News & Views | Pg 06
Google Fights Malicious Chrome Extensions

Next100 Winners' Special | Pg 25
5G For Enterprises: A Comprehensive Overview

ITNEXT
FOR THE NEXT GENERATION OF CIOs

FUTURE CIOs' INSIGHTS ON TOP TECH TRENDS

A special edition of IT Next, written entirely by the NEXT100 winners

April-May-June 2023 | ₹100 | Volume 14 | Issue 03 | A 9.9 Group Publication
www.itnext.in | facebook.com/itnext9.9 | @itnext_

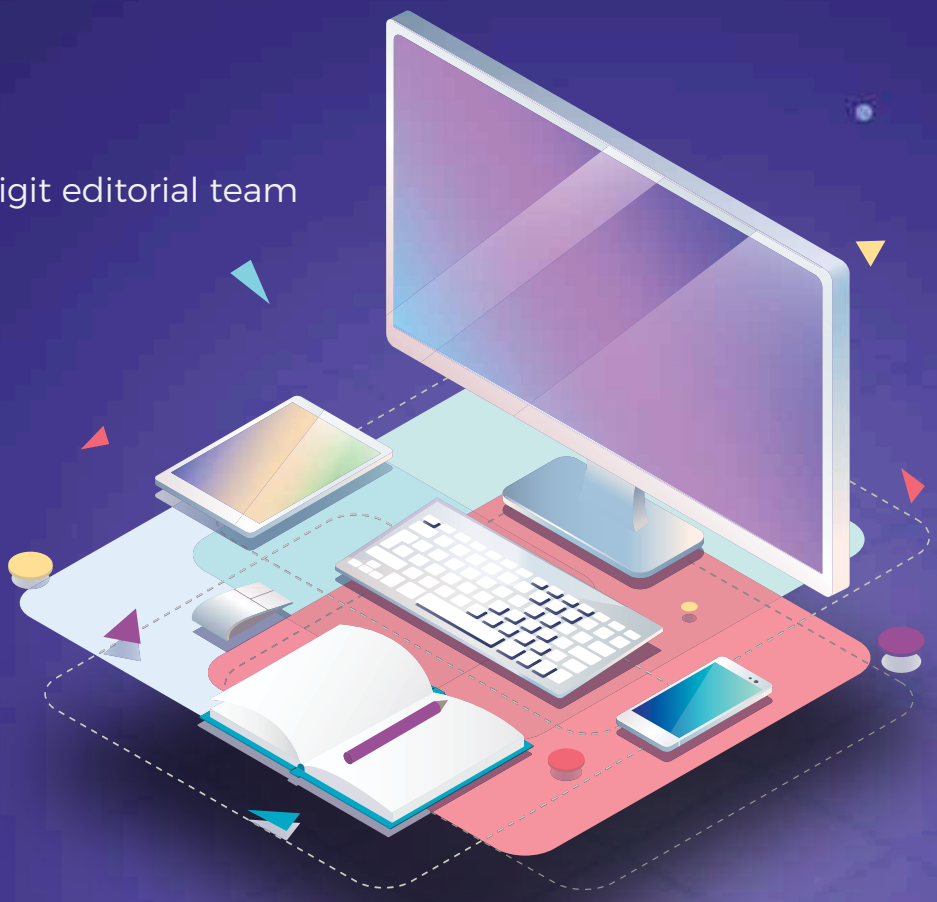
LAUNCHING

digit SQUAD

Here is your chance to become a Digit certified tech influencer

Benefits of Digit Squad Member

- Launch your own tech channel on Digit.in
- Become a Digit Certified tech influencer
- Engage with digit editorial team
- Make money



Apply now by scanning the QR code

www.digit.in/digit-squad/apply.html

This is now your platform!

I invite you to be part of this effort that will help the entire community. IT NEXT is now truly for you, of you and by you.

Shyamanuja Das

A decade back, did a full issue from user-generated content. That time, it was a sort of novel experiment. We have come a long way since then. Social Media has since made users' voices more mainstream.

This issue that you are holding in your hand is the next evolution in that direction. This is not just user generated but has been curated by our edit team from the opinion of experts who are the current and future enterprise IT leaders, all of whom are past winners of Next100 awards.

The articles are on specific topics: Artificial Intelligence, Data, cloud, and security. These are part of the theme of our annual conference, which will also host the Next100 awards.

As the CIO role gets transformed into CIDO (Chief Information and Digital Officer), these future leaders' perspectives will increasingly become important for successful digital transformation of businesses in fact, the future of business itself.

This is not a one-off experiment. IT NEXT will now be the platform for idea and opinion sharing for next-generation IT leaders, of course with a little curation from the editorial team.

By actively contributing to IT NEXT, you will not only enrich the collective knowledge and expertise of our community but also play a vital role in shaping the future of business and technology.

In the upcoming edition, our focus will be on celebrating the courage of those IT leaders who dare to dream big, the determination of those who challenge established norms, and the unwavering resilience of those who forge ahead despite uncertainties.

We invite you to embark on this incredible journey with us as we navigate the ever-evolving IT landscape. Your voice holds significance, and IT NEXT is your own platform to share your insights and ideas. Your contributions will make a lasting impact, empowering us all to embrace the opportunities that lie ahead. So, join us, and together, let's pave the way for a promising technological tomorrow.

I invite you to be part of this effort that will help the entire community. IT NEXT is now truly for you, of you and by you. ■

APRIL-MAY-JUNE 2023
VOLUME 14 | ISSUE 03

Content

NEXT100 WINNERS' SPECIAL | PAGE 10

FUTURE CIOs' INSIGHTS ON TOP TECH TRENDS

A special edition of IT Next, written entirely by the NEXT100 winners

Cover Design:
BAIJU NV

ADVERTISER INDEX

Bry Air Asia	BC

Please recycle this magazine and remove inserts before recycling

IT NEXT
ITNEXT.IN

MANAGEMENT
Managing Director: Dr Pramath Raj Sinha
Printer & Publisher: Vikas Gupta

EDITORIAL
Editorial Director - B2B Tech: Shyamanuja Das
Executive Editor - B2B Tech: Jatinder Singh
Assistant Manager - Content: Dipanjan Mitra
Principal Correspondent: Nisha Sharma

DESIGN
Sr. Art Directors: Anil VK
Associate Art Director: Baiju NV
Sr. UI UX Designer: Nikhil Wahal
Sr. Designer: Vipin Rai

SALES & MARKETING
Executive Director - B2B Tech:
Sachin Nandkishor Mhashilkar (+91 99203 48755)
Associate Director - Enterprise Technology:
Vandana Chauhan (+91 99589 84581)
Senior Manager - Community Development:
Neelam Adhangale (+91 98331 68076)

Regional Sales Managers
North: Pratika Barua (+91 99995 10523)
West: Vaibhav Kumar (+91 97176 74460)
South: Brijesh Kumar Singh (+91 98454 15137)
Ad Co-ordination/Scheduling: Kishan Singh

PRODUCTION & LOGISTICS
Manager - Operations: Rakesh Upadhyay
Asst. Manager - Logistics: Vijay Menon
Executive - Logistics: Nilesh Shiravadekar
Senior Manager - Operations:
Mahendra Kumar Singh
Logistics: Mohd. Ansari

Head - Digital & Event Operations: Naveen Kumar
Head - Digital Operations: Atul Kumar Pandey

OFFICE ADDRESS
9.9 Group Pvt. Ltd.
(Formerly known as Nine Dot Nine Mediaworx Pvt. Ltd.) 121, Patparganj, Mayur Vihar, Phase - I
Near Mandir Masjid, Delhi-110091
Published, Printed and Owned by 9.9 Group Pvt. Ltd. (Formerly known as Nine Dot Nine Mediaworx Pvt. Ltd.) Published and printed on their behalf by Vikas Gupta. Published at 121, Patparganj, Mayur Vihar, Phase - I, Near Mandir Masjid, Delhi-110091, India. Printed at Tara Art Printers Pvt Ltd., A-46-47, Sector-5, NOIDA (U.P.) 201301.

Editor: Vikas Gupta

9.9 GROUP

Why AI And Robotics Fail To Conquer Supply Chain Challenges

Organizations need to take a holistic approach that considers people, processes, and technology

By IT NEXT

Only 25% of the supply chain workforce is fully engaged. That means most workers aren't really invested in their jobs.

Technologies such as Artificial intelligence (AI) and robots alone cannot save the day when it comes to fixing supply chain problems. While many organizations = believe that these advanced technologies can make sure everything runs smoothly, from getting raw materials to delivering products to customers. But according to experts at Gartner, that's not entirely true. They say that relying solely on technology won't solve the decline in supply chain productivity.

According to a recent survey conducted by Gartner, titled the Global Labor Market Survey, 2,613 supply chain employees were asked about their work challenges. The results were quite surprising:

- Only 25% of the supply chain workforce is fully engaged. That means most workers aren't really invested in their jobs.
- Turnover in the supply chain function is 33% higher than before the pandemic. More employees are leaving their roles.
- Just 16% of the supply chain workforce is willing to go the extra mile and do more than what's expected of them.

So, why can't AI and robots fix all the supply chain problems on their own? Let's find out.

Technology has its limits: Technology has done wonders for supply chain management. It has brought automation, data analytics, and AI tools into the picture, which have improved efficiency, visibility, and decision-making. But relying solely on technology overlooks the complexity of the problem.

The human element: Supply chain operations involve many people, like suppliers, manufacturers, distributors, and customers. Technology can make things easier, but we still need human expertise and collaboration. Skilled professionals who can make smart decisions, manage relationships, and adapt to unexpected situations are crucial.

Process optimization: Technology can automate and optimize parts of the supply chain, but it's only effective if the underlying operations are well-designed. Even with latest technology, inefficiencies and bottlenecks can hamper productivity. Organizations need to regularly review and improve their strategies to make lasting progress.

Dealing with change: Introducing new technology often means changing the way organizations are structured, their culture, and even employee roles. But people can resist change, which can prevent the successful adoption of technology and limit its impact on supply chain productivity. It's important to have a comprehensive plan to manage change effectively and make the most of new technologies.

Taking a holistic approach

To tackle supply chain productivity challenges, organizations need to take a holistic approach that considers people, processes, and technology. Here are some key things to focus on:

Developing talent: Hiring and training the right people is crucial for supply chain success. Organizations should identify individuals with the right skills and provide training to enhance their abilities. Encouraging collaboration and sharing knowledge across different roles can create a culture of continuous improvement.

Optimizing processes: Regularly reviewing processes and using lean principles can uncover areas that need improvement. By eliminating bottlenecks, reducing waste, and streamlining workflows, organizations can boost efficiency and productivity. It's important to involve everyone in the supply chain to ensure everyone benefits.

Collaboration and partnerships: Building strong relationships with suppliers, distributors, and logistics providers is essential for supply chain productivity. Transparency, coordination, and agility can be achieved through collaboration. Embracing technologies that facilitate collaboration and data sharing can create a responsive and efficient supply chain network.

Continuous improvement: Organizations should establish ways to monitor and evaluate supply chain performance on an ongoing basis. Key performance indicators (KPIs) can help identify areas that need improvement and measure the impact of interventions. By fostering a culture of continuous improvement, organizations can adapt to changing market dynamics and stay ahead of the competition.

Conclusion

While technology undoubtedly plays a vital role in improving supply chain productivity, organizations must recognize that it is not a panacea. Addressing the underlying challenges requires a holistic approach considering the human factor, process optimization, and collaboration across the supply chain.

By investing in talent development, optimizing processes, fostering collaboration, and embracing continuous improvement, organizations can unlock the true potential of their supply chains and overcome productivity declines. Organizations can achieve sustainable supply chain success in the increasingly complex business landscape through a balanced integration of people, processes, and technology. ■

Google Fights Malicious Chrome Extensions, Enhances User Security

Google removes malicious Chrome extensions with 75 million installs from store

By Nisha Sharma

To protect user privacy and security, Google has swiftly taken action against a network of malicious Chrome extensions. With an alarming 75 million downloads, these extensions were discovered engaging in suspicious activities that severely threatened users. With prompt action, Google has successfully removed the extensions, ensuring the safety of its vast user base.

The threat unveiled - malicious intent behind chrome extensions

Behind the innocent façade of popular Chrome extensions lurked a network of deceptive software, discreetly collecting sensitive user data and executing unauthorized actions. This discovery sent shockwaves through the cybersecurity community, highlighting the potential dangers unsuspecting users face.

Rapid response - Google's commitment to user safety

Acknowledging the gravity of the situation, Google's security team collaborated with independent researchers to investigate and assess the impact of the malicious Chrome extensions. They aim to swiftly eliminate threats and protect users from data breaches and malware attacks.

Shielding users - removal and disabling of malicious extensions

Taking immediate action, Google promptly removed the malicious extensions from its Chrome Web Store, preventing further harm. In addition, the company disabled the extensions on devices where they had already been installed. By doing so, Google protected its users, ensuring their privacy and security were upheld.

Malicious activities unveiled - compromised browsing experience

The scope of the malicious Chrome extensions' activities became evident as investigations progressed. Users were subjected to intrusive advertisements, redirected to suspicious websites, and at risk of having their personal information stolen. The extensions compromised user security and disrupted their browsing experience, underscoring the need for immediate action.

Google's vigilance - investigating and mitigating the threat

Google's security team thoroughly investigated the malicious Chrome extensions and demonstrated its commitment to user safety. Their efforts aimed to identify the extent of the network and eliminate any potential risks. This proactive approach reaffirms Google's dedication to maintaining the highest cybersecurity standards.

With an alarming 75 million downloads, these extensions were discovered engaging in suspicious activities that severely threatened users.

User Responsibility - reviewing and removing suspicious extensions

To ensure optimal protection, users must carefully review their installed Chrome extensions and remove any suspicious or unnecessary ones. Users can mitigate risks and enhance their online security by taking this proactive step.

Unmasking malicious extensions: Avast detects new threats on the Chrome Web Store, revealing that Malicious browser extensions are tricky because of how they are made; the wings are intended to perform valuable functions, so at first glance, they seem innocuous. However, the obfuscated code of harmful origin is concealed within their code. The final payload appears aware that spamming individuals with unsolicited advertisements and search result hijacking, which modifies search experiences by showing sponsored links, paid search results, and possibly harmful links, are bad for users' search experiences.

Software Updates - key to strengthening security

Keeping Chrome and other software up to date is vital in fortifying digital defenses. Regular software updates often include essential security patches that protect against known vulnerabilities. Users can bolster their protection against emerging threats by prioritizing updates and maintaining a secure browsing environment.

Persistent cyber threats - the importance of vigilance

The incident is a stark reminder of the ongoing challenges cyber threats pose. While Google and other technology companies work diligently to combat risks, users must remain vigilant in their online activities. By staying informed and adopting safe browsing practices, users can actively contribute to their cybersecurity.

Conclusion

Google's swift response in removing malicious Chrome extensions with millions of downloads underscores its unwavering commitment to user security. By eliminating the threat and taking proactive measures, Google has effectively protected users' personal information and prevented potential cyberattacks. Users, too, must play their part by reviewing installed extensions, keeping software updated, and maintaining a cautious approach in the face of evolving cyber threats. Together, these efforts paved the way for a safer digital landscape. ■

CapitaLand

CIO&LEADER
TRACK TECHNOLOGY • BUILD BUSINESS • SHAPE SELF

We focus on **Building Resilient**, **Secure**, and **Sustainable Data Centres** for India

Surajit Chatterjee, Managing Director of Data Centre at CapitaLand Investment, Discusses his Company's India Strategy and Data Centre Trends

Amidst India's ongoing digital revolution and the increasing adoption of data-intensive technologies like cloud computing, AI, 5G, and IoT, the demand for data centres is rising significantly. As data localisation regulations come into effect, organisations are seeking reliable and secure local computing powerhouses that can provide scalable data storage and processing infrastructure.

CapitaLand Investment, a Singapore-based company, recognizes these emerging needs and is actively expanding its investments in India. They aim to deliver innovative, secure, and dependable data centre solutions to support India's ongoing digital transformation. In a recent interaction with CIO&Leader, **Surajit Chatterjee,** the Managing Director of Data Centre, India at CapitaLand Investment, provides insights into his company's plans for India and discusses current data centre trends. Here are the excerpts from the interview.

- ***What factors contribute to the growing demand for data centres in India?***

  India is currently experiencing a digital revolution. We saw this firsthand at CapitaLand, as the demand for data centres is increasing significantly. The exponential growth of digital services, e-commerce, cloud adoption, and remote work has dramatically increased demand for data centres. With the rise of data-intensive technologies such as AI, IoT, and Big Data, there has never been a greater demand for robust, dependable, and scalable data storage and processing infrastructure. Regulatory initiatives that encourage data localisation have also contributed to this desire. CapitaLand is ideally positioned to address these expanding demands. We are devoted to offering innovative, dependable, and secure data centre solutions to support India's continuing digital transformation.

- ***How does CapitaLand utilise new-age technologies to drive innovation and efficiency in data centres?***

  CapitaLand is leveraging emerging technologies to boost innovation and efficiency in its data centres. Artificial Intelligence and Machine Learning are crucial to our operations, allowing us to do predictive maintenance and reduce downtime. IoT sensors are crucial in real-time monitoring, allowing us to optimise operations and effectively regulate energy consumption. Automation technologies expedite our operations, and future-ready technology enables us to provide scalable, personalised services. Our dedication to implementing these innovative solutions distinguishes us, and we are delighted to be pioneers in this tech-driven transformation of data centre services.

- ***What are the emerging trends in Data Centre Infrastructure Management (DCIM)?***

  Data Centre Infrastructure Management (DCIM) is evolving due to the incorporation of AI, IoT, and cloud technologies. AI and machine learning will allow us to evaluate data and predict maintenance requirements, thereby reducing equipment breakdowns and maximising uptime. IoT devices enable us to monitor numerous environmental elements and the health of our equipment in real-time, allowing us to respond swiftly to any difficulties. CapitaLand is at the forefront of these trends, ensuring its data centres are future-proof and run efficiently.

- ***How are you integrating renewable energy sources into your operations?***

  Sustainability is essential to CapitaLand's business. Whenever possible, we are integrating sustainable energy sources into our data centres. Not only does using solar panels and wind energy lower our carbon footprint, but it also increases our energy efficiency. Additionally, we are investigating alternative renewable energy sources and integrating energy-efficient designs and technologies. Our efforts in this area indicate our determination to lead the data centre industry into a more sustainable future.

- ***How do data centres tackle the challenges posed by increasing data storage and processing demands?***

  The exponential growth in data storage and processing requirements is a crucial obstacle for the data centre sector. CapitaLand is equipped to meet these requirements. Our scalable data centres allow us to satisfy our customers in expanding data storage requirements. For rapid data access, we are introducing sophisticated storage technologies. In addition, load balancing and efficient data distribution techniques will help us successfully control processing loads, allowing us to retain optimal performance and dependability.

- ***What are the key considerations for ensuring data centre security and resilience?***

  Data centre operations place the utmost significance on data security and resiliency. CapitaLand is investing in cutting-edge physical security systems and tight access controls to protect our facilities' safety. We are deploying network firewalls, intrusion detection systems, and sophisticated data encryption measures on the digital front. We have also included robust disaster recovery methods, such as redundant systems and regular data backups. Regular vulnerability evaluations and audits allow us to detect and mitigate any issues proactively, providing our clients with the most significant data security.

- ***How do data centres leverage virtualisation technologies for improved resource utilisation and scalability?***

  Virtualisation technologies provide numerous benefits for data centre operations. CapitaLand is utilising these technologies to maximise resource utilisation and scalability. Allowing numerous virtual servers to run on a single physical server may increase efficiency and minimise expenses. Software-defined storage and networking further optimise resource allocation, allowing us to expand our services in response to fluctuating demand.

- ***What does the future hold for data centres in India? What are your plans?***

  The outlook for data centres in India is very positive. The rate of digital transformation is accelerating, and data localisation policies will increase the demand for data centres. CapitaLand will continue to invest in modern technologies and infrastructures, improve energy efficiency, and promote sustainability in the future. We intend to extend our presence with more resilient, secure, and environmentally friendly data centres to serve India's enterprises & its digital infrastructure requirements.

Reach out to us at: dcmarketing@capitaland.com to learn more.

FUTURE CIOs' INSIGHTS ON TOP TECH TRENDS

A special edition of IT Next, written entirely by the NEXT100 winners

With less than a month remaining to the highly anticipated Grand Finale of the 14th Next100 Award Ceremony, India's exclusive program aimed at identifying future Chief Information Officers (CIOs), we thought it the perfect time to introduce a special edition of IT Next, written entirely by the Next100 winners.

This edition marks the inaugural release of its kind, featuring 11 Next100 winners who have shared their invaluable perspectives on the latest trends and technologies reshaping the enterprise landscape and revolutionizing how organizations operate.

Through their insightful articles, we explore how different technologies and tech trends are revolutionizing industries and transforming organizations' operations.

EXPLORING TECHNOLOGICAL ADVANCEMENTS

This edition of IT NEXT covers a wide range of subjects, with our Next100 winners delving into the impact of AI, cloud computing, cybersecurity, and blockchain on various industries. Their analysis highlights how these cutting-edge advancements are reshaping the foundations of businesses, pushing them toward unprecedented growth and success. We sincerely appreciate all the contributors for sharing their expertise and shedding light on the transformative power of these technologies.

THE IMPORTANCE OF TALENT ACQUISITION AND DEVELOPMENT

In addition to technological advancements, this edition emphasizes the critical aspect of talent acquisition and development. Recognizing skilled professionals' pivotal role in driving innovation and sustainable growth, the authors shed light on the essential qualities and competencies required to cultivate a future-ready workforce. Their invaluable insights provide organizations and future CIOs with a roadmap for navigating the dynamic landscape of talent acquisition, development, and retention in an era of rapid technological advancements.

This entire issue promises to be an invaluable resource for aspiring CIOs, as their peers have written it.

JOIN US

We are committed to bringing you more such issues in the coming year. We invite you to share your interest in writing about the technology areas that intrigue you or consider joining our quarterly editorial panel, for a specific period, leading the way in delivering engaging content to the community.

Joining our editorial panel provides you with an exceptional opportunity to influence the direction of IT Next magazine. By leading the editorial strategy, you can contribute to the selection of topics, the creation of content, and the overall vision of the publication. Your expertise and ideas will play a crucial role in shaping the magazine for the benefit of Future CIOs and technology enthusiasts.

We invite you to share your interest in writing about the technology areas that intrigue you or consider joining our quarterly editorial panel. By expressing your interest, you can have the opportunity to shape the editorial strategy of IT Next magazine for a specific period, leading the way in delivering engaging content to the community.

FEEDBACK

We value your thoughts and feedback, and we encourage you to share them with us. If you have any comments, suggestions, or feedback regarding the content or any aspect of IT Next, please feel free to reach out to the editor, Jatinder Singh, at **Jatinder.singh@9dot9.in**. Your input will help us continuously improve and deliver content that resonates with our readers.

Thank you for your support, and we eagerly anticipate your thoughts and suggestions. ■

How Tech Is Transforming The Way We Explore The World

The integration of AI, cloud and analytics has made travel more accessible, affordable, and enjoyable than ever before

By Manoj Srivastava

The COVID-19 pandemic has brought significant changes to travel technology, leading to the closure of numerous airlines and hotels worldwide and a complete halt to all travel types. However, the travel industry has rebounded post-pandemic and is now profitable again, largely due to the integration of technology that has brought improvements to the industry. Online booking platforms and mobile apps have made travel more accessible, affordable, and enjoyable for millions of people globally.

Artificial Intelligence (AI), could revolutionize the booking experience by allowing platforms to offer personalized recommendations based on user behaviors' and preferences.

With ongoing advancements in technology, the travel industry continues to evolve and offer hassle-free and enjoyable experiences for travelers around the globe. Although these technological advancements have transformed the travel experience, it is crucial to strike a balance between technology and human interaction to ensure that travelers can still have

personalized and authentic travel experiences.

One of the most transformative changes in travel technology is the emergence of online booking platforms. Previously, travelers relied heavily on travel agents to book their flights and accommodations, which could be both costly and time-consuming. However, with the advent of online travel portals and other online travel agencies (OTAs), anyone with an internet connection can now easily book their flights and lodging within minutes. Additionally, mobile apps have also revolutionized the travel industry, making it more convenient and accessible than ever before.

Online booking experience

The online booking experience has come a long way in recent years, but there is still much room for improvement. As technology continues to evolve, here are some potential areas of development that could shape the future roadmap for online booking experience, Artificial Intelligence (AI), could revolutionize the booking experience by allowing platforms to offer personalized recommendations based on user behaviour and preferences. For example, an AI-powered booking platform could suggest destinations, flights, and hotels based on the user's search history and past travel patterns. Virtual and Augmented Reality (VR/AR) technology could transform the booking experience by allowing users to explore destinations and hotels before they book. Users could take virtual tours of hotels and attractions, helping them make more informed decisions and enhancing their travel experience, Voice-enabled Interface assistants like Alexa are becoming more prevalent, and travel booking platforms could leverage this technology to make the booking experience more natural and intuitive.

For example, users could use voice commands to search for flights and hotels, and the platform could use natural language processing to understand user preferences, blockchain technology could improve the security and transparency of online bookings by providing a decentralized and secure way to store and share data. For example, travelers could use blockchain-based platforms to store and manage their travel documents, eliminating the need for physical copies. As more people rely on mobile devices to make travel bookings, a mobile-first approach will be crucial for online booking platforms. This means designing interfaces that are optimized for mobile devices and offering features like push notifications and in-app messaging to improve the user experience. Overall, the future of online booking experience will be shaped by the continued evolution of technology. The key will be to focus on improving the user experience by leveraging the latest advancements in AI, VR/AR, voice-enabled interfaces, blockchain, and mobile technology.

BOT playing significant role in travel domain

Bots, or chatbots, are playing an increasingly significant role in the travel domain by automating customer service and providing personalized recommendations to travelers. Here are some ways in which bots are transforming the travel industry, Bots can handle a wide range of customer service requests, such as providing information about flights, hotels, and destinations, and resolving common issues like booking changes and cancellations. By automating these tasks, bots can reduce the workload of human customer service agents and provide faster and more efficient service to travelers. Personalized Recommendations: Bots can use artificial intelligence and machine learning algorithms to provide personalized recommendations to travelers based on their preferences and past behaviour. For example, a bot could suggest destinations, hotels, and activities based on the traveler's search history and previous bookings, bots can assist travelers with the booking process by providing real- time information about flight and hotel availability, pricing, and promotions. Bots can also help travelers compare prices and features across different booking platforms to find the best deals, BOTs can assist travelers who speak different languages by providing language translation services. By integrating with language translation APIs, bots can translate messages and provide responses in real-time, allowing travelers to communicate more effectively with customer service agents and local businesses, 24/7 Availability: Bots are available 24/7, allowing travelers to get assistance and information at any time, even outside of regular business hours. This can be particularly helpful for travelers who are in different time zones or who are experiencing travel disruptions like flight delays or cancellations.

Overall, bots are playing an increasingly significant role in the travel domain by automating customer service, providing personalized recommendations, and assisting travelers with booking and language translation. As technology continues to evolve, bots are likely to become even more sophisticated and play an even more significant role in shaping the future of the travel industry.

Customer expectations

Today's customers expect airlines and OTAs platforms to provide a seamless and personalized travel experience, customers expect a seamless booking experience, where they can easily search for and compare flights and hotels across multiple platforms. They also expect the booking process to be easy to navigate and complete, with clear pricing and fee structures. Customers expect personalized recommendations based on their travel preferences, past behavior, and loyalty status. Airlines and online booking platforms can use artificial intelligence and machine learning algorithms to offer personalized recommendations for flights, hotels, and activities.

Customers expect transparent pricing, with no hidden fees or charges.

They want to be able to compare prices across different platforms and see a breakdown of all costs before booking, efficient check-In and boarding process, with minimal wait times and hassle. They want to be able to check in online, choose their seat, and receive real-time updates about their flight status.

Customers expect a comfortable and entertaining in-flight experience, with amenities like Wi-Fi, in-flight entertainment, and comfortable seating. They also expect high-quality food and beverage options, with options for dietary restrictions and preferences.

There are also expectations around fast and efficient customer service, with prompt responses to inquiries and issues. They also expect airlines and online booking platforms to proactively notify them of flight changes or cancellations and offer flexible rebooking options. Overall, today's customers expect airlines and online booking platforms to provide a seamless and personalized travel experience, with transparent pricing, efficient check-in and boarding, comfortable in-flight amenities, and excellent customer service. Meeting these expectations requires a commitment to customer-centricity and a willingness to leverage technology to enhance the customer experience.

Cloud adoption in travel domain

Cloud adoption can help travel companies save costs by reducing the need for expensive hardware and infrastructure. Instead of investing in on-premise servers and IT staff, travel companies can leverage cloud-based solutions and shared resources, which can be more cost-effective in the long run. cloud-based solutions, travel companies can quickly and easily add or remove resources as needed to meet changing demand, without having to invest in expensive hardware or infrastructure. Cloud adoption and economy of scale can provide travel companies with greater flexibility in terms of their technology and

Cloud adoption and economy of scale can provide travel companies greater flexibility regarding technology and resource needs.

resource needs. Cloud-based solutions can be more easily customized to meet the specific needs of travel companies, allowing them to adapt quickly to changing market conditions and customer demands. Improved Security, cloud-based solutions can provide travel companies with better security and data protection. Cloud providers typically have advanced security measures in place to protect against cyber threats, which can be more difficult for smaller travel companies to implement on their own.

Cloud adoption and economy of scale can improve collaboration and communication between different teams and departments within travel companies. Cloud-based solutions can provide a central location for storing and sharing data, making it easier for teams to work together and share information. Overall, cloud adoption and economy of scale can provide significant benefits for the travel industry, including cost savings, scalability, enhanced flexibility, improved security, and increased collaboration. As the travel industry continues to evolve and adapt to changing market conditions, cloud adoption and economy of scale are likely to become even more important for travel companies looking to remain competitive and profitable.

How crucial is competitiveness for survival in the travel industry?

The travel industry is a highly competitive sector where survival is dependent on a company's ability to continuously innovate and adapt to changing market conditions. To remain competitive, travel companies must prioritize meeting and exceeding customer expectations by offering high-quality products and services, exceptional customer service, and staying abreast of the latest trends and technologies. Differentiation is key to standing out in a crowded market, and travel companies can achieve

this by providing unique offerings like specialized tours or exclusive travel packages or providing a superior customer experience.

Effective cost management is also critical for travel companies to remain competitive. This entails controlling expenses like labor, marketing, and distribution costs while optimizing their operations for maximum efficiency. Given that technology is rapidly transforming the travel industry, companies that do not adopt the latest technologies risk falling behind their rivals. Thus, travel companies must embrace new booking systems, mobile apps, and social media marketing strategies to reach customers effectively.

Overall, competitiveness and survival in the travel industry require agility, adaptability, and innovation. By keeping track of customer needs and expectations, differentiating themselves from competitors, managing costs, adopting new technologies, and partnering with other companies, travel companies can enhance their chances of success in a constantly evolving and challenging market.

Travel technology ecosystem

The travel technology ecosystem can be described in terms of the various technology solutions and platforms that are used by travel companies and consumers to plan, book, and manage travel. Here are some of the key components of the travel technology ecosystem:

Online Travel Agencies (OTAs): OTAs are platforms that allow consumers to search for and book travel products and services, such as flights, hotels, and rental cars. Examples of OTAs include EaseMyTrip, Expedia, Booking.com, and many more.

Global Distribution Systems (GDSs): GDSs are networks that allow travel companies to distribute their products and services to travel agencies and other third-party providers. Examples of GDSs include Amadeus, Sabre, and Travelport.

Travel Management Companies (TMCs): TMCs provide travel management services to corporate clients, such as booking travel for employees and managing their travel expenses. Examples of TMCs include EaseMyTrip, American Express

Airline Reservation Systems (PSS): Airline reservation systems are platforms that airlines use to manage their inventory and booking processes. Examples of airline reservation systems include Amadeus Altéa, SabreSonic, and TravelSky.

Mobile Applications: Mobile apps allow consumers to book and manage travel products and services on their mobile devices. Examples of travel apps include EaseMyTrip.

Payment Solutions: Payment solutions allow consumers to securely make payments for travel products and services. Examples of payment solutions include PayPal, Rupee Pay, MobiKwik Razorpay etc

A Travel meta-search Engine (MTSE): is a search engine that enables travelers to search for travel-related information such as flights, hotels, car rentals, and vacation packages across multiple travel websites at once. Instead of searching for travel deals on individual travel websites, a travel metasearch engine allows users to compare prices and availability from several sources, all in one place.

MTSEs work by aggregating and displaying the results of multiple travel sites, most popular examples of travel meta-search engines include Kayak, Skyscanner, and Google Flights. These platforms allow travelers to compare prices, find the best deals, and book their travel arrangements directly from the website.

Analytics and business intelligence: Analytics and business intelligence solutions provide travel companies with insights into consumer behaviour and trends, allowing them to optimize their offerings and improve their performance. Examples of analytics and business intelligence solutions include Google Analytics, Tableau, and SAS.

Overall, the travel technology ecosystem is a complex and interconnected network of platforms, solutions, and technologies that are used by travel companies and consumers to facilitate the planning, booking, and management of travel.

ChatGPT and its impact

The travel technology industry can benefit from ChatGPT's support in several ways. Firstly, ChatGPT can provide up-to-date information on the latest travel technology trends and developments to both consumers and industry professionals. This includes new products and services, emerging technologies, and best practices.

Secondly, ChatGPT can answer questions from both consumers and industry professionals regarding travel technology topics. For example, it can provide guidance on how to use specific travel apps or platforms, how to improve website usability and user experience, and how to stay current with the latest travel technology trends.

Thirdly, ChatGPT can offer recommendations to both consumers and industry professionals on which travel apps, platforms, and solutions are best suited for their specific needs and preferences.

Fourthly, ChatGPT can provide training and education to industry professionals on how to effectively use specific travel technology platforms and solutions. Additionally, it can help professionals optimize their websites and marketing strategies to reach their target audiences.

Finally, ChatGPT can conduct research into the latest travel technology trends and developments and share the findings with both consumers and industry professionals. By doing so, ChatGPT can promote innovation, best practices, and growth in the travel technology industry, benefiting both consumers and industry professionals. ■

The author is the Chief Information Officer of Ease My Trip, and was recognized as a Next100 Winner in 2019.

How Technology Is Changing The Business Landscape

Technology is not just changing the future of work, it is fundamentally reshaping the business landscape in a revolutionary way

By Rohit Kumar Sharma

Technology's impact on the future of work is already visible through the automation of jobs and the transformation of the way we work using digital technologies. However, it is crucial to acknowledge that technology is not the sole driver of change. Social and economic factors also play a significant role in shaping the future of work, as noted by Klaus Schwab, the Founder and Executive Chairman of the World Economic Forum.

The concept of the future of work is evolving rapidly, driven by the adoption of new technologies and the changing business landscape. The rapid advancement of technology presents a plethora of opportunities for businesses to streamline their

processes, boost productivity, and promote innovation. This digital revolution has caused significant upheaval for businesses, with technology advancing at an unprecedented pace.

The importance of agility and adaptability

The concept of 'The Future of Work' is rapidly changing, fueled by the adoption of new technologies and the evolving business landscape. With technology advancing at an unprecedented pace, businesses are experiencing a major upheaval, where the digital revolution presents a wealth of opportunities to streamline processes, boost productivity, and drive innovation.

As the saying goes, "It's not the big fish that eats the small fish, it's the fast fish that eats the slow fish" highlighting the importance of agility and adaptability to new technology in the business world. To stay ahead of the curve, many organizations are embracing new technologies.

One of the most significant ways technology is transforming the business landscape is through automation and the rise of artificial intelligence and robotics. This shift towards automation is increasing efficiency and reducing costs for businesses, while big data and analytics are enabling them to collect, analyze, and act on vast amounts of data to make more informed decisions. Additionally, remote working has accelerated the use of digital collaboration tools, allowing businesses to work more efficiently across distributed teams while reducing the need for physical office space. The adoption of emerging technologies such as 5G, AR/VR, Machine learning, and blockchain will create new opportunities for businesses to innovate and drive growth.

As technology continues to advance at an unprecedented pace, it will inevitably have a profound impact on the future of work.

Impact and Benefits of technological change

Technological change will have a profound impact on the way businesses operate. Automation and artificial intelligence (AI) are already transforming industries, and remote work is becoming increasingly prevalent. The gig economy is also growing, and upskilling and reskilling are becoming more important to adapt to new technologies. Businesses will need to adapt quickly to stay ahead of the curve and remain competitive in the marketplace.

The changing technological landscape presents many opportunities for businesses. Automation and AI can create new job roles and transform existing ones, while remote work can reduce overhead costs and increase productivity.

Businesses can benefit greatly from technological change, including increased efficiency, reduced costs, and access to a wider pool of talent. Additionally, remote work can help employees achieve a better work-life balance, while the gig economy can offer workers greater flexibility and independence.

Challenges

While technological change undoubtedly brings many benefits, there are also some significant challenges that businesses must face. One of the main concerns is the impact of automation and AI on jobs. While these technologies can increase efficiency and reduce costs, they may also lead to job losses in certain industries, particularly those that rely heavily on manual labor. This can have a significant impact on workers and their families and may require support from governments and other organizations to ensure a smooth transition to new employment opportunities.

Another challenge presented by technological change is the rise of remote work. While this can offer benefits such as improved work-life balance for employees, it can also create communication and collaboration issues for businesses. Managers may struggle to keep remote workers engaged and motivated, and it can be difficult to maintain a cohesive company culture when employees are geographically dispersed.

The gig economy is another aspect of technological change that presents challenges for businesses. While it

offers greater flexibility and independence for workers, it can also create issues around fair treatment and compensation. Many gig workers do not receive benefits such as healthcare or retirement savings plans and may struggle to earn a living wage.

Finally, upskilling and reskilling are becoming increasingly important as technological change continues to accelerate. However, these processes can be time-consuming and expensive for both businesses and workers. Businesses need to invest in the training and development of their employees to ensure that they have the skills needed to remain competitive in the changing business landscape.

Opportunities

The changing technological landscape presents many opportunities for businesses. Automation and AI can create new job roles and transform existing ones, while remote work can reduce overhead costs and increase productivity. The gig economy can provide access to a wider talent pool, and upskilling and reskilling can lead to a more skilled and adaptable workforce.

Businesses need to invest in the training and development of their employees to ensure that they have the skills needed to remain competitive in the changing business landscape.

There are many use cases for technological business change. For example, automation can improve manufacturing processes and reduce errors, while AI can help businesses make more informed decisions. Remote work can help companies access talent from all over the world, and the gig economy can help businesses scale up or down as needed. Upskilling and reskilling can help businesses stay ahead of the curve and adapt to new technologies.

Conclusion

In conclusion, the future of work will be significantly influenced by technological advancements, and businesses need to adapt to remain competitive. Upskilling and reskilling are critical investments that businesses must make to equip their employees with the skills and knowledge needed to succeed in an ever-changing job market. While these changes present some challenges, they also present opportunities for businesses to thrive by positioning themselves for success using the right tools and resources. By embracing these changes and investing in their workforce, businesses can navigate the future of work successfully. ■

The author is currently working as a Program Manager at T-Systems International, and was recognized as one of the winners of Next100 2020

The Future Of Manufacturing Through Digital Transformation

To succeed in implementing a smart factory, evaluate, choose, plan, test, and monitor outcomes strategically

By Gyan Prakash

Manufacturers face multiple challenges in today's volatile market. One of the biggest concerns for them is to adapt quickly to changing market conditions, and identify potential issues before they become major problems. To remain viable and increase their agility, manufacturers must remotely monitor equipment, detect anomalies, and respond to supply chain disruptions promptly. Digital transformation is critical for achieving this goal. That's the only way to achieving smart factory goals such as improving resilience, increasing agility, and shortening time to market. Smart factories utilize cutting-edge technologies to optimize production, decrease wastage, and improve product quality. They offer flexibility to quickly adapt to shifting market needs, aiming to achieve automation, intelligence, and agility in production processes for higher productivity, lower costs, and better products.

Smart factory framework

Smart manufacturing enables manu-

To remain viable and competitive in today's rapidly changing market, manufacturers must remotely monitor equipment, detect anomalies, and respond to supply chain disruptions promptly.

facturers to monetize their data and algorithms by adopting digital technologies to develop new revenue streams. Successful manufacturers automate decision-making processes and manage assets carefully to achieve operational excellence and agility while maintaining strong relationships with customers and suppliers. Follow the below framework to achieve success.

In order for businesses to gain insight into their operations and pinpoint areas for development, the smart factory framework needs to be connected to the same value chain. As a result, they may eventually become more profitable and more competitive. A smart factory's value chain is made up of a number of phases, each of which is essential to the production process as a whole. Manufacturers can boost productivity, cut expenses, and enhance customer satisfaction by utilizing cutting-edge technologies and optimizing each step of the value chain. As shown below.

Establishing KPI targets, tracking KPIs, and constantly improving the value chain based on KPI data are all steps in the process of connecting the value chain of a smart factory with KPIs. Smart factories can identify areas for growth and make data-driven decisions to optimize the production process, increase productivity, lower costs, and boost customer satisfaction by monitoring and analyzing the KPIs listed below.

Given its potential to help businesses succeed and stay competitive in today's fast-paced environment, smart factory is becoming more and more important in the manufacturing sector. Manufacturers can boost productivity, raise product quality, give customers a better experience, streamline their supply chains, and gain a competitive edge by adopting smart factory initiatives. Aligning initiatives with business goals, creating a thorough strategy, prioritizing initiatives, utilizing existing technology investments, and tracking success are all necessary for maximizing ROI for smart factories.

A strategic approach is needed

IT decision makers can ensure that their companies are maximizing their investments in smart factories and remaining competitive in today's fast-paced business environment by following the value chain and framework outlined above. Smart factory implementation success requires a strategic approach that includes evaluating the current state of the business, choosing the best technologies to implement, developing a detailed plan, putting the technologies into use and testing them, and monitoring and evaluating the outcomes. Manufacturing businesses can increase efficiency, productivity, and quality control while lowering costs and maintaining competitiveness in today's rapidly changing technological environment by adhering to these crucial steps.

In a nutshell, a smart factory functions like a symphony orchestra, with each instrument being a piece of machinery or equipment, and the director being cutting-edge technology. The machines communicate with one another and adjust their performance in perfect unison to produce a flawless final result. Artificial intelligence and other cutting-edge technologies serve as the conductor, guiding and directing the production process to ensure that each note is performed precisely and each beat is timed exactly. The result is a manufacturing masterpiece where quality, productivity, and efficiency all work together to produce something incredibly magnificent. ■

The author is a Senior Consultant at Cognizant MLEU Consulting, and was recognized as a Next100 Winner in 2016.

Safeguarding Digital Transformation: The Crucial Role Of Cybersecurity

The role of cybersecurity in protecting sensitive data, preventing unauthorized access, and thwarting cyber threats has become paramount

By Abhay Dhasmana

In today's rapidly evolving world, where smart devices reign supreme and customer preferences continuously shift, digital transformation has emerged as the cornerstone of business success. However, amid the excitement and promise of this transformative journey, one aspect cannot be overlooked: cybersecurity. Its role in protecting sensitive data, preventing unauthorized access, and thwarting cyber threats has become paramount. This article delves into the significance of cybersecurity within the realm of digital transformation, highlighting its crucial role in safeguarding organizations and individuals alike.

The rising stakes: protecting sensitive data

As the volume of personal and confidential data stored online skyrockets, cybersecurity measures are no longer

Businesses that rushed into adopting digital transformation without giving cybersecurity measures priority frequently discovered this the hard way by suffering the damaging effects of hacks.

optional but imperative. Ensuring the security of this data is particularly crucial for businesses that handle sensitive customer information, such as financial or health data. Unauthorized access or breaches could have dire consequences, including reputational damage and legal ramifications. Therefore, robust cybersecurity protocols stand as the first line of defense in the battle against ever-evolving cyber threats.

Preserving system integrity and privacy

Digital systems lie at the heart of any successful digital transformation. Cybersecurity plays a pivotal role in maintaining the integrity of these systems, ensuring that they remain free from tampering or compromise. Furthermore, as the internet of things (IoT) proliferates, individuals are becoming increasingly interconnected with various devices that collect and store their personal data. By implementing robust cybersecurity measures, organizations can safeguard this data, protecting the privacy of individuals and preserving their trust.

From boardrooms to breach realities

Cyber threats have grown in frequency, complexity, and target-oriented nature. Consequently, cybersecurity has transcended its status as a technical concern to become a board-level issue for organizations undertaking digital transformation initiatives. The pandemic-induced shift to remote work and the subsequent rapid adoption of new technologies further emphasized the importance of cybersecurity. Organizations that hastily embraced digital transformation without prioritizing cybersecurity measures often learned the hard way, experiencing the devastating effects of breaches. However, it's never too late to act.

A chance for redemption

Organizations that rushed into digitization without adequate protection need not despair. By involving their cybersecurity teams and implementing proper security systems, these businesses can mitigate existing risks and prevent further damage. Proactive cybersecurity measures are essential in preventing cyber-attacks and ensuring the uninterrupted availability of digital systems. Remember, investing in digitalization without solid cybersecurity practices is akin to constructing a house without a foundation – a recipe for disaster.

Navigating the third-party conundrum

With digital transformation gaining momentum, organizations increasingly rely on third-party entities to power their initiatives. Cloud providers, robotics, process automation, and IoT solutions have become crucial components of the digital landscape. However, the ease with which non-IT business units adopt these technologies has given rise to shadow IT, making it exponentially harder to assess an organization's risk profile. Without robust third-party/vendor risk management programs, the potential risks can outweigh the benefits. Therefore, maintaining a strong cybersecurity posture when engaging with third parties is paramount.

Conclusion

As organizations continue to embrace the winds of digital transformation, they must recognize that cybersecurity is not an afterthought but an integral part of the journey. By prioritizing cybersecurity measures, businesses can safeguard their digital assets, prevent unauthorized access, maintain system integrity, and protect individual privacy. The road to successful digital transformation lies in merging innovation with cybersecurity, allowing organizations to soar to new heights while keeping their operations secure. ■

The author is a 2021 Next100 Winner and currently serves as a senior consultant at HCL Technologies

Developing Digital Skills And Talent To Drive Change

People, product, prototype, process, and performance are the 5Ps of transformation journey

By Hitesh Bajaj

In this fast-changing technological landscape, we are witnessing organizations at all scales and levels undertaking transformational journeys. Every organization today realizes the potential and prospect of innovation, speed, and scale. To outgrow the competition, one needs to keep evolving and offering better products, services, and solutions than ever before. This entails changes at various levels in the organization – technology, people, process, product, pricing, and performance.

These changes lead to companies taking up more and more transformation programs. The core objective of these programs is for companies to improve their productivity, efficiency, automation, reporting, real-time data, decision-making, and faster go-to-market.

Transformation strategy

A well-defined transformation strategy is key before undertaking such an engagement. Such a strategy should involve the current state and how companies intend to move to a future-ready state. More impor-

tantly, companies should know what skills, capabilities, and organizational changes are needed to move to that future state. This transformation strategy should then lead to an effective tactical roadmap and detailed operational plan.

A transformation journey is always an experience-changing journey and multiple factors and facets come into play. These include the 5 P's - people, product, prototype, process, and performance. While each one of these five is important, they must balance each other out to produce a long-term, sustainable, and robust equilibrium for an Organization.

A company has to invest time, effort, money, and other resources to build these 5Ps that essentially form key pillars of any transformation journey.

Getting a buy-in: Any change that involves moving from the current state to the future state, or in other words transformation, includes people at the center of such a change. Hence, buy-in from People is so crucial to ensure they support such a transformation engagement. This may not be as easy as it sounds. When people are used to doing certain things in the same fashion for many years, having them shift or adapt to a new change may be a challenging undertaking. This requires building and delivering an

Organizational Change Management (OCM): Simply put, companies need to come up with communication, alignment, and messaging mechanisms to help people see the big picture while addressing any concerns or questions they may have. Thrusting a Transformation change on People seldom works. It is vital to convey to your workforce the key objectives, short-term and long-term benefits, and a clear roadmap so they see the same benefits as the Leadership team would.

Let's remember – when the transformation does complete, it is your "People" who will work and deliver for you using the new changes. Hence, for transformation to be successful, getting your people onboard with you will be the key. Also, note that not 100% of people may understand the benefits of Transformation right away. This is where communication, guiding, and enabling the workforce are so important.

Building the required skills and capabilities

Now that you have the Workforce understand the benefits of transformation and you are ready to embark on that journey, the next step is to "enable" your workforce. This involves having opportunities to build skills, capabilities, and talent, and providing training platforms for the workforce.

Some of the steps and methods to enable your workforce

I. Function and skillset mapping – Undertake an exercise to map your people based on the Functions/ Groups/Departments they work in and the current skillsets they possess

II. Identify gaps/opportunities – With the mapping exercise above, identify what Gaps will arise when the transformation is complete. These gaps could include a lack of resources, lack of skillsets, knowledge, access to tools, etc.

III. Fitment mapping – Now that you have done the Function mapping and identified the gaps, the next stage includes identifying the resources that will have the highest impact or will be directly involved with the transformational changes. This is called "Fitment Mapping". If required, you can also assign Ratings on a scale of 1 to 100 to identify people in the highest impact bucket or category

IV. Building digital skills and capabilities – Devise various training opportunities for your workforce to acquire the required digital skillsets and capabilities. These include, but are not limited to –

- User guides or digital online copies
- Frequently asked questions (FAQs) guide
- Instructor-led training classes
- Virtual training classes
- Open forum/all-hands call
- Question and answer (Q&A) sessions

V. Training classes – Plan for both Instructor-led and Virtual training programs that will focus on specific digital skills, products, and processes. If you have a geographically diverse workforce and if you have the required resources to do so, such training programs can be conducted in multiple languages aimed at such a diverse workforce

VI. Flight simulator – If possible, build a Flight Simulator environment where People can practice and simulate various scenarios, and situations, and get real-time first-hand experience with the new system, tool, or technology. This will help build confidence in your People by getting them to know the new or future-state environment a little better

VII. Subject champions/subject matter experts – Within the group, identify the individuals/teams that can act as go-to persons/team for the rest of the people to get more insights into the system, tool, or technology

VIII. Feedback mechanism – Build a Feedback mechanism where People can anonymously rate the new system, tool, or technology and provide any insight or feedback. Encourage both positive as well as constructive criticism as both are required to know and judge how the transformation is being perceived. This will help you act on areas where further improvements are needed.

Lastly, companies should encourage a culture where continuous improvements are seen positively and the ones that warrant changes are adapted and implemented for companies to be more productive and efficient in the long run given the resources at the company's disposal and within the boundaries of the defined transformation charter. ■

The writer of this article is a Project Director at Infor and was honored with the Next100 2022 award.

5G for Enterprises: A Comprehensive Overview Of The Future Of Wireless Networks

A quick guide covering key features of 5G, its architecture, the challenges to its implementation, and the various use cases and impacts of this ground-breaking technology.

By Dr. Satish S. Doiphode

5G is the latest and most advanced wireless network technology to date. It promises to bring faster speeds, lower latency, and greater connectivity, transforming how we communicate, work, and live. With the ability to connect billions of devices, enable new forms of entertainment, and power emerging technologies like autonomous vehicles and smart cities, 5G can potentially change the world as we know it. In this article, we will explore the key features of 5G, its architecture, the challenges to its implementation, and the various use cases and impacts of this ground-breaking technology.

From radio waves to 5G: A brief history of wireless networks

The history of wireless networks can be traced back to the early 1900s when radio waves were first used to transmit messages across distances. The first commercial wireless communication system was introduced in 1921 by Western Electric and AT&T, which enabled voice communication over long distances using analog technology.

The evolution of wireless networks continued with the introduction of the first-generation (1G) networks in the 1980s, followed by the second-generation (2G), third-generation (3G), and fourth-generation (4G) networks. Each generation brought advancements in technology, capacity, and services.

The era of 5G: key features and capabilities

Today, we are on the cusp of the fifth generation of mobile networks, or 5G, which promises to be even faster, more reliable, and more flexible than its predecessors. Let's explore the key features of 5G:

- **High speed:** 5G networks can deliver significantly faster download and upload speeds than previous generations of wireless networks. 5G can achieve up to 20 Gbps speeds, roughly 20 times faster than 4G.
- **Low latency:** 5G networks offer much lower latency than previous generations of wireless networks. Latency is the time it takes for a signal to travel from one device to another. With 5G, latency can be reduced to as little as 1 millisecond, which is almost instantaneous.
- **Massive connectivity:** 5G networks can support a much larger number of devices and connections than previous generations of wireless networks. This is essential for the Internet of Things (IoT), which requires billions of devices to be connected to the Internet.
- **Network slicing:** 5G networks can be divided into multiple virtual networks, each with specific characteristics, to support different applications and services.
- **Edge Computing:** 5G networks can support edge computing, which allows data processing to occur closer to the data source. This can reduce latency and improve the performance of applications that require real-time data processing.
- **Improved energy efficiency:** 5G networks are designed to be more energy-efficient than previous generations of wireless networks, essential for supporting a growing number of connected devices and reducing the environmental impact of wireless networks.

As the deployment of 5G networks continues, we can expect to see many new and innovative use cases emerge, leading to a more connected, efficient, and sustainable future.

The architecture of 5G: components and technologies

The 5G architecture consists of three main components: the User Equipment (UE), the Radio Access Network (RAN), and the Core Network. Let's take a closer look at each component:

- **User equipment (UE):** The UE includes all the devices that connect to the 5G network, such as smartphones, tablets, IoT devices, and more. These devices communicate with the network through the RAN.
- **Radio Access Network (RAN):** The RAN is responsible for connecting the UE to the core network. It includes base stations, antennas, and other equipment that transmit and receive wireless signals.
- **Core Network:** The Core Network is the backbone of the 5G network. It handles authentication, billing, routing, and connecting to external networks. It also enables network slicing and edge computing.

Overcoming challenges: Implementing 5G networks

Implementing 5G networks comes with its own set of challenges. Some of the key challenges include:

- **Infrastructure Deployment:** Building the necessary infrastructure for 5G networks, including installing new base stations and upgrading existing infrastructure, requires significant investment and coordination between network operators and government entities.
- **Spectrum Allocation:** 5G networks require access to a wide range of radio spectrum to deliver their promised speeds and capacity. Allocating and managing the spectrum is a complex task that involves coordination between regulatory bodies and network operators.
- **Security and Privacy:** With the increasing number of connected devices and the transfer of sensitive data over 5G networks, ensuring the security and privacy of the network becomes crucial. Network operators and device manufacturers need to implement robust security measures to protect against cyber threats.
- **Interoperability and Standardization:** Global standards need to be established to ensure seamless connectivity and interoperability between different 5G networks and devices. This involves collaboration between industry

stakeholders and standardization organizations to develop and adopt common protocols.

Exploring the use cases of 5G

The potential applications and use cases of 5G are vast and varied. Here are some of the areas where 5G is expected to make a significant impact:

- **Industry transformation:** 5G technology has the potential to transform a wide range of industries, including healthcare, manufacturing, transportation, and energy. By enabling new use cases such as remote monitoring, autonomous vehicles, and predictive maintenance, 5G networks can improve efficiency and productivity in these industries, leading to cost savings and increased innovation.
- **Communication:** 5G networks can enable new forms of communication, such as high-quality video conferencing and virtual and augmented reality experiences. These technologies have the potential to improve communication and collaboration across distances and enable new forms of remote work and education.
- **Entertainment:** 5G networks can enhance the delivery of entertainment and media content by enabling ultra-high-definition streaming, immersive virtual and augmented reality experiences, and real-time multiplayer gaming. These technologies can provide consumers with new and engaging ways to consume content.
- **Smart cities:** 5G technology can enable the development of smart cities, where infrastructure and services are connected and optimized for efficiency and sustainability. By enabling real-time monitoring and control of traffic, energy, and other systems, 5G networks can reduce congestion and pollution, improve safety, and enhance the quality of life for citizens
- **Economic Growth:** 5G technology has the potential to drive economic growth by enabling new industries and business models. By creating new use cases and applications, 5G networks can stimulate innovation and entrepreneurship, leading to job creation and economic growth.

The impact of 5G technology is likely to be far-reaching and transformative. By enabling new forms of communication, enhancing entertainment experiences, and transforming industries, 5G networks have the potential to reshape society in significant ways. As the deployment of 5G networks continues, we can expect to see many new and innovative use cases emerge, leading to a more connected, efficient, and sustainable future.

What's ahead

The future of 5G technology is exciting, with many emerging trends and technologies that are likely to shape its development in the years to come. Here are some of the key areas to watch:

1. **Expanded coverage:** As 5G networks continue to be rolled out around the world, we can expect to see expanded coverage in both urban and rural areas. This will enable more people to take advantage of the high-speed connectivity and low latency of 5G networks.
2. **Increased adoption:** With the growing availability of 5G-enabled devices, we can expect to see increased adoption of 5G technology in both consumer and enterprise applications. This will create new opportunities for innovation and entrepreneurship, as businesses and individuals explore new use cases and applications for 5G networks.
3. **Edge computing:** One of the emerging trends in 5G technology is the use of edge computing, which involves processing data closer to the source rather than sending it to a centralized server. This can reduce latency and improve the performance of applications that require real-time processing, such as autonomous vehicles and augmented reality experiences.
4. **Virtualization:** Another emerging trend in 5G technology is network virtualization, which involves creating virtual networks that can be dynamically configured and managed. This can improve the scalability and flexibility of 5G networks, enabling them to support a wide range of use cases and applications.
5. **Integration with other technologies:** 5G technology is likely to be integrated with other emerging technologies, such as artificial intelligence and the Internet of Things (IoT). This will create new opportunities for innovation and enable the development of new applications and services that are more intelligent and responsive.

Overall, the future of 5G technology is bright, with many exciting trends and technologies that are likely to shape its development in the years to come. As the deployment of 5G networks continues, we can expect to see many new and innovative use cases emerge, leading to a more connected, efficient, and sustainable future.

Conclusion

5G represents a significant leap forward in wireless network technology, offering unprecedented speeds, low latency, massive connectivity, and a multitude of new possibilities. While there are challenges to overcome, the potential benefits of 5G are immense, ranging from enhanced mobile experiences to powering emerging technologies like IoT, autonomous vehicles, and smart cities. As 5G continues to roll out across the globe, it holds the promise of reshaping society, driving economic growth, and paving the way for a more connected and innovative future. ■

The author of this article is currently working as the Vice President of RPMG - IT and Automation at Reliance Industries Limited, and a recipient of the Next100 2022 Award.

What The Future Holds For Cloud Computing: Exciting Trends And Transformations

Cloud computing has already revolutionized businesses, but what does the future hold for this dynamic technology?

By Jayesh Maduskar

First, let's talk about the new norms in cloud computing: hybrid and multi-cloud. A hybrid cloud combines the best of both private and public cloud environments, enabling organizations to harness the scalability and cost-effectiveness of the public cloud while retaining control over their data and applications. As businesses increasingly move their workloads to the cloud, hybrid cloud solutions will become the standard.

But that's not all. Businesses are now using multiple public and private clouds to meet their specific needs, creating a diverse cloud landscape. However, the hybrid cloud is not going away anytime soon. The hybrid cloud will become even more common as businesses move their workloads to the cloud. So, what will be the future of cloud storage and security? It will likely be a mix of hybrid and multi-

cloud deployments as businesses seek to find the right balance of agility, flexibility, security, and control.

Now, let's delve into an exciting concept: serverless computing. In this model, cloud providers dynamically allocate compute resources and storage based on the specific code being executed, charging users only for what they need. Servers are still in the mix, but the provider handles all the provisioning and maintenance. While still in its early stages, serverless computing shows promise as a scalable and cost-effective solution for running cloud-based applications.

But wait, there's more! Artificial Intelligence (AI) and Machine Learning (ML) are already making their mark in cloud computing, offering intelligent services like chatbots, predictive analytics, and fraud detection. In the future, AI and ML will further integrate into the cloud, providing even more advanced services such as autonomous systems and intelligent automation. Brace yourself for an era where cloud computing becomes smarter than ever before. According to IDC, by 2024, a staggering 75% of enterprises will embed AI functionality into their business applications.

Of course, as more data and applications migrate to the cloud, data privacy and security concerns will continue to grow. Ensuring robust data protection and mitigating the impact of disruptions like outages or natural disasters are top challenges for the cloud computing industry. However, with the rapid advancement of cloud security features, businesses can rest assured that their data is well-protected. According to a report by Gartner, by 2023, customer errors will be responsible for 99% of cloud security failures, highlighting the importance of user responsibility in safeguarding cloud environments.

In the face of adversity, the cloud shines as a superhero in disaster recovery. With its flexibility, scalability, and reliability, cloud computing ensures uninterrupted access to data and operations even during natural disasters or power outages. It's a lifeline that keeps businesses afloat in turbulent times.

The future of cloud computing is an exciting one, with trends like hybrid and multi-cloud, serverless computing, AI and ML integration, and heightened cloud security shaping the landscape.

As cloud computing becomes increasingly competitive, we can expect to witness an ongoing price war among providers. Consumers will reap the benefits as service prices continue to drop, making cloud solutions more accessible than ever before.

But as cloud services become more pervasive, increased regulation is on the horizon. Stricter guidelines around data privacy, security, and other related issues will protect users' rights and hold providers accountable for their actions. It's a step towards a more responsible and transparent cloud industry.

In conclusion, the future of cloud computing is an exciting one, with trends like hybrid and multi-cloud, serverless computing, AI and ML integration, and heightened cloud security shaping the landscape. Organizations must stay ahead of the curve to remain competitive and leverage the transformative power of cloud computing. The journey has just begun, and the possibilities are limitless. ■

The author is a recipient of the prestigious Next100 award, currently working as Principal Solution Architect-Oracle Cloud Presales.

How To Build Digital Skills And Talent To Support Transformation

Finding and retaining digital talent is a significant challenge, with the demand for digital skills outpacing the supply of qualified professionals

By Rahul Rai

In today's rapidly evolving digital landscape, businesses face the ongoing challenge of staying ahead of the curve and remaining competitive. The key to achieving success in the digital age is to have a workforce that is equipped with the right skills and expertise to drive transformation. However, finding and retaining digital talent is a significant challenge, with the demand for digital skills outpacing the supply of qualified professionals. So, what's the best way out?

Upskilling: Empowering employees for digital transformation

Upskilling is an essential element of building digital skills within the workforce. It involves training employees to acquire new digital skills that are

relevant to their roles and the company's goals. Upskilling is a cost-effective way to build digital capabilities within the organization, as it reduces the need for hiring new talent and can be customized to the specific needs of the business. Whether through online courses or on-the-job training, upskilling provides flexibility for employees to acquire the skills they need to succeed in the digital age. According to McKinsey & Company, 87% of companies consider upskilling a crucial component of their workforce strategy, highlighting its significance in driving digital transformation and innovation.

Apprenticeships: nurturing digital talent for the future

Apprenticeships offer an effective way to build digital skills and talent within the workforce. By hiring and training individuals seeking to acquire new skills and gain experience, companies can develop a pipeline of talent ready to support digital transformation. Apprenticeships can be tailored to the specific needs of the business, providing a unique opportunity for employees to learn on the job while earning a wage. This approach also promotes diversity and inclusion, as it opens doors for underrepresented groups to develop digital skills and contribute to the digital landscape.

Cultivating a culture of learning and development

Creating a culture of learning and development is a critical element in building digital skills and talent within the workforce. This culture encourages employees to continually develop their skills and acquire new knowledge, fostering innovation and agility. Offering access to online courses, conferences, workshops, and encouraging employees to experiment with new technologies and share their knowledge can help establish a culture of continuous learning. By doing so, companies promote innovation, increase employee engagement, retention, and productivity.

Digital talent development is facilitated by offering opportunities for skill development and gaining priceless experience, as well as by encouraging staff to take on new challenges and experiment with cutting-edge technologies.

Embracing agility: developing digital talent for the future

The rapidly changing nature of the digital landscape presents a challenge in building digital skills and talent within the workforce. To address this challenge, companies must focus on developing digital talent that is agile, innovative, and adaptable. Soft skills such as critical thinking, creativity, and collaboration play a crucial role in driving innovation and solving complex problems in the digital age. Encouraging employees to take on new challenges, experiment with new technologies, and providing opportunities for skill development and gaining valuable experience contribute to the growth of digital talent.

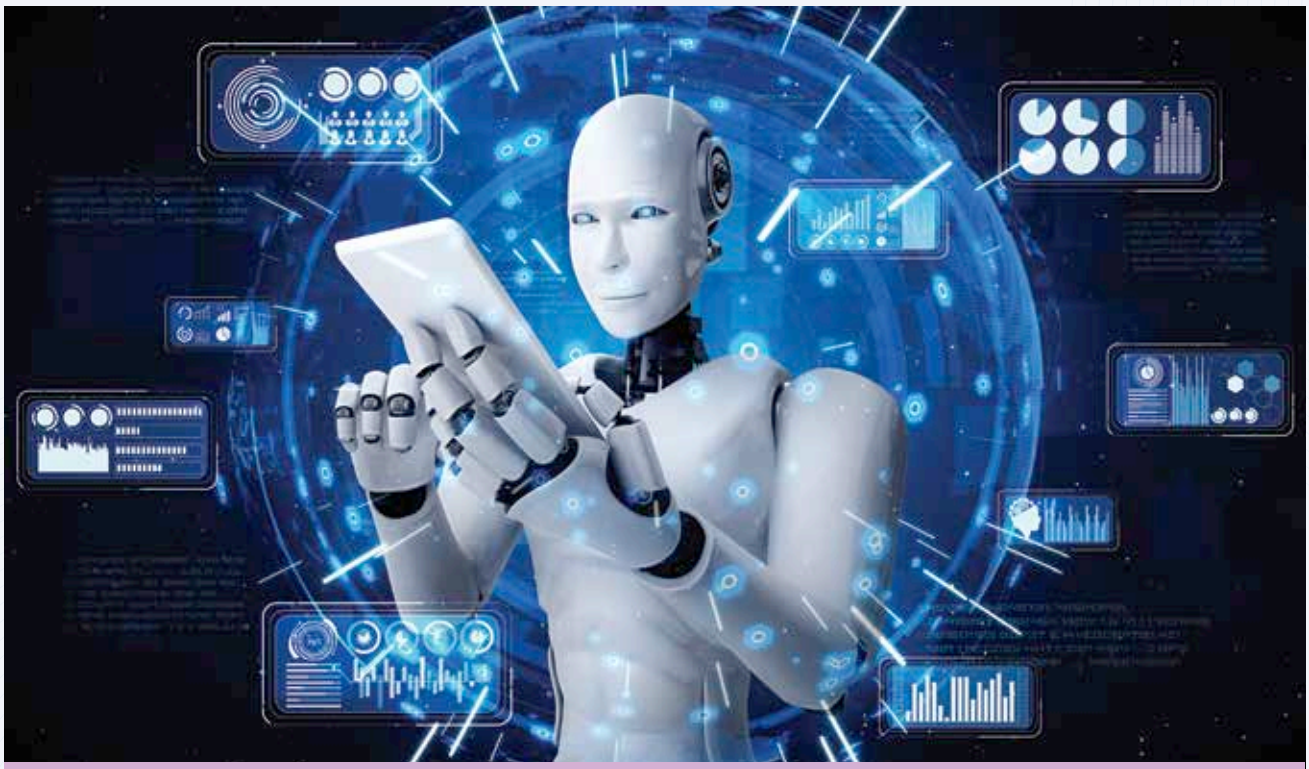
Conclusion

Building digital skills and talent within the workforce is a critical component of success in the digital age. By investing in upskilling, apprenticeships, and fostering a culture of learning and development, companies can bridge the skills gap and ensure that their employees are equipped to drive digital transformation and innovation. It is also essential for companies to regularly assess and evaluate the effectiveness of their digital skills development initiatives. Feedback mechanisms such as surveys, performance evaluations, and regular check-ins can help identify gaps, measure progress, and make necessary adjustments to the training and development programs. By continuously improving and refining their digital skills strategies, companies can ensure that they are effectively building the talent and capabilities needed to support ongoing digital transformation.

Embracing agility and focusing on the development of soft skills further prepares the workforce to thrive in the rapidly changing digital landscape. In a world where digital skills are in high demand, building a digitally skilled and talented workforce is essential for businesses to remain competitive and future-ready.

By investing in these strategies and creating a supportive environment for continuous learning and development, companies can cultivate a digitally skilled and empowered workforce that is capable of driving innovation, adaptability, and long-term success in the digital era. ■

Rahul Rai, the author of this article, is a Next100 Winner of 2018 and currently working as Global Service Management Leader and ERP Projects at Syngenta Group.



Effective Strategies For Achieving AI Success: A Guide To Best Practices

Unleash the potential of artificial intelligence by implementing proven strategies that lead to remarkable outcomes and transformative advancements

By Sanjay Chhokra

Artificial Intelligence (AI) and digital transformation have become pivotal forces reshaping the business landscape. To thrive in the digital age, companies must acknowledge these trends and develop effective strategies for integrating AI and digital technologies into their operations. While embarking on the digital transformation journey may seem daunting, the potential rewards are immense. AI, as a critical component, plays a key role in ensuring the success of this transformation. Therefore, understanding the best strategies for harnessing AI becomes crucial.

Develop a clear vision

A clear vision is a foundational step toward achieving a successful digital transformation. It involves identifying the areas of your business

that can benefit from AI and digital technologies. By carefully examining your objectives and challenges, you can set clear goals that align with your long-term vision. This clarity of purpose serves as a guidepost for the entire transformation process, providing direction and ensuring that efforts are focused on achieving meaningful outcomes.

Take a customer-centric approach

In the digital era, customer experience is paramount. Companies prioritizing the customer experience are more likely to succeed in the long run. AI and digital technologies offer powerful tools for enhancing the customer experience by providing personalized services and recommendations. Businesses can gain deep insights into customer preferences, behaviors, and needs by leveraging AI's capabilities, such as data analysis and machine learning algorithms. This knowledge allows for tailored experiences, fostering more robust customer relationships and driving business growth.

Invest in talent

AI and advanced innovations require specialized expertise that may be limited within your workforce. Investing in talent is crucial for successful digital transformation. Consider hiring experts in AI and digital technologies or providing training to upskill your current employees. Building a future-proof digital team equipped to meet the evolving demands of digital transformation is critical. Additionally, technical expertise and digital skills are necessary for developing and maintaining the AI-driven technologies that will fuel your digital transformation journey.

Embrace data-driven decision making

Data analytics plays a pivotal role in driving successful digital transformation. AI and digital technologies generate vast amounts of data that can be utilized to inform decision-making processes. By harnessing the power of data analytics, businesses can gain valuable insights into customer behavior, market trends, and operational efficiencies. These insights empower organizations to make informed decisions, optimize business processes, and identify new opportunities for innovation and growth.

Businesses can use AI's capabilities, such as data analysis and machine learning algorithms, to obtain deep insights into customers' preferences, behaviors, and demands.

Collaborate with partners

Digital transformation is a multifaceted endeavor that often requires expertise from various domains. Collaborating with strategic partners such as technology vendors, service providers, and industry specialists can significantly enhance your digital transformation strategies. Partnerships enable businesses to access specialized knowledge, resources, and technologies that accelerate the implementation of digital solutions. By leveraging the collective expertise of external collaborators, companies can overcome challenges more effectively and achieve transformational outcomes.

Be agile

In the rapidly evolving digital landscape, agility is essential. Companies must be adaptable and open to change, ready to pivot strategies and embrace emerging technologies. An agile mindset allows organizations to respond quickly to market shifts, customer demands, and technological advancements. By staying proactive and continuously monitoring the digital landscape, businesses can seize new opportunities, stay ahead of competitors, and drive innovation within their industries.

Prioritize security and privacy

As AI and digital technologies become more prevalent, ensuring security and privacy is paramount. These technologies can introduce potential risks if not managed effectively. To mitigate these risks, organizations must prioritize security by implementing robust measures to protect data and systems. Compliance with data protection regulations is crucial to maintain customer trust and safeguard privacy. Transparency in communicating data usage and handling practices builds confidence and fosters more robust relationships with customers.

Conclusion

By implementing these strategies, businesses can effectively integrate AI and digital technologies into their operations, driving successful digital transformation. Developing a clear vision, prioritizing the customer experience, investing in talent, leveraging data analytics, collaborating with partners, embracing agility, and prioritizing security and privacy are the critical pillars for achieving long-term success in the digital age. With a strategic approach and a commitment to innovation, organizations can navigate the complexities of digital transformation and unlock the full potential of AI, leading to enhanced competitiveness and sustainable growth. ■

The author of this article is a recipient of the Next100 award in 2013 and currently working as Head- IT for Nirmal Mission For Vision Society.

The Evolving Threat Landscape

The top trends that will shape the evolving cybersecurity landscape, requiring proactive measures and strategic planning for effective risk management

By Kamal Sharma

The threat landscape for cybersecurity is constantly evolving. Staying ahead of potential risks and threats has become a top priority for organizations and technology heads. However, it's not so easy. In recent years, we have witnessed an increase in the number and severity of cyber-attacks, with cybercriminals becoming more sophisticated and better equipped with the modern tools and techniques needed to infiltrate networks and steal sensitive information.

In this article, we will explore some cybersecurity trends and predictions that will likely shape the threat landscape 2023 and beyond.

Rise in Ransomware

Ransomware attacks have become a serious concern over the past few years, and the frequency and severity of these attacks continue to rise. According to CERT-IN, India's national cyber agency, India witnessed a 53% increase in ransomware incidents (yer-over-year) in 2022. Ransom-

ware attacks are being launched by cybercriminals to disrupt the critical infrastructure and services of organizations to extract ransom payments. Organizations of all scale are under severe pressure to combat these threats and at times even with the best of solutions, there is no guarantee that they will not be affected by the Ransomware attacks.

In 2021, we witnessed high-profile ransomware attacks on major companies, including the Colonial Pipeline and JBS Foods attacks. These incidents warn that ransomware attacks can cause severe damage and underline the importance of robust cybersecurity measures in place.

Cyberattacks could affect many IoT devices. With device manufacturers and cybersecurity firms collaborating to develop more secure IoT devices, we may anticipate a greater focus on IoT security in 2023.

Internet of Things (IoT) Security

The Internet of Things (IoT) is expanding rapidly, with an estimated 21 billion IoT devices worldwide. With trailblazing wireless technologies such as 5G and 6G changing the way we connect with our devices; organizations will have to evaluate their existing infrastructure and how well it has been designed to meet their future business needs. Among all concerns, security has been a significant concern for cybersecurity experts. Many IoT devices are vulnerable to cyberattacks, and in 2023, we can expect to see an increased focus on IoT security, with device manufacturers and cybersecurity companies working together to create more secure IoT devices.

Addressing IoT security requires a comprehensive approach that encompasses rigorous device authentication, encryption protocols, and continuous monitoring to detect and mitigate potential threats.

Artificial Intelligence (AI) and Machine Learning (ML)

AI and ML have been game-changers for the cybersecurity industry, allowing experts to analyze vast amounts of data and detect potential threats. However, cybercriminals also use AI and ML to their advantage, creating sophisticated attacks that bypass traditional cybersecurity measures. In 2023, we can expect to see a continued focus on AI and ML cybersecurity solutions, with cybersecurity experts using these technologies to stay ahead of the game.

Cloud Security

Cloud computing has transformed the way we store and access data, but it has also created new cybersecurity challenges. As more and more companies move their data and applications to the cloud, cybersecurity experts must adapt their strategies to protect against cloud-based threats. In 2022, we can expect to see a greater focus on cloud security, with companies investing in more advanced security measures to protect their cloud-based assets.

The Cybersecurity talent shortage

The cybersecurity industry is experiencing a significant talent shortage, lacking skilled workers to fill open positions. This shortage will continue in 2023, with an estimated 3.5 million unfilled cybersecurity positions worldwide. We expect to see increased investment in cybersecurity training and education programs to address this shortage. Collaboration between academic institutions, industry partners, and government entities can help bridge the talent gap and empower cybersecurity professionals with the knowledge and skills required to effectively protect digital assets.

Conclusion

As we delve into 2023, several critical areas will demand heightened attention and concerted efforts. Firstly, ransomware attacks are expected to surge, posing a grave risk to organizations of all sizes. These malicious campaigns, often accompanied by extortion tactics, can paralyze essential systems and compromise critical data. It is crucial for cybersecurity professionals to adopt proactive measures, such as robust backup strategies, vulnerability patching, and employee awareness training, to mitigate the impact of ransomware attacks.

As cybercriminals leverage AI and ML algorithms to launch sophisticated attacks, enterprises must develop and deploy advanced AI-driven solutions to detect anomalies, identify patterns of malicious behavior, and fortify defenses against emerging threats.

Furthermore, with the rapid adoption of cloud computing, ensuring robust cloud security measures is paramount. Organizations must prioritize data encryption, multi-factor authentication, and access controls to safeguard sensitive information stored and processed in the cloud. Implementing comprehensive monitoring systems that detect unauthorized access attempts and anomalous activities is essential to maintaining data integrity and privacy.

By remaining vigilant and embracing a multi-faceted approach to cybersecurity, organizations can mitigate the risks posed by the evolving threat landscape. ■

The author of this article is Group Head of Information Technology at Track Components, and was honored with the Next100 Award in 2022.

How Blockchain Is Revolutionizing Business Processes

Blockchain ensures secure and decentralized data, providing a competitive edge to businesses while reducing costs and improving payment transparency

By Navratan Bohra

Blockchain is the technology that creates a ledger of transactions on the internet that is secure, tamper-proof, and easily accessible. It is one of the newest innovations of the digital age. Initially, it was developed for Bitcoin (crypto- currency), but now it is used universally, whether you are working in supply chains, manufacturing processes, record management, healthcare, retail space, land registration verifying ownership, IoT devices, public ledger, equity swap or any other industries. Blockchain could help businesses in getting a competitive edge due to its ability to secure and decentralize data has led to its adoption in business processes, improving efficiency, transparency, and security.

Let's explore the transformative potential of Blockchain in enterprise ecosystems, with a specific focus on its impact on the financial sector.

Efficient and secure payments

Blockchain technology significantly enhances payment transparency, efficiency, and security, while reducing costs for financial services firms and their users. Previously, it would take up to a week for payments between entities to be completed. However,

with blockchain, transactions can be instantly transferred. Leveraging digital currencies and distributed ledger technologies makes payments faster, cheaper, and more convenient. Notably, blockchain's ability to secure transactions is a key benefit. Traditional asset transfers, such as wire transfers, are susceptible to fraud and hacking. In contrast, blockchain facilitates secure peer-to-peer transactions without the need for intermediaries. Transactions are safeguarded using sophisticated cryptography techniques, including symmetric and asymmetric cryptography methods.

Contracts make transactions safe and transparent, removing the need for mediators and enhancing the effectiveness of the client onboarding journey.

Quicker settlement in stock markets / financials

On February 15th 2023, the Securities and Exchange Commission adopted a rule amendment to shorten the standard settlement cycle for most routine securities trades from two business days after the trade date to one business day after the trade date (or from "t+2" to "t+1" in common parlance). Major stock exchanges are exploring the potential of blockchain to allow almost immediate stock settlements by reducing transaction time and operational cost. NASDAQ uses blockchain technology to issue and share private securities, while the London Stock Exchange is exploring blockchain opportunities with cross-industry groups of institutions to change the way securities are being traded in Europe.

EKYC - Digital Identity Verification

Blockchain technology can be used to create secured digital identities that can be verified without the need for intermediaries. This can help reduce Identity Theft and Fraud, as well as improve the efficiency of identity verification processes.

Supply chain for asset management

Blockchain technology is also being used to improve Supply Chain Management. It also improves transparency in the supply chain, allowing customers to trace the origin of the products, they purchase. Today, the asset management and supply chain network largely focuses on a centralized digital system that gives real-time visibility of assets within our systems. The distributed ledger concept enables direct trading and settlements across boundaries, it helps in reducing cost, increasing data accuracy, and reducing delays in processes. It makes you vulnerable to errors, frauds and misinterpretation during an exchange of assets between parties.

Agreement/contracts with clients

Agreement / contracts are self-executing contracts with the terms and Conditions and in agreement between buyer and seller being directly written into lines of code. This means that the contract automatically executes when the conditions of the agreement are met. Contracts enable secure and transparent transactions, reducing the need for intermediaries and thus improving efficiency in business process of Client On boarding Journey.

Data management with regulators

Blockchain technology can help businesses manage data securely and transparently, ensuring data accuracy and compliance with privacy regulations. It offers a decentralized network that makes it difficult for hackers to hack, tamper with or steal data. Financials organizations are using blockchain to securely store and manage data as required by regulators for Clients.

Conclusion

The financial services industry is moving towards Blockchain technology adoption, it is an innovation that has revolutionized the global financial system and making it more secure and efficient. There are many ways in which the blockchain technology is enhancing the global financial service industry. Its ability to secure transactions and Efficient Payments, improve supply chain management for Asset management, EKYC – Digital Identity Verification, which makes it a valuable tool for businesses of all sizes.

As blockchain continues to evolve, we can expect to see more use cases emerge, further transforming the way we do business. It is driving the under cost and providing further values to the service seekers. Blockchain technology is revolutionizing business processes by improving efficiency, transparency, and security. The adoption of blockchain technology in the financial services industry is still in its infancy. Future innovations that we anticipate are interoperability and advancements in transaction processing. ■

The author of this article is a Next100 2022 award winner and currently working as Deputy Vice President-Operations & IT, Anand Rathi Enterprise Services

Privacy Enhancing Computation

We delve into Privacy Enhancing Computation in our Navigator MasterClass on Emerging Trends - a field dedicated to protecting sensitive data during computing processes.

By Akash Jain

In the second installment of our Navigator MasterClass on Emerging Trends, we explore Privacy Enhancing Computation, a field of study that aims to safeguard sensitive data throughout any computing process. This goes beyond conventional encryption methods. Below are some of the well-known models within this scientific discipline:

- Adding random noise to data before sharing (Differential Privacy);
- Distribute data over multiple machines/ devices for Machine Learning (Federated Learning);
- Retrieve information without revealing its nature or purpose (Private Information Retrieval);
- Process encrypted data without any decryption (Homomorphic Encryption);
- Data shares used by multiple parties without knowing about each other's data share (Secure Multi-Party Computation).

Although the models have existed for a considerable period, the convergence of numerous factors has intensified the need for their implementation. These include concerns over privacy, security risks, regulatory scrutiny, widespread availability of computing resources, and the prevalence of ubiquitous computing - which refers to the seamless integration of technology into our everyday lives, allowing us to remain connected constantly. Before delving further into the topic, let us first examine some present-day applications.

Early adopters

Not surprisingly, IT companies were the early adapters of privacy enhancement advancements. Microsoft used Homomorphic Encryption for its Personal Health Information Exchange Program. It also deployed Homomorphic Encryption coupled with Secure Multi-Party Computation for its tool "Project WhiteNoise", targeted towards data scientists in healthcare and financial services industries. Google uses Federated Learning with Homomorphic Encryption to analyse data across millions of devices. It also uses Differential Privacy to collect data on search queries and usage patterns.

Apple uses Differential Privacy from iOS 10 onwards to suggest words and phrases as users type some text. IBM used Secure Multi-Party Computation at MIT Media Lab. MIT itself has developed a tool called "Falcon" that uses Homomorphic Encryption and Secure Multi-Party Computation to execute computations on sensitive data without revealing the underlying data to the researchers.

The emergence of these models into mainstream computing has also started to solve some prickly problems in the IT world. As an example, McKinsey pointed out that the decentralized architecture of Web3 might put data security/ privacy at risk. At least two solutions have already been proposed. In a research paper published in Science Direct by a team of Spanish Researchers, the model of Homomorphic Encryption was combined with Blockchain. An IEEE paper on the other hand turned the data sharing problem in industrial IoT into a Machine Learning problem and then solved it with Federated Learning.

In a modified approach, an article by Chinese researchers proposed a model of Differential Privacy in situations where IoT/ Edge Computing is in location-sharing mode (leading to private data disclosure). So, it is clear that privacy-enhancing computation will change some of the emerging technologies in how they will eventually be implemented, especially in the world of distributed data. A reduced version of this approach is used by US Census Bureau while collecting data where Differential Privacy is deployed. And it is to be noted that they use Secure Multi-Party Computation for data analysis by multiple analysts.

The mainstreaming of privacy consciousness has motivated many IT departments to deploy various privacy-enhancing computation techniques

Challenges

In a few cases of the emerging technology landscape, privacy enhancement will create boundaries, an example being pervasive computing. This architecture of forever and everywhere connected is in direct conflict with privacy enhancement. AN IEEE paper that examined this issue suggests that the solution lies in the restriction of pervasive computing and stricter privacy regulations.

In any case, the mainstreaming of privacy consciousness has motivated many IT departments to deploy various privacy-enhancing computation techniques. Amazon uses Homomorphic Encryption during customer data analysis; European Central Bank used the same technique while collecting sensitive data from banks on their risk exposure. The issue is even more pronounced in medical research: International Genomics Consortium" (IGC), a research organization focused on studying genetic mutations and their impact on cancer uses Secure Multi-Party Computation and UK NHS' "Data Safe Haven" platform uses the same model coupled with Differential Privacy to analyze patient data.

Having said all that, we must recognize that the biggest challenge in using privacy-enhancing computation is its complexity. It is just plain old and hard to comprehend. In a paper presented at ACM's 2021 CHI Conference on Human Factors in Computing Systems, the following implementation issues were identified: tractability of a nebulous concept, usability by developers, accountability, and explainability.

If one was to explore alternatives, one can look at the suggestion of an HP Labs researcher who published in Cornell University's arXiv. The suggestion was to use trusted computing with its "root of trust" encompassing hardware and software. This however transfers the onus of privacy to hardware from software and is therefore more cumbersome and expensive. At best it can be used for high-security applications; an example is the HSM (Hardware Security Module) used in payments processing, which is a black box used to generate and validate CVV of credit & debit cards. (By the way, it can be used for cryptographic key securitization in any application).

And just a parting thought, it is a good thing that internet cookies are on their way out anyways; privacy-enhancing technologies would have disallowed them and rendered them useless. ■

"International Genomics Consortium"(IGC), a research organization focused on studying genetic mutations and their impact on cancer uses Secure Multi-Party Computation and UK NHS' "Data Safe Haven" platform uses the same model coupled with Differential Privacy to analyze patient data.

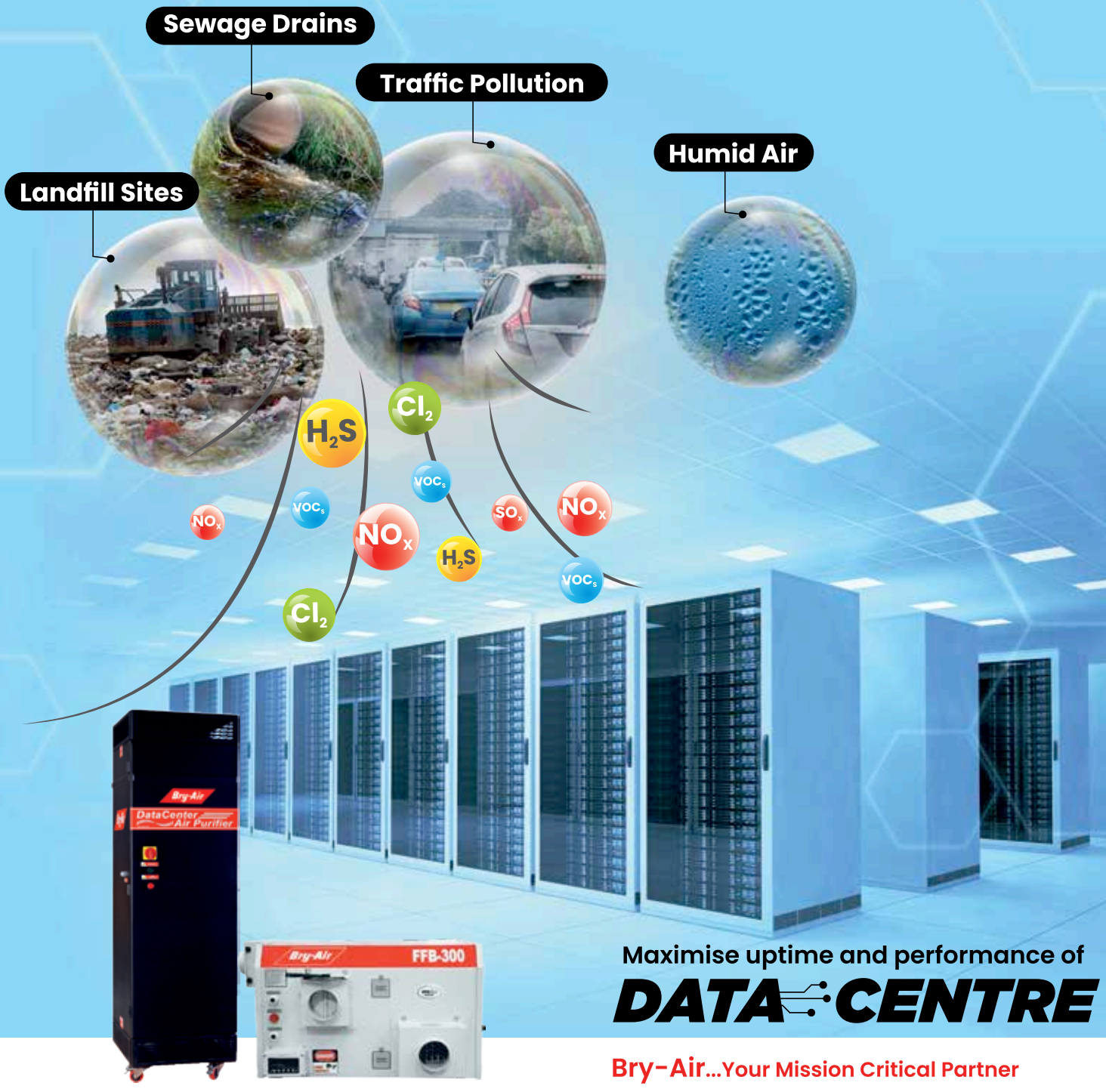
The author, Akash Jain, managed large IT organizations for global players like MasterCard and Reliance, as well as lean IT organizations for startups, with experience in financial and retail technologies.

To follow the latest in tech,
follow us on...

facebook.com/digitgeek

digit.in/facebook

Bry-Air solutions help neutralise corrosive gases and control moisture



Maximise uptime and performance of DATA CENTRE

Bry-Air...Your Mission Critical Partner

BRY-AIR (ASIA) PVT. LTD.
21C, Sector-18, Gurugram - 122015
Haryana, India

+918826990350
1800 102 7620

bryairmarketing@pahwa.com
www.bryair.com