

## Digital Project Management

### 6.1 Digital Technology Trends in Project Management

Majority of traditional project management failures occurring due to the requirements miss management, scope creep, change request handling, adoption failures or sustained maintenance of all activities that are with the project management. Therefore, it is very important to understand the critical aspects of project management and its related challenges and it is very essential to introduce the digital technology for the management of modern projects to overcome the most of the shortcomings of the conventional project management and it is called as *Digital Project Management*.

Project management aims to utilize resources across all technology tracks to achieve the intended goals within a predetermined schedule. Managing the projects using digital technologies involves managing various digital technologies such as content management systems, portals, search, analytics, etc., to achieve high quality deliverables.

The project management uses the digital technologies such as experience platforms, enterprise portals, content systems, commerce platforms, user experience technologies, mobile technologies, search and collaboration.

Following are the key trends of digital projects:

- The digital project uses modern day technologies such as experience platforms, commerce products, API platforms, Big-data technologies, AI technologies, Cloud technologies, IOT platforms, AR and VR applications.

- The digital projects are mainly executed through an Agile methodology or in iterations to attain faster time to market.
- The primary success metrics are user engagement, performance, responsiveness, agility and user conversion.
- The solutions are mainly supplied to internet users and provide omni-channel capabilities.

A significant benefit of digital technology is the storage of information via a cloud. By keeping your critical resources in the cloud, team members can access documents, images and more with ease and without a never-ending email chain.

**Some ways how these trending technologies are making positive changes in project management:**

- **Project planning:** Uses the data from previous projects to plan better.
- **Scheduling and time tracking:** Keeps track of time spent on tasks and manages scheduled events, meetings, milestones and deadlines.
- **Communication and collaboration:** Lets you share critical information with team members, clients and stakeholders.
- **Budgets and deadlines:** Helps you in delivering the projects within the allocated budgets.
- **Process tracking:** Keeps track of the ongoing projects whether they are on track or not, whether the resources need to be adjusted or not.

**Recent Trends in Digital Technology in Project Management:**

- **Location based analytics:** Using location-based services, organisations want to push personalised, relevant, and effective campaigns and services.
- **Social channel utilization and touch point optimisation:** Organisations want to engage their customers at all touch points (web, offline, kiosk, mobile, social media, IVR, etc.). Due to increased popularity of social media platforms, organisations use them for the voice of customer channels, brand marketing, campaigns, etc.
- **Mobile-first and cloud-first strategies:** Digital platforms are built with mobile devices as their primary delivery platforms. The applications are deployed increasingly on the cloud to realise the "software as service" model.
- **Intuitive user experiences:** Seamless and integrated cross channel enabled content with dashboard views, unified views, 360-degree activity views, and

rich, real-time visualizations are becoming the norm in the user experience space.

- **Digital marketing:** Organisations are leveraging social media platforms to market their products and brands. Peer recommendations and peer approval play a major role in influencing customers.
- **Analytics:** Real-time analytics of user actions and analysis of historical data will be used for contextual recommendation and for personalising the experience.
- **Domain specific trends:** Each functional vertical has its own set of digital transformation goals. The main digital transformation goals for some of the verticals are as follows.
  1. **Banking:** Digital banking, omni-channel experience, personalisation, dashboard experience, virtual branch, self-service tools, social media engagement, analytics, mobile apps, digital payments, and digital wallets.
  2. **Retail:** Virtual assistant, AI-based smart recommendations, chat bot, augmented reality, mobile apps, Big Data, IOT, wearables, cloud delivery (SaaS), social media marketing, social listening, user enablement, targeted marketing, loyalty management, digital marketing, customer segmentation, and voice of customers.
  3. **Utilities:** Dashboard experience, self-service, process automation, real-time monitoring, dashboard view and analytics.
  4. **Life sciences:** Business intelligence, mobile apps, CRM, ERP applications, wearables, IOT and reporting.
  5. **Automobile:** IOT and telematics.
- **Other digital technologies:** Organizations are increasingly investing in Big Data, IOT and wearables for applicable use cases.
- **Personalized, unified, responsive and contextual user experiences:** Modern digital applications are user centric and the user experience is designed to provide a holistic view of all the user activities. Customers expect consistent cross-channel experiences due to proliferation of mobile apps and multiple digital channels. Digital applications provide a unified view through personalised dashboards and landing pages with aggregated information from various sources.
- **Platform philosophy:** Normally, development of a digital platform for an enterprise requires implementation of multiple capabilities such as experience modules, personalisation modules, content management system, digital marketing modules, mobile apps, services enablement, web analytics, search modules, and so on. Business process optimisation: Underlying business

processes are optimised through process automation and simplification. Products such as BPM (Business Process Management), message-oriented middleware (such as Enterprise Service Bus-ESB, and API gateway), and rules engines are used to orchestrate the complex rules driven business processes.

- **Internet of things (IOT):** IOT and sensors are used to get real-time information from various connected devices and report/predict the outcome. Connected and wearable devices are increasingly used in the health care domain.
- **Big data analytics:** Applying analytical techniques to a massive volume of data will reveal the hidden patterns and trends and provide vital insights into the data. Digital solutions can leverage big data analytics for predicting outcomes, providing relevant recommendations, understanding the data, creating data visualisations, and making faster decisions. Big data analytics is increasingly used in financial applications, digital e-commerce solutions, and in health care.
- **Touch and gesture-based inputs:** As native mobile apps are gaining momentum for implementing the mobile-first strategy, touch-based features and location-based services are replacing traditional keyword/text-based inputs.
- **Social integration:** Social and collaboration features (such as blogs, wiki, chat, community, forums, calendar, surveys and message boards) and integration with social media platforms (such as Twitter and Facebook) are becoming a basic necessity in most modern digital applications. Enterprises are engaging their customers at various social touch points and carryout personalised and targeted marketing campaigns. Enterprises also use other advanced features such as social analytics, social listening, social media marketing, and sentiment analysis to gauge user sentiment about the organisation's service and product.
- **Voice-enabled applications:** More and more B2C digital applications are becoming voice-enabled. Most of the digital applications, such as search, maps, mobile apps, and smart phone assistants, work based on voice commands.
- **Location-aware services:** As mobile devices are becoming primary access channels for users, more digital applications are exploiting the location-based services to push the notifications, offers, promotions, and services to actively engage with end users. Digital applications such as maps, games, navigation systems, and logistics systems use location-based services.
- **Gamification:** Gaming concepts such as point-based incentives, explorative themes, entertainment value, increasing complexity of challenges, using multimedia content, instant feedback, goal/task-based UI design, and collaborative problem solving are used in the context of digital solutions.



Gamification is widely used for digital marketing, e-learning, e-commerce applications, digital knowledge management, and question-answer systems.

- **Augmented reality (AR):** The AR based systems augment the real world with digital world, thereby enhancing the end user experience. Augmented reality creates a virtual world and is mainly used in retail domain, gaming/entertainment, and e-commerce domains.

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## 6.2 Cloud Technology:

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Cloud technology or cloud computing is also popularly referred as a cloud.

The cloud can be defined as a virtual storage space that exists on the internet. It is a storage space where the people can place their digital resources such as software, applications and files.

Cloud technology allows the people to use the digital resources stored in the virtual space by the way of networks, often using satellite network. It allows the people to share information and applications across the internet without being the restriction of their physical location.

### Application of Cloud Technology in Project Management:

It is very easy to apply the concept of cloud in management and it comprises a service of entrance to the background of the project as well as to use. For instance, the software distribution model is referred to us **Software as a Service (SaaS)**, whereby a customer is able to access the basic software applications located in the provider server and pays for each as he/she continues to use them. The benefit of using Cloud applications is that it allows information sharing between participants of a project as well as its capacity to protect inclusion of the customer to manage the project. The expertise of project management managers shows that the teething troubles that concerns a project manager relate to the so called "hard" features, for example, the choice of technology, adaptation of infrastructure as well as developing a single management, and there are more related to "soft" sections of management, such as organising as well as putting into practice of change process, resistance of network administration and education.

The using of the service model is able to provide an organisation implementing the project similar advantages as the application of Cloud for the firm which include : secure storage of data associated with the project; the compatibility with the version of the application that supports the management of a project; automation of some processes; requires no special license for the software; it is not necessary to acquire

an exceptional server for project management; easy and quick access to the project from any place, one just needs to have internet access; the ability to support remote working of project team members when need arises; offers the right to use hefty computing power required in the execution of giant as well as complex projects and; technical assistance of cloud providers.

Project management is a complicated process that requires all project partners to be involved to avoid project failures. For instance, project management calls for proper management of resources, scheduling of projects, monitoring, evaluation and project milestone mapping. With the cloud computing technology, it provides the platform(s) that will enable project managers to coordinate various project stakeholders from different remote areas with the sharing of cyberspace to implement the projects. However, there are project management software available, but the project managers need to learn how to use them. It is also recommendable that project managers and organisations should use the clouding services to implement their projects so as to improve their service delivery and timely completion of their projects hence customer satisfaction. However, cloud computing services has its limitations in internet and server reliability, by the failure of one of the systems (internet or server), the entire service will be down. Therefore, there will be no any accessibility of any information until the systems are restored. Nevertheless, cloud computing services are reliable and effective that project managers or organisations should consider to implement.

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### **6.3 Internet of Things (IoT):**

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Internet of Things (IoT) refers to the process of connecting everyday physical objects to the internet from common household objects like light bulbs to health care assets like medical devices to wearable, smart devices and even smart cities.

#### **Working of IoT:**

IoT refers to any system of physical devices that receive and transfer data over wireless networks with limited human intervention. This is made possible by integrating computing devices in all kinds of objects. For example: a smart thermostat can receive location data from your smart car while you are travelling between work place and home. The connected devices can adjust your home's temperature before you arrive. This is achieved without your intervention and



produces a more desirable result than if you manually adjust the thermostat. It works by continuously sending and receiving and analysing the data in a feedback loop. Depending upon the kind of IoT technology, analysis can be conducted either by humans or artificial intelligence and machine learning (AI/ML) in a real-time or over a longer period.

The IoT is essentially the global network of devices that can communicate with one another and end users through the internet. Many major technology firms are developing their own IoT platforms such as Amazon web services, Microsoft Azure and Google cloud etc.

The IoT intersects with project management on everything from team collaboration to data collection and you can expect real time status reporting via IoT to user in a new era of dynamic planning and revolutionised project execution. Data collection will happen seamlessly and constantly, allowing leaders to make more informed decisions. Inventory and resources will be easily monitored at all times. Devices can automatically sense and respond to what is happening around them or in their network, reducing the need for human intervention, lowering operating costs increasing response times and minimising errors and also the customers can expect to receive better and faster service.

### **Uses of IoT in Project Management:**

In project management, the IoT technology will fundamentally alter the speed of project execution. Organisations that capitalise on the IoT will complete projects faster than those don't. The following things will change and which will require project managers to adopt both technically and systematically.

1. IoT enables the hyper speed reporting, and reduces the cost of communication, no more idle times are required in between activities and no more silos from support systems such as database, storage and IT operations.
2. IoT allows complete monitoring and process control: IoT allows project managers, management and stakeholders to monitor and control activities in real-time. Therefore, the overall system is monitored on a single screen, which allows the managers to attend immediately to any interruptions.
3. IoT creates an explosion of valuable project data: In the past, archiving historical data was a time and labour-intensive process, with the IoT, historical data will become available immediately, which is extremely helpful for current and future projects.

4. IOT allows super-deep data analytics: With the 10T comes advanced data analytics and advanced data analytics require advanced interpretations and management, and project manager must upgrade their skills related to data handling.
5. IOT users in stricter ethical and legal implications: Today's internet connected devices send data to each other extremely fast. We are not dealing with dial-up modems anymore one error could create a domino effect that could topple an entire project or in extreme cases, an entire career before you can say 'Enron'.
6. IOT raises expectations for all stakeholders: Once companies adopt IOT, the market place will be transformed into a level playing field, only the strongest and effect will survive.

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#### **6.4 AR and VR Applications in Project Management:**

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##### **Augmented Reality (AR):**

Augmented reality is the real time use of information in the form of text, graphics, audio and other virtual enhancements integrated with real world objects.

AR is an enhanced version of the real physical world that is achieved through the use of digital visual elements, sound, or other sensory stimuli delivered via technology. It is a growing trend among companies involved in mobile computing and business applications in the particular.

AR's primary goals is to highlight specific features of the physical world, increase understanding of those features, and derive smart and accessible insight that can be applied to real world applications. Such big data can help the company's decision making and gain insight into consumer spending habit, among others.

##### **Virtual Reality (VR):**

Virtual reality refers to a computer-generated simulation in which person can interact within an artificial three-dimensional environment using electronic devices, such as special goggles with a screen or gloves fitted with sensors. Ex: 3D movie, video games, virtual meetings.

In 3D movie, using special 3D glasses, one can gets the immersive experience of being a part of the movie with on-spot presence.



<b>Augmented Reality</b>	<b>Virtual Reality</b>
1. Combination of digital and real world.	1. Totally artificial digital world.
2. User experience is partially immersed.	2. Complete sense of immersion.
3. Camera-enabled devices such as smart phone, tablet or smart glasses are required. Desktop and lap-top are not suitable because of its fixed camera position, unless an external camera is used.	3. Special hardware equipment is required (Microsoft Hololense, HTC vive, oculus right, Google daydream, etc).
4. Latest versions of common operating systems are good enough (Android, IOS, Windows).	4. Special software is required.
5. Initial cost is lower than the VR.	5. Initial cost is higher than the AR.

### **AR and VR in Project Management:**

AR and VR in project management are useful in decision making problems in complex projects. This is particularly important for fields where prompt and accurate reactions are extremely important and also with the help of AR/VR, easier and much faster understanding of large amount of data is possible.

### **Benefits of AR and VR in Project Management (PM):**

1. Increase in competitive ability.
2. Increase in efficiency and productivity.
3. Reduces time and costs.
4. Reduces errors and facilitates of work processes.
5. Enables fast remote support for repairing systems weakness.
6. Enable fast and remote collaboration.
7. Involve innovation support.
8. Facilitate to understand large amounts of data.
9. Facilitate decision making problems solving.
10. Facilitates monitoring of projects.
11. Reduces the project validation risks.

**Applications of AR and VR in Project Management:**

1. **Architecture, civil engineering, construction and real estate:** Instead of standard 2D format of drawings and renderings, investors and customers can now experience realistic impression of their future buildings, flats, business places, both from the outside and from the inside. Application of AR/VR technologies in these kinds of projects significantly reduces costs and time expenditure, improves design, and facilitates construction planning. Also, there is research that synthesizes current VR/AR applications from the point of construction safety with the conclusion that AR/VR applications already achieved lot in that field, and there is more space for further improving their applications in construction safety.
2. **Marketing and sales:** Many companies have recognized additional values for both marketers and customers. For instance, Ikea Place app helps customers in fast decision making when purchasing furniture, by using cameras of smartphones or tablets. It analyses customer's room and puts furniture in adequate position. For wider use, there is a tool that promotes commercial sales - Amazon's app which lets to place items inside customer places using AR, to see how items will fit the space.
3. **Education:** AR/VR technologies offer great opportunities and diversity in education (remote learning, interactive learning, 'real' lessons, etc.). This also involves education of experts for PM, who should be both educated by using such technologies, and be educated to apply these technologies in their work.

There are many examples of AR/VR projects for general use in education, for example: SCARLET Special Collections using Augmented Reality to Enhance Learning and Teaching (University Manchester), cARe-Creating Augmented Reality in Education (City, University of London), AR studio-Australian research project (the University of Canberra, the Australian National University and Macquarie University) etc.

4. **Visual industries:** There are many examples of using AR/VR and related projects in this field; game industry, fashion industry, entertainment industry - cinema, film, travelling exhibitions (e.g., landmarks, museums) etc.
5. **Automotive:** AR/VR solutions are used for test drives, car elements testing, car dealership experience, etc. For example, Volkswagen adopts VR and AR solutions with belief that they help the company to successfully deal with increasing demands that automotive industry has been facing on. The

company systematically engage employees to use VR and AR solutions for training and collaboration to empower their brands and business departments. They developed smart infrastructure that enables training, collaboration and service integration worldwide. Employees and whole teams learn within an interactive 3D space. This solution increases training efficiency, reduces learning time and travel costs, and helps transfer of relevant knowledge in solving practical tasks.

6. **Manufacturing:** In complex manufacturing processes AR is useful in delivering the right information at the right moment to factory workers on assembly lines. This is efficient in reducing errors, reducing costs, time saving, and productivity improving. Any operator in Industry 4.0 with the help of AR could be a smart operator soon, while simulation and optimisation will be supported by VR technologies.
7. **Healthcare:** Training of surgeons is one of the most important field of application of the AR/VR technologies in healthcare. There are examples of usage AR/VR technology in triage and urgent care, for example Red Cross Triage AR application using Google Glasses.
8. **Defence:** TARGET (Training Augmented Reality Generalized Environment Toolkit) is European project which started 2015 and planned to end in 2018. The project develops AR and VR solutions for training the security critical agents (for example, policeman, fireman, emergency medical staff, anti-terrorist units, etc.). The project uses different approaches allowing remote connection of AR and VR systems to geolocation and other tools, involving 3D modelling, photogrammetry, drones and many other state-of-the-art technologies. creates new-made mixed reality environment where trainings are provided in extreme under-pressured security situations. Improving and optimization training is the aim of the project.
9. **Service support:** Remote technical and expert support, visualized instructions, remote repairing, knowledge, exchange, etc., with the AV/VR technologies, maintaining and repairing at remote locations is possible. For example, industrial giant ABB uses AR to maintain and repair equipment at remote locations which they found particularly useful in dangerous and complex remote procedures.



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**6.5 Cloud Technology, IOT, AR and VR Applications in Smart Cities:**

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A smart city is a framework, predominantly composed of information and communication technologies (ICT), to develop, deploy and promote sustainable development practices to address a growing urbanisation challenge. A big part of this ICT framework is essentially an intelligent network of connected objects and machines (also called as digital city) that transmit data using wireless technology and the cloud technology

Cloud based IOT applications receive, analyse and manage data in real-time to help municipalities, enterprises, and citizens to make better decisions that improve quality of life. Citizens engage with smart city ecosystems in various ways using smart phones and mobile devices and connected cars and homes, pairing devices and data with a city's physical infrastructure and services can cut costs and improve sustainability.

- Communities can improve energy distribution, streamline fresh collection, decrease traffic congestion and even improve air quality with the help of IOT.
- Connected traffic lights receive data from sensors and cars adjusting light cadence and timing to respond to real-time traffic, reducing road congestion.
- Connected cars can communicate with parking meters and electric vehicle charging docks and direct drivers to the nearest available spots.
- Smart garbage can automatically send data to waste management companies and schedule the pick-up as needed versus on a preplanner schedule.
- Citizen's smartphone becomes their mobile driver's license and ID card with the digital credentials, which speeds up and simplifies access to the city and local government services together, these smart city technologies are optimizing infrastructure, mobility, public services and utilities.

**AR and VR Technologies:**

All the above technologies contribute to the quality of the life in a smart city. However, without the Augmented reality, this picture is incomplete. The other technologies are considered to be back-end technologies that work in the background and remain hidden from view. AR can be the interface which provides access to all the

benefits of a smart city. With AR it is possible to interact with the normal environment in a completely different way for example.

- **AR navigation systems of smart cities:** Augmented layer with navigation can drastically improve the navigation experience and increase the safety of your journey.
- **AR as a search engine for physical places/objects:** AR will help you in an innovative way i.e., it involves physical interaction with the world, using gestures and body movements.
- **Social network for citizens:** AR can be used as a framework for a social platform, where citizens can interact with each other, share information and leave comments about real physical objects such as restaurants, hospitals, etc.
- AR improves sight-seeing experience of smart city.
- AR as an eliminator of language barrier etc.
- VR can help in emergency management, disaster, preparedness, real time information overlay etc.
- VR/AR can enable remote training and distance learning to create engaging classroom content which accomplishes the same objective' as in person schooling.
- VR/AR can help in design, prototyping, production, prevention of workplace hazards, inventory management, training and assembly etc.

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## 6.6 Data Science and Analytics in Project Management:

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### Data Science:

Data science is an umbrella that encompasses data analytics. The data science is a multidisciplinary field focussed on finding actionable insights from large sets of raw and structured data. This field is primarily fixed on finding answers to the things we don't know we don't know. Data science experts use several different techniques to obtain answers, incorporating computer science, predictive analytics, statistics, and machine learning to resolve through massive datasets in an effort to find solutions to problems that have not been thought of yet.

Data science focuses on finding meaningful correlations between large datasets and it seeks to discover new and unique questions that can drive business innovation. Data scientists' main goal is to ask the questions and locate potential places of study,

with less concern for specific answers and more emphasis on finding the right question to ask and finding the better way to analyse the information.

**Data Analytics:**

Data analytics is a branch of data science. Data analytics focuses on processing and performing statistical analysis of existing datasets. Analysts concentrate on creating methods to capture, process and organise the data to find actionable insights for current problems and the best way to present this data.

More simply, the field of data and analytics is directed toward solving problems for questions that data science brings forth. More importantly, it is based on producing results that can lead to immediate improvements.

Data science seeks to discover new and unique questions that can drive business innovations; on the other hand, the data analytics aims to find the solutions to those questions and determine how they can be implemented within an organisation to foster data driven innovation.

Steps in data science and data analytics in PM involves

- a. Define the question
- b. Define the ideal dataset
- c. Determine what data you can access
- d. Obtain the data and clean the data
- e. Exploratory data analysis
- f. Statistical prediction/modelling
- g. Interpret results
- h. Challenge results
- i. Synthesis/write up results
- j. Create reproduceable code.



**Questions:**

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1. What is digital project management?
2. Explain the digital technology trends in project management.
3. What are the positive changes in project management due to the digital technologies?
4. What are the recent trends in digital technology in project management?
5. What is cloud technology?
6. List applications of cloud technology in project management.
7. What is IOT? and explain the working of IOT.
8. List the uses of IOT in project management.
9. What is AR and VR?
10. What are the differences between AR and VR?
11. What are the benefits of AR and VR?
12. What are the applications of AR and VR?
13. Explain the applications of cloud technology in smart cities.
14. What are the steps in data science and data analytics in PM?
15. What are the applications of cloud based IOT in smart cities?
16. Explain the data science in project management.
17. Explain the data analytics in project management.