

# Comparative Analysis of the Application of Metaverse Technology in Enterprises

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**Abstract.** Since the appearance of AR and VR, the model of the metaverse technology has emerged. Until now, metaverse technology has developed rapidly. There is still no definite answer to the question that how metaverse technology can achieve the symbiosis of virtuality and reality, reduce costs and increase efficiency[1]. However, all countries in the world have shown a positive and friendly attitude towards the metaverse policy. Now the world's major enterprises are competing to implement the strategic layout of the meta-universe, striving to be the leader of the development of meta-universe technology, The answer would be provided in the near future [2]. All countries in the world have shown a positive and friendly attitude towards the metaverse policy.

**Keywords:** Metaverse Technology; Application.

## 1. Introduction

### 1.1 Background

By comparing the different degrees of the application of enterprises to the meta-universe technology, we can know the development process of the current meta-universe technology and the application of enterprises to the meta-universe technology [3]. Through the specific analysis of the enterprise application of the meta-universe technology, we can clearly see the results of the combination of virtuality and reality of the enterprise's meta-universe technology. It can also effectively see which way is effective and worthy to learn, which way needs to be improved [4].

### 1.2 Related Research

With the continuous development of the Internet, we are now in an era of digital transformation from all aspects of material life. With the continuous development of science and technology, the Internet gradually moves from the computer to the reality [5]. In recent years, virtual worlds, such as VR and AR, have gradually emerged. Virtual worlds, such as newly born babies, begin to grow and develop rapidly [6]. With the development of virtual worlds, metaverse technology comes into being. Our cyberspace is increasingly digitized and artificial intelligence is becoming more sophisticated, catalyzed by numerous emerging technologies, resulting in a state-of-the-art technology and framework, the metaverse [4]. All countries attach great importance to the emergence of the metaverse. After Facebook changed its name, many countries rushed to publish relevant policies and regulations of the metaverse technology, and leading enterprises from all countries want to participate in it and become the leading enterprises of the metaverse technology [2].

Since announcing the name change in October 2021, Facebook has overhauled its business model and strategy. It will take time and data to determine whether Facebook can return to its former peak or even surpass it. We can't say for sure what the metaverse will be like in the future [7]. However, after Facebook, many enterprises have started to layout the metaverse strategy, such as China's Tencent, NetEase and the recent rookie in the game industry Miha You have entered the metaverse and applied it. In the immature exploration stage of metaverse technology, each company uses metaverse technology in different ways and directions. Through comparison, we can know how each enterprise combines with itself to operate metaverse technology [8].

### 1.3 Objective

By comparing the enterprises' application of metaverse technology, the status of their application can be accessed to respectively. The different approaches for the application would also be clear through the comparative analysis.

## 2. Present Status Description

### 2.1 Countries' Views on Metaverse Technology

In March 2021, Roblox, called the "first stock in the Metaverse," was officially showed to the public; In October Mark Zuckerberg renamed Facebook as "Meta" and plans to turn it into a metaverse technology company within five to 10 years. Since then, many business giants have said they want to join the research team of the metaverse technology. At the same time, Tencent, Byte Dance, Wanxing Technology, Zhongqingbao, NetEase and other domestic enterprises are also taking efforts to continue the commercial paces of the metaverse technology. At the same time, in 2021, a number of commercial banks and enterprises launched virtual staff, making a major breakthrough in the Yuan Universe. Starting from 2021, countries around the world will gradually carry out the meta-cosmic strategy. In December 2021, China's Central Commission for Discipline Inspection and State Supervision Commission released "How the Metaverse Technology will Rewrite Human Social Life". Rationally view the new round of technological revolution brought by the Metaverse Technology and its impact on society, do not underestimate the opportunity of 5 to 10 years in the future, and nor overestimate the evolution and change within the next 1 or 2 years. In October the same year the U.S. bipartisan senators asked the government to supervise the artificial intelligence data ownership and act which requires the federal system of artificial intelligence of monitor data in particular, face recognition, and asked the federal government to establish artificial intelligence working group, to ensure that government contractors to shoulder responsibility biometric data collected by the use of artificial intelligence technology [6]. Through legislation about the Artificial Intelligence Act, the Digital Services Act and the Digital Markets Act, the EU has adopted a conservative and strict step towards the Metaverse Technology, including increasing transparency, respecting users' choice, strictly protecting privacy and restricting some high-risk applications. In May 2021, the Ministry of Science, Technology, Information and Communication initiated the formation of the "Metaverse Technology Alliance", which included more than 200 local companies and institutions, including Hyundai and SK Group. In November, Seoul laid out a detailed five-year plan to turn itself into a city with metaverse technology applied. In July 2021, Japan released the "Investigation Report on the future possibilities and topics of the virtual space industry". The report believes that the government should focus on preventing and solving the legal problems of "virtual space", and improve the applicable provisions of transnational and cross-platform business laws; The government should develop industry standards and guidelines with industry participants and export such standards and guidelines to the rest of the world.

### 2.2 The Value of the Metaverse Technology Applied to the Enterprises

#### 2.2.1 Costs Decreasing and Utility Increasing

At present, the business model and service form of enterprises are gradually changing. The application of meta-universe technology helps enterprises to achieve cost reduction and efficiency increase and provide better service for customers. There are many positions in the enterprise with high repeatability, low technical demands and standardized work which is easy to be done. Digital employees generated by digital derivative technology -- meta-universe technology can better replace manual positions and complete this kind of work. Digital employees can work around the clock, without pay and without errors. The cost of digital staff is mainly focused on the development and production cost in the early stage, and the maintenance cost in the later stage is relatively low, and

the labor cost can also be reduced accordingly. Enable more staff to engage in higher-value work, optimize the allocation of human resources, and expand their career development planning.

### **2.2.2 Increasing Users' Satisfaction after the Usage of Metaverse Technology**

Meta-universe technology can provide customers with ubiquitous, non-existent, high efficiency, high precision service, eventually to enhance customer experience. Everywhere, the metaverse technology can accomplish tasks in multiple scenarios online and offline. All the time, no matter at which time, the work of the metaverse technology will not be affected, and can continue to work 24 hours without resting. High precision, that is, the metaverse technology can process transactions quickly and efficiently, and can interact with customers through the basis of artificial intelligence. A knowledge repository can quickly search for relevant knowledge in all aspects and accurately serve customer needs.

## **2.3 The Main Situations for the Application of Metaverse Technology**

Currently, metaverse technology is used in 14 scenarios. They are gaming, social, office, business, real estate, travel, architecture, engineering, design, automotive, learning, education, fitness, live streaming, esports, and live music. The internet feeds data into the metaverse technology, and geospace triggers content and corresponding data into the metaverse technology, allowing us to understand, manipulate and simulate the world in new ways that save time and open up new possibilities for our lives and businesses. This kind of information is everywhere, not in industry, tourism and military, in which areas civilian is unlimited.

More and more games will participate in the metaverse technology, and the experience which provides by them are more and more immersive, more spatially adaptive, more social and interactive. At present, there are many metaverse games online, and get a lot of praise. For example, the game created by Tencent has been downloaded more than 100 million times, which shows that metaverse games are popular among the public. Building on much of the technology of virtual worlds in games, the metaverse technology allows us to socialize through "real" feelings of activity. Not just by sharing photos and linking to news. Internet collaboration has already happened through tools like Zoom, Slack and Pega, but in the future, there will be more immersive experiences which involves metaverse technologies. Maybe in the future, we can go all over the world through metaverse technology, without spending a lot of time and money, we can see a lot of things in the immersive virtual world. Metaverse space is even providing great help in engineering the construction of buildings, where architects, designers, and engineers can work together to design buildings and reduce labor costs.

The metaverse technology will bring us a new era, offering new experiences. New tools will give metaverse creators all kinds of realities to play with.

## **2.4 Comparison of the Present Application Status of Metaverse Technology in Enterprises**

### **2.4.1 Tencent**

First, take Tencent, a Chinese company, for an example. At the end of 2020, Ma Huateng put forward the concept of "full truth Internet", which can transform the real world into virtual world and help users achieve more real experience. In the Tech Day of Tencent Ecology Conference in 2021, Zhang Zhengyou pointed out that with the development of PC interconnection and mobile Internet, the "all-truth Internet era" is coming. "Quanzhen" means that the metacosmic technology is truly symbiotic and inseparable. Shen pointed out that their essential goal is to move towards a deeply immersive experience, so it is reasonable for Tencent to layout the meta-universe and take the "full truth Internet" as the starting point. At present, Tencent layout of the metaverse technology development action in addition to investment in game companies and related projects, and put its own deployment in the next. In the form of investment and cooperation strategies, it has carried out a comprehensive and extensive layout around the dimensions of game, social, hardware and so on. In addition, Tencent has applied to register nearly 100 trademarks related to the "metaverse". At the end of June 2022, Tencent XR division announced the establishment of the official forays into the

metaverse technology of virtual worlds. In early August, news spread that Tencent planned to increase its stake in Ubisoft and become its single largest shareholder, giving the industry more room for imagination [9].

The game is the closest "entrance" to the meta universe, Tencent early layout, to seize the first advantage chance. Tencent is behind Roblox, Epic Games, and Mini Play, the companies that have come closest to the idea of a metaverse. Tencent formed a joint venture with Roblox in 2019 before the "first stock in the Metauniverse" went to the public. It also became a 40% shareholder in Epic Games, where it will lay out the Fortress Property game content and AR/VR content development engine. Tencent has repeatedly tried to seek for and work with Mihayou Technology Co LTD, one of the most popular metauniverse game developers, but failed to make a deal.

Tencent based on the game IP, launched towards a series of virtual digital users, the current sound volume which is relatively large including "king of glory" infinite king group, "QQ Dazzle dance" star pupil.

The metaverse technology applying socially is also a key area of Tencent's layout. In 2017, Tencent bought a 12% stake in Snapchat for \$2 billion and applied the latter's AR filters, Bitmoji avatars and other technologies in the super QQ Show, helping QQ Show transform from 2D to 3D. Nowadays, super QQ Show is based on face pinching and dressing experience, with a number of entertainment games, and spread through the social relations providing by QQ itself. It is considered to be one of the metaverse technology concept products with high completion degree, best playability and fluency on the current market. In addition, QQ Music has launched VR album function, creating VR music room function for musicians such as Jay Chou, Jane Zhang and Wang Yuan. Tencent is also the largest shareholder in Soul, a "meta-cosmic social platform".

In terms of hardware, Tencent has cooperated with Black Shark Technology through investment this year. At present, Black Shark technology is making VR headsets with communication function. Tencent has also dabbles in the NFTS space, investing in Australian NFT startup Immutable and launching a digital collection platform called Magic Core, which is launching a limited edition named Thirteen Invitesimal vinyl NFT [10].

#### 2.4.2 Facebook

In October 2021, Zuckerberg said Facebook would change its name to Meta and make a big push into the metaverse. Since 2014, Facebook has made more than 15 times of the acquisitions in areas including computer vision, facial recognition, eye tracking, artificial intelligence, AR/VR and other technologies.

Through years of investment and acquisition and self-development of systems, Facebook is now leading the industry in key technologies such as VR/AR. At present, Facebook owns Oculus VR hardware, and includes a series of social platforms including Facebook, Messenger, Instagram, WhatsApp and Horizon, thus accumulating rich resources in the hardware entry side and platform used for the testing of the metaverse technology. At present, its Oculus is the most advanced and ecologically mature VR product within the world [8].

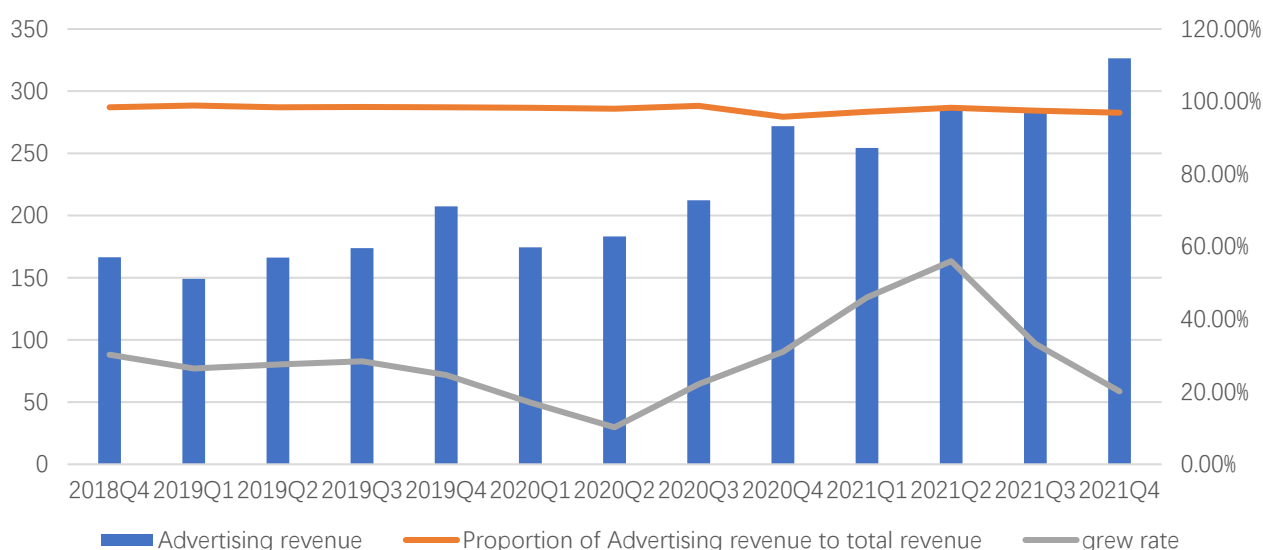
But at present, the customer is still discomfort ale to the experience, and the technology and reality has not been perfectly integrated. The rate of Facebook's user growth is 6.2% per year in the third quarter of 2021, which decreased from 11.8% in the same period of 2020, according to the earnings report. Meanwhile, US teens are spending less time on Facebook, the time shorted 16% comparing with the time they spent a year earlier, as Bloomberg reported. While Facebook's total number of users has been growing for years, it has had its own problems among the key young American demographic, as well as the impact of short-video rival TikTok [11].

However, Facebook has been constantly evolving and adjusting the development of the adjustment, Meta announced on February 2, 2022.

Facebook's revenue growth slowed sharply, but it increased spending. Since changing its name to Meta, Facebook has faced a twofold problem for shareholders. The main issue slow domw the rate of revenue growth, with the company only managing 20% year-over-year growth in 4Q21 after missing its revenue target of \$513 million in 3Q21 (Table 1).

**Table 1.** Financial statements of Meta

| Year                         | 2021Q4   | 2021Q3    | 2021Q2   | 2021Q1   | 2020Q4   | 2021      | 2020     | 2019     |
|------------------------------|----------|-----------|----------|----------|----------|-----------|----------|----------|
| Revenue                      |          |           |          |          |          |           |          |          |
| Advertising                  | \$32,693 | \$28,276  | \$28,580 | \$25,439 | \$27,187 | \$114,934 | \$84,169 | \$69,655 |
| Other revenue                | 155      | 176       | 192      | 198      | 168      | 721       | 657      | 541      |
| Family of Apps               | 32,794   | 28,452    | 28,772   | 25,637   | 27,355   | 115,655   | 84,826   | 70,196   |
| Reality Labs                 | 877      | 585       | 305      | 534      | 717      | 2274      | 1139     | 501      |
| Total revenue                | \$33,671 | \$29,010  | \$29,077 | \$26,171 | \$28,072 | \$117,929 | \$85,965 | \$70,697 |
| Income(loss)from operations  |          |           |          |          |          |           |          |          |
| Family of Apps               | \$15,889 | \$ 13,054 | \$14,799 | \$13,205 | \$14,874 | \$56,946  | \$39,294 | \$28,489 |
| Reality Labs                 | (3,304)  | (2,631)   | (2,432)  | (1,872)  | (2,099)  | (10,193)  | (6,623)  | (4,503)  |
| Total income from operations | \$12,585 | \$ 10,432 | \$12,367 | \$11,378 | \$12,775 | \$46,735  | \$32,671 | \$23,986 |


**Figure 1.** Advertising revenue scale and growth rate

Meta reported its first quarter-over-quarter revenue decline in the second quarter of 2022. Revenue of \$28.82 billion this year compared with \$29.077 billion a year earlier; Quarterly advertising revenue was \$28.15 billion and quarterly net income was \$6.687 billion. The company had 1.97 billion daily active users and 2.93 billion monthly active users in the second quarter [11]. (PRNewswire/Menlo Park, Calif., July 28, 2022)

### 2.4.3 Mihoyo

Not long ago, there is a dark horse of the Internet game industry. It was the genish, a game owned by Miha Tour. In the short period of 1-2 years, "genshin" surpassed Tencent, NetEase and other popular games, and once became the first download of Applestore. Once shock to the outside world, is the fact that mihajlovic swim once refused to tencent's investment, also frequently in the years to invest into other startups, successively invested several universal social product Soul, nuclear energy technology development company energy singularity, video cloud solution providers wei led era, recently invested in domestic private Oriental space rocket manufacturing enterprises [12].

### 2.4.4 NetEase

In the trend of the metaverse, many enterprises have entered the metaverse field, among which there is a major Chinese Internet company - NetEase. At present, NetEase and Tencent have more similar development path, mainly to the meta-universe game as the main development field and technical accumulation. Liu Bai, the director NetEase Yaotai, told the reporter of China Business News that at present, NetEase Yaotai has more than 10 kinds of activity scenes and nearly 100 kinds of personalized clothes, which can simulate the real meeting scene in depth. For the present NetEase

Yaotai, the technical challenge is relatively small, because it has accumulated technology in the field of game research and development before [13].

### **3. The Discovery of the Problems**

Comparing the four companies, we find that Tencent, Mihoyo, NetEase and Facebook have different applications for the metaverse technology. Although they are both social and gaming leaders, they have different applications for the metaverse technology.

Tencent pay attention to the overall development of the whole universe technology layout. At present, Tencent takes game development as one of its key strategies. In recent years, Tencent has cooperated with many companies to launch a number of metaverse games. In addition, Tencent built the XR division to realize the integrated development of software and hardware. Facebook, on the other hand, is a fusion of the real world and the virtual world, such as AR and VR. But on the whole, it didn't work out as expected. But in terms of earnings and active users, Tencent is ahead of Facebook [10].

For NetEase, the metaverse technology pays more attention to game field, and it also developed NetEase Yaotai platform. Because of the early approaching of metaverse technology field, there is much technology accumulation of NetEase Yaotai platform. For Mihoyo, it relies on metaverse technology game to become famous, and the wealth comes as its result. Then the income reinvested the other fields of metaverse technology.

All in all, with the comparison of the companies, there is the conclusion that the various directions of usage of metaverse technology applied by them. It is not difficult to discover that the approach of metaverse technology, the personality of the company itself should be considered before the technology is applied. Or the effort would be in vain.

### **4. The Solution to the Problems**

#### **4.1 Enhancing the Innovation of the Technology**

The technology of the metaverse is complex, so the development level of its technology determines the space of its application in the future. It is necessary to strengthen technological research and innovation in all aspects and multi-dimensions, improve the combination with AI and information processing ability.

#### **4.2 Researching the Laws and Policies for Regulating the Metaverse Technology**

Metaverse technology has a variety of application scenarios, but also brings challenges in compliance and security. Due to the particularity of many industries, metaverse technology must ensure its security and accuracy to avoid risks. Special laws and regulations should be set up at the regulatory level to strictly require the application of metaverse technology and its standardized, healthy and orderly development.

#### **4.3 Integrating the Application Situations Towards the Further Stages**

Metaverse technology is an emerging industry, which is an important interactive carrier connecting the real world and the virtual world. It has application in all aspects. Promote the deep integration of digital services and scenes, promote marketing model innovation, create immersive experience, and attract more customers.

For example, through the "Great wisdom shift Cloud chain" to achieve the proper employee's office location, time is not limited. Reduce labor costs. Under the "Great wisdom shift cloud chain" technology, employees can work at any time, any place, and more perfectly realize the home office. In this way, the business activities of enterprises will not be stopped and losses will be reduced even if the outbreak and other force majeure factors occur again.

#### 4.4 Linking the Multiple Application Situations of the Metaverse Technology

As the metaverse technology is still in its early stages, the multi-scene application of metaverse technology is still lacking. When a single scene is applied to the metaverse technology, there may be good scene fusion, but when multiple scenes are used, the connection is not smooth. There are a variety of problems, such as jam, flash back, re-login to the system and so on. Therefore, it is also very important to connect multiple scenes using metaverse technology.

Different companies have chosen various approaches to the application of metaverse technology. Through the study of their development steps, there would be precious experience provided for the other companies that are willing to enter this area.

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