

Unit - 4

Internet of Things in Digital Transformation

IoT solutions play an increasingly important role in modern enterprises. Each year, more entrepreneurs embrace IoT to exploit its rapidly evolving technology.

According to the, [Internet of Things \(IoT\) Connected Devices Installed Base Worldwide from 2015 to 2025](#), report from Statista, the number of connected devices worldwide will reach 75.44 billion by 2025. This raises the question of how IoT will accelerate enterprise digital transformation.

This article will examine the role and impact of IoT in digital transformation. But before we do that, it is critical that everyone understand the criticality of digital transformation for business success.

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The Importance of Digital Transformation for Businesses

The process of utilizing technology to fundamentally transform an organization's operations, products, services, and customer experiences is known as [digital transformation](#). It enables businesses to discover innovative opportunities, cut costs, and improve efficiencies. By utilizing digital capabilities, companies can unlock new value and enhance their competitiveness in the marketplace.

The true essence of digital transformation is not limited to technology. It involves a fundamental shift in how businesses operate and engage with customers. By harnessing the capabilities of digital technologies, organizations can stimulate innovation and generate tangible benefits for their customers and themselves.

The digital transformation process is an ongoing journey where businesses continuously seek ways to enhance their operations and

elevate the customer experience. In today's dynamic and intricate business environment, companies must leverage technology to stay ahead of the competition and ensure long-term success.

Also Read: [Why is Employee Experience as Important as Customer Experience](#)

Market pressure is a crucial driver for implementing digital transformation. Market leaders must also embrace digital change to compete with agile, technologically advanced businesses. It is not an exaggeration that digital transformation is essential for preparing the enterprise for the future and adapting to technological disruptions

With rapidly changing customer requirements and expectations, enterprises must adapt their traditional business processes by leveraging emerging technologies. Enterprise digital transformation is precious in managing internal processes and providing personalized customer experiences.

IoT in Digital Transformation

IoT is rapidly becoming the future of digital transformation in various sectors, including healthcare, government and education, security, communication, agriculture, and transportation.

IoT significantly impacts organizations' digital transformation by:

- Providing new investment opportunities
- Reducing operational costs
- Enhancing customer experience
- Improving productivity
- Facilitating better decision-making
- Enabling new business models
- Increasing revenue

Incorporating IoT technology into modern enterprises provides numerous advantages and has led to many startups building their entire operations around it. Businesses can digitally transform their processes by

leveraging IoT solutions, which offer a variety of critical benefits. Thus, the role of IoT in digital transformation is diverse.

Here are some of the significant advantages of incorporating IoT into digital transformation:

Automation of Tasks

IoT devices can automate various tasks, including complex ones, streamlining processes and reducing errors, ultimately accelerating innovation and increasing efficiency. Additionally, IoT technology can simplify data collection, allowing businesses to gather and analyze data in real-time for valuable insights and data-driven decision-making.

This approach speeds up development while reducing the costs associated with data collection and analysis. This role of IoT in Digital transformation brings many benefits to companies.

Connectivity

[IoT devices](#) can connect diverse systems and enable data and information sharing, promoting collaboration and accelerating digital transformation. By harnessing the potential of connectivity, businesses can develop innovative products and services that enhance efficiency, reduce costs, and increase customer satisfaction.

This can be accomplished by integrating data sources and better monitoring and managing connected devices.

Monitoring and Analyzing Data

IoT devices can analyze and monitor data in real time, offering valuable insights to inform decisions and improve decision-making. This capability enables businesses to identify trends, predict potential issues before they occur, and reduce downtime.

Furthermore, IoT technology provides a way to gain a deeper understanding of customer behavior and preferences. Also, it will allow businesses to tailor their products and services to meet customer needs better. It will further lead to increased customer loyalty and profitability.

Additional Layers of Security

IoT solutions offer additional layers of security to safeguard data and systems against potential threats. It reduces various risks of data breaches and other malicious activities. Automating security-related processes and procedures with IoT can reduce the time and effort needed to maintain a secure environment. It will further help organizations to focus on other areas of their operations.

Additionally, automated security measures ensure that systems are consistently up-to-date and effective in protecting data and systems, enhancing overall security measures.

Helpful in Better Decision Making

Making informed decisions is possible through digital transformation as it helps to bring actionable insights. All data analysis tools and techniques can assist businesses in tracking better insights and performance metrics. It can further assist in providing a better result.

Combining emerging technologies such as IoT, AI, and AR is necessary today for all digital transformation initiatives. Among these emerging technologies, IoT is vital in making various digital transformation solutions highly user-friendly and helpful.

Digital transformation is no longer an option but a fundamental requirement for every modern business across the globe. Irrespective of your organization's sector, size, or business model, digital transformation efforts are essential for thriving in today's competitive landscape.

However, the execution of a digital transformation process can present challenges when it involves adapting digital offerings to meet customer requirements. This is where mobile applications play a crucial role.

In the realm of enterprise digital transformation, mobile apps serve as a smooth pathway to drive your organization into the digital age effortlessly. Also, with the emergence of cutting-edge technologies such as AI, ML, and IoT, the integration of mobile applications is enhancing outcomes significantly.

Transitioning to the core aspects of business, two primary elements require a business's attention when planning a digital transformation. First workflow and workforce and second adaptability and portability. By incorporating their processes and communications into mobile apps, businesses can effectively address both objectives simultaneously.

Here are some statistics looking into why enterprises need to count mobile applications in their digital transformation strategy –

Although the above graph should be a compelling reason to prioritize mobile app development, there are additional statistics to consider.

As per the Business of Apps report, 57% of the digital media usage and traffic comes through apps.

Typically, the average smartphone user has a collection of more than 80 apps, with around 40 apps being actively used each month.

21% of millennials visit a mobile application 50+ times every day.

While the statistics undeniably highlight the surging growth of mobile apps, our focus in this article is the pivotal role that mobile applications play in the realm of digital business transformation.

In fact, it is proven that companies that embrace digital transformation improve the efficiency and profitability of their businesses.

As per research conducted by the SAP Center for Business Insights and Oxford Economics, 80% of businesses that have successfully undergone digital transformation have reported increased profits, with 85% noting

an expansion in their market share. On average, industry leaders anticipate a remarkable 23% boost in revenue compared to their competitors.

Why should Businesses invest in mobile apps for digital transformation?

Enterprise mobile applications enable employees to engage with the company's fundamental operations, even when they are not stationed at their desks. Consequently, this leads to enhanced employee satisfaction and heightened team efficiency. Thus, mobile applications become crucial for digital transformation in business.

Boosting Productivity and Efficiency: Providing employees with access to enterprise apps represents a strategic decision. These transformative applications significantly enhance productivity by enabling task completion, while keeping a watchful eye on business processes via mobile devices. Employees gain the flexibility to carry these apps anywhere, responding promptly without sticking to their desks.

Streamlining Workflows: Mobile software systems empower team leaders to assess their team's performance while considering future optimizations. Additionally, organizations can leverage workflow optimization apps to automate repetitive and tedious tasks, implementing predefined rules to minimize the potential for human error.

Enhanced Customer Satisfaction: Mobile applications play a pivotal role in improving customer engagement for businesses. They achieve this by analyzing customer journeys, delivering tailored messages, personalized push notifications, and more. The advent of digital mobile apps and chatbots has revolutionized customer service, offering users prompt responses to their inquiries and requests. In short, the integration of digital apps into enterprises significantly elevates the overall consumer experience.

Transparency: Mobile apps empower users to access and share content on the go, anytime and from anywhere. Consequently, employees receive real-time updates that enable them to make informed decisions. Furthermore, digital apps can track tasks completed by team members and even provide their real-time location.

Collectively, these numerous reasons position mobility as a prominent solution within the US digital transformation solutions market.

Benefits of Adopting the Digital Model

We've already highlighted several points showcasing the importance of digital transformation, yet there are additional reasons emphasizing its importance.

According to research findings, organizations that have achieved digital maturity demonstrate a remarkable 26% increase in profitability compared to their competitors who have not embraced digital transformation.

PTC survey has indicated that digital transformation can yield substantial benefits, including a 40% enhancement in operational efficiency, a 36% reduction in time-to-market, and a significant 35% improvement in the overall customer experience

Let's explore the active role of mobile apps in driving a comprehensive 360-degree digital transformation within an enterprise.

Role of mobile Apps in digital transformation

In the past, businesses often viewed mobile applications as standalone entities rather than recognizing their pivotal role as catalysts in digital business transformation. However, this perception is not accurate, as mobile apps have the potential to expedite the pace of digital transformation and significantly contribute to an organization's overall success. Considering this, let's delve into different methods by which mobile apps can drive your business's digital transformation efforts.

Leveraging AI in Mobile Apps:

The advantages of using AI to enhance the customer experience are undeniable. In the realm of marketing transformation, businesses are increasingly employing AI to create user-friendly mobile applications, utilizing technologies such as natural language processing, natural language generation, speech recognition technology, chatbots, and biometrics.

AI-driven enterprise mobility applications best for employees with added intelligence and capabilities, sparking their enthusiasm, enhancing their knowledge, and ultimately boosting their productivity. AI not only aids in process automation and predictive analysis but also, enables businesses to cater to customer preferences in a manner that aligns with their desires.

Incorporating IoT into Mobile Apps:

The days when IoT was primarily utilized for product displays and information sharing are fading into the past. The potential applications of mobile apps within the IoT domain continue to broaden.

Enterprises are adopting IoT transformation apps to efficiently manage smart equipment in their offices and supply chains, enhancing both efficiency and transparency. Although still relatively new in the enterprise sector, IoT digital apps are steadily establishing their foothold in the business landscape.

Utilizing real-time analytics to make well-informed decisions:

In today's business landscape, having access to real-time data analytics can confer a significant competitive edge. Within the context of enterprise digital transformation, mobile apps serve as a valuable means for businesses to gather user data and connect with their audience through marketing transformation messages crafted with insights gleaned from user app journeys.

Real-time analytics offer the ability to evaluate team performance, assess productivity, and gain immediate insights into task-related challenges that impact overall business value.

Enhancing Mobility:

Mobility within an enterprise environment empowers employees to work at their convenience. Although its immediate effects may appear subtle, in the long term, it significantly influences team productivity.

By affording employees the flexibility to work according to their preferred time and location, you create an environment that fosters creativity and

heightened productivity. A tangible outcome of implementing software that allows employees to work on their own terms and preferences was the emergence of innovative business expansion ideas and an overall increase in workforce productivity.

Serving as the Digital Persona:

Mobile apps don't just facilitate business transformation; they also open doors to a multitude of new possibilities. A mobile app's digital strategy allows businesses to maintain alignment with both their current and prospective customers, making them the digital representation of your organization, and offering the foremost experience to potential users.

With the increasing dependence of customers on their mobile devices, the integration of mobile applications into your business strategy is instrumental in elevating customer engagement and gaining a competitive advantage, enabling you to surpass your rivals.

Process of utilizing mobile apps for digital transformation?

Here are some tips that can help your strategies for increasing the ROI on your enterprise app –

Embrace a Mobile-First Approach:

The crucial distinction that sets successful enterprise apps apart lies in how organizations view apps as more than just an extension of their websites. They prioritize a mobile-only approach throughout their software development journey, shaping every aspect from design to mobile app development and testing processes.

Defining the Mobility Scope:

Another valuable insight offered by digital transformation consulting firms is the importance of carefully examining your operations and workflows. This analysis helps identify the teams, departments, or functions that would gain the most from mobility.

Delegating Digital Transformation Initiatives:

When considering the outsourcing of digital transformation, we examine numerous advantages associated with entrusting digitalization to a digital transformation strategy . The primary advantage revolved around saving businesses efforts and time which goes into solving challenges like the absence of digital expertise, and constraints within the agile transformation process.

Conclusion

Embracing digital transformation has become imperative for most companies. With the ever-evolving technology landscape and increasingly aspirational and demanding customers, digitalization is essential for achieving success. Initiating your digital journey through mobile technology can be an excellent starting point.

Mobile applications play a pivotal role in the digital transformation efforts undertaken by organizations across various industries. Customers prefer engaging with brands through mobile experiences, readily embracing mobile solutions that simplify their lives.

Therefore, investing in mobile app development can significantly accelerate your organization's digital transformation and provide a substantial competitive edge.

What Is the Role and Importance of Cloud Computing in Digital Transformation?

Cloud computing plays a crucial role in driving digital transformation, offering businesses the essential flexibility and scalability required for rapid innovation and growth. Let's explore how cloud computing plays a crucial role in supporting the digital transformation journey:

Agility and Innovation: Since digital transformation is a complex and ongoing process, cloud computing makes it easy for businesses to launch new applications and services during the transformation journey. This agility empowers businesses to experiment with innovative products, services, and experiences as well as expedite their introduction to the market to create value for customers.

Scalability and Cost Efficiency: Cloud is highly scalable, so businesses can easily add or remove resources as needed. This flexibility results in significant reductions in IT expenses, especially when companies are undergoing rapid growth.

Access to Cutting-Edge Technologies: Cloud computing providers present a wide range of advanced technologies, such as AI, ML, and big data analytics. This accessibility empowers businesses to leverage these innovations without substantial investments in their hardware and software.

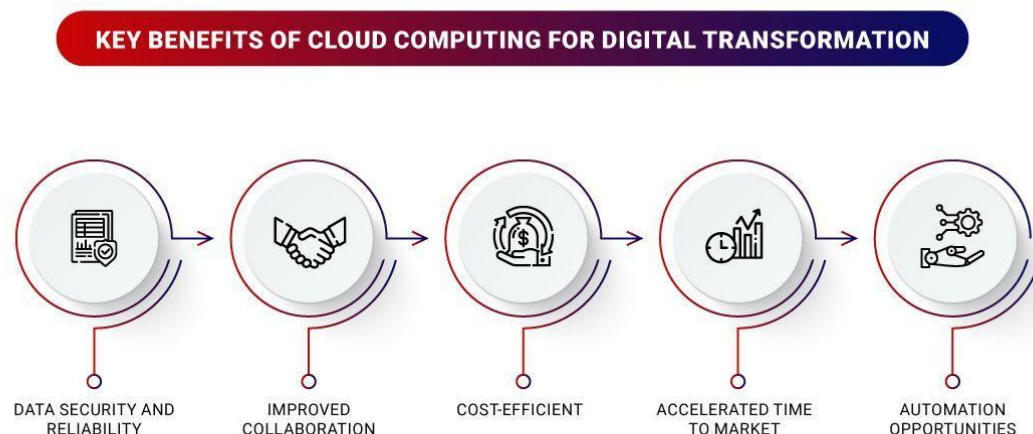
Enhanced Collaboration: Cloud-based applications and services facilitate effortless collaboration among employees, irrespective of their geographic locations. This collaboration improves overall productivity and efficiency.

Elevated Customer Experience: Cloud computing helps your business gain deeper insights into customer behavior by analyzing vast amount of customer data to enhance customer experience (CX). Cloud-based solutions also enable real-time engagement and omni-channel experience to simplify the delivery of personalized services and support. By enabling your business to streamline customer care processes, cloud computing in digital transformation further makes it easy for businesses to deliver exceptional outcomes to the end-users.

Let's now explore the many benefits your organization can gain by embracing the cloud for digital transformation.

Major Benefits of Cloud Computing for Digital Transformation

The role of cloud in digital transformation helps businesses with the flexibility to scale resources as and when needed, improves accessibility for remote work, ensures data security, and promotes environmental sustainability. Let's explore other significant benefits that cloud computing brings to the table:



#1 Data Security and Reliability

Cloud computing focuses more on data security and reliability, making cloud services a trusted choice for businesses. They invest heavily in state-of-the-art security measures and redundancy, going above and beyond what many individual businesses can afford to ensure the safety and availability of data. This comprehensive approach to data security not only safeguards critical business

information but also significantly enhances the reliability and business continuity of operations.

Example:

Consider a global e-commerce company that relies on the cloud to store and manage customer data, product information, and transaction records. The company uses a leading cloud provider renowned for its security infrastructure. Here's how this benefit of data security and reliability plays out:

- **Robust Security Measures:** The cloud provider employs advanced encryption, multi-factor authentication, intrusion detection systems, and constant security monitoring. In practice, this means that even in the event of a cyberattack or data breach attempt, customer and transaction data remain protected.
- **Data Redundancy:** Cloud providers often maintain multiple data centers across different geographic locations. This redundancy ensures that in the rare event of a hardware failure, natural disaster, or other unexpected disruptions, data remains accessible and secure.
- **Reliability and Business Continuity:** In the event of a server failure or power outage, the system automatically switches to an alternate data center without any noticeable service interruption, ensuring business continuity. The e-commerce company can confidently operate, knowing that its online store will remain available to customers 24/7.
- **Cost Savings:** By leveraging the cloud provider's robust security and reliability features, the e-commerce company avoids the substantial costs of building and maintaining its data security infrastructure and disaster recovery solutions.

#2 Improved Collaboration

Cloud computing in digital transformation is a revolutionary technology for enhancing collaboration within and outside an organization. It enables seamless access and sharing of data and applications across devices and departments.

Key Aspects of Cloud Computing for Improved Collaboration:

- Seamless Data Sharing
- Accessibility Across Devices
- Real-time Communication
- Remote Work Enablement

#3 Cost-Efficient

By moving your IT infrastructure to the cloud, you can eliminate the expenses of purchasing and maintaining on-premises hardware and software. Also, cloud service providers offer various pricing options, such as spot and reserved instances, allowing companies to optimize their cloud costs. Around 82%^[1] of small and medium businesses report reduced costs after adopting cloud tech. This cost efficiency enables businesses to allocate resources more effectively and invest in other critical areas of growth and development.

#4 Accelerated Time to Market

In the conventional approach, it took a lot of work to set up and manage the IT infrastructure for new projects, which involved significant time and capital investment. This acts as a barrier to quick innovation. Cloud service providers offer a

solution to this problem by providing pre-configured services to fulfil all your business needs.

Cloud Computing enables the organization to access servers, databases, and other necessary components within minutes. This helps reduce the time to market and increases agility, allowing businesses to stay ahead of market demands.

#5 Automation Opportunities

Cloud computing in digital transformation provides various automation advantages that enhance efficiency, agility, and cost-effectiveness in multiple areas of a business's operations.

By leveraging cloud services, businesses can automate routine, time-consuming tasks, reducing the risk of human error and reducing human intervention for more strategic outcomes. This not only improves operational efficiency but also enhances overall productivity. Whether it be scaling the infrastructure, continuous compliance monitoring, or managing automated back-ups, cloud computing offers tremendous automation capabilities to organizations.

Some specific examples of cloud-based automation

- **Infrastructure Scaling and Management:** Cloud platforms provide auto-scaling features, allowing businesses to adjust their computing resources based on demand.
- **Security and Compliance Monitoring:** Cloud computing and digital transformation provide automated security and compliance monitoring solutions to identify and react to security threats, vulnerabilities, and compliance concerns in real-time.
- **Data Backup and Disaster Recovery:** Businesses can protect their essential data and systems by configuring automated backup schedules and disaster recovery plans.
- **Resource Optimization:** Cloud automation tools can continuously monitor resource usage and make recommendations or adjustments to optimize resource allocation.
- **Workflow and Process Automation:** Beyond infrastructure and IT operations, cloud platforms offer tools for automating business workflows and processes. This includes order processing, document approval, and customer support ticket routing.

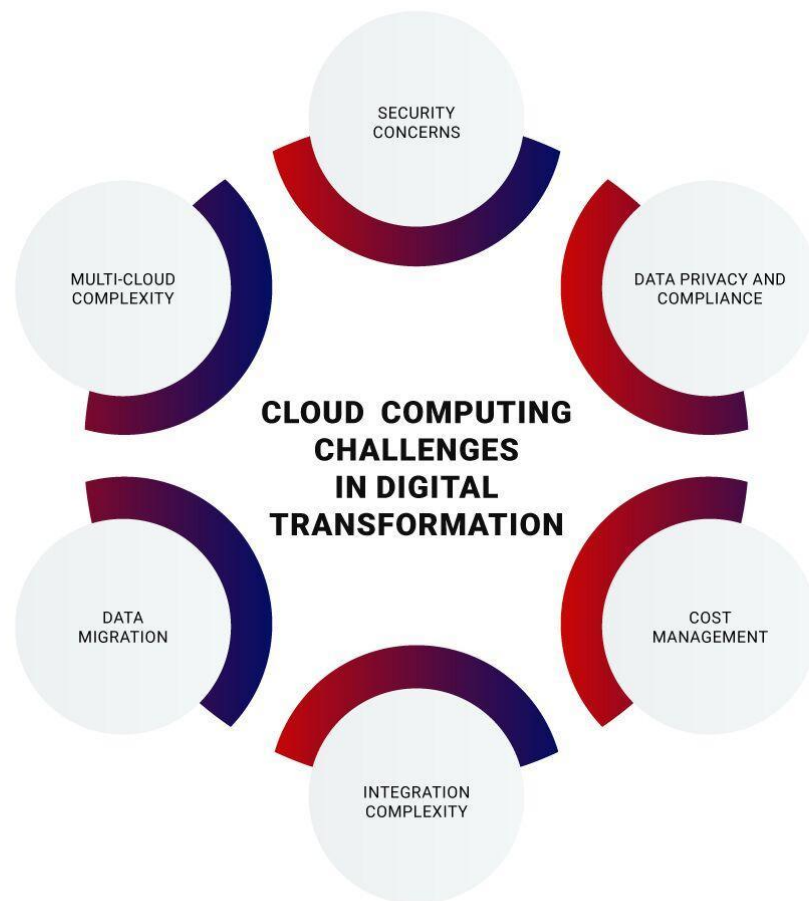
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Cloud Computing Challenges in Digital Transformation and How to Overcome Them

As you know, cloud computing has accrued benefits for digital transformation. However, its adoption also presents several challenges, including security concerns, skill shortages, and cost management.

Let us explore the most common cloud computing challenges in digital transformation and practical solutions for overcoming them. By understanding these challenges and how to address them, businesses can ensure that their cloud computing and digital transformation initiatives are successful and deliver the desired results.



Security Concerns

Keeping data and systems secure in cloud computing is a big challenge because cloud providers share their infrastructure and resources with multiple customers. In the event of a security vulnerability within the cloud provider's infrastructure, it exposes all of its customers to potential risks such as malware attacks, and data breaches.

Solution:

You should prioritize security by implementing security controls and monitoring your cloud environment for vulnerabilities. Use encryption, access controls, and regular security audits to protect your data. Employing strong passwords and multi-factor authentication are among the best practices to enhance your cloud security.

Data Privacy and Compliance

No cloud providers can guarantee 100% data privacy. Cloud providers store and process data in remote locations, making it difficult for organizations to control their data and ensure compliance with applicable regulations.

Solution:

To address this challenge:

- Familiarize yourself with the relevant data protection laws such as GDPR or HIPAA.
- Choose cloud service providers that offer compliance features and tools.
- Regularly audit and update your compliance measures to stay on the right side of the law.
- Have a business contingency plan in place for responding to data privacy and compliance incidents.

Cost Management

Cloud computing can become expensive if not managed properly. Organizations face unexpected costs due to data transfer, storage, or overprovisioned resource costs, especially in complex multi-cloud environments. It can further vary depending on usage, performance, availability, location, and features.

Solution:

To tackle this challenge:

- Use cloud cost management tools such as CloudWatch by AWS, Cloud Health, and similar to track and control expenses.
- Implement auto-scaling to adjust resources based on demand.
- Regularly review your cloud usage to identify areas where you can cut costs.
- Implement cloud governance policies and procedures, such as policies to prevent overprovisioning and unexpected costs.

Integration Complexity

Integrating legacy systems with cloud-based solutions can be complicated, leading to disruptions in business operations. Some specific integration complexity challenges include heterogeneous cloud applications and services, API complexity, frequent changes in cloud applications and services, and lack of expertise to integrate existing on-premises systems.

Solution:

To overcome this challenge, develop a comprehensive integration strategy and choose the right approach. Consider using middleware or APIs to bridge the gap between old and new systems. Test integrations thoroughly to ensure a smooth transition.

Data Migration

Moving existing data and applications to the cloud can be challenging, with potential data loss or downtime during the migration process. Moreover, the entire migration process is intricate, time-intensive, and financially demanding.

Solution:

Plan your data migration carefully by understanding the migration needs. There are several data migration strategies available (such as lift-and-shift, re-platforming, and

refactoring) and you can choose the right one according to your requirements. It is a good business practice to back up your data, perform test migrations, and have a rollback strategy in case of issues. You may also engage with experts or cloud migration services to ensure a successful transition.

Multi-cloud complexity

Handling multiple cloud environments can be challenging, especially when dealing with various cloud providers. Each provider comes with its own set of tools, APIs, and billing structures, which can complicate obtaining a unified overview of your cloud expenditures and usage. These create complexity and challenges for organizations.

Solution:

Using a cloud management platform will help you manage multiple cloud environments proficiently. Execute cloud governance policies and procedures to ensure that your multi-cloud environment is managed effectively.

Top Strategies for Cloud Adoption in Digital Transformation

By now you can relate to how cloud and digital transformation helps modern businesses realign business process. However, you need an effective business strategy that focuses on key components – the organization's goals, current structure, and processes – much needed to make the “right” shift towards optimization.

- **Technology Selection:** Collaborating closely with a cloud enablement partner empowers you to define the technologies needed to meet your unique requirements precisely. A critical component of this process involves identifying legacy technologies that could hinder your progress toward overall growth.
- **Data Requirement Analysis:** A detailed examination of data systems would reveal the right input about current data, identify substandard data types and remove unnecessary or unused data. Outlining a plan to audit current data and building a knowledge base of the new data type is something your technology partner can offer before combining them for the shift.
- **Process Mapping:** The most crucial yet difficult part of any digital transformation strategy – the business process must focus on how to realign resources & operations to serve customers better. Further, these decisions must be made in favor of changes with the digital interface that ultimately serves the customer well.
- **Organizational Alignment:** This step primarily deals with the mindset to accept and [embrace digital transformation](#) across the organization. With dedicated IT representatives & employees well-versed in explaining the new processes, change management can be dealt with swiftly. The objective here is to help ease the organizational changes in nearly every aspect of business after transformation.

What Are The 4 Types of Service Models in Cloud Computing?

While we've discussed the key components of strategy, let us now explore the different types of cloud computing that could enable digital transformation with cloud. There exist four types of cloud computing service models.

Software as a Service (SaaS)

- Offered on-demand, it uses the internet to deliver third-party managed applications to avoid download needs by clients or businesses.
- Third-party cloud provider hosts software apps and provide them on-demand across the globe.

Infrastructure as a Service (IaaS)

- A comprehensive cloud computing service model, it offers IT infrastructure services like software, hardware, databases and platforms with network, processing power, storage, and servers.
- Allows application development by purchasing resources on-demand with the evolving computing needs.

Platform as a Service (PaaS)

- Allows company's software developers to create and manage custom applications.
- Third-party vendors can manage IT infrastructure and access to computing resources (servers, storage, security, integration layers, network components, & more)

Functions as a Service (FaaS)

- It enables developers to run individual functions without having to manage the underlying infrastructure, offering a cost-effective and scalable approach.
- FaaS is ideal for applications that require rapid, event-driven processing and can be a valuable addition to your cloud toolkit for specific use cases.

Best Practices for Cloud Computing in Digital Transformation

With the cloud, organizations can innovate more quickly, scale efficiently, innovate more easily and seize new market capabilities faster. All this, while also reducing technology risk. To maximize the benefits of cloud computing in digital transformation, organizations must adopt these best practices.

Define a Clear Cloud Strategy and Roadmap

Before embarking on your digital transformation and cloud computing journey, establish a well-defined strategy and roadmap. This includes setting clear goals, aligning with business strategy, and understanding customer needs. The roadmap should outline the steps, timelines, and milestones for implementation while assessing the current desired future state and any associated risks.

Choose the Right Cloud Model and Service

Selecting the most suitable [cloud deployment model](#) is critical. Businesses can select from public, private, or hybrid cloud models according to their specific needs and comfort level with risk. There are four types of cloud service models.

1) IaaS 2) PaaS 3) SaaS 4) FaaS

While IaaS supplies fundamental computing resources, PaaS offers development environments, SaaS delivers ready-to-use applications, and Functions as a Service (FaaS) enables developers to run individual functions with a cost-effective approach.

Evaluate existing applications and workloads to determine their suitability for cloud migration. Some may require re-architecting or refactoring for optimization, while others might need retirement or replacement. Plan and execute the migration process carefully, considering approaches such as lift-and-shift, re-platforming, re-hosting, re-purchasing, or re-building to ensure a smooth, secure, and efficient transition.

Develop and Deploy Cloud-Native Applications

For enterprise digital transformation and cloud adoption, create and deploy cloud-native applications explicitly designed for the cloud. These software solutions are agile, scalable, and resilient, using microservices, containers, serverless architecture, DevOps, and continuous integration and delivery (CI/CD) practices. They integrate effortlessly with cloud-based and on-premises applications and data stores, enriching flexibility and enabling innovation.

Manage and Monitor Cloud Resources and Performance

Ongoing management and monitoring of cloud resources are crucial to ensure availability, reliability, and security. Automation and orchestration of resource provisioning and management are essential, along with regular performance and cost monitoring. Utilize tools and frameworks for visibility, control, and optimization of cloud operations.

Implement a Cloud Governance and Security Framework

Establish a governance and security framework that defines policies, standards, and best practices for cloud adoption and usage. This framework should encompass data protection, identity and access management, compliance, incident management, and business continuity planning. The alignment with business objectives and compliance with legal requirements is paramount.

Foster a Cloud Culture and Mindset

Instill a cloud-centric culture within your organization, emphasizing change, innovation, and collaboration. Effective communication about the benefits and challenges of digital transformation and cloud adoption across the organization is critical. Engage and empower employees, customers, and partners with support and guidance, and establish mechanisms for measuring and rewarding the outcomes and learnings of cloud adoption.

Robotic Process Automation (RPA) stands as a cornerstone of digital transformation, revolutionizing how businesses automate repetitive tasks, streamline operations, and boost efficiency. This article delves into the application of RPA and its pivotal role in automating routine tasks, driving operational excellence, and fostering digital transformation.

Automating Repetitive Tasks

- **Task Automation and Workflows.** RPA technologies replicate human actions to automate rule-based, repetitive tasks across various departments, including data entry, report generation, invoice processing, and more.
- **Eliminating Manual Errors.** By minimizing human intervention, RPA reduces the likelihood of errors in routine tasks, enhancing accuracy and mitigating the risks associated with manual data entry and processing.

Improving Operational Efficiency:

- **Enhanced Speed and Scalability.** RPA operates round the clock, accelerating task completion times and enabling scalability. This agility allows businesses to handle increased workloads efficiently.
- **Resource Optimization.** RPA reallocates human resources from mundane, repetitive tasks to more strategic initiatives that require critical thinking, problem-solving, and creativity, optimizing workforce potential.

Streamlining Business Processes

- **Integration and Data Management.** RPA integrates seamlessly with existing systems, bridging gaps between disparate applications and databases. It enhances data management by facilitating smooth data transfer and synchronization.
- **Process Standardization.** RPA ensures standardization of processes by following predefined rules and workflows consistently, reducing variations and ensuring compliance with regulations and best practices.

Cost Savings and ROI

- **Reduced Operational Costs.** By automating tasks, RPA reduces operational costs associated with labor, time, and resources, leading to significant savings for organizations.
- **Quick Return on Investment (ROI).** RPA implementations typically yield quick returns on investment due to the immediate improvements in efficiency, accuracy, and productivity.

Continuous Improvement and Adaptability

- **Adaptive Learning and Evolution.** Advanced RPA systems leverage AI and machine learning to adapt and improve over time. They learn from patterns and exceptions, optimizing processes continuously (See also: **AI Automation in Digital Transformation**).
- **Process Analytics and Optimization.** RPA tools provide analytics and insights into process performance, identifying bottlenecks and areas for optimization, facilitating ongoing improvement initiatives.

What is RPA?

Robotic process automation (RPA), also known as software robotics, uses intelligent [automation](#) technologies to perform repetitive office tasks of human workers, such as extracting data, filling in forms, moving files and more.

RPA combines APIs and user interface (UI) interactions to integrate and perform repetitive tasks between enterprise and productivity applications. By deploying scripts which emulate human processes, RPA tools complete autonomous execution of various activities and transactions across unrelated software systems.

This form of automation uses rule-based software to perform business process activities at a high-volume, freeing up human resources to prioritize more complex tasks. RPA enables CIOs and other decision makers to accelerate their digital transformation efforts and generate a higher return on investment (ROI) from their staff.

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RPA and intelligent automation

In order for RPA tools in the marketplace to remain competitive, they will need to move beyond task automation and expand their offerings to include intelligent automation (IA). This type of automation expands on RPA functionality by incorporating sub-disciplines of artificial intelligence, like machine learning, natural language processing, and computer vision.

Intelligent process automation demands more than the simple rule-based systems of RPA. You can think of RPA as “doing” tasks, while AI and ML encompass more of the “thinking” and “learning,” respectively. It trains algorithms using data so that the software can perform tasks in a quicker, more efficient way.

RPA and artificial intelligence

Robotic process automation is often mistaken for [artificial intelligence](#) (AI), but the two are distinctly different. AI combines cognitive automation, [machine learning](#) (ML), [natural language processing \(NLP\)](#), reasoning, hypothesis generation and analysis.

The critical difference is that RPA is process-driven, whereas AI is data-driven. RPA bots can only follow the processes defined by an end user, while AI bots use machine learning to recognize patterns in data, in particular unstructured data, and learn over time. Put differently, AI is intended to simulate human intelligence, while RPA is solely for replicating human-directed tasks. While the use of artificial

intelligence and RPA tools minimize the need for human intervention, the way in which they automate processes is different.

That said, RPA and AI also complement each other well. AI can help RPA automate tasks more fully and handle more complex use cases. RPA also enables AI insights to be actioned on more quickly instead of waiting on manual implementations.

How does RPA work?

According to Forrester, RPA software tools must include the following core capabilities:

1. Low-code capabilities to build automation scripts
2. Integration with enterprise applications
3. Orchestration and administration including configuration, monitoring and security

Automation technology, like RPA, can also access information through legacy systems, integrating well with other applications through front-end integrations. This allows the automation platform to behave similarly to a human worker, performing routine tasks, such as logging in and copying and pasting from one system to another. While back-end connections to databases and enterprise web services also assist in automation, RPA's real value is in its quick and simple front-end integrations.

The benefits of RPA

There are multiple benefits of RPA, including:

- **Less coding:** RPA does not necessarily require a developer to configure; drag-and-drop features in user interfaces make it easier to onboard non-technical staff.
- **Rapid cost savings:** Since RPA reduces the workload of teams, staff can be reallocated towards other priority work that does require human input, leading to increases in productivity and ROI.
- **Higher customer satisfaction:** Since bots and chatbots can work around the clock, they can reduce wait times for customers, leading to higher rates of customer satisfaction.
- **Improved employee morale:** By lifting repetitive, high-volume workload off your team, RPA allows people to focus on more thoughtful and strategic decision-making. This shift in work has a positive effect on employee happiness.
- **Better accuracy and compliance:** Since you can program RPA robots to follow specific workflows and rules, you can reduce human error, particularly around work which requires accuracy and compliance, like regulatory standards. RPA can also provide an audit trail, making it easy to monitor progress and resolve issues more quickly.
- **Existing systems remain in place:** Robotic process automation software does not cause any disruption to underlying systems because bots work on the presentation layer of existing applications. So, you can implement bots in situations where you

don't have an application programming interface (API) or the resources to develop deep integrations.

To learn more about what's required of business users to set up RPA tools, read on in our blog [here](#).

Challenges of RPA

While RPA software can help an enterprise grow, there are some obstacles, such as organizational culture, technical issues and scaling.

Organizational culture

While RPA will reduce the need for certain job roles, it will also drive growth in new roles to tackle more complex tasks, enabling employees to focus on higher-level strategy and creative problem-solving. Organizations will need to promote a culture of learning and innovation as responsibilities within job roles shift. The adaptability of a workforce will be important for successful outcomes in automation and digital transformation projects. By educating your staff and investing in training programs, you can prepare teams for ongoing shifts in priorities.

Difficulty in scaling

While RPA can perform multiple simultaneous operations, it can prove difficult to scale in an enterprise due to regulatory updates or internal changes. According to a Forrester report, 52% of customers claim they struggle with scaling their RPA program. A company must have 100 or more active working robots to qualify as an advanced program, but few RPA initiatives progress beyond the first 10 bots.

RPA use cases

There are several industries that leverage RPA technology to streamline their business operations. RPA implementations can be found across the following industries:

Banking and financial services: In the Forrester report on “The RPA Services Market Will Grow To Reach USD 12 Billion By 2023”, 36% of all use cases were in the finance and accounting space. More than 1 in 3 bots today are in the financial industry, which is of little surprise given banking's early adoption of automation. Today, many major banks use RPA automation solutions to automate tasks, such as customer research, account opening, inquiry processing and anti-money laundering. A bank deploys thousands of bots to automate manual high-volume data entry. These processes entail a plethora of tedious, rule-based tasks that automation streamlines.

Insurance: Insurance is full of repetitive processes well suited for automation. For example, you can apply RPA to claims processing operations, regulatory compliance, policy management and underwriting tasks.

Retail: The rise of ecommerce has made RPA an integral component of the modern retail industry that has improved back office operations and the customer experience. Popular applications include customer relationship management, warehouse and order management, customer feedback processing and fraud detection.

Healthcare: Accuracy and compliance are paramount in the health care industry. Some of the world's largest hospitals use robotic process automation software to optimize information management, prescription management, insurance claim processing and payment cycles, among other processes.

What is digital transformation strategy?

A digital transformation strategy details how an organization will use digital technologies to continuously create new products, services, processes and engagement channels, as well as reengineer existing ones to meet ever-evolving customer needs and market conditions.

Ideally, a digital transformation (DX) strategy articulates what the organization wants to achieve and provides high-level direction as to how digital technologies will be used to reach those objectives. Business process improvement plans and any required shifts in [organizational culture should also be included](#). "It needs to have enough detail so that the organization can understand it," said Joan Smith, managing director and global solutions lead at Protiviti Digital.

The strategy should be customer-centric and driven by the business outcomes that organizational leaders want to achieve. "It's focused on reshaping the organization's long-term competitiveness and the sustainability of the business," said Raja Ranganathan, chief growth officer at Randstad Digital.

A digital transformation strategy is a must-have for organizations today, according to executive advisers and management consultants.

"Everything is underpinned by the need for digitization, and every organization has to articulate how they're digitalizing and how they're evolving their digital state and how they leverage technology to execute on their business strategies," said Debbie Vavangas, a vice president at IBM Consulting and global lead for Garage, IBM's transformation model. "Transformation is pervasive across organizations, and it's constant. As we look forward, this strategy needs to be almost laser-focused on how you drive growth and optimization through technologies like generative AI, cloud and the integration of ecosystems."

Why is a digital transformation strategy important?

At its most basic level, a DX strategy is the use of digital technologies to create or reimagine how customers are served and how work gets done.

A well-thought-out and well-crafted digital transformation strategy ensures an organization correctly identifies what products, services and work need to be created or reimaged to remain competitive. For nonprofits or government agencies, this might mean effectively and efficiently delivering on their missions. For businesses, this typically means being as profitable as possible by boosting revenue, cutting costs and improving market share while meeting other strategic goals, such as sustainability.

Multiple studies and history show the importance of having a good digital transformation strategy. Indeed, an organization's success and often its very survival are at stake. Digital-leading organizations consistently outperform digital laggards, and digital disruptors can shutter legacy entities.

Case in point: In 2023, global consulting firm McKinsey & Company published the results of its [study](#) of 20 digital leaders and 20 digital laggards in the retail banking sector between 2018 and 2022. The study found digital leaders outperformed laggards in several financial metrics, including total shareholder returns.

Such figures have spurred executives to action. The "2023 State of Digital Transformation" report from TEKsystems, for example, found that only 17% of surveyed leaders lacked a strategy around digital initiatives. That's an encouraging statistic, as the report authors noted that "simply deploying technology, without a plan, is a recipe for disaster."

Vavangas said a DX strategy explains to everyone in the enterprise where the organization is heading, thereby helping to "bring everyone on the journey" and working toward the collective goals.

A thoughtful DX strategy also focuses the organization's attention, said Kamales Lardi, author of *The Human Side of Digital Business Transformation* and CEO of Lardi & Partner Consulting. More specifically, it focuses the organization on the most pressing digital initiatives -- those that deliver value toward meeting its enterprise-wide goals.

Lardi said this approach keeps teams from pursuing initiatives that introduce new technologies without understanding how they'll deliver value or implementing transformation projects that only help segments of the enterprise.

"True transformation comes when you look at the whole organization, and you transform the whole organization to be successful," Lardi added.

To illustrate this point, Lardi walked through how an organization should address plans to [implement AI to transform customer support services](#), explaining that a well-crafted strategy recognizes and plans for transforming the back-end systems and processes required to support the new front-end use of AI.

Moreover, experts said a DX strategy assures stakeholders that executives and their teams are addressing ongoing competitive pressures and that they have a plan on how to use technologies to respond to those pressures in ways that are the most beneficial to the organization. In other words, a DX strategy clearly establishes the expectation that the enterprise is committed to and actively planning for change.

"By holding out a separate digital transformation strategy, you're calling it out, and there is a cultural and communication element to that ... you've named [it] specifically as critical to the future of your company," said Jeff Wong, global chief innovation officer at professional services firm EY.

Furthermore, articulating DX plans and setting timelines for achievement, which are typical components of a DX strategy, encourage speed of action and create a sense of urgency -- both needed to keep up with today's rapid pace of technology evolution and the innovation it spurs.

"In any organization, it's easy to do what you were doing last year or the year before. [Therefore,] to ensure the organization is heading in a new direction, you have to call it out, which enforces the criticality of it and the speed at which it has to be done," Wong said.

A DX strategy establishes the agility, speed and ultimately the resiliency an organization needs to effectively compete in the 21st century, where "the world is moving faster and faster," Wong added.

What are the key elements of a digital transformation strategy?

Successful digital transformation requires attention to an organization's technology resources, business processes, outcomes it seeks to achieve, and the products and services it delivers to the market to meet customers' needs and expectations.

As the idea of digital transformation takes off, DX experts have stressed the need to address all those pieces in concert. Addressing one or two areas might create new digital capabilities, more efficient processes and even new products, but it won't deliver the sustained, continuous innovation that meets or even anticipates

the changing customer and market requirements that are hallmarks of a successful digital organization.

As such, a strong DX strategy must address how to advance enterprise operations, business models and the technology ecosystem. An ideal digital transformation strategy also addresses how customers and employees use and interact with those three elements.

A robust strategy does that by articulating the organization's current state in all those areas, envisioning the future and detailing the actions needed to move the organization forward.

"You need your objectives and visions, a map to make sure you're heading in the right direction, and the organizational and financial resources that are going to help you get there," said Ramesh Vishwanathan, practice senior director at TEKsystems Global Services. An effective strategic plan is more than a description of where the organization is and what it wants to achieve, according to Vishwanathan and other DX experts. It contains and requires the following elements:

- C-suite sponsorship. "The CEO has to buy into the strategy," Wong said. "That is core and central for any successful digital transformation."
- A snapshot of the organization's current state. "You need an honest understanding of your business, its strengths and weaknesses, [and] the capabilities where you excel so you can leverage [those areas] where you're already good," Lardi said.
- [Adequate funding](#) and a funding mechanism that supports iterative development and innovation processes.
- Data and insights that provide an understanding of what existing, potential and future customers and constituents want from the organization.
- Risk and mitigation strategies.
- A list of priorities and information on how leaders will rank opportunities that arise in the future. "You might come up with 100 good ideas, but you have limited resources -- money, time -- so you're going to want to prioritize," Lardi said.
- The right talent and a plan to [get the required skills](#), whether that's through training existing employees, hiring new ones, engaging partners or a combination of those options. "You need to put your most talented

people and change agents in these digital transformation programs," Wong said.

- Plans to alter processes and change management strategies. "To build a new pathway for digital in your company, there are a lot of old habits, systems and processes that have to change," Wong said.
- Strategies to onboard new technologies and accelerate the adoption of new capabilities.
- Metrics to determine and measure success. "They should be laser-focused on the business value," Vavangas said.
- Feedback mechanisms that alert teams when initiatives don't deliver returns or achieve objectives.
- A communication and digital marketing plan to help create demand and excitement for the planned transformations.
- Timelines to initiate actions and achieve objectives, with the DX strategy itself lasting no longer than three years. Wong said some DX strategies provide plans on how to kick off the DX program with something like a plan for the first 100 days of execution.
- Flexibility. "The market and technology will change, so your targets and criteria might need to be adjusted as you move along," Wong said.

How to build a digital transformation strategy

With digital transformation an imperative for organizational success, DX experts stressed the criticality of [building a complete and compelling strategy](#).

They also emphasized the importance of having executive engagement in the planning process and the needed resources -- such as market research and input from strategic partners -- to build a comprehensive plan.

Lardi outlined a four-step process that, at a high level, calls for the following:

1. Analyzing existing trends and the organization's current situation.
2. Identifying where the organization wants to go, which she said requires "disruptive visioning."
3. Plotting how to bring that disruptive vision into reality, laying out what should be done in what time frames to produce specific outcomes.
4. Executing on the plan, with pilots and buildouts.

Vavangas offered similar high-level steps, and added that an effective DX strategy starts with the following:

- Identifying and understanding what value means to the organization. "Know what transformation is going to do for your business," she said.
- Analyzing your platforms, processes and people and what needs to change in each of those areas for the organization to deliver the envisioned value.
- Detailing how to execute on the plans.

How to measure the success of a digital transformation strategy

To ensure an organization delivers value to its customers and can differentiate itself in the market, DX experts advise executives to use business metrics to determine whether their [transformation initiatives are successful](#).

The following measurements can be used to evaluate transformation initiatives:

- Customer experience and engagement measures such as Net Promoter Score ([NPS](#)) or other customer-oriented figures, such as response time or customer retention. Ranganathan said these can be used to measure whether transformation efforts have a positive, neutral or negative effect.
- Business KPIs and Objectives and Key Results ([OKRs](#)), such as cost of customer acquisition, help keep transformation efforts "very business-outcome focused," Vishwanathan said.
- Revenue, which multiple DX experts cited as a solid measure to [determine whether transformation initiatives deliver value](#).
- Profits, which capture not only whether transformation efforts are boosting the top line but generating efficiencies.
- Innovation -- such as the number of new products rolled out each month -- to determine whether the transformation has "fostered a culture of innovation," Ranganathan said.
- Capabilities -- like the innovation index -- look at the ability of the organization to deliver new functions at an increasing pace, and make faster and more accurate decisions around launching new products and services and entering new markets.

- The speed of change and successful change adoption, which DX authorities said helps measure whether the organization is becoming more capable of ongoing transformation.

Trends for digital transformation

The pressure to transform is not new. Organizations of all types have had to transform their operations, products and services, as well as how they engage with employees, customers and business partners.

However, the [pace of change has been ramping up](#) in recent decades thanks to computers, the internet and now digital technologies.

That pace and its continuous nature have made digital transformation distinct from prior eras of change, which gave organizations much more time to evolve, according to management consultants and transformation experts. Those same factors, they noted, are also why an organization should plan digital transformation as its own program.

However, as organizations become more capable of continuous transformation and learn to quickly embrace emerging technologies, some enterprise leaders and DX experts said the digital transformation strategy might be absorbed into the overall enterprise strategy.

"When I think about digital transformation and digital transformation strategy, I agree with the idea that it should simply be part of your overall strategy," Wong said. "It's something that supports the overall strategy, it's not separate from it."

Technology for digitally transforming business processes

The growth and adoption of digital technologies has undoubtedly led organizations on a pathway to success, with enhanced customer service and increased productivity being areas where these technologies have had the biggest impact. The four "megatrends" – cloud, big data, mobile and social technologies are clearly having a positive impact, industry watchers who believe that only a few early adopters have been able to transform their organizations with these technologies are mistaken. Digital transformation is occurring rapidly at a majority of public and private sector organizations.

A new study by George Westerman, Didier Bonnet, and Andrew McAfee found that firms with a strong vision and mature processes for digital transformation were more profitable on average, had higher revenues, and achieved a bigger market valuation than competitors without a strong vision

Mobility Enables New Business Scenarios:

Mobility is not just about mobilizing existing business – it is an opportunity for organizations to reinvent their product, process, and business model. According to the Harvard Business Review survey, mobile initiatives are the most frequently adopted of the four megatrends. They have already transformed business operations and changed the ways employees work. Majority of survey respondents indicate that putting mobile functionality in the hands of employees is now a key requirement, and leading companies are also leveraging the growing ubiquity of smartphones to innovate and drive top-line revenue growth.

Mobile connects employees to their work and each other

Benefits of using mobile devices and applications

64%

Anywhere access to corporate apps and data

53%

Increased employee productivity

34%

Increased employee collaboration

RNF Technologies has helped many organizations including Dow Chemicals reinvent their product process and business model. RNF built an EH&S **mobile app** for Dow Chemical's Texas operations. An **enterprise mobile application**, the app's primary objective was to digitize all safety protocols, track employees and mitigate safety hazards through its push notification warning system. Read more about the project [**here**](#).

Below are business scenarios where mobility has transformed business processes, enhancing clients' operational efficiency and agility.

- **1. Better Customer Experience:** The rise of mobility has seen a significant impact on customer experience. 73 per cent of consumers feel retailers which offer in store mobile technology provide superior customer service, with a further 64 percent more likely to shop at a

retailer which provided instore mobile technology. Mobile apps connect the business with consumers and provide them with instant information regarding their problem. They can also help predict more precise ETAs, which provides a more accurate wait time for the customer and exact expense report for companies. Apps are now more than ever personalising user experience, increasing immediate access to information for users. When considering shopper expectations it is clear that mobility has made a strong impact on customer experience and will be at its heart going forward.

- **2. Greater Operational Efficiency:** The use of mobile technology as a means to improve operational efficiency has become increasingly prevalent in the manufacturing industry. More and more companies have realized the benefits that can be gained from investments in various mobile devices and complementary business software. The email-based smartphone devices allow you to essentially respond to email wherever you are, but now these tablet devices extend to a totally new level. You are able to look more and dive deep into the information you're getting and then make more informed decisions. Inventory management, warehouse management, quality, and production decision-making are other areas of interest.
- **3. Enhanced Customer Loyalty:** Incorporating enterprise mobility into a retailer's business strategy can help keep a customer engaged and loyal to your company brand. As a retailer, you know quick responses to customer inquiries is one of the many goals you have for your store. To achieve a high level of satisfaction and support, employees must have real-time access to information. Mobility is a key to the future success of loyalty programs. Those companies that do not become early adopters of this technology will be left to ponder why they have been left behind.
- **4. Augmented Revenue Generation:** In today's digital world, Enterprise Mobility is creating new revenue channels, improving field staff efficiency, and leveraging new modes of user engagement to increase market penetration and customer loyalty. Shorter sales cycles and reduced cost of customer acquisition are significantly boosting cost savings and revenue generation while enhancing productivity and efficiency, resource utilization, and streamlining business processes with lower operational costs.

The most important trends, the most interesting things, are happening at the intersections of different technologies," asserts Babson College's Davenport. Organizations are being transformed to be significantly greater among those that deem multiple technologies to be critical. As an emerging technology in the realm of digital revolution, mobility offers

significant promise to drive innovation and transform business. Whether it is to energize existing product, enable better customer service, tap into new profit sources or boost workforce productivity, a well-devised mobility strategy can not only help organizations expand to new markets but also keep costs in check