when the need arises.

To quote another example, in the area of Electric Mobility, we recently spun off two new companies - one for manufacturing electric vehicles called Switch Mobility and the other one called Ohm Mobility, which exclusively focuses on offering EVs on an Electric Mobility as a Service model (eMaaS). During conversations with potential investors, the primary interest area was centered around data, its ownership, creating differentiated services from connected vehicle data and the allied monetization strategies. This is a paradigm shift from our traditional queries around battery design, tyre life, payload, etc. This also further re-enforces our belief that data is the bedrock of the foundation for all next-gen business models.

No wonder then, that data has become the prime mover that is accelerating the valuation of all new-age companies. Data as a currency is no longer a myth and data valuation is fast becoming a reality. This is part of our Data Infonomics strategy at Ashok Leyland as well ■

“Without big data analytics, companies are blind and deaf, wandering out onto the web like deer on a freeway”

—Geoffrey Moore, Author & Consultant



Hybrid cloud is the way ahead

The journey of hybrid cloud should reflect the journey of business. However, technology challenges are still unsolved and there is no scope to live with them.

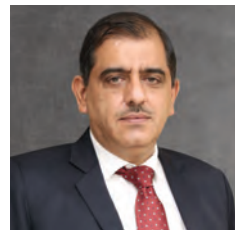
AUTHORS

Large companies can try shared private cloud

BINAYAK PRADHAN
Senior Director - IT
(Cloud Business Team)
Samsung Data Systems

Challenge at hand dictates adoption strategy

DNYANESHWAR GAIKWAD
EVP
Edelweiss Financial Services



Agility with protecting legacy!

MANISH MALIK
Head - IT
(Marketing Division)
Indian Oil

Balancing regulatory requirements with innovation

MOHAN VENKATESAN
SVP & Head - IT
Infrastructure & Application
Axis Bank

Scalability need assessment must, while rolling out

PRAVIN SHARMA
Chief General Manager &
CTO, Union Bank of India

Need for a cloud policy!

RAMESH KAUTA
CTO
NABARD

Right balance is the holy grail

SUMIT MALHOTRA
CIO
Times Internet

MANGESH ADHIKARI
VP - IT,
SBI Life Insurance Co

Moderator

SHYAMANUJA DAS
Editorial Director, B2B Tech
9.9 Group

Hybrid cloud ensures success of your transformation journey

In today's world, businesses across industries recognize the imperative to operate in a hybrid, edge-to-cloud world.

A one-size-fits-all, public cloud approach doesn't work for most of their applications and data, which must stay on-premises or at the edge due to a combination of cost, compliance, control, governance, latency and performance, security, and application entanglement.

HPE's strategy is that the cloud experience—and the benefits it brings in speed, agility, efficiency—should be accessible to apps and data everywhere.

Automation and orchestration across your cloud estate is key to the success of the deployment and operation of your right mix of hybrid cloud. This focus on automation ensures that you have the scalability, repeatability, maintainability, and security required to meet your business goals.

To help you determine the right mix of hybrid cloud, we can analyze your portfolio and identify the most suitable target platform and disposition for each workload or application. By leveraging our "Right Mix Advisor Service", we can effectively work through hundreds of applications. From there, we can begin to plan what will move, how to move it, what will need to be modernized, and where the most suitable target platform will be.

Your involvement in this journey is critical. In our partnership with you, we ensure that your team is learning and guided alongside our experts so that at the end of our engagement with you, your team is empowered to drive your transformation program forward.

The development of the Hybrid Cloud Operating Model ensures the ongoing success of your digital transformation program, enabling the business, outcomes, and efficient IT operations to begin to take shape.

HPE's Hybrid Cloud Advisory and Professional Services team is here to help make this the reality for your business by leveraging our comprehensive portfolio of products and solutions where they best fit.

Automation and orchestration across your cloud estate is key to the success of the deployment and operation of your right mix of hybrid cloud. This focus on automation ensures that you have the scalability, repeatability, maintainability, and security required to meet your business goals.

Ravindra Ranade
Pointnext Services
Enterprise Business Head – West Region
HPE India

Vikram Kumar Yerram
Country Manager - GreenLake Cloud Services
HPE India

Technology evolution is not a linear progression and different technologies come together at different points in time to deliver disruptive capabilities. When Cloud computing emerged on the scene, businesses lapped it up and it delivered powerful capabilities. A public Cloud platform provides enterprises with an agile, scalable, robust, and cost-effective IT infrastructure that supports business requirements—even in unpredictable scenarios.

But public Cloud presented specific challenges for which many enterprises turned to on-premises and private Cloud as all kinds of workloads are not always appropriate for public cloud. Some workloads which require higher security, compliance and are latency sensitive work better on-premises and enterprises are choosing to keep certain workloads to better meet specific requirements.

This does not mean a rejection of public Cloud, but it is a realization that a combination of all capabilities is required to meet different needs. Thus, hybrid Cloud wherein different environments are adopted to achieve strategic goals are becoming popular. Small wonder then that IDC predicts by 2022, over 90% of enterprises worldwide will be relying on a mix of on-premises, dedicated private clouds, multiple public clouds, and legacy platforms to meet their infrastructure needs.

This boost towards hybrid Cloud is also because of pandemic-induced digital transformation efforts which pushed many laggards into the digital forefront. Companies which did not have the IT infrastructure to support a remote workforce found public Cloud infrastructure services a great way to ramp up capabilities for business continuity.

The limitations of traditional data center are well documented with long procurement cycles, tedious maintenance, and massive manpower requirements. Even though a private Cloud in a co-lo offer certain benefits, it has limitations in scalability and access to advanced technologies. Given that all environments offer benefits and limitations, savvy businesses are increasingly taking a strategic approach to use a best-of-breed solution, picking and choosing solutions that best fits with the use case. They are combining the power of different environments to reap the benefits of flexibility and keep information on-premises while exploiting the speed and elasticity of public cloud without making huge upfront investments.

Drivers of Hybrid Cloud

A hybrid Cloud model offers organizations the flexibility to put workloads in the environment that delivers the maximum business value—a right blend of speed, flexibility, scalability, and reliability while meeting data security, governance, compliance, performance issues in a cost-effective manner.

For example, the company website may be deployed on public Cloud to leverage scalability, while the customer database for its e-commerce application may be deployed on private Cloud to comply with data privacy norms. Similarly, new applications and workloads are being deployed on the Cloud to take advantage of agility and time to market and as the product matures is brought back to a private Cloud for higher compliance or security, striking a seamless balance between public and private cloud platforms.

So what is driving the adoption of hybrid Cloud. Let us examine a few business and technical imperatives for hybrid Cloud.

Nature of business: Heavily regulated industries such as banking, financial services, healthcare are subject to compliance requirements and cannot deploy all workloads in public Cloud. Yet business imperatives such as need to innovate and remain competitive demands agility and easy access to resources which public Cloud offers. The need to store massive amounts of unstructured data and powerful resources for data processing make Cloud an ideal choice. Hybrid becomes a natural choice for businesses operating in such sectors to deploy workloads that seamlessly operate in an environment of choice.

Geographic presence, compliance: Large global organizations operating across geographies have specific compliance and localization requirements and often deploy private Clouds. Yet there are many applications such as internal training, collaboration tools and enterprise applications that are common and overlap for the organization at large and are ideally suited for public Cloud. Sometimes proprietary information is deployed in a private Cloud or even on premise because of security requirements.

Phase of growth: Many start-ups begin the journey in public Cloud due to easy access of resources and pay-as-you-go model and bring back workloads to a private Cloud or on premise to achieve risk mitigation, better control, and capability to service premium customers.

Need to leverage Cloud: Traditional businesses with large on-prem deployments seek to leverage inherent advantages of Cloud for agility and speed to market. Cloud

offers ideal conditions for frequent experimentation by building dev and test environments at will and destroying them when the experiment is over. This facilitates innovation as companies can test ideas at low costs without any liabilities. At the same time, ideas that work can be deployed in the Cloud and as the initiative grows can easily scale in the Cloud. Also, Cloud-native capabilities such as DevOps, microservices, containerization, serverless equip businesses for competitiveness.

Digital Transformation: As Cloud-enabled digital transformation initiatives gain momentum fueled by analytics and the need to innovate, organizations are achieving disruptive capabilities to experiment frequently, fail fast and collapse the time from idea to production.

Easy access to latest technologies: Cloud-led digital transformation provide access to modern technologies such as DevOps, containerization, microservices and serverless, which in turn facilitate continuous innovation at speed and scale, based on informed insights and data-based decision making.

Maturity of users and technology: As businesses gain experience and expertise of different Cloud environments, there is more understanding of what environments will deliver the best results. Also, maturity in advanced technologies such as containerization easily facilitate portability of applications across environments.

Challenges to Hybrid Cloud Environments

As in all emerging scenarios, there are new sets of challenges to initiatives, most of which can be addressed with due awareness and planning. This includes the following.

Mindset and culture: Management and stakeholders often have unrealistic expectations about hybrid Cloud and a large amount of education is necessary to build awareness and sober expectations. This includes issues related to speed to market which significantly enhances with Cloud capabilities but yet, there are tests and quality checks which require time and efforts.

Moving to the Cloud is not the end goal but a journey and this requires a change in mindset to do things differently and continuously improve the deployment and derive benefits.

Also, employees and IT personnel must understand that a key benefit of Cloud adoption is automation and must employ the available tools and capabilities to fully reap the benefits.

Managing security: Managing hybrid Cloud across public and on-premises systems is hugely complex and large part of that complexity comes from security management. According to Alert Logic 2017 Cloud Security Report, hybrid Cloud deployments experienced the maximum security breaches because there are too many moving parts. Both public and private Cloud resources need to access data sets exposing vulnerabilities and calling for more robust security systems such as central authentication, role-based granular access, alert management systems and automated monitoring.

Application readiness: Applications and IT systems must be made Cloud-ready with native capabilities to scale at speed and deliver continuous improvements based on modern technologies. Therefore, legacy applications cannot simply be deployed and must be re-architected by using modern technologies such as

The appeal of hybrid cloud is witnessing a steady increase because of the flexibility, scalability, and agility

DevOps and containerization leveraging appropriate platform such as managed database, automated pipelines, function as a service and built-in automation for reliability and robustness.

Ironically, management often endorses infrastructure migration but becomes hesitant when it comes to app modernization, unless it is services-led business such as banks. CIOs in traditional sectors such as manufacturing, CIOs are hard pressed to justify application modernization, and this is also a mindset challenge that must be tackled with due education.

Interoperability: At the same time, if applications and systems are proprietary and cannot access resources across environments, benefits will be limited and therefore one of the main things is to ensure compatibility across systems and take advantage of open-source tools and capabilities for seamless deployments.

Vendor lock-in: This is a tricky area as often Cloud offerings are designed to deliver the best performance on proprietary systems which becomes a challenge for inter-operability when the customer wants to migrate to a different environment. Therefore, businesses must be discerning while choosing platforms and services, keeping in mind performance and flexibility issues.

Next Steps

Based on extensive customer interaction, below are few best practices to get started.

- Do a thorough assessment of internal systems and consolidate in house infra systems before embarking on Cloud. Identify the best fit for Cloud migration, picking a low-hanging fruit with minimum dependency as a proof of concept before the heavy lifting.
- Some applications may not be designed to take full advantage of Cloud capabilities in the existing set up and the only way is to modernize to derive maximum leverage.
- Remember one size does not fit all and you need to have an understanding of your needs and decide accordingly. For example, a trading house will never deploy its application in the Cloud despite the advantages it offers because of the nature of its business which requires extremely high-speed and high performance.
- Balance the need to meet compliance goals and security of the deployments while innovating to create customer experiences, catering to remote customers and meeting the needs millennials.
- Design and implement a robust and reliable Disaster Recovery plan to justify the returns of a hybrid environment.
- Work up a good SLA contract that does not bind you to the vendor and allows flexibility to migrate workloads as required. Often contracts are designed tightly to lock in the customer for a specified time frame, so it is important have a legal team take a close look at the agreements and is able to negotiate for more flexibility.
- Monitor performance of hybrid systems and tweak the system for better performance. Deploy advanced security practices that allow access in a granular manner, employ encryption for data in transit and at rest and have robust alert management systems in case of breach.
- Identify a partner with good customer references and work closely with the partner while ensuring you also develop internal capabilities to manage and supervise operations with the partner.

With its numerous benefits, the path to hybrid Cloud must be pursued diligently to ensure system delivers the efficiency and cost benefits in the long haul

The appeal of hybrid Cloud is witnessing a steady increase because of the flexibility, scalability, and agility. At the same time there are inherent challenges related to security, seamless operability and managing across environments. Therefore, IT teams must do due diligence to craft a strategy that fits in with the specific needs of the organization, is alert to the pitfalls and takes pro-active measures to counter it.

Bringing together private and public Cloud requires built-in automation and management capabilities and so, one of the key things include ramping up the talent pool with a structured approach for continuous capability enhancement. With its numerous benefits, the path to hybrid Cloud must be pursued diligently to ensure system delivers the efficiency and cost benefits in the long haul ■

Binayak Pradhan
Senior Director - IT (Cloud Business Team)
Samsung Data Systems

Large companies can try shared private cloud

Earlier journey to cloud was a one-way traffic but last few years we have seen a reverse trend wherein many challenges in public cloud have emerged. So, why is private cloud still important?

Benefits of public cloud were amply demonstrated during the pandemic enabling quick digital transformation, especially for those who were not prepared.

We use public cloud at a global level but I think hybrid cloud makes more sense as there are so many home-grown applications which are best kept on premise.

Second, we have many subsidiaries in India, if we could have a private cloud on a shared model which can serve different subsidiaries. That will be so much more cost-effective than going to the public cloud and building everything separately for each subsidiary. A lot of requirements may be specific to sales or R&D, but many things overlap and a shared private cloud can definitely provide long-term benefits.

Have a strategic approach to pick and choose which workloads must go to which kind of environments. We should have a checklist and a process to decide, which workloads should go to public cloud or must be kept on-premises or go to private cloud. If we can develop our own cloud management platform & user interface, that can give an added advantage.

Also, we must prepare skill sets and assess whether we have adequate skill sets when going to public cloud as managing a proprietary environment require an understanding of the specific public cloud vendor. At the same time, on-prem private cloud must also explore open-source technology along with licensed and proprietary tech to leverage cost-efficiencies ■

"Have a strategic approach to pick and choose which workloads must go to which kind of environments."

Challenge at hand dictates adoption strategy

The industry at large would have infra in the cloud and now going through the second phase i.e., app modernization. I have a different view in adoption strategy because a BFSI conglomerate has many group companies and each group has a different challenge. For example, a company may be having huge technical debt, and the approach to cloud adoption will be developed around managing the technical debt. Similarly, another company may have a latency-sensitive product and requires a particular technology stack to deliver value. Then the strategy for the data center is entirely different from the one I mentioned earlier.

So, I do not have a ready playbook from which I can pull out a page. Here I have to manage things little differently to meet specific requirements. But, in terms of framework, few things come into play. Such as the cost, may not be the primary consideration, but it is an important one. Secondly, the imperative to meet with compliance and whether the regulations allow workloads to move to the cloud. Thirdly, IT governance and security considerations play an essential role too.

Another aspect of the decision process is the availability of a skill set or how to build them. The strategic roadmap around skill up-gradation, identifying new growth areas, proactively training employees, and having programs to engage and retain them is needed.

We are all playing it by ear because there is no defined path as we evolve as individuals and the industry ■

Dnyaneshwar Gaikwad
EVP
Edelweiss Financial Services

"The strategic roadmap around skill up-gradation, identifying new growth areas, proactively training employees, and having programs to engage and retain them is needed."

Agility with protecting legacy!

The digital ecosystem of today comprises data ingestion, real-time transactions, integration between different IT and OT systems through API calls, analytics, development platform comprising containers, micro services, DevOps to give a seamless experience to the end users.

Hybrid cloud uses best of both the worlds and provides way for a balanced approach to meet the digitalization expectations of end users. Hosting of applications with basic workloads running in the on-premises data center with an option to move to public cloud in case of peak load justify the hybrid cloud as it results in lot of savings by eliminating the need of upfront capital investment in the in-house data centres for provisioning of infrastructure for the peak loads.

Content Management Platforms are overloaded with huge demand of storage in terms of increased digitization and paper less offices. Today's applications require uploading of contents, audio/video clippings needing huge storage.

On-premises storage again require capital investment and considering that procurement cycle in Government or Public Sector offices is too long. Hybrid cloud overcomes it by proving storage as a service model for content-based applications wherein we can take advantage of Object Storage on cloud for storing structured as well as unstructured data including audio/video clippings whereas database would be hosted in-house from data security perspective.

Hybrid cloud type of setup enables organizations to think of moving their development platforms to public cloud and use the cloud-native tools and services to modernize their applications.

With upcoming 5G and convergence of IT and OT setups, demand of real-time analytics with AI/ML technologies shall require hybrid setups where workloads would be balanced between Edge data centers and public cloud giving rise to ecosystem wherein segregated data shall move to cloud keeping real-time and primary data on Edge servers ■

Manish Malik
Head - IT
(Marketing Division)
Indian Oil

"With upcoming 5G and convergence of IT and OT setups, demand of real-time analytics with AI/ML technologies shall require hybrid setups where workloads would be balanced between Edge data centers and public cloud."

"Traditional vendors are enabling access to similar (public cloud like) technologies on-premises and it is possible to build and operate a highly advanced technology environment in a private set-up."

Mohan Venkatesan
SVP & Head - IT Infrastructure & Application
Axis Bank

Balancing regulatory requirements with innovation

The trigger point for a hybrid environment is due to the fundamental need to balance the regulatory needs of the sector while achieving agility to innovate at speed. We have to compete with the fintechs and offer innovation in the touch and feel to attract and retain customers.

Time-to-market is critical business requirement, and the infrastructure environment should support this need. What are the ways by which one can come up with a production environment quickly and efficiently as selecting, buying and implementing hardware is time-consuming with built-in uncertainties?

Every banking organization has huge infrastructure needs and we are making significant investments both on-premises and in public cloud. But nothing is easy as public cloud also has its own set of challenges with many hidden costs such as transaction costs and proprietary technologies. The cost structure often hold surprises and one must find optimum ways of procurement via negotiations and SLAs.

Decisions around hybrid cloud is strategic and carry along the management. Do we want to focus on achieving business outcomes or spend time in managing infrastructure, whether we need to build and manage everything or partner an expert who manages massive clusters in the cloud while facilitating access to latest technologies?

Innovation is driving public cloud adoption but traditional vendors enabling access to similar technologies on-premises is making it possible to build and operate highly advanced technology environment in a private set-up.

Axis Bank has been primarily on-premises but in the last two years 25 to 30% applications are in public cloud and we are adopting DevOps, containers, and Kubernetes. We are taking cautious steps and evaluating each use case carefully meeting with compliance and security needs of the banking sector ■

Pravin Sharma
Chief General Manager & CTO
Union Bank of India

Scalability need assessment must, while rolling out

Cloud is a journey, an ongoing process of harnessing the benefits. But whether it is on-premises private or public cloud, both have benefits and challenges.

Data regulation is a key consideration but there are no clear instructions. Considering that data operations are business-critical for banks, security of those data transactions is the core. So, it must be a strategic decision where we host specific workloads depending on the nature of the workload, keeping in mind the regulatory and data security needs. Banks are exploring which workloads must be deployed in public or private cloud and what are the security imperatives to keep the applications on-prem.

Digital transformation initiatives are difficult to succeed in siloed operations as transformation requires a seamless experience and this is facilitated in a public cloud environment. In-cloud organizations can put all data and applications in one place and data can move freely. Most important is that cloud enables to manage unpredictability inherent in certain business applications with unlimited scalability and facilitate redundancy in business-critical applications.

Pandemic-induced digital transformation has accelerated public cloud adoption, especially in the public sector to deliver services to customers. Prior to March 2020, banking did not have work from home culture, but it became a necessity. This required digital technologies to remotely recognize and monitor employees in the sense that they are working in a compliant manner for the required amount of time.

Any roll out plan must consider the scalability needs of the workload, keeping in mind the procurement cycle. Suitable arrangements should be made for pay-per-use model or a rate contract model where the resources can be available quickly within a specified time frame ■

"Digital transformation initiatives are difficult to succeed in siloed operations as transformation requires a seamless experience and this is facilitated in a public cloud environment."

Need for a cloud policy!

Hybrid cloud is the way to go with a thorough risk assessment; else organizations will end up with the wrong foot forward. Adoption of any environment should be measured by specific needs and never due to peer pressure. Organization should put in place a well-articulated cloud policy. Each organization has its own break-even point, and they need to consider private/hybrid/public cloud based on that need and volume of transactions. The cloud journey may start with third-party services followed by scaling up.

Second issue is the availability of skill sets and resources because it is not practical or advisable to hand over all the controls to a service provider due to service integration challenges as there may be a hybrid cloud or more than one public cloud. A seamless integration of operations across different environments will be a challenge by a service partner and the internal team must be geared up to own and manage a complex environment.

Third, identify hidden costs as organizations may not be able to fully understand the pricing mechanisms. Although a solution may appear attractive, but it may entail a number of hidden costs which makes the option unattractive, so that's where the power of making an informed decision comes into play.

Fourth issue is the capability to do audits and checks from the point of view of cyber security. Building internal capability for audits is crucial, otherwise the organization will end up depending on an external party and eventually who owns the security becomes a critical strategic issue.

Finally, draw up contractual agreement with hyper scalers to ensure for entry/exit clauses which are commercially viable. They are designed to deliver benefits over the long-term but till then it is almost like a lock-in. And even after that if you want to exit, there are penalties and other things that makes your exit difficult. Have a strong legal team draw up a better contractual agreement to allow more flexibility ■

Ramesh Kauta
CTO
NABARD

"Draw up contractual agreement with hyper scalers to ensure for entry/ exit clauses which are commercially viable."

Sumit Malhotra
CIO
Times Internet

"In the world where the product is changing at hyper speed, the interoperability to move workloads between the two disparate clouds is a BIG challenge."

Right balance is the holy grail

Public cloud empowers agility and scalability by democratizing access to technology. Pay-per-use model where you can spin 1,000's of instances without asking for anyone's permissions is a tremendous business benefit. But, access is only one part; harnessing the value of cloud is what creates the differentiation.

On one hand, an optimally deployed mid-size private cloud provides a better cost efficiency over the public cloud while on the other, PaaS offerings from cloud providers help in driving faster innovation and better time-to-market with minimal development effort. Holy grail is to figure out a way to balance between the two worlds of private and public cloud.

But, in the world where the product is changing at hyper speed, the interoperability to move workloads between the two disparate clouds is a BIG challenge.

We have been running a large hybrid cloud across multiple geographies over a decade. Built on open-source technologies, our cloud platform helps in IT governance across disparate worlds by providing visibility through a single pane of glass and ensuring workloads are portable. The implementation helps in driving 80% cost efficiency over the public cloud with cumulative savings of millions of dollars every year ■

“Ultimately, the cloud is the latest example of Schumpeterian creative destruction: creating wealth for those who exploit it; and leading to the demise of those that don’t.”

—Joe Weinman, author of Cloudonomics:
The Business Value of Cloud Computing

Index

This book is for IT decision makers in large and medium Indian enterprises that are planning to implement selected technologies in their organizations.

This book is produced by CIO&Leader, the flagship B2B technology publication of 9.9 Group, in association with Hewlett Packard Enterprise India. The book has been co-authored by senior enterprise IT leaders who participated in a series of deliberations, as part of a program, also called FutureScape. The contents of the book have been prepared based on the deliberations of these senior tech leaders with senior executives of HPE India, moderated by the editors of 9.9 Group.

9.9 Group is an innovative media organization that engages the B2B technology community through cutting-edge content and innovative engagement formats.

Hewlett Packard Enterprise | intel | CIO&LEADER TRACK TECHNOLOGY • BUILD BUSINESS • SHAPE SELF | IT NEXT FOR THE NEXT GENERATION OF CIOs

ISBN 978-93-93651-66-2

9 789393 651662

₹4,500