Metaverse - Dive Into The New World

Hello!

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Research Interests – VR, ML, BCI

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What do you think when you hear the word "Metaverse"?

ⓘ Start presenting to display the poll results on this slide.

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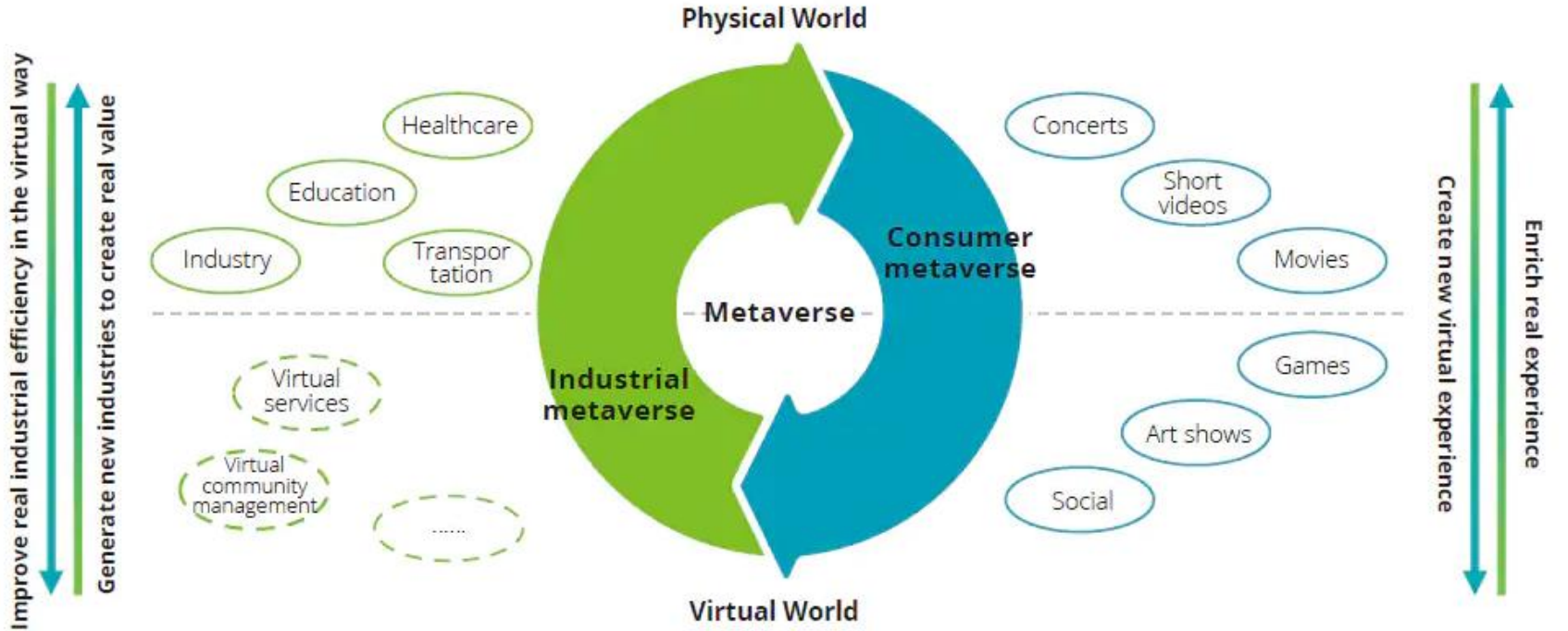
Which Industry do you think Metaverse will impact in the future?

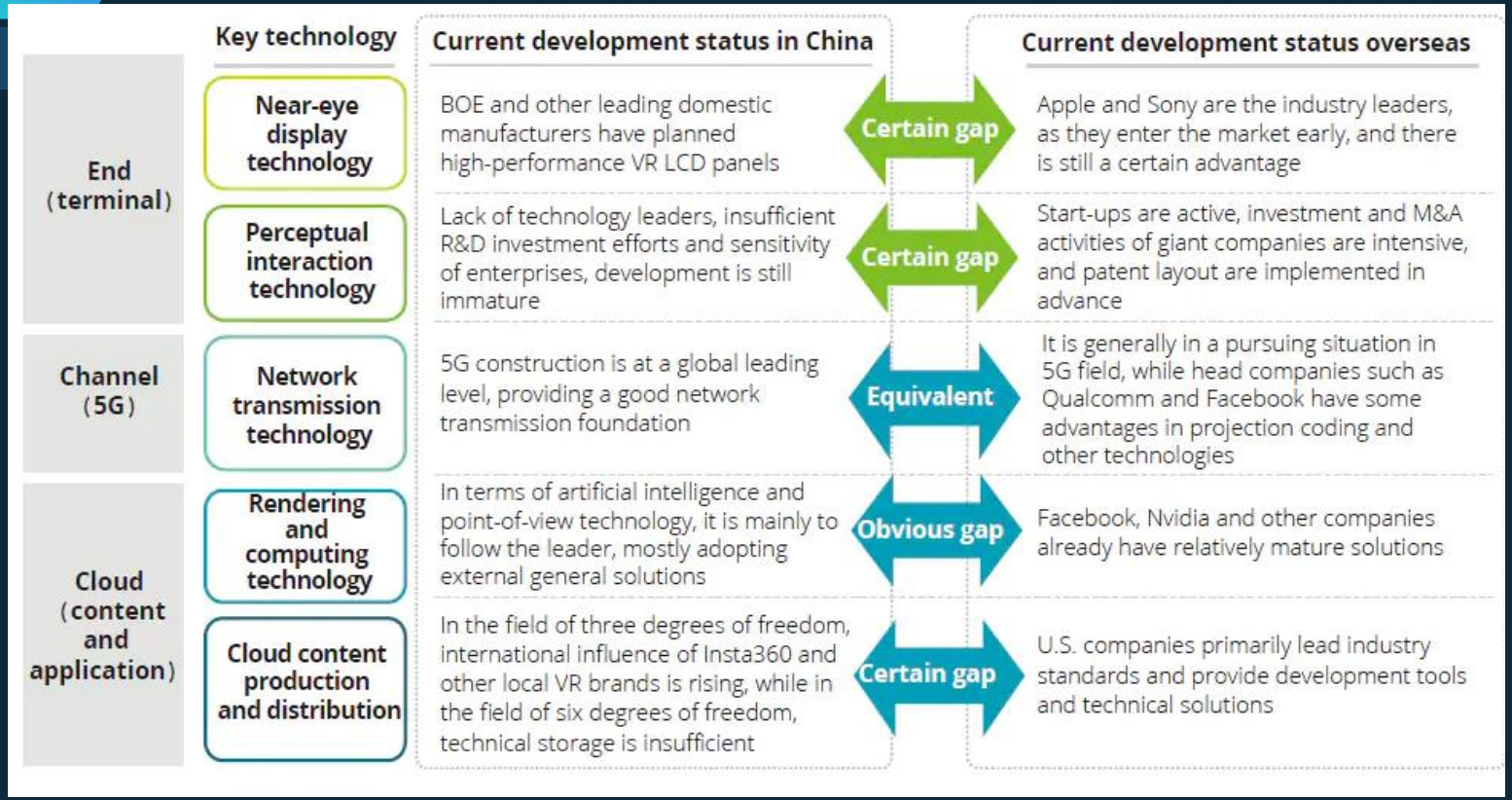
ⓘ Start presenting to display the poll results on this slide.

Ecosystem of the Consumer and Industrial Metaverse



Source: Deloitte Research and analysis

Status of Key Technologies



Topics

- Introduction to XR
- Project Demo
- Development Tools
- Queries

1 Introduction

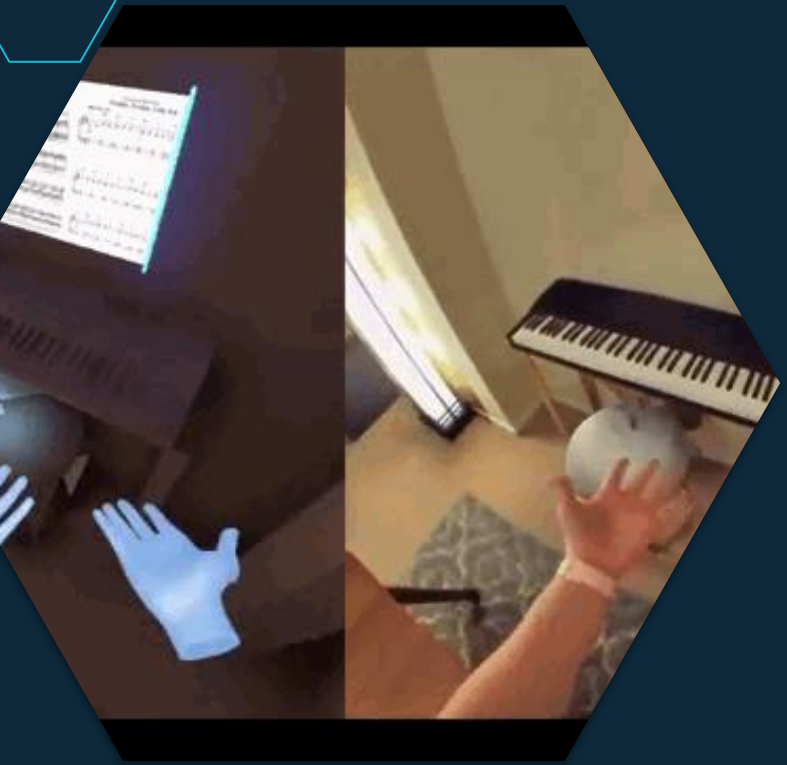
Defining VR, AR, MR

Virtual Reality

- a three-dimensional, computer-generated environment
- can be explored and interacted with by a person
- ability to manipulate objects or perform a series of actions

Augmented Reality

- superimposes a computer-generated image on a user's view of the real world
- enhances natural environments or situations and offer perceptually enriched experiences



Mixed Reality

- merging of real and virtual worlds to produce new environments and visualizations
- physical and digital objects co-exist and interact in real-time

REAL ENVIRONMENT

MIXED REALITY (MR)

VIRTUAL ENVIRONMENT

Tangible User Interfaces (TUI)

A TUI uses real physical objects to both represent and interact with computer-generated information (Ishii & Ullmer, 2001).

Projection Augmented models (PA model) are a type of Spatial AR display, and are closely related to TUIs

Augmented Reality (AR)

AR 'adds' computer-generated information to the real world (Azuma, et al. 2001).

Spatial AR

Spatial AR displays project computer-generated information directly into a user's environment (Bimber & Raskar, 2005).

'See-through' AR (either optical or video)

A user wears a head-mounted display, through which they can see the real world with computer-generated information superimposed on top (Cakmakci, Ha & Rolland, 2005; Billinghurst, Grasset & Looser, 2005).

Augmented Virtuality (AV)

AV 'adds' real information to a computer-generated environment (Regenbrecht, et al. 2004).

Virtual Reality (VR)

VR refers to completely computer-generated environments (Ni, Schmidt, Staadt, Livingston, Ball, & May, 2006; Burdea & Coffet 2003)

Semi-immersive VR

A semi-immersive VR display fills a limited area of a user's field-of-view.

Immersive VR

Immersive VR, which uses either a head-mounted-display or a projection-based system, completely fills the user's field-of-view.

Using physical objects to create a virtual model (Ichida, Itoh, & Kitamur, 2004). As a user adds a physical 'ActiveCube' to the construction, the equivalent virtual model is automatically updated.

The 'Bubble Cosmos' – 'Emerging Technology' at SIGGRAPH'06. The paths of the smoke-filled bubbles are tracked, and an image is projected into them as they rise.

See-through AR: the butterfly is computer-generated, and everything else is real (Fischer, Bartz & Straßer, 2006; Kölsch, Bane, Höllerer, & Turk, 2006).

Semi-immersive VR using the Barco Baron workbench (Drettakis, Roussou, Tsingos, Reche & Gallo, 2004).

Projection-based immersive VR. The users are fully immersed in the 'CAVE' (FakeSpace, 2006; Cruz-Neira, Sandin & DeFanti, 1993).

Key Advantages of XR

- Immersive
- Engaging
- Risk Free Experience
- Low Cost
- Enhanced Interactivity
- Entertaining

Opportunities in the Field

Industry

- Entertainment
- Training
- Customer Support
- Manufacturing

Research

- Advancing the field of XR
- Psychological Research
- Driving Artificial Intelligence

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Project Demonstrations

Implemented as part of research projects at DRDO and IIT Roorkee

VR Cognitive Test Battery

Developed By – VIPS Students

Multi Tasking Drone Simulator

Developed By – Mumbai University Students

Driving Simulator for Workload Estimation

Real Time Cognitive State Monitoring

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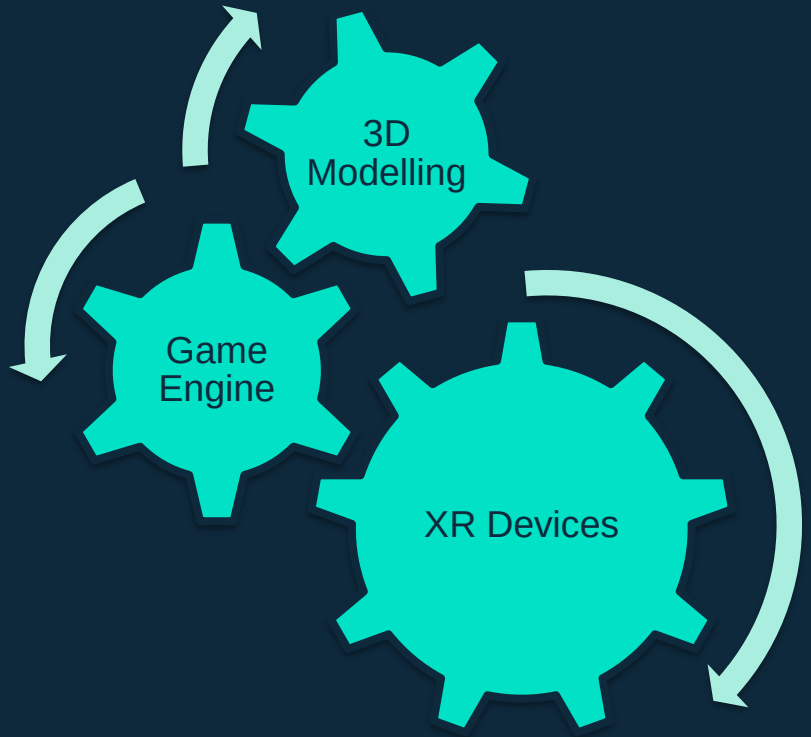
Development Tools and Technology

Base of all XR Development

Key Components



3D Modelling Tools

- Modelling
- Texturing
- Rigging
- Animation

Game Engines

- Physics
- Scripting
- User Interaction
- Gameplay

Devices

Virtual Reality

Augmented Reality

Thanks!

Any questions?

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