

CAICT 中国信通院

10 Observations on Global Metaverse Industry Development

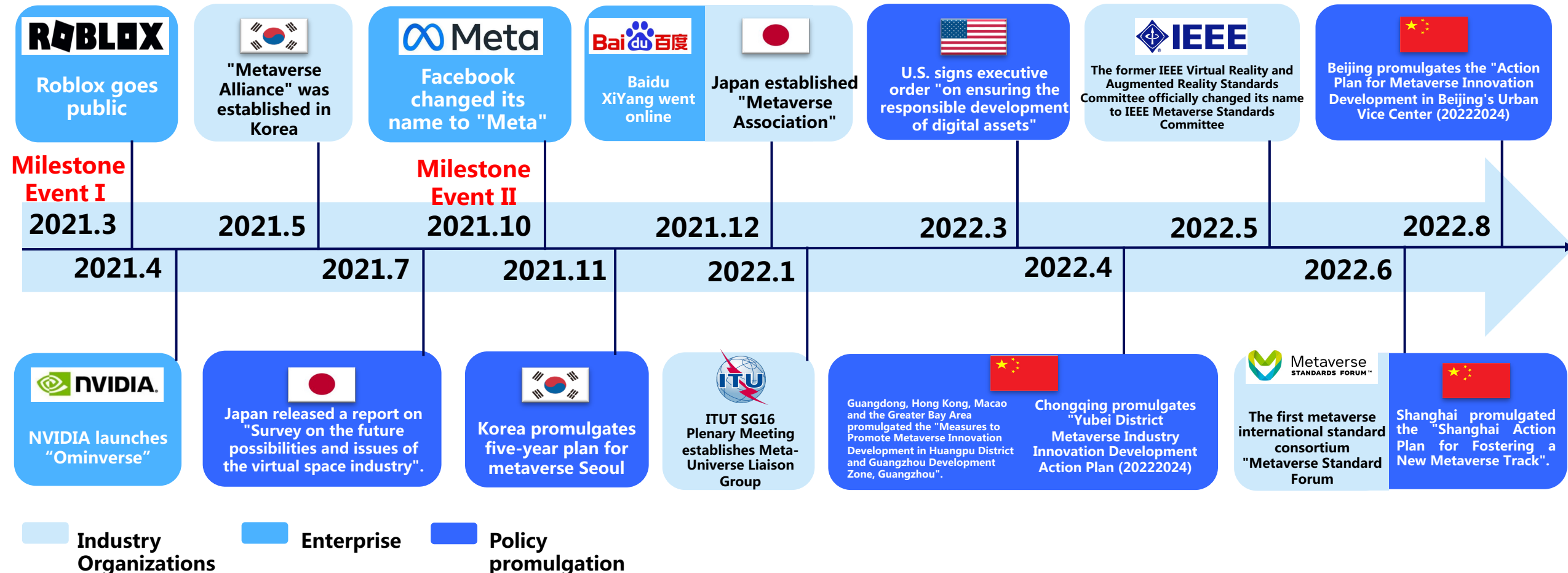


中国信息通信研究院
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Metaverse emerges with multiple parties promoting the explosion

Since the concept was introduced, the metaverse has continued to climb in popularity. The government, industry organizations and enterprises have entered the market, and the meta-universe has ushered in an explosion.



At present, the metaverse has problems such as unclear concept boundary, immature technology tools and the absence of phenomenal applications in the market, which require more research and exploration.

The concept boundary is still unclear



Meta

The metaverse is a new type of Internet application and social form that integrates reality and reality by integrating multiple new technologies.



Roblox

The metaverse is a persistent online world that provides participants with a wide range of experiences and avenues for self-expression.



Nvidia

The metaverse is several shared virtual 3D worlds with greater interactivity, sedation and collaboration.



School of Journalism and Communication, Peking University

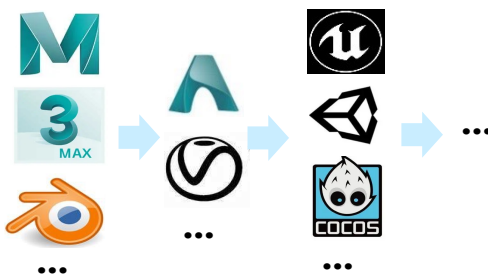
Meta-universe is a virtual world that is mapped and interacted with the real world by using technology to link and create a digital living space with a new social system.



School of Journalism, Tsinghua University

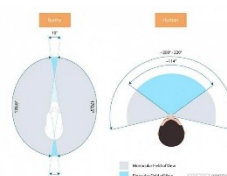
Meta-universe is a new type of Internet application and social form that integrates multiple new technologies.

Technical tools are not yet mature



Three-dimensional content production chain is fragmented

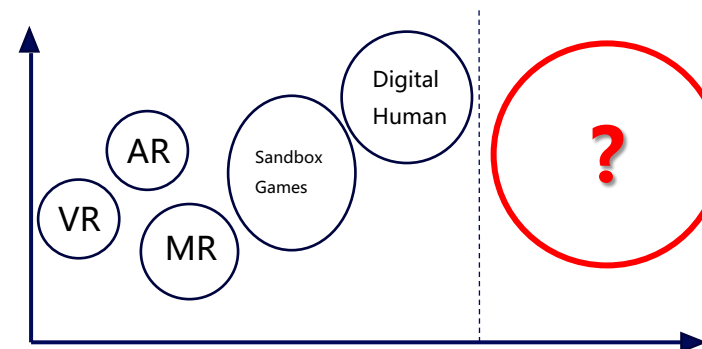
- Complicated operation process
- High learning cost



The interactive terminal has two major pain points: dizzy and bulky

- "Screen effect" and limited field of view
- Heavy equipment is not light

Phenomenal applications are absent from the market

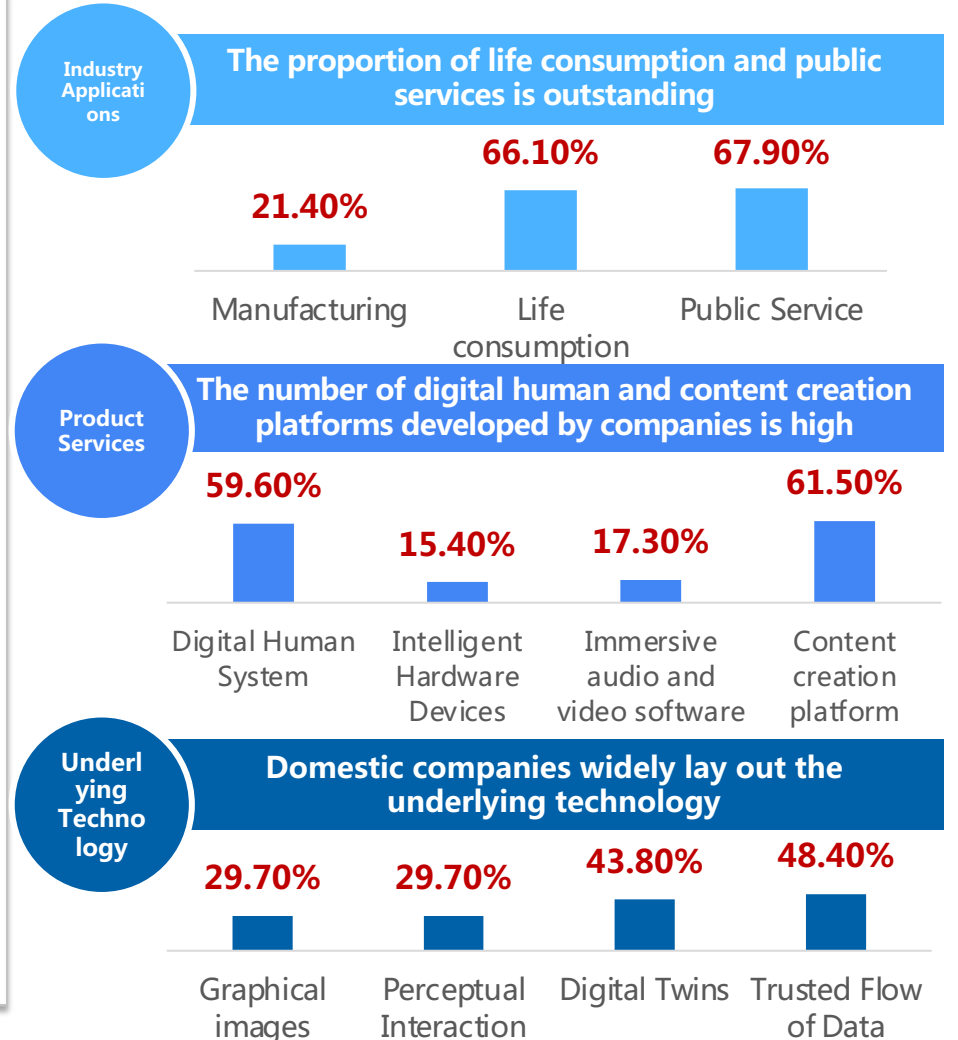


Although VR/AR terminals, digital people, sandbox games, etc. are developing well, these products all precede the emergence of the "meta-universe" concept. After the emergence of the meta-universe concept, there is no clear landing scene and substantial products.

Carry out metaverse industry mapping work to provide reference for industry to judge future trends

Based on the questionnaires issued by industry organizations such as "Meta-universe Innovation Exploration Front", "Content Technology Industry Promotion Front" and "Trusted Blockchain Promotion Plan", CICT has conducted a survey through The final "2022 Metaverse Industry Mapping" was drawn up by surveying more than 140 metaverse-related enterprises and 334 cases.

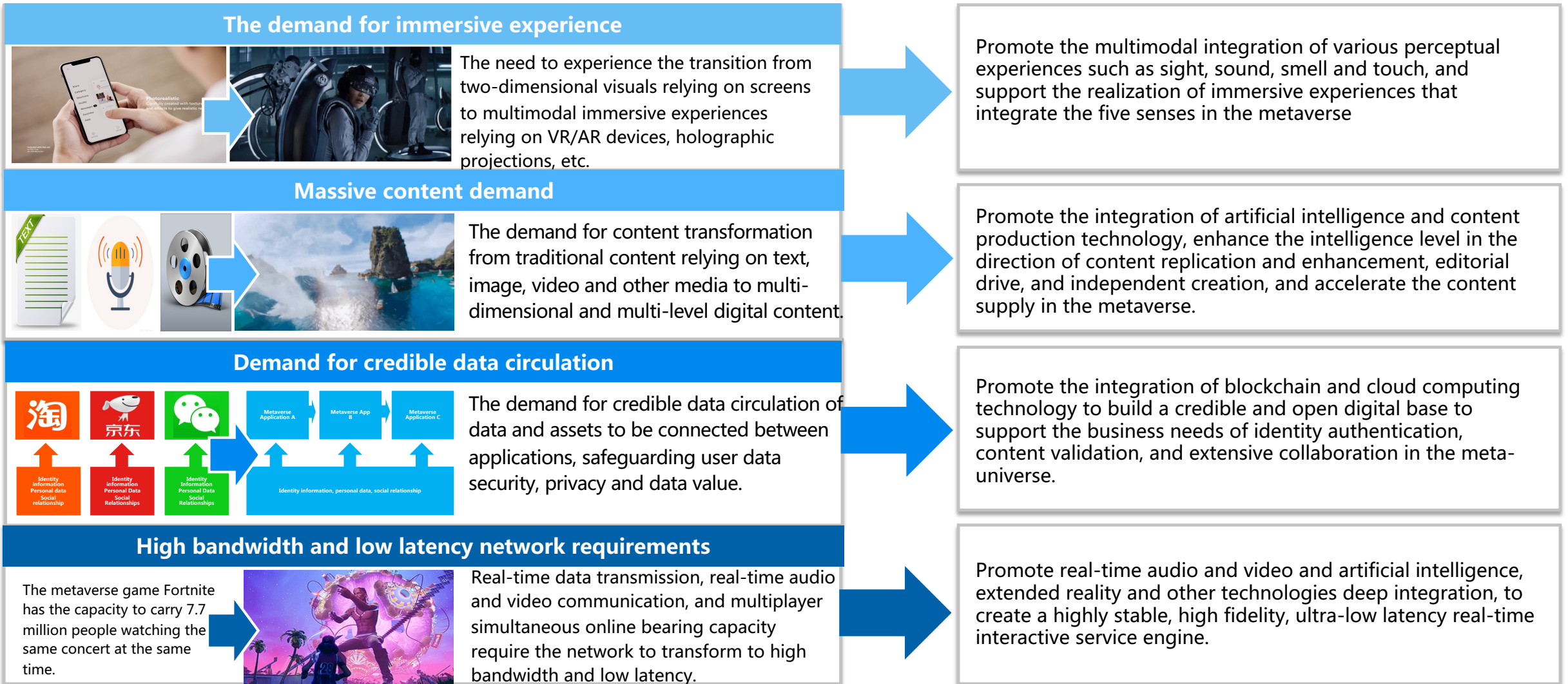
2022元宇宙产业图谱



Note: Mapping content will continue to be iterated subsequently

Observation 1: Four types of demands drive metaverse technology integration and innovation

The development of digital society has given rise to four new demands, and metaverse is an attempt to address these demands, which will drive the cross-border synergistic development of multi-domain technologies



Observation 2: B-side 3D engine is a new opportunity in the field of graphic image

The metaverse is expected to awaken the B-side application scenarios other than games and entertainment, and the B-side 3D engine is a new opportunity in the field of graphics and images.

Computer & mainframe era



In 2002, WindowsXP opened the computer era
Computer: Windows, Mac...

Smartphone era



2008, Iphone3 opened the smartphone era
Smartphone: IOS, Android...

Metaverse terminal era



In 2021, Meta opened the meta-universe meta-year
Meta-universe terminals: AR, VR, brain-computer interface...

Leading companies have built the core technology and core patent wall of game engines



UNREAL ENGINE

- Deeply cultivate computer terminals, poor **compatibility with Android and other mobile terminals**
- Relying on strong arithmetic power to achieve the highest standard of graphics rendering
- C++ needs to be compiled, high development difficulty
- Difficult to get started, high C++ logic requirements

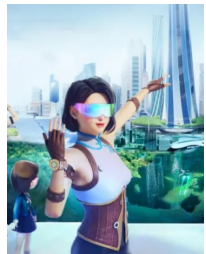
- For smart mobile terminals, it has strong cross-platform adaptability
- Weak graphics rendering capability, but strong compatibility with low-end devices
- Use C# language, high development efficiency
- Perfect information and low learning cost



ToB 3D engines become new opportunities for graphic images

The arrival of the meta-universe era and new terminals provides a brand new track outside of games and entertainment, and application scenarios such as smart parks, smart cities, and smart industries emerge.

Unity and UE engine technology can not meet the needs of the scene, making the B-end-oriented 3D engine a brand-new opportunity in the field of graphics and images.



Observation 3: Audiovisual interaction is still the main hot spot in the industry, haptics and brain machine are still in the scientific research incubation stage

At present, visual interaction is the most mature technology industrialization on behalf of extended reality (XR) globally, while haptic interaction and brain-computer interface are still in the scientific research incubation stage.

XR, with its three-dimensional, natural interaction, spatial computing and other characteristics completely different from the mobile Internet, is considered to be the key connecting device and the core grip to reach users in the metaverse ecology, and has become the main direction of audiovisual interaction in the industry.

Audio-visual interaction



Tracking and positioning



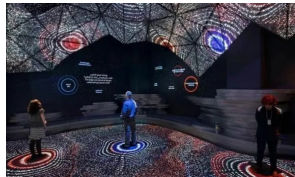
Immersive sound field



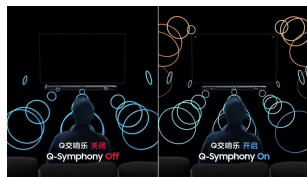
Gesture Tracking



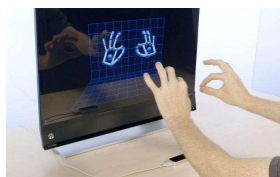
Eye Tracking



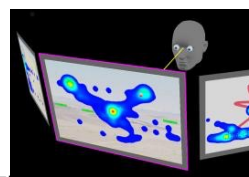
capabilities of perceptual interaction are actively invested by various manufacturers and **are becoming increasingly mature.**



discrimination, spatial reverberation, and flux sensory shifting have become the focus of development, and manufacturers such as Facebook, Microsoft, Nvidia, Dolby, Google, and Qualcomm are actively investing in them.



Initially mature, it will become a new mode of AR/VR input interaction.



The new standard for AR/VR terminals, the technology combination of eye tracking + multi-focus display + gaze point rendering is expected **to become the key technology combination to enhance virtual reality immersion.**

In the future, the metaverse will break through the stage of "visual + auditory" dual-sensory interaction and enter the era of multi-sensory fusion interaction, in which visual, tactile, olfactory, gustatory and brain-computer interaction can be carried out simultaneously, and new interaction technologies will emerge in large numbers.

Haptic interaction



Sensor Interaction



Digital Textiles



ActiTouch attaches capacitors to the user's forearm, **PocketThumb** and **ARCord**, among others, convert clothing and MR digital entities into user interfaces, and **Google** launches the **Jacquard Project**...

Brain-computer interface



Invasive



Non-intrusive



Currently, **Meta**, **Valve**, **Neuralink**, **BrainCo**. However, the implementation of brain-computer interface technology and application scenarios are more difficult to implement, and the maturity cycle is expected to be more than 10 years.

The emergence of multiform somatosensory fusion interaction methods will bring more possibilities for metaverse interaction.

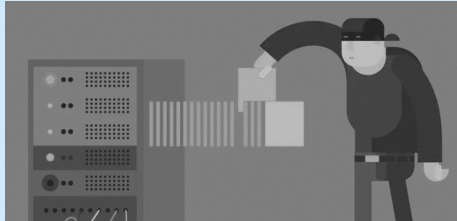


Observation 4: Blockchain and privacy computing are the key technologies to achieve credible data circulation

Blockchain and privacy computing, with their security, reliability, and tamper-proof features, are key technologies to realize the credible flow of data in the metaverse.



Data Security Challenges



Due to the characteristics of data such as easy to tamper, easy to leak, easy to circulate and high value, the corresponding security control measures are weak in data hosting, processing, circulation and application.



Challenges of Data Authentication



As the various kinds of confirmed rights of data transactions are not yet clear, there is no way for the transaction parties to establish a good mutual trust relationship in the transaction, which also makes it impossible to talk about the transaction.



Blockchain and privacy computing will realize data flow and governance



Blockchain and privacy computing provide the key technical solutions to achieve data flow and governance. The quality of data **is improved through a secure, reliable, and tamper-proof technology system, the rights of data are guaranteed through deposition and property rights traceability, and data sharing is guaranteed through** privacy computing.



Blockchain and privacy computing will effectively clarify and confirm rights



Blockchain technology can build a unique identity on the chain through digital signature and timestamp, and classify and grade data through privacy computing technology, so as to effectively clarify data rights, improve data quality, effectively measure data value, and enhance data security and privacy.

Observation 5: The size of the digital human market is expected to see explosive growth in China

With the increasing maturity of digital human theory and technology and the expanding scope of applications, the size of China's digital human market is expected to see explosive growth in recent years

Multiple breakthroughs to achieve technology availability

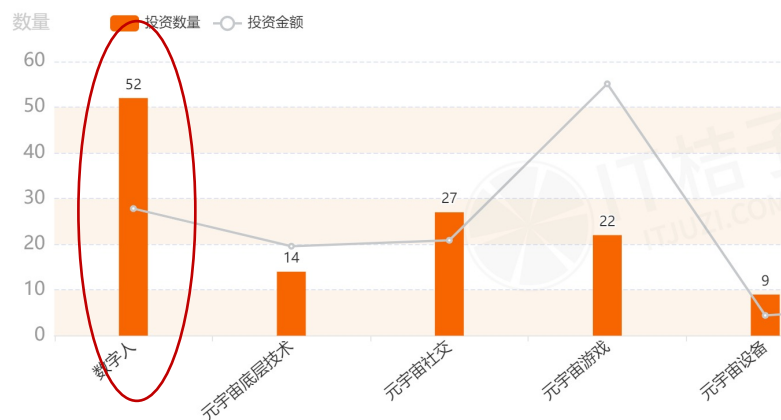
History of Digital Man



Image source: China Academy of Information and Communications Technology

Metaverse stimulates industrial applications

Total number and amount of financing for each sub-sector in China's meta-universe



Data source: IT Orange

Stimulated by the concept of meta-universe, digital people are accelerating from technological innovation to industrial application. According to IT Orange statistics, as of October 27, the number of people investment in China's digital field in 2022 was 52, which is the sub-sector with the largest number of investment and financing in the meta-universe field.

Industry actively laying out digital people

- 行业企业**: 中国移动, 中国电信, 中国联通, ICBC, 中国工商银行, 中国银行, 中国建设银行, 浦发银行, 平安科技, CCTV.com, 人民网, 新华社
- 互联网企业**: 阿里巴巴, 百度, Tencent, 腾讯, 京东, 字节跳动, 快手, 网易, NetEase
- 终端企业**: HUAWEI, oppo vivo, TRANSSION
- AI企业**: 科大讯飞, 商汤, 微软小冰
- 初创企业**: 硅基智能, 蔚领时代, XMOV

Domestic Internet head enterprises, terminal enterprises, key industry enterprises, AI enterprises, startups and other enterprises have laid out the digital person field, and have launched a series of products, including virtual anchor, virtual services, virtual idols and other typical applications.

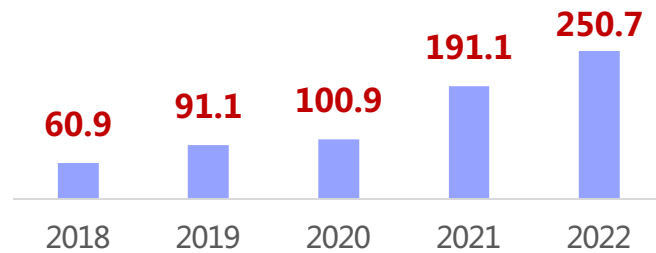
In recent years, driven by the wave of new technologies such as artificial intelligence and virtual reality, the production process of digital people has been effectively simplified, allowing for intelligent driving of text, voice and video, and a significant increase in technical usability.

Observation 6: XR terminal is a common layout hotspot at home and abroad

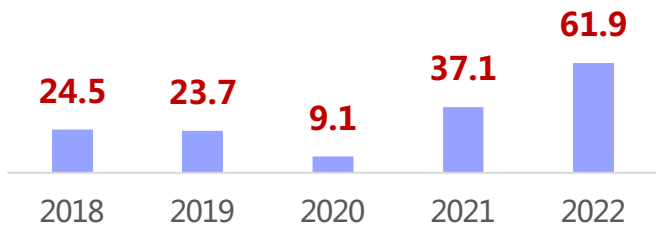
VR/AR and other meta-universe terminal entrance has become a common hot spot for domestic and foreign layout, and there is still more room for improvement compared with the global leading level in China

Domestic and foreign common hotspot: AR/VR and other metaverse terminal entrance

VR/AR investment in overseas markets in the first half of 2022



VR/AR investment in China in the first half of 2022



In the first half of 2022, the amount of overseas financing and M&A vocalization was 25.07 billion yuan, and the number of occurrences was 104, while the amount of domestic financing and M&A vocalization was 6.19 billion yuan, and the number of occurrences was 68. Overall, VR/AR and other meta-universe terminal entrances have become a common hot spot for domestic and foreign capital concerns.

Data source: Gyro Research Institute 2022 H1 VR/AR Industry Development Report

Domestic: Gaps exist, accelerating to catch up

Terminal	Near-eye display	Jingdong and other domestic manufacturers have laid out
	Perceptual interaction	Lack of technology leaders, insufficient R&D investment and sensitivity of enterprises, immature development
5G	Network Transmission	5G construction is at a global leading level, providing a good network transmission foundation
Content Application	Rendering Computing	In artificial intelligence and main viewpoint technology to follow mainly, mostly using external overall solutions
	Cloud content production and distribution	Rising international influence in the field of three degrees of freedom, but insufficient technical reserves in the field of six degrees of freedom

Overseas: first layout, leading the world

Existing gap	Apple, Sony and other industry leaders still have advantages
Gaps	Active start-ups, intensive investment and M&A activities of giant companies, early patent layout
Technology is	Overall 5G is in a catch-up situation, while head companies such as Qualcomm and Facebook have certain advantages in projection coding and other technologies
Significant gaps	Facebook, Nvidia and other companies already have relatively mature solutions
Gaps exist	U.S. companies lead industry standard specification and provide development tools and technical solutions

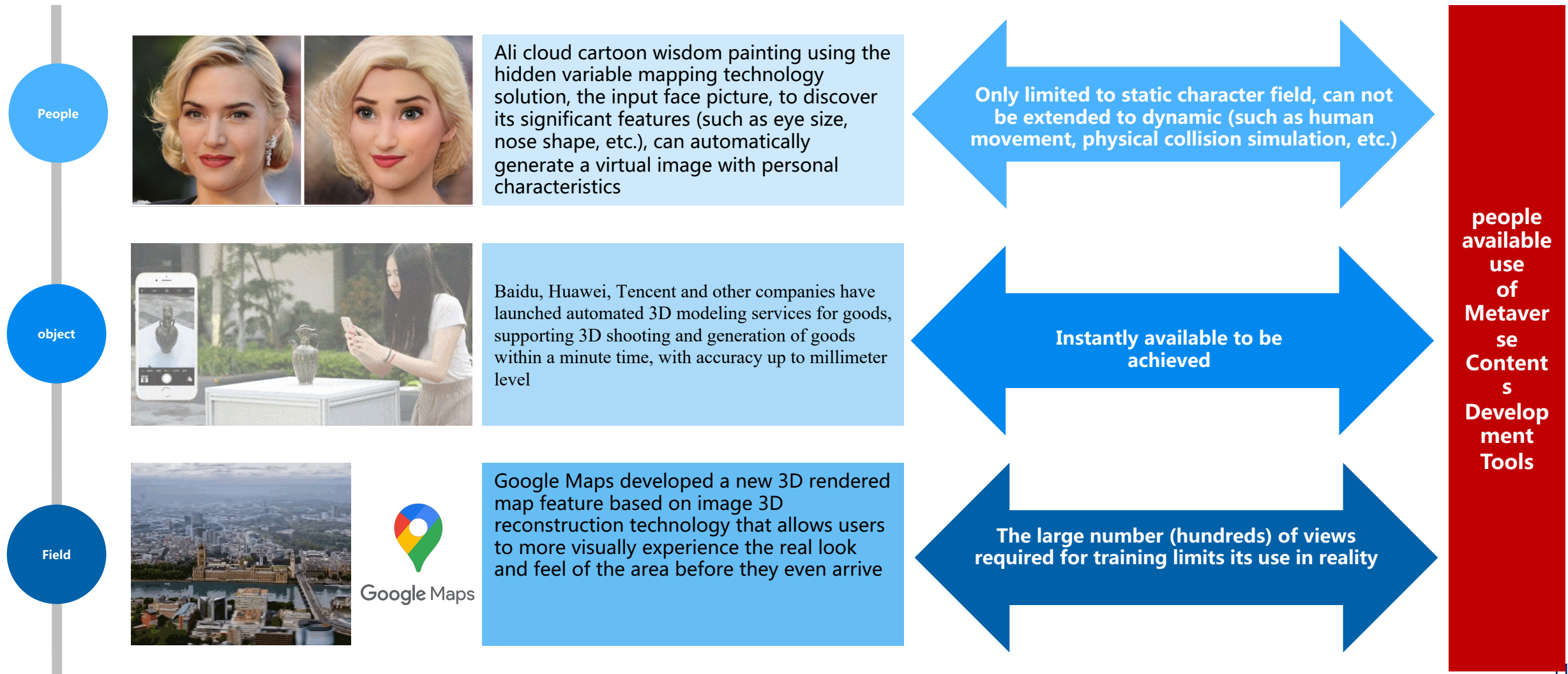
Data source: Deloitte

There is still a gap between China and the global leading level in forward-looking research, especially in key technology areas such as perceptual interaction, rendering calculation, content production and distribution.

Overseas XR industry started early, with higher development stage and scale, and industry and capital have more in-depth research and understanding of the industry.

Observation 7: The metaverse content development tool available to everyone is a long way off

AI is gradually reducing the threshold and cost of 3D modeling, and more consumer-grade tools are expected to emerge, but there are still three major bottlenecks that need to be broken



Observation 8: Manufacturing Metaverse focuses on innovation for full process optimization of industrial products

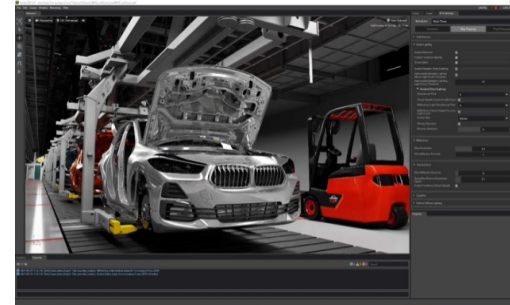
The manufacturing meta-universe is oriented to key areas such as automotive, steel, high-end equipment manufacturing, covering the whole process of **technology development, production operation and maintenance, and supply chain management**, promoting the optimization and innovation of key links, and accelerating the **digitalization, networking and intelligent upgrade** of manufacturing industry

Technology R&D



Volvo uses Omniverse for vehicle design, realizing simulation in various scenarios, effectively reducing R&D and training costs, and improving testing and verification efficiency.

Production operation and maintenance



BMW uses Omniverse to improve its production system, realizing real-time interaction between people and fields, accelerating the digital upgrade of parts diagnosis and system maintenance, and improving the efficiency and capacity of equipment operation and maintenance

A virtual factory management platform for an automotive global brand A



Image source: Deloitte

Supply Chain Management

The value that the Industrial Omniverse platform brings to Global Automotive Brand A Group includes

- ◆ Real-time integration and compatibility capabilities for the vast and intricate data of a global automotive brand A plant, covering all elements of the entire plant model
- ◆ Reducing production planning time, increasing flexibility and accuracy, and promising to help Brand A be able to customize new vehicles more accurately and efficiently than ever before.
- ◆ Coordinate global production system arrangements, including materials, parts, and complete vehicles

Observation 9: Life consumption meta-universe focuses on immersive experience upgrade

The meta-universe of life consumption focuses on social, gaming, office, and living areas, with the help of real-time audio and video, extended reality and other key technologies, focusing on enhancing multi-sensory immersive experiences in multiple scenes

Social and leisure



Open Gaming



Meeting and office



Holographic life assistant



Products

In 2021, Meta officially opened Horizon Worlds, a metaverse social platform.

EPIC Fortnite in-game virtual concert held, 12.3 million players experienced online.

Microsoft launched the enterprise office AD universe platform Mesh.

Huawei launched AR platform River Map, Dunhuang **3D heritage restoration tour assistant** and other applications.

Observation 10: Public service meta-universe focuses on the improvement of service effectiveness

Meta-universe public services focus on government, education, healthcare, finance and other fields, and have initially emerged new forms of public services combining XR devices, digital human customer service, virtual business halls and other new products, which have significantly improved the interaction experience and service efficiency



Metaverse + government

chinanews.com

The metaverse government affairs hall that combines **digital human customer service, virtual business hall, and real-world navigation** is built so that citizens can create **virtual avatars, enter 3D virtual city hall and mayor's office through** cell phone app, and make suggestions to the city government using the citizens' opinion collection platform.



Metaverse + Education

Build virtual classrooms, virtual **laboratories and other educational teaching environments, so that students can observe 3D models at any time through devices** such as VR headsets and learn knowledge more vividly and efficiently.



Metaverse + Medical

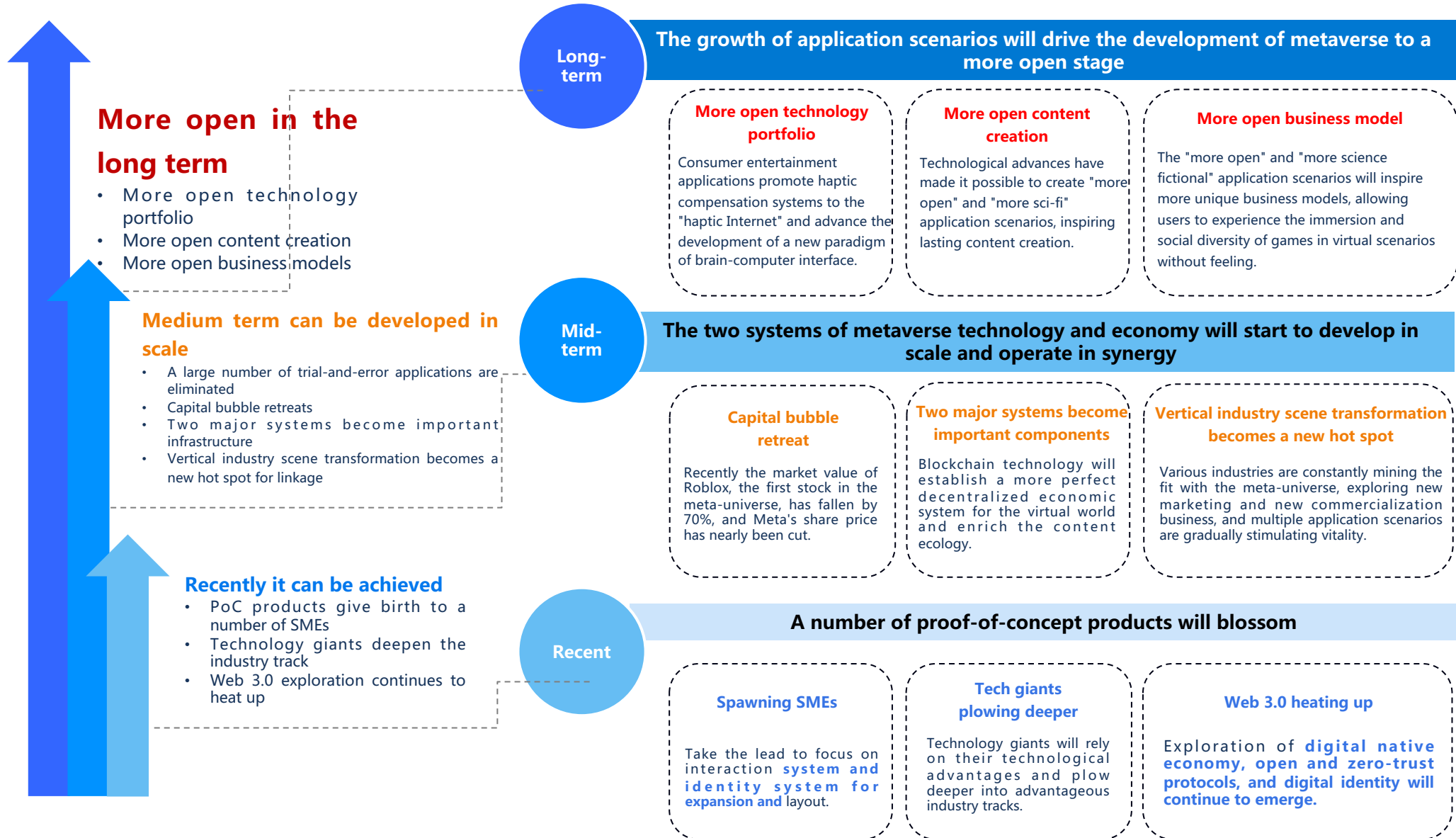
Equipped with gesture recognition, **voice control, positioning tracking and other functions** through VR headsets and other devices to assist **doctors in viewing 3D body images of patients and other information during surgery, and applied to clinical consultation, rehabilitation care, telemedicine and other scenarios.**



Meta-universe + Finance

It allows users to walk freely in the virtual **business hall, replacing traditional physical interactions such as touch** screen with handles or body movements, and providing panoramic full-time, efficient and convenient metaverse financial services with wide coverage.

The development of metaverse will go from "achievable" to "scalable" to "more open".



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Thanks



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