



Augmented/Virtual Reality

Next Big Thing of Digital Environment

November 2017

Introduction

Virtual Reality (VR) creates a digital environment that replaces the user's real-world environment. VR is primarily used in gaming and entertainment applications.

Augmented Reality (AR) overlays digitally-created content into the user's real-world environment for instance, projecting sales and inventory data onto products on store shelves

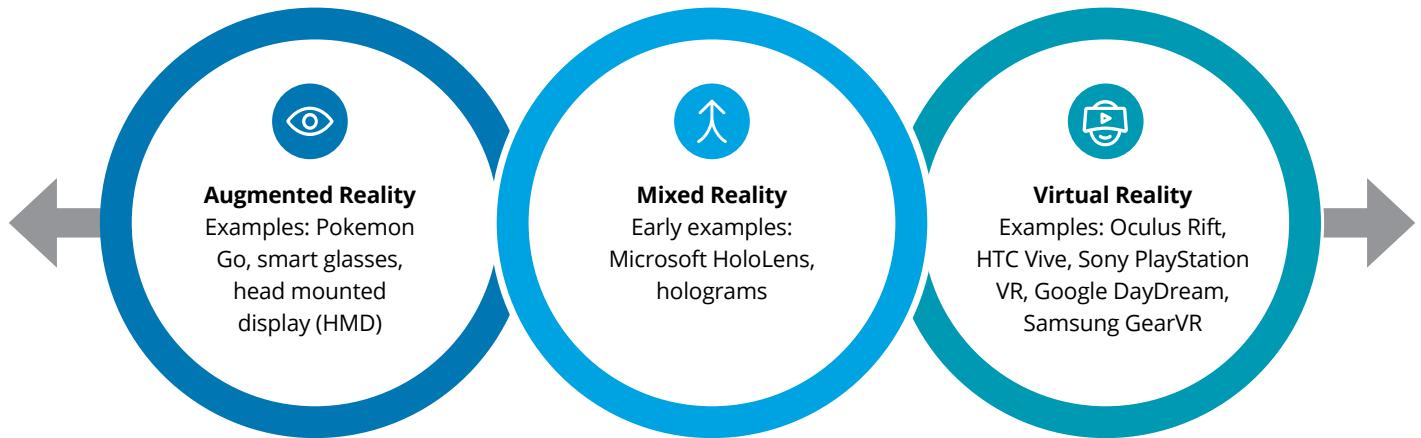
Mixed reality (MR) is a blend of VR and AR creating an environment in which digital and physical objects can interact. For example, MR will allow marketers to put virtual products in consumers' hands and gauge their responses.

In recent times, VR and AR are coming together to impact business and enterprise together. VR and AR are reshaping marketing in domains ranging from real estate and automotive to consumer goods and retail.

Implicit learning and development is one of the domains where AR and VR enabled products and services are expected to gain traction. Other industries that will experience traction in this space are Aerospace, Oil and Gas, Heavy machinery where on-the-job training is conventionally difficult or dangerous but can be transformed to an easier version through virtual and augmented reality solutions.

Advent of 4G and high speed data communications have become key drivers for adoption of VR/ AR. Growing demand for VR gear among smartphone users, advent of entry-level VR headsets in the market and marketing push by smartphone manufacturers have boosted the VR market across the globe.

The Extended Reality Spectrum



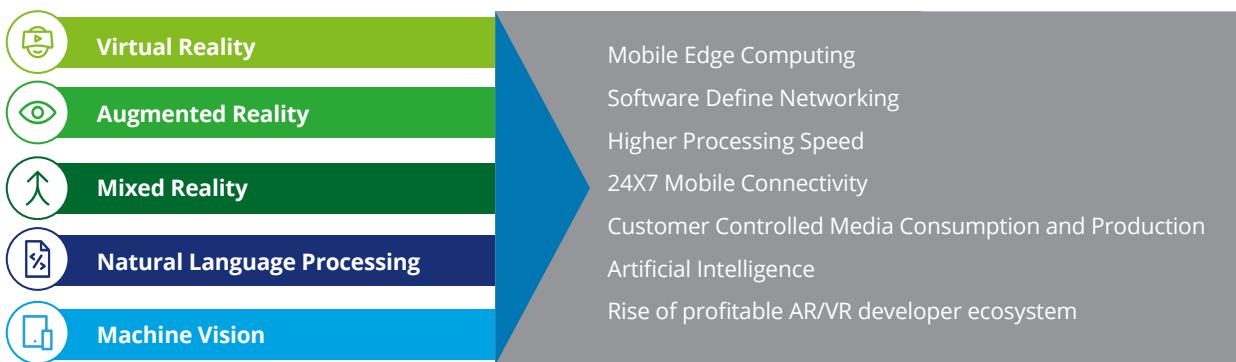
Source: Forrester





Key Drivers for Digital Reality

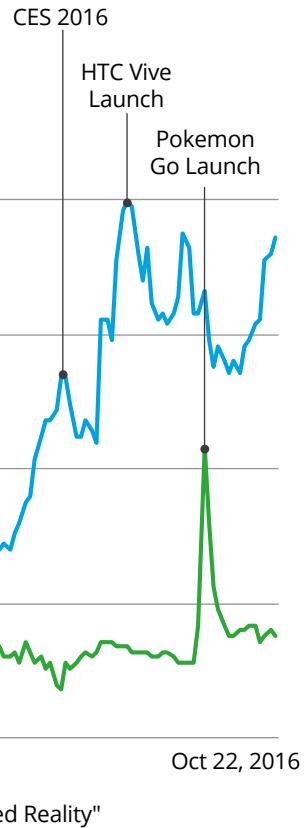
Drivers for Digital Reality



Source: Industry Reports

Despite promising outlook of virtual and augmented reality, the initial adoption rate in developing nations, like India, is expected to be low due to lack of content and awareness among users. However,

thought leadership and trainings can prove useful for making the big shift towards adoption. However, interest in VR and AR has increased among people over the last few years.



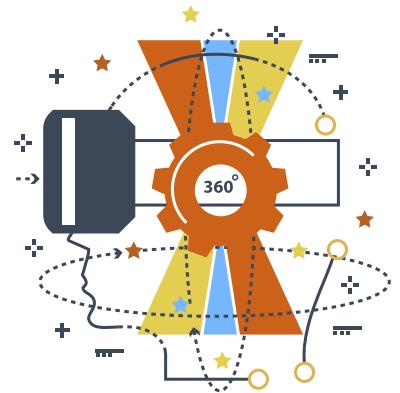
Source: Google Trends

Use Cases of Digital Reality

Government can make use of VR and AR products and services for customs and border protection by making it easier to simulate scenarios for virtual training. Similarly, VR based training can be leveraged for disaster preparedness.

Remote assistance can be coupled with augmented reality for maintenance of oilrigs, aircraft, pipelines and any such

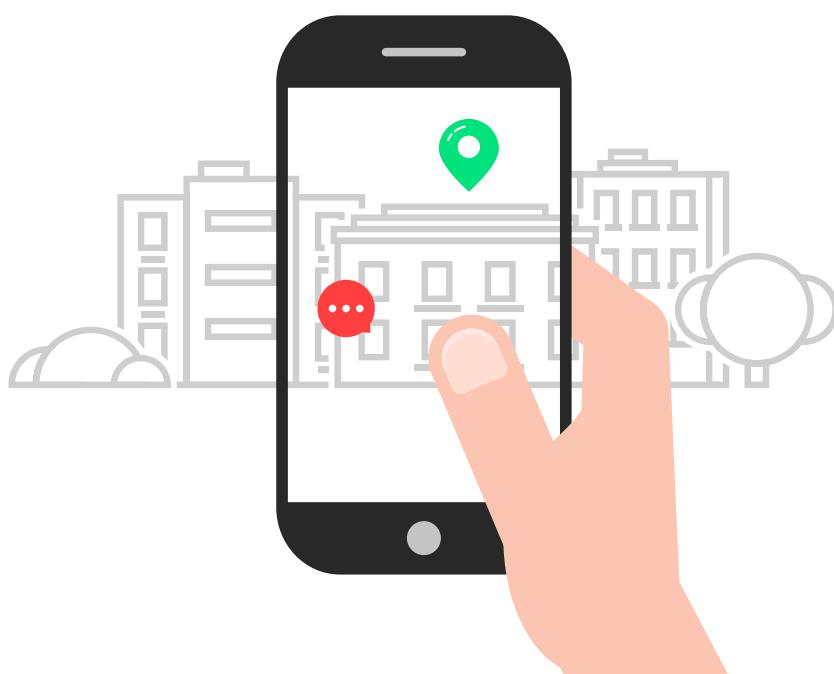
machine, which is difficult for humans to enter into. AR/VR could witness high utilization in Edutech domain. It could be of immense help by employing virtual teaching, digital learning and development methods in schools and colleges.



Few use-cases of digital reality across various domains

Healthcare	Aerospace	Government Services	E&R	Retail	Manufacturing
Connected Worker – AR solutions to be used for pre-operation activities (training, surgical planning, decision-making) VR for PTSD – VR is being used to help soldiers with post-traumatic stress disorder (PTSD) by using VR warfare simulations to help veterans deal with instances that might be triggers to behavior that could be destructive to themselves and others	AR Knowledge on Demand – Hands-free augmented reality solution to provide on-demand access and share knowledge with various employees See-What-I-See – Hands-free Remote Assistance allows engineering experts to provide see-what-I-see assistance for aircraft inspection and issue resolution	Customs and Border Protection – AR enabled interactive training makes it possible for agents to simulate scenarios where trainees can see and interact with virtual environments Augmented Emergency Management – Uses 3D mapping of surrounding environment and wayfinding capabilities, such as virtual compasses, showing target location etc.	Augmented Reality/Virtual Reality based training program	Product Catalog with AR – Displays interactive features when the customer scans the display icon found in the product catalog using an app AR based Digital catalog – Through the use of AR, smartphone users can scan the catalog and open additional information about the product	AR SOP Guide and Instructor – Digitizing standard operating procedures, along with computer vision, gesture inputs, and voice commands are used to create the solution. Operators receive 3D modeled step-by-step instructions, automated task guidance, and visual assistance on smart glasses and tablets.

Source: Industry Reports, News Articles



Tools and Technologies

Digital reality covers a wide spectrum from passive 360-degree photos to complete 3D immersive worlds. To develop such applications various tools and technologies need to be considered. The tools and technologies must be identified

on the basis of requirements and whether those are met by the functionalities offered by tools/technologies. Few tools and technologies are listed below to highlight various facets involved in digital reality projects.

List of technologies and vendors

Category	Example Vendors
Game Engines/ Dev Platforms	<ul style="list-style-type: none">Unity TechnologiesUnreal Engine
Haptic Feedback	<ul style="list-style-type: none">AxonVRUltrahaptics
Motion Tracking	<ul style="list-style-type: none">OptiTrackNoitom
Simultaneous Location and Mapping (SLAM)	<ul style="list-style-type: none">EoniteStereolabs
Eye Tracking	<ul style="list-style-type: none">SensoMotoric InstrumentsPupil Labs
Cameras and Capture Devices	<ul style="list-style-type: none">Nokia OZOVuze
Spatial Audio	<ul style="list-style-type: none">Dolby AtmosMint Muse
Content Development/ Post Production Software	<ul style="list-style-type: none">MettleKolor
Stitching Software	<ul style="list-style-type: none">Mistika VROrah
Version Control	<ul style="list-style-type: none">Plastic SCMMercurial
VR/AR Analytics	<ul style="list-style-type: none">Cognitive VRAldin Dynamics

Source: Company Websites

Conclusive Remarks

Digital reality is likely to have multiple applications, both consumer and enterprise, in the longer term. Investments in the VR and AR segment are growing, consumers are showing interest, and industry leaders recognize these areas as a potential opportunity for growth.

Across domains, AR/VR is changing how products and services are developed and delivered, which is transforming into increased productivity and operational efficiencies. It has the potential to become the foundation of next-gen computing.



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