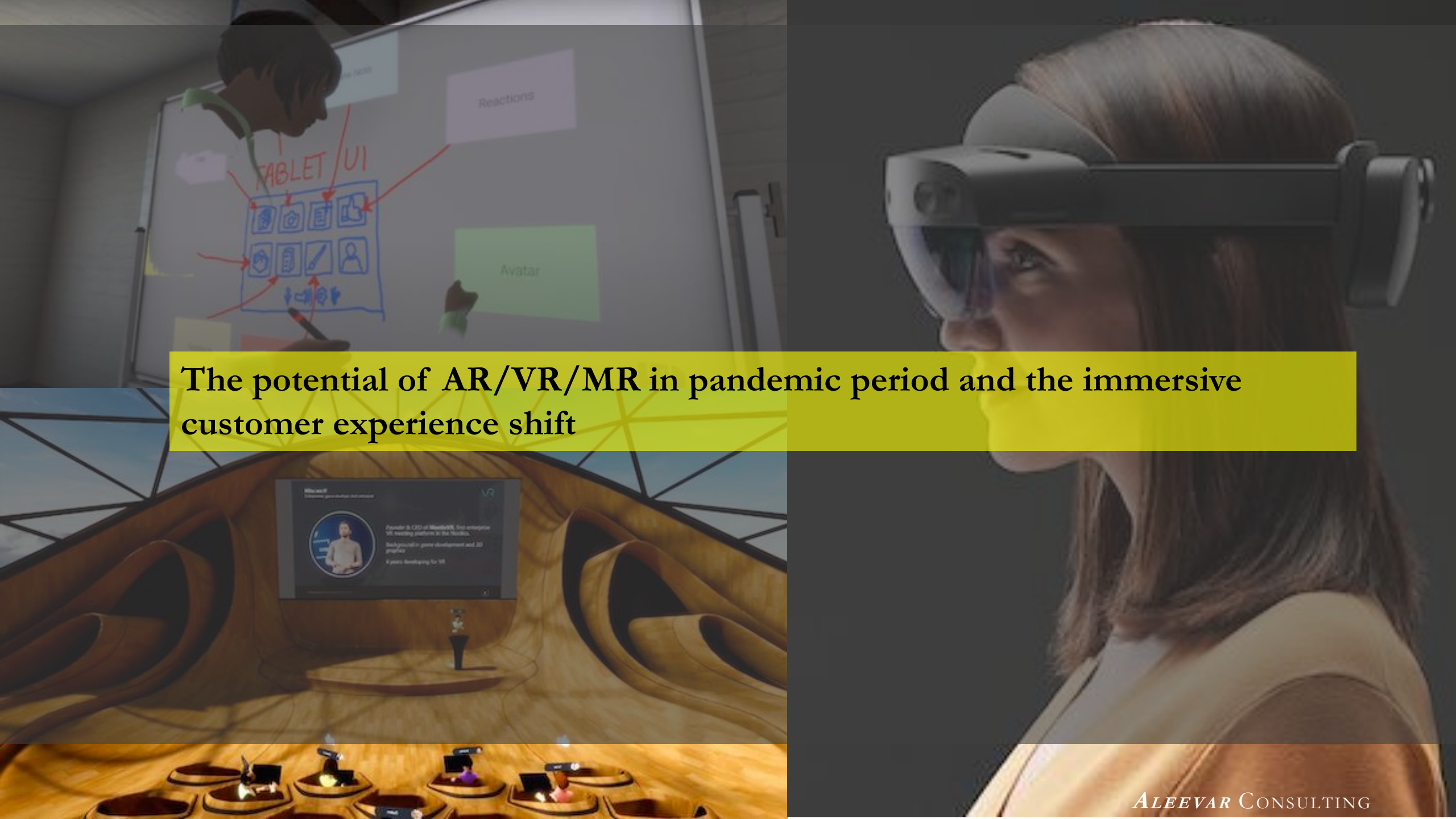

The potential of AR/VR/MR in pandemic period and the immersive customer experience shift

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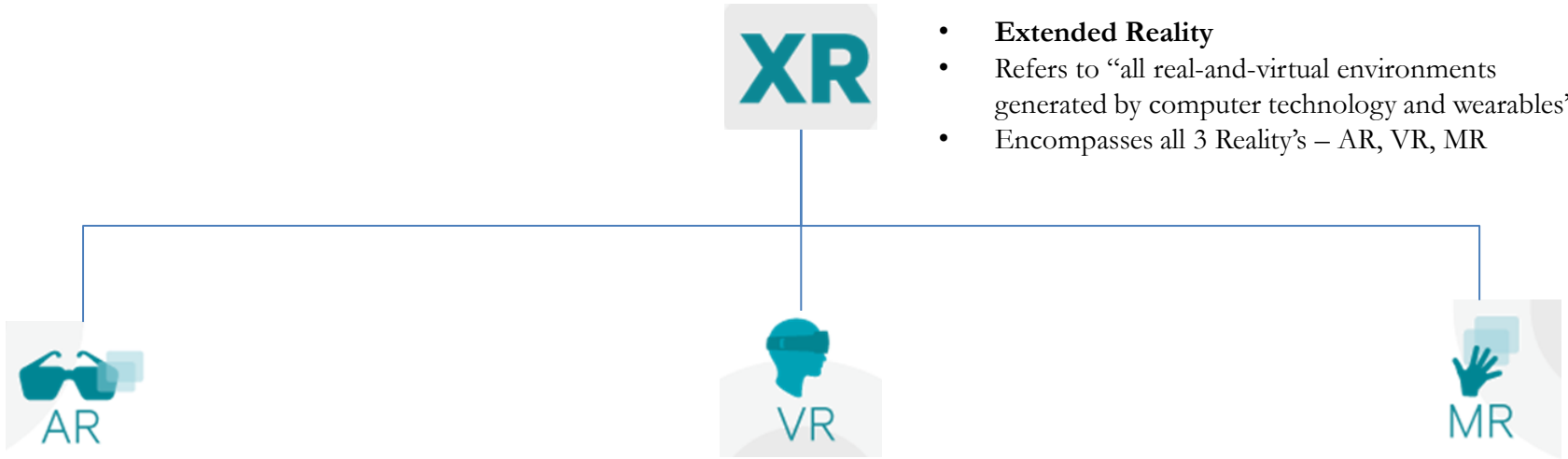
What is AR, VR, MR & XR?



- **Extended Reality**
- Refers to "all real-and-virtual environments generated by computer technology and wearables".
- Encompasses all 3 Reality's – AR, VR, MR

- **Augmented Reality**
- Adds digital elements over a live view through a camera

- **Virtual Reality**
- Immerses you completely into a digitally constructed world

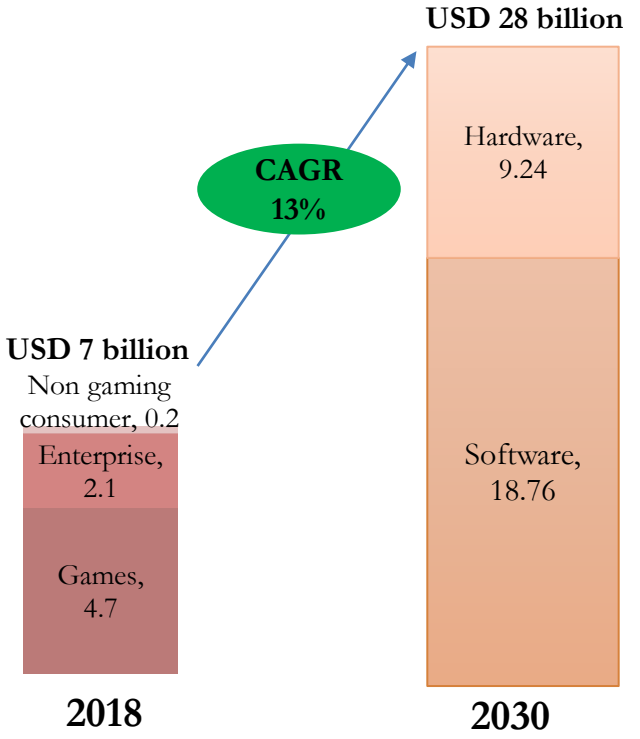
- **Mixed Reality**
- Combines elements of both AR and VR where it enables you to interact with real-world and digital objects at the same time.

Source: Medium, AR Post

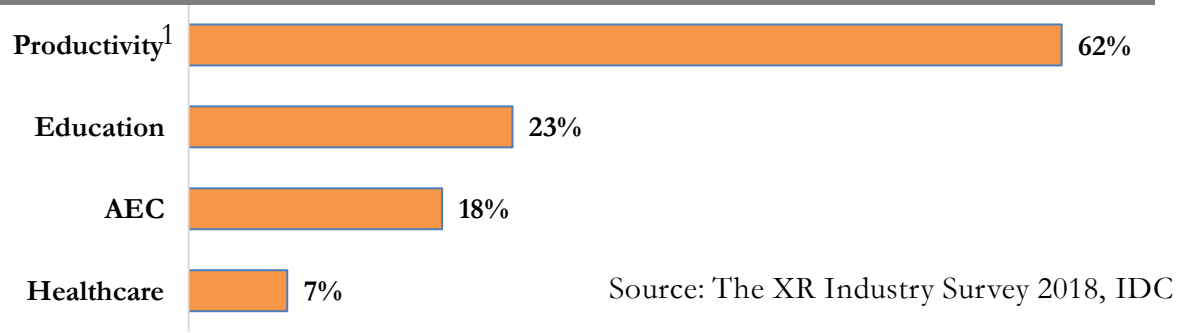
Global market size and evolution

***Global AR & VR product revenues** are expected to grow from US $3.8 billion in 2017 to US $56.4 billion in 2022.* VR market revenue will grow at a compound annual growth rate (CAGR) of 13% from US$7bn in 2018 to $28bn in 2030 where VR software accounts for two-thirds of the total VR market at USD18.7 billion and the remaining are hardware sales at USD9.2 billion. In 2018, Games software accounted two-third at USD4.7 billion followed by enterprise software at 30%, USD2.1billion and and non-gaming consumer software only at 2%, USD200 million. AR/VR Investment and development are focused in productivity applications at 62%. The top AR/VR usecases are Supplement labour, virtual Customer visits, and Design and product engineering.

Global VR market revenue



AR/VR Investment and development by Sectors



Source: The XR Industry Survey 2018, IDC

Top AR/VR use cases

Source: Grid Raster survey Apr 2020

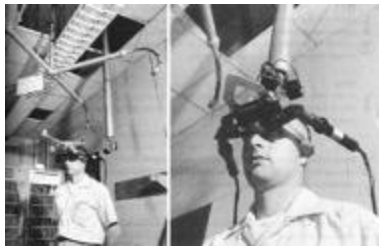
AEC – Architecture Engineering and Construction
Source: Enterprise Talk, Transforming Audit Isaca.org

Note 1: knowledge transfer among employees, increased employee efficiency onsite, improved fix rates, and fewer truck rolls

Evolution of XR timeline

- **[1939]** The evolution of XR dated back as early as 1939 where View-Master introduced the stereoscopic visual simulator in rotated films.
- **[1957]** The earliest-known immersive and multi-sensory machine was pioneered by filmmaker Morton Heilig.
- **[1968]** The first head-mounted XR helmet was created by Harvard University student, Ivan Sutherland.
- **[1978]** MIT Aspen Map demonstrated the interactive virtual tour.
- **[1979-1985]** Eric Howlett developed the Large Expanse, Extra Perspective (LEEP) optical system into a stereoscopic image with wide angles to create a sense of space and later redesigned it for NASA's Ames Research as a VR installation.
- **[2012–present]** Post 2010 witness multichoice of device. E.g. VR and/or MR headsets from Oculus & HTC and AR glasses from Google & Microsoft provided enterprise quality devices supporting the productivity of business applications until the present day.

1939
View-Master



1968
VR-AR helmet Ivan Sutherland and Bob Sproull "The Sword of Damocles."

1979
Eric Howlett Panoramic Stereo Photography

1993
Nintedo Virtual Boy

2007
Google Street View

2015
Google Glass

2016
HTC Vive

2016
Microsoft Hololens

1957
The Sensorama by Morgan Heilig

1978
MIT Aspen Movie Map, virtual tour

1985
NASA-Ames Research

1997
Post Traumatic Stress Disorder (PTSD) Therapy

2012
Oculus Rift DK1

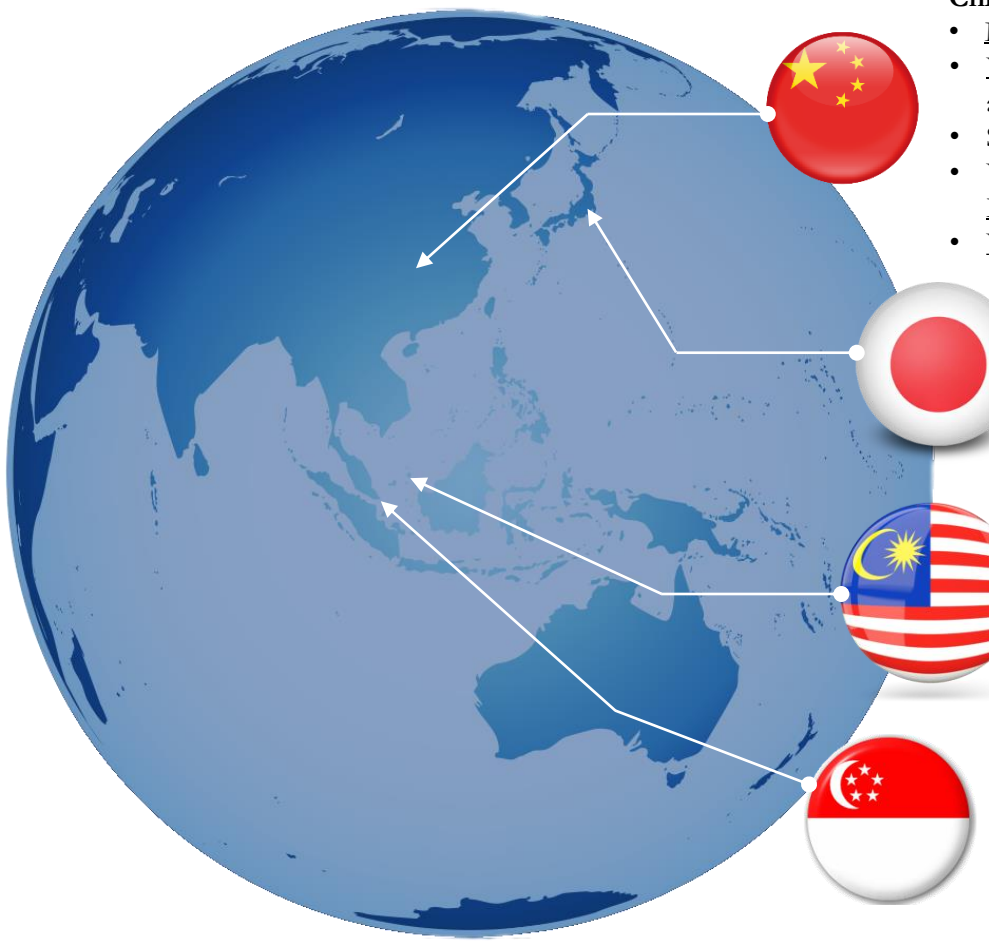
2014
Google Cardboard

2020-2021
Apple AR Glasses

1960 **1970** **1990** **2010** **2020**

Asian AR/VR motivation and development

Enterprise virtual reality sector will take off until 2030 due to vigorous effort from both direct government and private investment in the APAC region. China leads the pack with their ambitious Made in China 2025 strategy. Japanese telecommunication companies to setup AR/VR platform with 5G technology. Malaysia TM demonstrated VR in tourism. Singapore put AR training in aerospace, security services and education.



China

- Made in China 2025, a strategic plan high value manufacturing
- VR Masterplan focus on ecosystem development (i.e. Funding, Technologies, Standards, and R&D, SCM. Industry application, Public Service Platform, Privacy & security)
- Shenzhen government and HTC' $1.45bn Shenzhen VR investment fund and VR research institute
- VR companies are Baofeng Mojing on headgear, VR Waibao collaboration tools, PanguVR in Visual technology, Langzou on education
- Virtual Reality Industry Alliance (IVRA) as standards

Japan

- NTT Docomo, KDDI and Softbank to set up VR/AR viewing platforms utilising 5G at sports games and other live events
- HoloEyes, medical virtual anatomical drawing, Fujitsu's zSpace, a heart explorer for healthcare, Psychic VR Lab's shopping experience at department stores, NTT Data's sport training for baseball and finding required objects in manufacturing

Malaysia

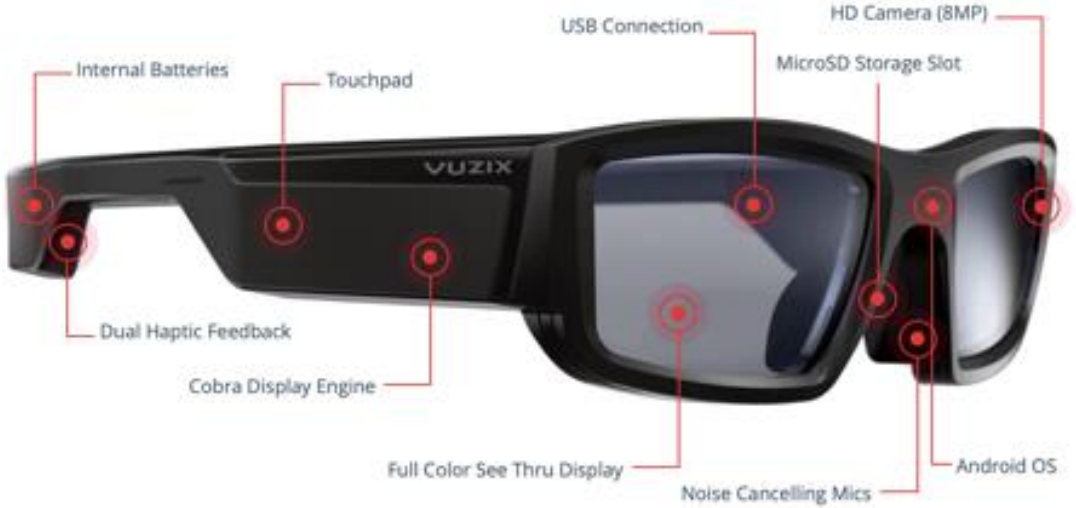
- TM 5G demonstration on UNESCO Global Geopark Langkawi, vConcert and vGames
- Tourism apps where Sarawak state to work with EON Reality,
- AR/VR association - Malaysia Chapter to foster collaboration

Singapore

- ST Engineering – AR Training for Aircraft Maintenance, Pit Crew Scenario, Incident Response for Security forces
- Education on Road Safety, Human Anatomy Puzzle
- Design and building construction with Fraunhofer headset

AR enterprise gadget

AR gadget such as AR glasses, is well-designed to support Remote Assistance, Image Guided Therapy and Training (Healthcare, Automobile, Production, Data Centre, etc.)



Vuzix Blade Smart Glasses, an AR glasses and its specification

AR enterprise use cases for remote assistance & training

Google Glass Enterprise 2
AR in Assembling

Microsoft Hololens
AR in Mechanics Training

VUZIX M4000
AR in Manufacturing

AR enterprise use case for image guided therapy

Philips showcases unique augmented reality concept for image-guided minimally invasive therapies developed with Microsoft – Feb 2019.

In contrast to open surgery, minimally invasive therapies only require a small incision. Dedicated instruments such as catheters are inserted through the incision and guided to the treatment area, which can include the heart, blood vessels, brain, liver and other major organs.

Source: Philips USA

Use cases, trends & benefits

Summary of 4 selected industries

	[VR] Healthcare	[AR/VR] Real Estate	[VR] Conference & Meetings	[AR/MR] Retail & E-commerce
Use cases	**Service Providers**: virti, OMS **Hospitals**: UNE University of New England, The George Washington University Hospital	**Service Providers**: realar **Real Estate Companies**: 贝壳, MahSing, Sime Darby Property	**Platforms**: hubs by mozilla **Service Providers**: ENGAGE (Communicate / Teach / Learn) **Events**: 2020 IEEE VR Atlanta, V²EC 2020	**Service Providers**: Obsess, Emersya **Retailers**: Timberland, Tommy Hilfiger, IKEA **E-commerce Platforms**: 淘宝网 Taobao.com
Trends	>300 doctors in Los Angeles learned new skill through VR	Greater use of online tools since COVID-19	The radical shift towards VR conferences has been successful	Leveraging on the potential of AR
Benefits	Immersive experience & improved decision-making process Effectiveness in reducing risk & limiting injuries	3D visualisation for better purchase decision Saves time, money & effort	Virtual engagement Encourages a larger number of global speakers & attendees	Provides shopping experience in-store, in-app & in-browser Enhances sales effectiveness

Use cases, trends & benefits
[VR] Healthcare

Use case

Service Providers | **Hospitals**

Virti	Oxford Medical Simulation (OMS)	The University of New England (UNE)	George Washington University Hospital (GWUH)

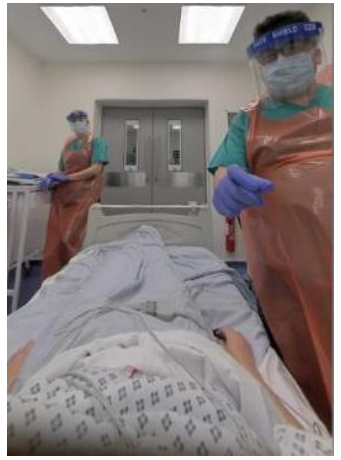
Trends

>300 doctors in Los Angeles learned new skill through VR
E.g. How to **(i)** effectively put on and take off protective equipment, **(ii)** assess an affected person's symptoms

Benefits

Immersive experience & improved decision-making process
Simulations can be created with close similarity to real-life situations which helps healthcare professionals to better prepare themselves on what they should do and how they should do it in different scenarios.

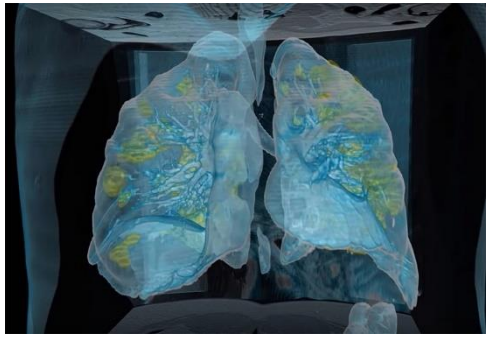
Effectiveness in reducing risk & limiting injuries
People trained by VR had lower performance errors and higher accuracy compared to those trained by conventional approaches.



Virti's simulation puts doctors and nurses into the eyes of COVID-19 patients.

OMS is aiding struggling healthcare providers and medical professionals to get the training needed to deal with the COVID-19.

A nursing student at UNE undergoes a VR simulation to get ready for real-world hospital situations.



The GWUH is using innovative VR technology to assess its first COVID-19 patient.

Source: Forbes, CNN, VR World Tech, Design Boom

Use cases, trends & benefits
[AR/VR] Real Estate

Use case

Service Providers

RealAR

Real Estate Companies

Beike Zhaofang

MahSing

Sime Darby Property

Trends

Greater use of online tools since COVID-19
E.g. virtual reality, 3D rendering and live-streaming, to facilitate marketing, research, and purchasing of real estate due to COVID-19. (based on Juwai IQI's Malaysia Property Index and Survey)

Benefits

3D visualization for better purchase decision
E.g. 3D views of buildings and amenities, floor plans or AR with real-time 3D rendering, adding all the landscaping, animation, color and textures.

Saves time, money & effort
AR/VR for property viewing eliminates the need to visit properties physically; which helps clients to view more in less time. At the same time, lesser property agents are needed which ultimately saves not only time but also money and effort.

Visit property plans within RealAR's AR app.

Customers can have a virtual 3D walk in each flat and view each room and interior.

Online VR tour within Beike's platform.

Sime Darby Property providing customers the VR experience during the property launch back in 2016.

Source: Forbes, RealAR, Beike, TheStar, FreeMalaysiaToday, Medium, SupChina, Queppelin

Use cases, trends & benefits

[VR] Conference & Meetings

Use case		
Platforms	**Service Providers**	**Events**
Mozilla Hubs	**Engage**	**IEEE VR Conference March 2020**
		HTC Virtual VIVE Ecosystem Conference March 2020

Trends

The radical shift towards VR conferences has been successful
Both VR conferences that have recently happened in March 2020 garnered over 4,000 attendees from more than 55 countries.

Benefits

Virtual engagement
Being able to observe elements from a first-person perspective while having the ability to interact with the elements can have greater effect on one's concentration and learning experience.

Encourages a larger number of global speakers & attendees
Travel time, meal costs and other traditional tradeshow expenses are eliminated which enables conference planner to invite more guests and participants across the world.

Inside a basic virtual room within Mozilla Hubs.

IEEE VR current and past conference chairs gather for a virtual group photo.

Login screen within the Engage app platform.

Avatars can appear over 360-degree live video feeds.

Virtual engagement can be done through 3D virtual elements like models of the Coronavirus and the train.

Source: Forbes, Mozilla Hubs, Engage, Medium, IEEE Computer Society, VR 360

Use cases, trends & benefits
[AR/MR] Retail & E-commerce

Use case

Service Providers		Retailers		E-commerce Platforms
Obsess	Emersya	Timberland	Tommy Hilfiger	Ikea	Taobao

Trends

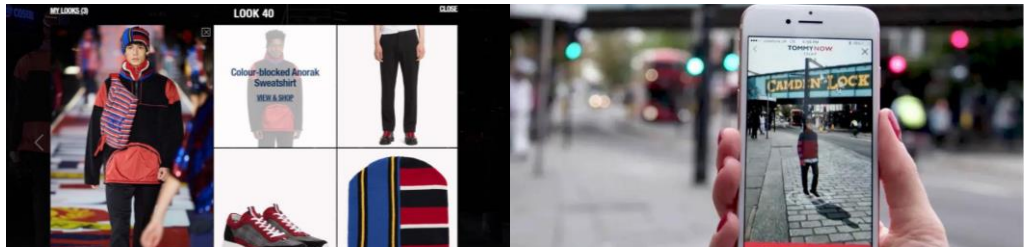
Leveraging on the potential of AR
In 2020, 46% of retailers plan to deploy AR solutions to meet customer service experience requirements. Today, more than 1 billion smartphones and tablet devices can deliver augmented experiences and it is mentioned that 100 million consumers will shop using AR online and in-store.

Benefits

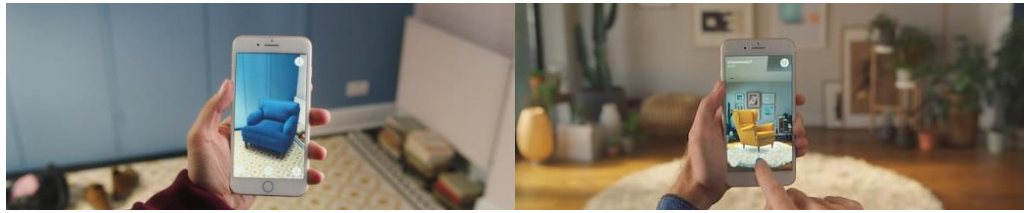
Provides shopping experience in-store, in-app & in-browser
E.g. Immersing customers into a virtual dressing room; offering a virtual test drive; overlaying digital information onto the physical world: furniture, a clothing, a shoe or any other information to improve customer engagement.

Enhances sales effectiveness
When a retailer offers AR functionality in their shops, 68% customers spend more time, some pop-up stores achieved an average order value increase of 300% and may lead to more conversions.

AR smart mirror that enables people to alter their outfits (e.g. jackets or trousers)



AR app that lets people display and pre-order fashion week outfits.



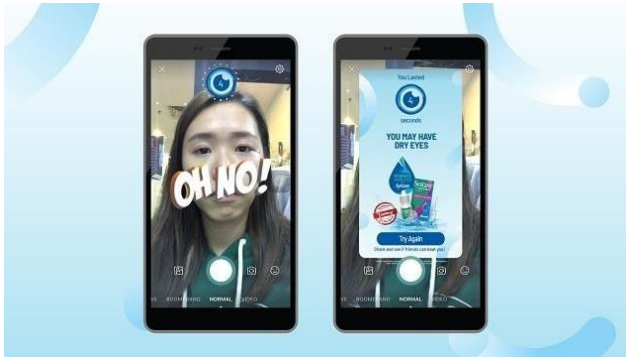
AR app Ikea Place allows people to project virtual furniture onto a physical space.

MR Taobao Buy+ enables customers to browse and place 3D holograms of selected products into their environment.

Source: Forbes, ObsessAR, Emersya, Tech Crunch, Medium, Deloitte, Gartner, ARVR Journey, Retail Customer Experience, NexTech AR Solutions, VR Scout, Marketing Squad, Academic Works

Use cases in Malaysia

[AR] Trying on spectacles by projecting virtual spectacles onto the customer's own face.



[AR] Doing a smart eye-hydration test using phone AR for Alcon.

[VR] VR learning experience for Science learning in eKelas programme.

[AR] Showcasing an immersive experience on ocean observation for aquariaKLCC.

[AR] Demonstrating an AR fashion mirror at Lazada WECOMMERCE 2019.

[VR] Virtually navigating through a physical store at Lazada WECOMMERCE 2019.

Source: Pott Glasses, Marketing Interactive, Maxis, NST, Soya Cincau

Summary

1 **Top AR/VR use cases:**

Labour supplementing (Remote assistance)

Virtual customer visits (Customer experience)

Product design & engineering

Employee training

2 **A selective combination of B2B / B2C use cases, trends & benefits categorised under 4 industries:**

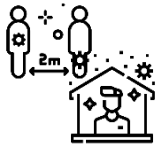
Healthcare

Real Estate

Conference & Meetings

Retail & E-commerce

3 **What may work for the future?**



Even if the COVID-19 pandemic becomes under control, the new normal will still exist where social distancing and staying at home are practised, as displayed in China.

Thus, it is encouraged for industry players in Malaysia to adopt XR technology to leverage on the early mover advantage.

4 **What can we do for you?**

Marketing / customer research

Capacity building

Strategy roadmap

What we can do for you. Consider these three service offerings

Marketing / customer research

- Understand the likely changes in customer behaviours and attitudes in consuming products and services in the context of the coronavirus pandemic
- Such changes will also affect sectors such as travel, hospitality, healthcare and consumer product. The key outcome is to maximise people's trust

Capacity building

- Reviewing critical components of businesses such as workforce, customers, suppliers, stakeholders, cash flow and business continuity in order to build resilience that gives the competitive edge
- Capacity building is imperative as a result of this health and economic crisis as it is causing dramatic restructuring and shock to customer behaviours and business models

Strategy roadmap

- Consider running workshop with key team members to provide macro outlook and align business operation to mitigate the disruption ahead
- Share global best practices and run ideation sessions to develop a strategy to prepare for shifts in customer behaviour and business models

Aleevar Consulting

Elevating business, enabling capacity building

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