

**Overview: Technology  
Roadmap of the Future  
Trend of Metaverse  
based on IoT,  
Blockchain, AI  
Technique, and Medical  
Domain Metaverse  
Activity**

**Seminar of Technology and Arts**

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指導老師：許素朱

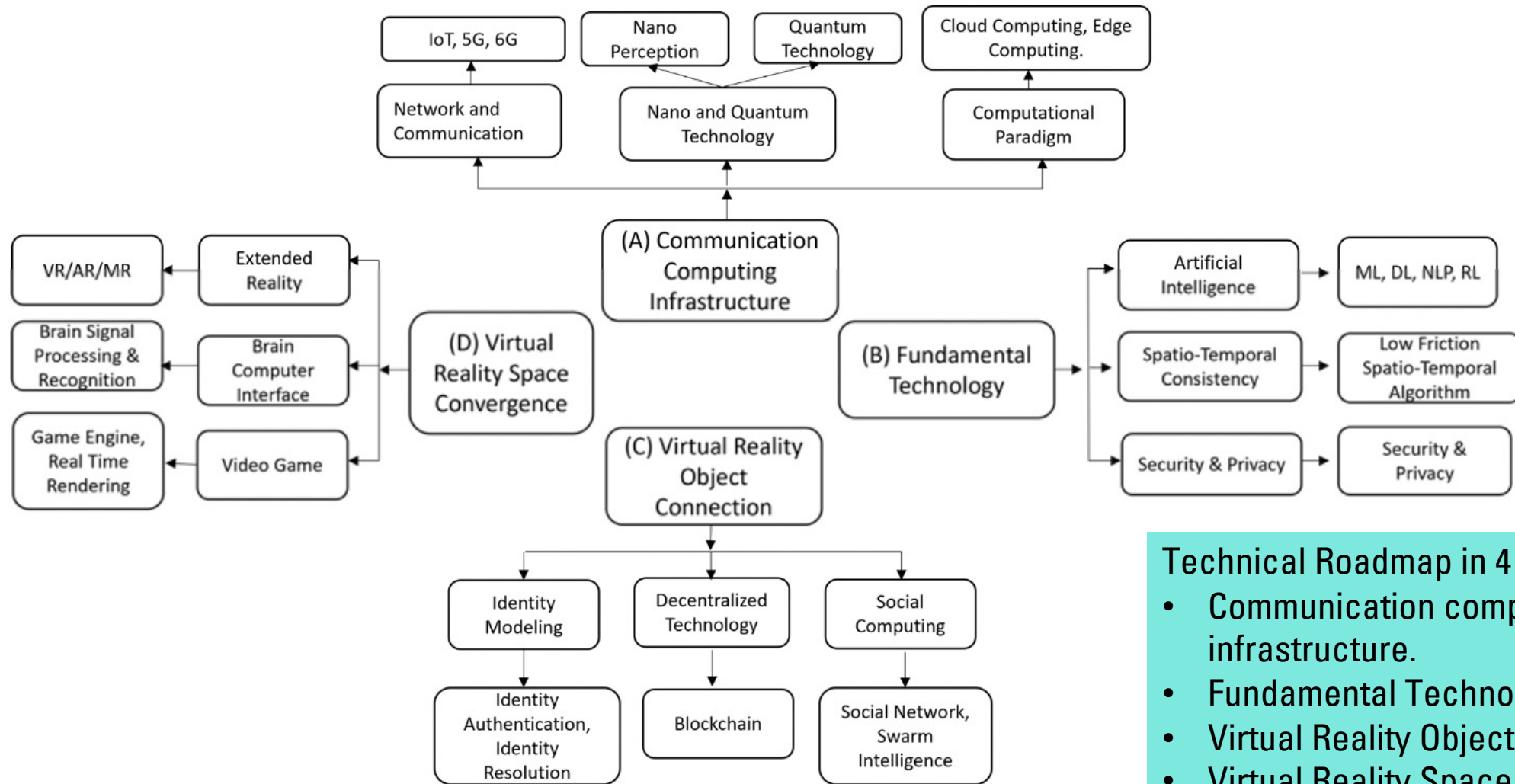
# Authors and Keywords

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- Keywords: **Metaverse, IoT, Blockchain, Artificial Intelligence, Healthcare**

# introduction

- The Metaverse is a virtual shared space that everyone can access. It's a catch-all term that refers to the entire digital and virtual world.
- Metaverse's core branches are Healthcare, Entertainment, Military, Real estate, Manufacturing, and Education. Within a metaverse, each user has their perspective on the virtual world, with the underlying environment presenting a consistent state to all users.
- Metaverse Virtual Reality (VR) and Augmented Reality (AR) are invading healthcare, medicine, and innovative technologies based on AR and VR are emerging to improve medical education and training as well as processes and procedures.

# METAVVERSE TECHNIQUES



**Figure 1.** A complete Technological Roadmap of Metaverse

Technical Roadmap in 4 groups.

- Communication computing infrastructure.
- Fundamental Technology
- Virtual Reality Object Connection
- Virtual Reality Space and Convergence

# Communication Computing Infrastructure

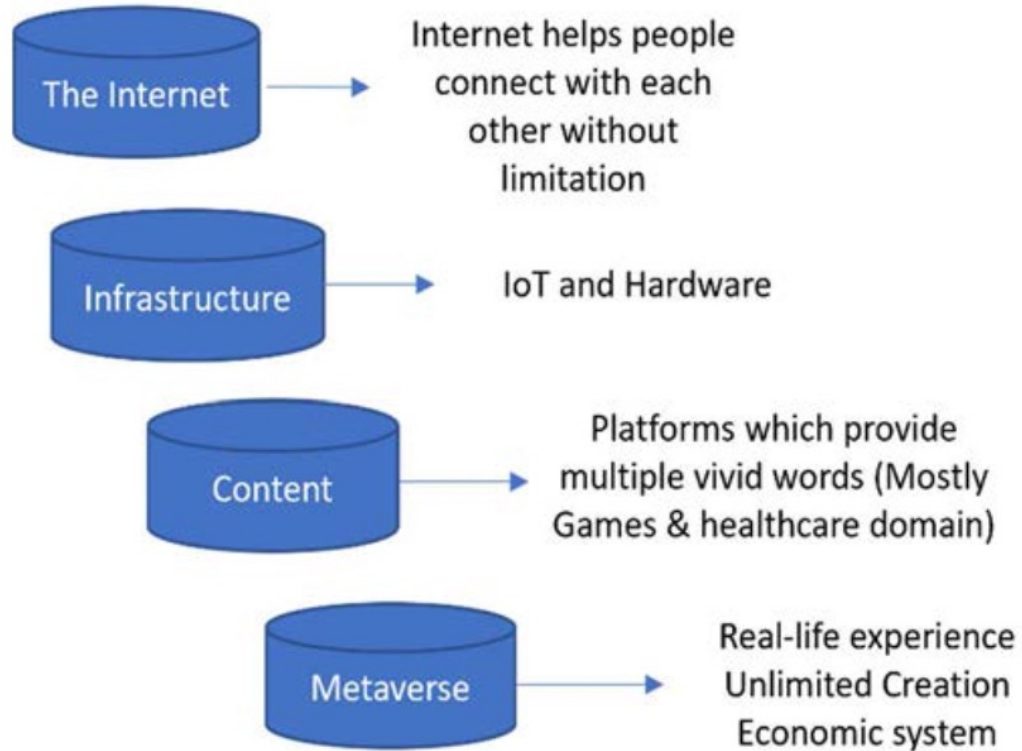


Figure 2. IoT and Internet for Metaverse

- The manufacturing field has been evolving rapidly with the help of IoT Technology and metaverse core-stream also working as an IoT device.
- **Internet:** Follow 5G and 6G technical roadmap
- **Infrastructure:** Medicine, healthcare, games, and applications that help users immerse themselves in one or more different worlds

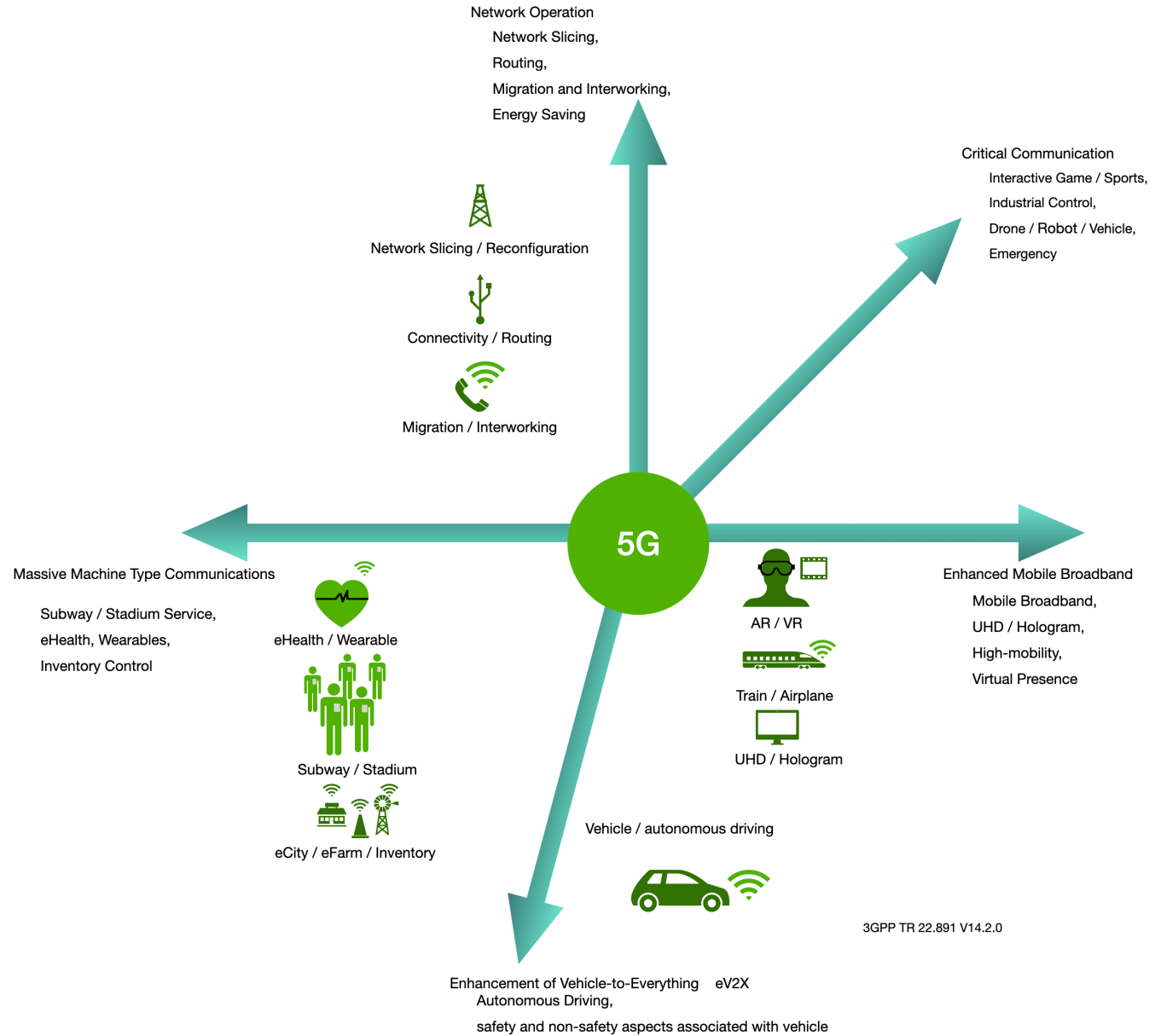


Figure 3. Edge Computing in the Metaverse

# 3GPP with 5G

3GPP defined the 5G applications and some related dependencies.

These directions of the application slices provide the industry with more strategic forward markets.

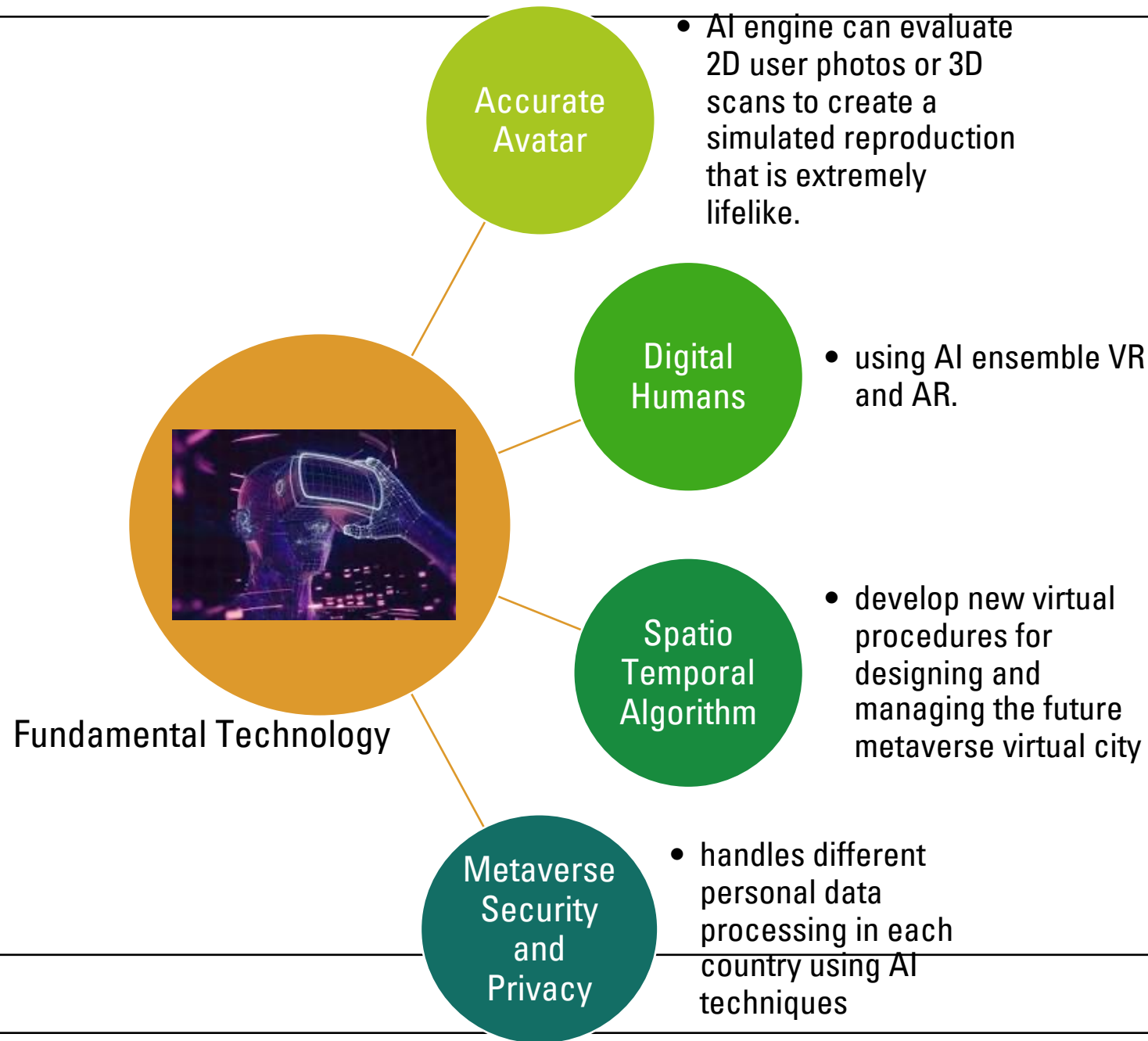


# Fundamental Technology

- “The metaverse is defined as a virtual space where users can interact with 3D digital objects and 3D virtual avatars of each other in a complex manner that mimics the real world”

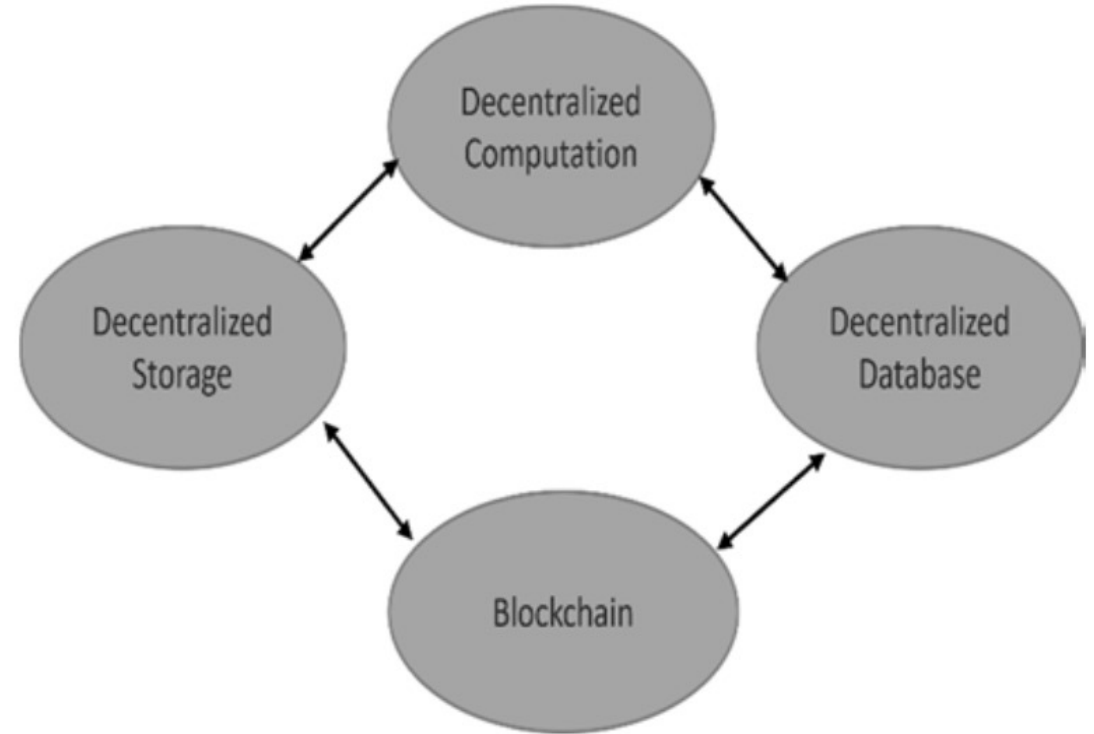
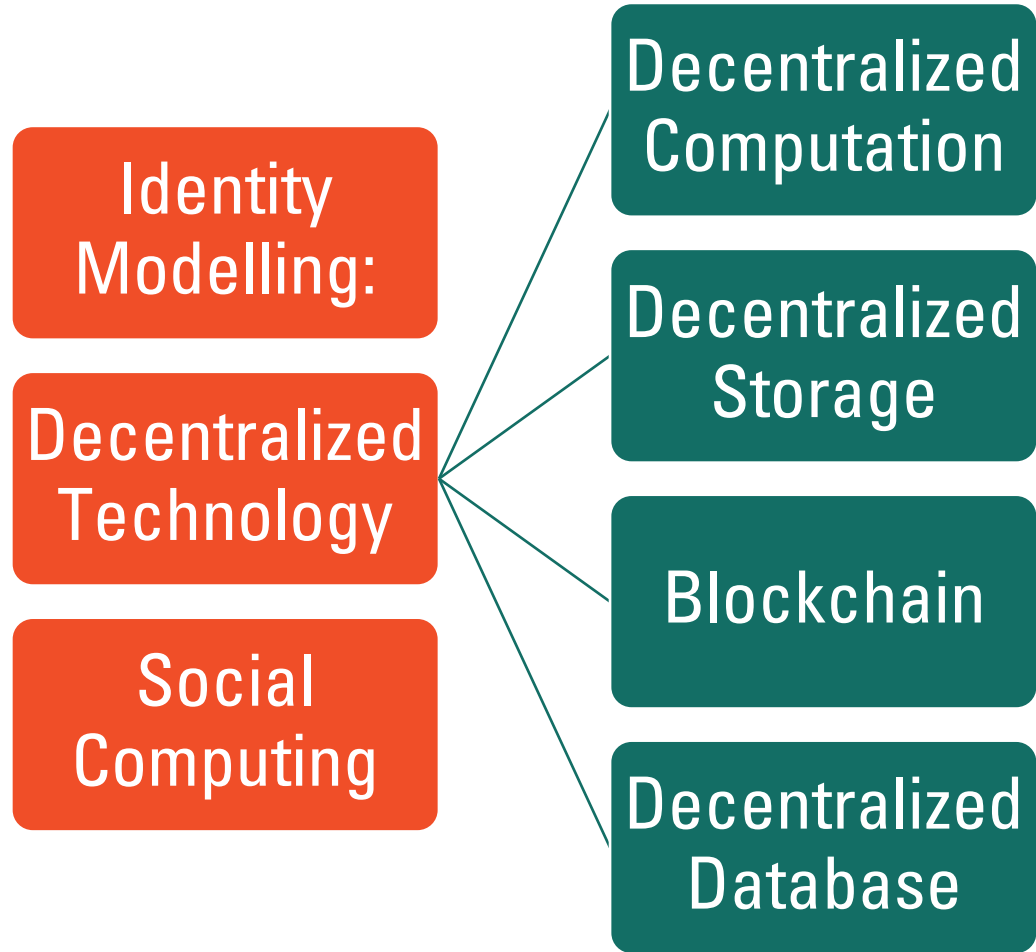


**Figure 4.** Five Artificial Intelligence use cases in the Metaverse



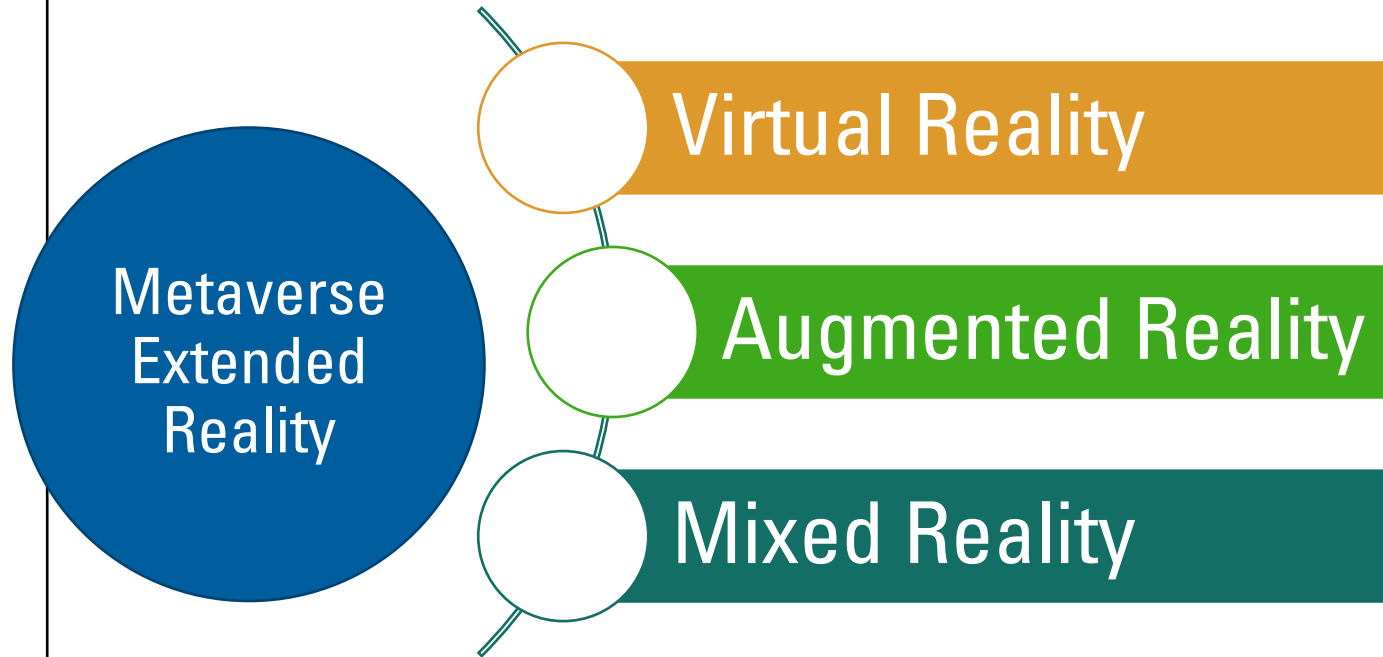


# Virtual Reality Object Connection

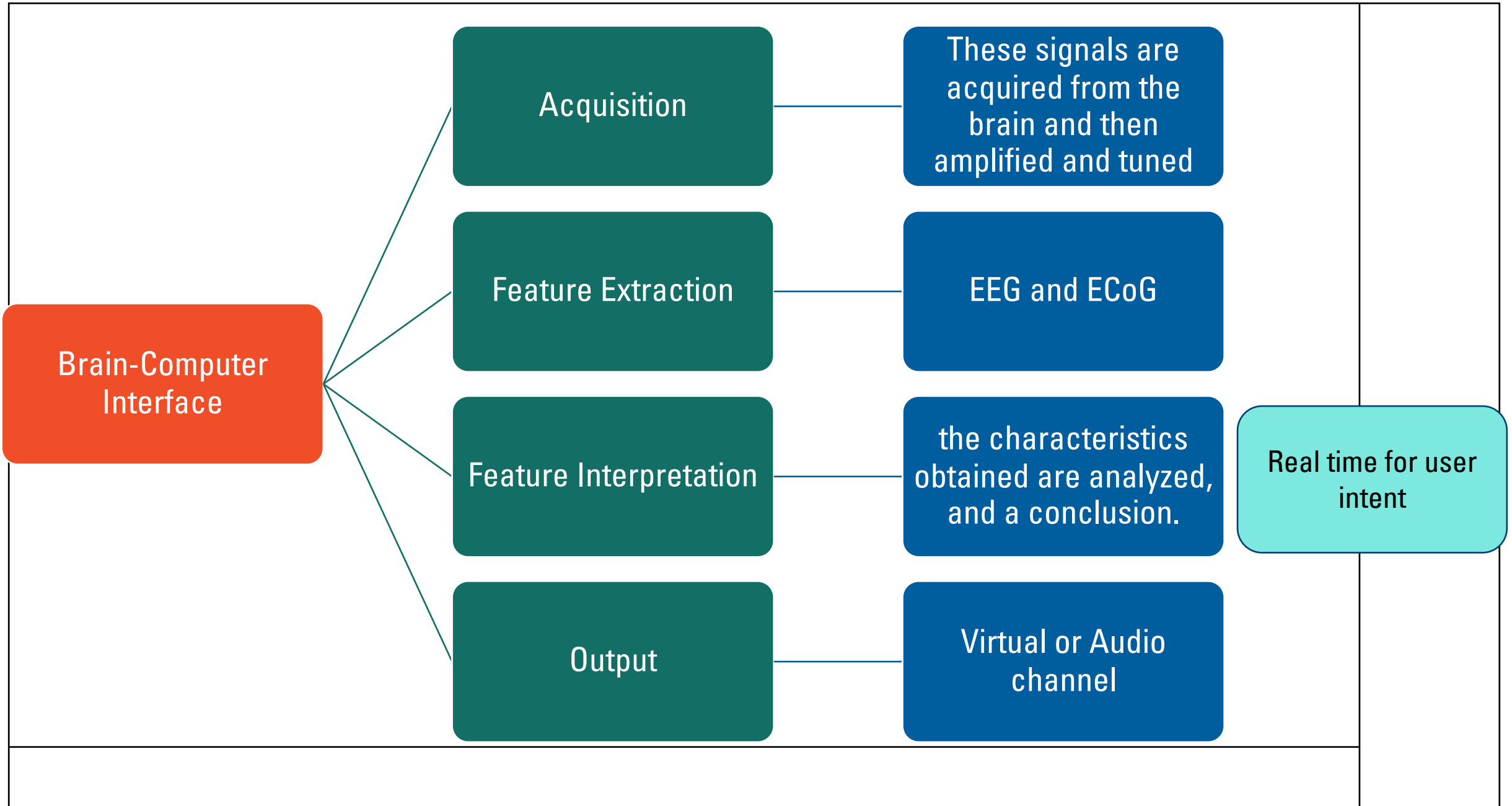


**Figure 5.** Metaverse decentralized technology

# Virtual Reality Space Convergence



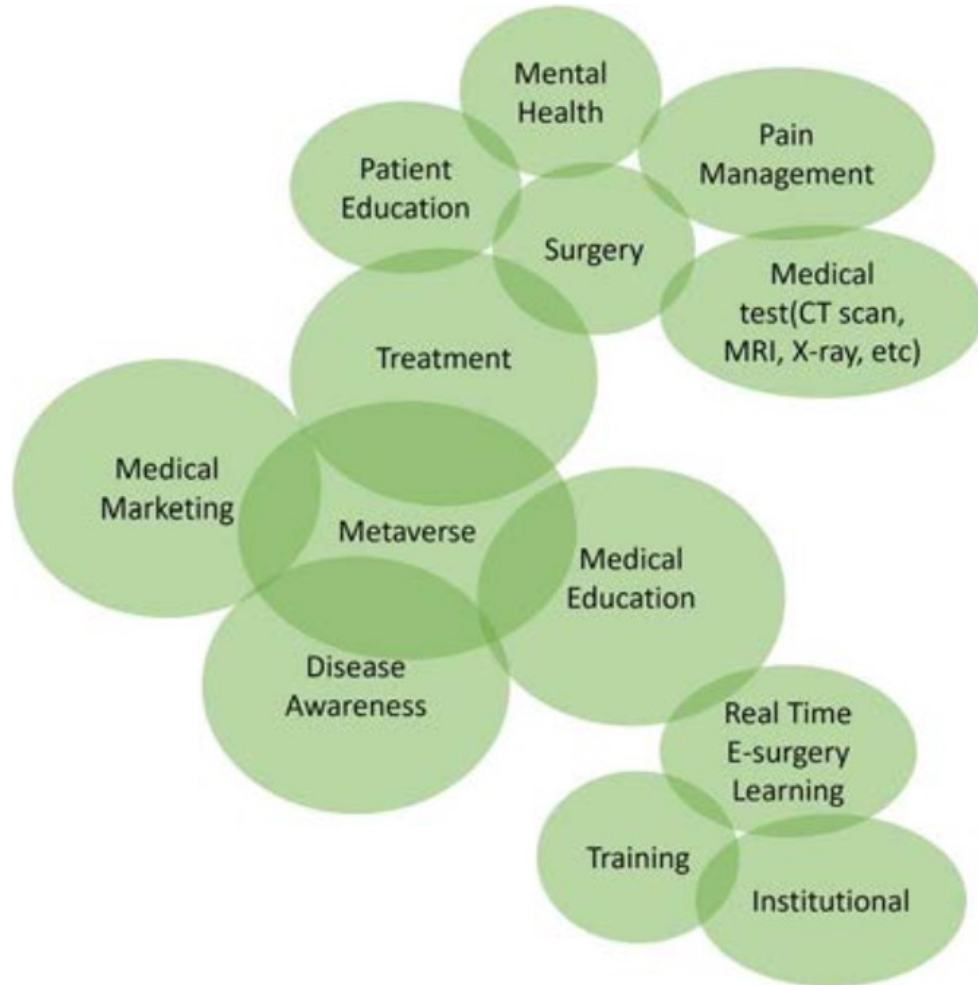
- Computer generate virtual environment.
- recognize real-world surfaces and objects using technologies such as object recognition, plane detection, facial recognition, and movement tracking, etc.
- hybrid of augmented reality and virtual reality. Also known as Hybrid Reality



## Real-Time Rendering

- “Real-time rendering is a field of computer graphics focused on analyzing and producing images in real-time. Metaverse video game platform using the real-time rendering for metaverse avatar”

# METAVVERSE IN MEDICAL DOMAIN



AR headsets are utilized to see vital real-time patient data such as heart rate, body temperature, blood pressure, and breathing rate, in addition to pre-operative images from CT, MRI, and 3D scans

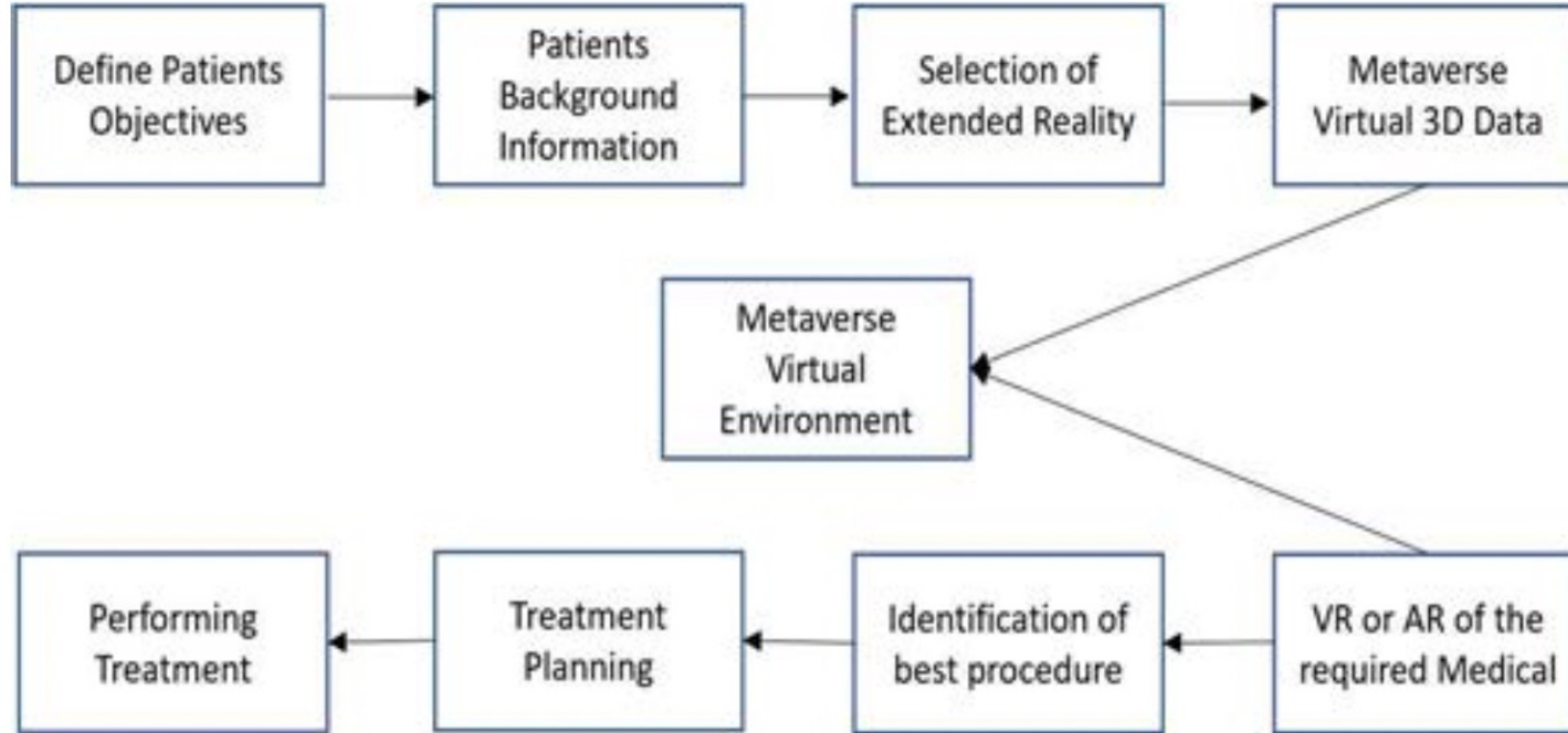
<https://www.microsoft.com/zh-tw/hololens>

**Figure 7.** Metaverse in Medical Domain

## Metaverse Activities in Healthcare

- Remote surgery, telepresence, augmented reality surgery
- 3D human anatomy models for education, visualization diagnosis, and planning
- Architectural design for healthcare facilities
- Preventive medicine and patient education
- Haptic aided rehabilitation
- Visualization of massive medical databases
- Treatment planning
- Medical therapy
- Pain control
- Psychotherapy through Virtual Reality
- Virtual patients
- Surgery simulation

# Proposed Process of Patients' General Treatment using Metaverse Technology



**Figure 8.** Metaverse technology in the medical domain

## Conclusion

“Technology giants such as Facebook, Microsoft, Apple, Google, and many gaming companies have ambitious plans for materializing the metaverse.”