



AUGMENTED REALITY & VIRTUAL REALITY IS NOW A REALITY FOR ENTERPRISES- THE FUTURE IS HERE!

Abstract

Innovation and next-generation technologies have completely changed the way we work, live and possibly even the way we think. AI, Augmented Reality (AR), Virtual Reality (VR), and Blockchain are just some of the technologies that have affected how we consume art, music, movies, and how we communicate, shop, and travel. We are in the midst of a complete digital revolution.

This perspective paper illustrates a point of view on the use of mixed reality (MR) in today's enterprise environment, and covers-- virtual reality and augmented reality, market trends, industry examples, and challenges within organizations that are adopting mixed reality. In short, it sheds light on what the future is expected to look like in the context of enterprise disruption with MR.

Introduction

Johnny Mnemonic, the Lawnmower Man, Minority Report, the Matrix, Minority Report, the Terminator 2, Ironman...

Besides captivating audiences with their stunning visual effects, these films all have one thing in common - they showcase how MR technologies could be potentially used in the future.

These movies also serve to remind us that, until a few decades ago, our only brush with AR and VR was through film and entertainment. However, things have changed today, and how!

Everyone seems to know what VR headsets are, and the popularity of Pokémon Go almost allows omission of a basic introduction to AR. Though they are often used interchangeably, it is essential to clarify that AR and VR are not the same.

Virtual Reality is "the computer-generated simulation of a three-dimensional image or environment that can be interacted with in a seemingly real or physical way by a person

using special electronic equipment, such as a helmet with an internal screen or gloves fitted with sensors." VR can digitally recreate the environment around you, or give you the impression you are somewhere entirely different.

Augmented Reality "however, creates greater interactivity in real-world environments, where objects that reside in the real world are enhanced by computer-generated perceptual information."

In simple terms, where VR replaces your vision, AR adds to it.

Mixed reality (MR) on the other hand "is the merging of real and virtual worlds to produce new environments and visualizations, where physical and digital objects co-exist and interact in real time." MR does not exclusively take place in either

the physical or virtual world, but is a hybrid of the two, encompassing both augmented reality and augmented virtuality via immersive technology interfaces.

While heavily deployed in the entertainment sector, innovation in AR, VR

and MR is slowly catching up to other walks of life. In fact, the technology exhibits the potential to address enterprise and industrial challenges that were previously perceived as undefeatable.

From their beginnings in the 1990s, both AR and VR have come a long way. Today's VR set-ups are capable, immersive, easy-to-use, and cost-effective. High-end versions like the HTC Vive and Oculus Rift allow you to use your own hands in virtual worlds and spatially track your movement.

On the lower end, headsets like the Samsung Gear VR and Google Cardboard offer a smartphone powered experience. While mobile VR is limited, it is a more viable access point for end consumers owing to the lower cost of infrastructure and the near ubiquitous usage of smartphones around the world.

Although these devices are often perceived as pureplay gaming hardware, advancements in technology are making VR relevant to enterprise use cases. Microsoft's HoloLens is one such offering that has caught the attention of many enterprise leaders for its capabilities in training and remote industrial assistance. Key examples of such use cases are covered in subsequent sections of this paper.



The Mixed Reality Landscape & Market Outlook

Here is a look at what the market predictions for Mixed Reality look like-

<p>“According to a recent estimate by Goldman Sachs, AR and VR are expected to grow into a \$95 billion market by 2025.”</p>	<p>“The global mixed reality market was valued at USD 258.69 million in 2018 and is expected to register a CAGR of 47.9% over the forecast period (2019-2024).”</p>	<p>“UK government, as a part of its industrial development strategy, announced an investment of EUR 33 million in April 2018 to cover immersive technologies like AR, VR, and MR.”</p>	<p>“As of May 2019, the installed user base for AR-supporting mobile devices reached 1.5 billion. Revenue for the industry should hit \$75 billion.”</p>
<p>Combined studies by McKinsey, World Economic Forum and Goldman Sachs forecast that the “AR and VR will grow incrementally reaching as high as 50% of 2025.”</p>	<p>“The technologies behind AR/VR have moved 5 to 30 percent further along the Gartner Hype Cycle since April 2018.”</p>	<p>Augmented Reality is no more an “emerging” technology, but it has graduated as a mature one! In 2018, itself, VR was not an emerging and experimental technology anymore, but it had already become something usable and useful.</p>	

With this data, it becomes increasingly evident that AR and VR have great market potential, and warrant further investments to establish their usefulness in the enterprise context.

The Enterprise Shake up

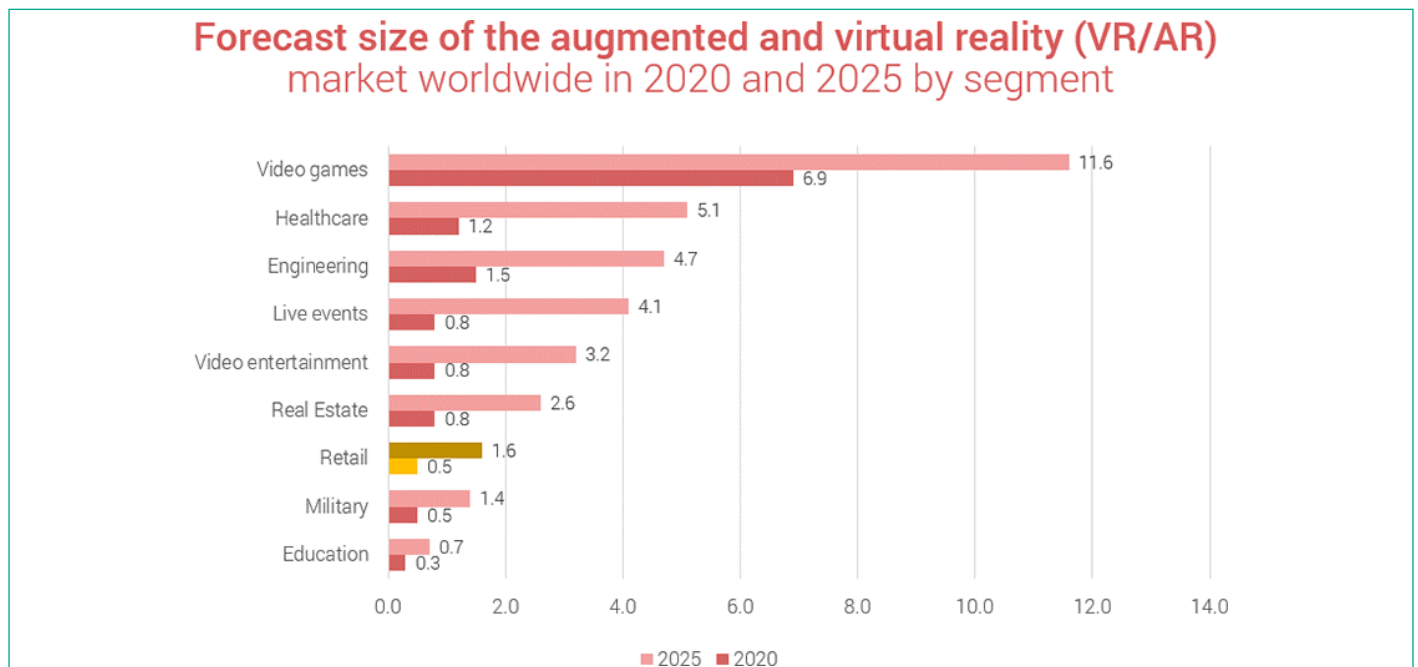
Arguably, for any technology wave to succeed, it needs to find sponsorship at an enterprise level. Many of the concerns related to AR/VR/MR such as consumer acceptance levels, can be addressed by winning support within enterprise markets.

While creative industries such as media and entertainment, and communication have

long leveraged AR/VR for different ends, core industries such as manufacturing, healthcare and even education are slowly deploying AR/VR enabled solutions to solve critical problems. For instance, AR solutions can be purpose-built with the ability to draw on a screen or move an image during a remote presentation, or to conduct architectural walkthroughs,

etc. According to Jacob Lowenstein, who leads AR-related business development and product strategy for Samsung NEXT, AR interfaces are particularly useful for visualization in various forms, including data and analytics as well as more practical tasks like furniture placement, cosmetic tryouts, toys, building models, training materials and more.

How Are Organizations Leveraging MR?



Source- Statista

Here is a look at how AR/VR/MR can be used in key industries. Some of these technologies are already in use by big players in the market, while emerging use cases indicate the strong potential for growth in this space.

Retail

- **Try Before You Buy, Smart Mirrors** with AR/VR
- RFID Based Product Recommendations
- **Point and shoot** AR and AI based information in stores
- Home/ Furnishing retail with superimposed **visualization** with MR
- **Virtual Fitting Rooms** in ecommerce
- **Build as you go** modeling with MR to buy and customize purchases

Popular Among- **Apparel Retail, CPG Retailing, Home and Furnishings, Make Up, Jewellery, Eyewear, Food and Beverage**

Manufacturing

- **Quality Control, Visualization in Assembly Lines**
- **MR based Guides** with integrated parts and instructions for service or build
- **Remote Assistance** Onsite
- **Decision-making instructions** that will guide operators or staff through the most complex control operations
- **Compliance and safety issue management** by looking around mixed-reality environments
- **Maintenance manuals** super imposed with point and view on a car with AR
- **Directions and hazard signals** while driving

Popular Among- **Automotive, Equipment Manufacturing, OEMs, Commercial Jetliners, Construction**

Healthcare

- **Painless/ Reduced Pain** in Diagnostic Tests with AR
- AR enabled projections for research, trials
- **Remote Assist and collaboration** in treatments and surgery
- **VR based therapy** and environment training for patient recovery
- **Remote Doctor Patient treatment** enhanced with AI
- **Psychological therapy** with VR transporting patients to environments and simulating body parts

Popular Among- Patient Care, Therapy in **Hospitals, In Home Wellness and Health Check Organizations, Tele Medicine and Remote Care, Rehab Centers**

Education

- **Virtual Training** and try and learn for science and research
- **Distance Education and AR classrooms**
- **Practical learning** with VR or simulations
- **Instruction or Tips and Tricks based teaching with physical devices**

Popular Among- **Higher Education Universities, Distance Education Programs, Science and Research Learning, Lab Exercise learning**

AR/VR are also commonly used in real-world navigation tools, space exploration simulators, and as military and defense training aids.

Additionally, creative marketing campaigns can leave a lasting impression

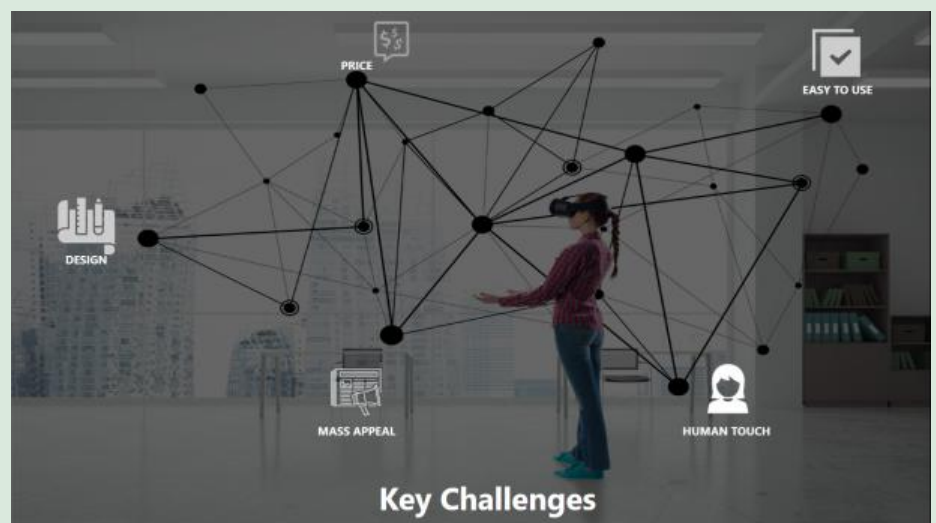
on the audience's mind with AR/VR/MR technologies. For instance, virtual placements in physical setups like stores, bus stops or airports can deliver interactive experiences and offer the potential to build new, highly engaging campaign tools.

In public safety, first responders can use AR to be alerted about risk zones and also get a view of teams that need remote help real time. Similarly, AR with geolocation enabled can help disaster victims with directions to safe zones and locations with medics, help, firefighters and others.

Hurdles To Mixed Reality Adoption In The Enterprise

Despite promising market trends and favorable pundit predictions, a host of challenges still plague large-scale acceptance of AR and VR. This technology has been perceived as "the technology of tomorrow" for over a decade and is unfortunately still being looked at as something that will gain momentum in the "next five years". A great way to cull all apprehensions around adoption is for this to be accepted on an enterprise scale.

However even at an enterprise level, the adoption of this technology is not without its challenges.



Design & Ease of Use

From a technological perspective, the design of AR/VR hardware and experiences presents a huge challenge. Over the years the way end users access AR/VR has changed and is even available via mobile devices today. However, in order to enable access and adoption at an enterprise scale, the foundational technology of AR/VR needs to be improved. Existing 3D design tools and head-mounted displays need to be redesigned for greater comfort and usability, while establishing a greater field of view (FOV) and more intuitive control interfaces.

In fact, key infrastructural parameters that need to be achieved to overcome AR/VR limitations, including device weight, brightness, display quality, FOV, latency

and thereby the user experience.

From an enterprise perspective, technology training programs need to be created to ensure optimal usage and adoption of AR/VR.

Price

Today, AR/VR probably gets the most visibility among tech enthusiasts, cutting-edge digital transformation companies, gamers, and of course, early adopters. This is largely because of the investments involved in integrating VR into the workspace and the high prices associated with the devices themselves. Many high-end AR/VR devices are priced as high as \$2000 - considerably higher than the average smartphone. Given these limitations, it becomes expensive to invest

in enabling a large field force of technicians to use these devices for remote access or guided servicing. But as adoption scales and the technology becomes available at more reasonable price points, we expect the market potential of AR/VR to grow in leaps and bounds.

Human Touch

Alongside the overall need for ease of use and intuitiveness, every technology needs to have some aspect of human touch. In this case, the actual users of the AR/VR or MR experiences need to be able to interact with the devices and tools to have an experience that seems still human in this entirety although it is in fact virtual or augmented.



Transforming Enterprise Mixed Reality With Microsoft Business Applications

HoloLens and HoloLens 2 are Microsoft's core offerings in this space. Having begun as an augmented reality venture, Microsoft's enhanced product line includes mixed reality offerings to address a host of new use cases and needs in the enterprise space

"Mixed reality on HoloLens 2 combines an untethered device with apps and solutions that help people across your business learn, communicate, and collaborate more effectively. It's the culmination of breakthroughs in hardware design, AI, and mixed reality development from Microsoft, designed to help you lead your industry into the future".


In the enterprise space, Microsoft HoloLens solutions primarily compete with Google Glass 2, although the latter is still perceived as an enterprise security risk. HoloLens devices are intuitive, ergonomic, and easy

to use, and provide an immersive view of multiple holograms, while delivering an experience that is instinctual and untethered. These offerings are tied into Dynamics 365 - a Microsoft training and

rewards program that provides extensive benefits to all partner enterprises. Today, the HoloLens series has already played a role in many enterprise success stories.



Dynamics 365 Remote Assist
Empower technicians to solve problems faster the first time. With heads-up, hands-free video calling on Microsoft HoloLens, technicians can collaborate with remote experts on a PC or mobile device to troubleshoot issues in context.




Dynamics 365 Guides
A series of step-by-step instruction cards with image and video support that enables employees to learn the flow of work by providing holographic instructions when and where they need them.




Dynamics 365 Product Visualize
Used to close your sales faster with mixed reality tool for showcasing and customizing products and having a clear understanding on the product


Benefits




Reduce travel costs



Remote Inspection



Collaborate Remotely



Faster troubleshoot and repair



Greater Retention of learned skill



Improve employee performance



Enable Just-in-time training



Jobs done faster with less errors



Iterate designs quickly



Sell Better with visualization

The impact and benefits of these offerings can be seen across industries and experiences.

Field Service & Remote Assistance

- Manufacturing & Shop Floor
- Oil & Gas & Utilities sector
- Telecom Installations & Services
- Hi-Tech

Mixed Reality Customer Experiences

- Retail & Shopping Experience
- Automotive
- VR in Entertainment, Gaming, Amusement Parks
- Hospitality & Services
- Real Estate, Housing, Furnishing purchases

Mixed Reality for Safety

- Space
- Defense/ Public Sector
- Services/ Firefighting, First Responders
- Military

How Has Infosys Enabled MR In The Enterprise?

Efficiency in Field Service Operations for Quality Maintenance with Dynamics 365 Field Service & Remote Assist

- HoloLens-based guides for field workers, engineers, and technicians on how to resolve issues.
- Improved collaborative resolutions with remote assistance from supervisors, who can visually access the live work and suggest improvements in real-time
- A completely hand-free experience within issue resolution, improving quality of work and ensuring smoother operations

HoloLens solution for hands free infrastructure management for Technology Company with Dynamics 365

- HoloLens-based solution assists in managing infrastructure of servers, data centers and equipment
- Customer Engagement solution to install, inspect, fix issues with equipment and facilities in Data Centers
- Ability to perform hands-free infrastructure inspections against pre-built checklists and functional tests on the installed equipment
- Auto creation of case/ issue tracking in Dynamics 365 in case of failed tests

AR/ VR experience in buying for Real estate/ Property Management with Dynamics 365

- Provision for interested property purchasers to view models of house/ property using a HoloLens solution
- Ability to make design changes on the go and visually see how that would look like
- Finalize changes and get an immediate understanding on the impact on price and quote
- Complete the personalized selling process at the right price

MR Implementation/ Adoption Roadmap

Given our extensive experience in building MR solutions, Infosys is well-positioned to partner with customers on their MR transformation journey. To begin with, our specialists follow a three-step program

- Demonstration of existing solutions in our repository to better articulate the possibilities and experience of MR in the enterprise
- ACE starter program to kick start the MR journey, that will include identifying

high-level business requirements and the potential value clients can derive from the deployment of a MR based solution. Discuss the business case, assess the AS-IS state & landscape, Blueprint, POC & Validate, Recommend fit-gap/solution options, Prepare Deployment / Execution Plan

- Start small if needed, with pilot groups and use cases, so user adoption is ascertained before big bang MR use cases are brought to larger workforces



The Infosys Vision For An MR-powered Future

Immersive virtual environments are touted to be the new user interface through which consumers will interact with AI platforms, enabling visualization and manipulation of vast amounts of data in entirely new ways. Patterns, relationships and anomalies will emerge more easily, empowering enterprises to transform how they run their businesses and even create completely new business models.

Growth is being supported by investments in software, hardware, platforms and landscape changes. These investments are primarily focusing on replacing keyboards and flat displays with entirely new paradigms for collaboration and communication. While there are challenges in adopting this wave of technology, there is no denying the immense potential for innovation with Mixed Reality.

At Infosys, we've built a dedicated Innovation Lab working on mixed reality use cases for businesses and a full-fledged Center of Excellence enabling enterprises to get rapidly assimilate and deploy MR technologies.

For many enterprises, MR offers the

ability to rewrite the rules on how consumers and employees view and interact with workspaces and products. By marrying the physical and digital in new and unpredictable ways, MR is helping organizations around the world reinvigorate, inspire and truly innovate their business and customer paradigms.



About the Author



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Rithika Messiahdas is a Principal Consultant with Infosys. She has over 12 years of experience in the Microsoft Dynamics space having worked on CX implementations, pre-sales and development and strategy for new Industry vertical solutions and Digital Experience Innovation. Her areas of interest span across thought leadership and building of new solutions enabling modernization to the existing enterprise ecosystem with focus on Next Generation technology areas across AI, Automation, Analytics, MR, IOT and related enrichments.

Infosys Cobalt is a set of services, solutions and platforms for enterprises to accelerate their cloud journey. It offers over 14,000 cloud assets, over 200 industry cloud solution blueprints and a thriving community of cloud business and technology practitioners to drive increased business value. With Infosys Cobalt, regulatory and security compliance, along with technical and financial governance comes baked into every solution delivered.

For more information, contact askus@infosys.com

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