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Metaverse Theory

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Metaverse Theory

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Abstract—In recent years, with the development of VR games and the tremendous development on computer technologies such as rendering engines, more and more players and investors have fantasized about the concept of metaverse, which was officially mentioned by Neal Stephenson in the novel *Snow Crash* in 1992, it tells a glorious story of the people from the future living in virtual world. But so far, no one can really put forward the characteristics of a metaverse from the perspective of philosophy and world architecture. In this paper, I will compare the real world with the game world and propose one lemma and three theorems for constructing a metaverse, and came out with a guideline of blockchain game development, which indicates four phases of the game development, aims to give out a guidance for the future blockchain game.

Index Terms—metaverse, blockchain game, open world, theorem

I. INTRODUCTION

In recent years, blockchain games have gradually become more and more popular. People make huge profits by playing blockchain games, such as *Axie Infinity*, *Cryptokitties*, etc. Most of the blockchain games are based on Card games (such as *Hearthstone*) or simulation games, all these games are for the purpose of allowing players to earn more. Games with such an attitude may be unhealthy, and the capabilities of the blockchain have not been blend into the games. At the same time, another part of the users in blockchain world yearn for the future world described in the novel *Snow Crash*[1]: in this world everyone lives in a virtual world, and can do anything in this Utopia, but these users keep dreaming instead of really put forward the metaverse's arrival.

Today's blockchain games and fantasists become two extremes. Blockchain games are extreme realists: games used only for players to earn more. The fantasists of blockchain games have been dreaming about the arrival of the metaverse, trying to find games similar to the metaverse in the existing games, but do nothing to help the metaverse's arrival. In order to solve such a dilemma, in this paper, I puts forward the metaverse theory for the first time by combining the reality with ideals. This theory is a guideline for the basic form of metaverse, game designers can use this theory to analyze every kinds of blockchain games. Due to the shortcomings of blockchain games, a complete metaverse theory with 3 theorems was finally proposed. All games that try to implement a metaverse should refer the metaverse theory. Then, I explained the idea that blockchain games are all in the early stage, and proposed four stages of blockchain game development,

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hoping to provide guidance for the development of subsequent blockchain games.

II. BACKGROUND

A. Blockchain

Blockchain is a kind of distributed storage technology. It originated from Bitcoin[2] created by Satoshi Nakamoto in 2009 and was discovered by people. People realized that the blockchain mechanism in Bitcoin can be used and modified better, so various blockchain-based digital currencies have subsequently been produced. In recent years, governments and banks have also begun to positive explore the application scenarios of blockchain. Its main characteristics are divided into three points: 1. Unforgeable: every A cryptocurrency is unforgeable, and it is guaranteed by the principles of cryptography. 2. Traceability, the source and transaction records of each cryptocurrency are traceable. 3. Permanence, all kinds of information on the blockchain will be permanently recorded, and no one can tamper with the above historical information. This also enables the blockchain to have the advantages that traditional databases do not have, thereby providing a way to implement cryptocurrencies.

B. Blockchain Games

Blockchain games are a type of game that uses digital currency to replace gold coins in traditional games. Because digital currency is full of volatility, current blockchain games such as *Axie Infinity* and *Cryptokitties* use the volatility of digital currency. Digital currency is bound to pet development, so that pets in the game can be sold at high prices to obtain profits. *Decentraland*, *Alien World*, *DEGO* and other games use the characteristics of digital currency to integrate into traditional simulation games, trying to simulate a real city, where people can conduct real estate transactions, buy and sell lands and buildings, trying to build a real world. These types of games can be regarded as the blockchainization of traditional games. How to create native blockchain games (relying on certain characteristics of the blockchain to reach a height that traditional games cannot reach) is the most important issue which the blockchainers are about to face.

III. METAVVERSE THEORY

Metaverse is a sci-fi world created in *Snow Crash*. In this virtual world, people can do anything. It is similar to the scene described by Ernest Cline in the novel *ReadyPlayerOne*[3]: people can play any race in the game, any role of appearance.

However, the ReadyPlayerOne and Snow Crash world are based on fantasy which lacks a theoretical basis. People know that this kind of world may exist in the future, but they don't know how, and when it will come. Unfounded fantasy cannot lead to any metaverse's arrival. In this chapter I will analyze the metaverse and traditional MMORPG games and real world, then put forward three theorems that the metaverse needs to follow to meet the design of the theorems. Whether it is a game or a world, it has the conditions to become a metaverse.

A. Market Diversification

We have never studied the market effect in games, because traditional MMORPGs such as Warcraft, Final Fantasy, and Sword and Soul are published by a centralized company, and all the items that can be purchased in the game are part of the game company's products. Gamers earn in-game items or play time by buying in-game currency from the game company.

In a decentralized world, things are different, because in decentralized blockchain games, the game's token mechanism and game content are completely separated, that is, you can design a game with poor game content but well-designed token mechanism to attract users (often mentioned as DeFi). On the blockchain, a token can be exchanged for other tokens, can be used, consumed, and can also buy game props. Therefore, one of the most important differences in blockchain games is that the energy of tokens in blockchain games is much greater than "golden coins" in traditional games. Therefore, new mechanisms in the game are produced in blockchain games: Market mechanism.

The traditional in-game market is often constructed by gamers and game companies: gamers spend money to obtain game content, and game companies make profits from it. The second is for gamers to trade with other gamers, or to buy game props with offline fiat currency. However, most of the trading behaviors come from the first type, which is also a way for game companies to make huge profits. In blockchain games, supplies and demands in the game market has changed. Before we can figure out the root cause of the changes, we need to figure out: What do gamers obtain from games?

Traditional game players spend money to buy game experience, other players spend money to buy game equipments and so on. The buyers and sellers in games should construct a kind of relationship of demand and supply, then the transaction occurs. Nowadays blockchain games such as Axie Infinity, or other games, these game players spend money to earn more, which creates a paradox: whose money are the players earning? What they earn is the money of the person who loses each game-the person who loses in the game pays a certain bonus to the winner, and what they earn is the money that enters the game later, for example: Player A pays \$50 bought a growth potion, and hoped that its pet would grow up and sell for a good price, but the currency price dropped, and the grown pet was only sold for \$30, which caused a loss to the player, and the resulting loss was not the player's expect. So once the game becomes an uncertain game theory dilemma, there will always be someone who loses. In such a system, profits are

not generated by supply and demand, but by competition. This kind of game is very similar to gambling, and it is completely different to metaverse world.

Therefore, after analogy, we found that if you want to implement metaverse in blockchain games, it is necessary for profits to be generated by supply and demand market instead of competitions between players, and the relationship between supply and demand needs to be diversified. If the profit relationship is very singular, it will become a trading market platform instead of metaverse. In this game, players need to pay for daily bills, game time, weapons and equipments, consumables, unlock game content, and transaction fees. In return, players get: profit, better game experience, more interesting game mode and game time in the game. Note that the above description not only defines a diversified buyer's market, but also a diversified seller's market: some players sell props to earn profit, some old players bring new players to pass some checkpoints to earn profit, and some players give a hand to others then charge fees for profit. We can say that this kind of market is a metaverse diversified market. From this I proposes the first metaverse theory:

Theorem 1: A metaverse must have Market Diversification.

Note that: market and diversification must exist at the same time.

B. Bidirectional Demands

We once again compared the real world with the game world, trying to find more information from it. We know that the general interaction process of traditional MMORPG games, such as Maplestory, WOW and other games, is very simple. Generally, players need to get pleasure from the entire game world. From the perspective of players, they need games to pleasure their spirit feeling. In contrast, game has no requirements for players. Any players can enter and anyone can exit at any time. Analogous to the real world, we find that things are different here.

The birth of human is uncontrollable. Mankind is forced to enter this world, then survive and explore, evolved into a huge race. The birth of each newborn in this race cannot be chosen by himself, it's the result of the parents' commission of accomplishing the continuation of the ethnic group. This newborn will continue to shoulder this responsibility when he grows up and continue to contribute his strength to the continuation of his own ethnic group. This sense of responsibility is inherently given to newborns. We can also say that everyone is born with the responsibility of inheriting the lineage. Someone may give up the responsibility, but even if he gives up responsibility and promises from his parents, The love for their lovers and even their contribution to the company makes them more responsible, and they cannot choose to quit the world at will. This leads to our lemma:

Lemma 1: Life is born with responsibility naturally, and more and more responsibilities from the world will be assumed.

This lemma is very easy to understand and obvious. It is impossible for people to come to the world without any kinds of responsibility. Even if they are not responsible for their parents and family members, they need to be responsible for their own lives, and by this kind of responsibility relationship, they will gradually live in society. In fact, these relationships can be regarded as acquired responsibility relationships. This relationship is given to all human-being by the world. This kind of responsibility is also the key to the world's continued reproduction and gradual progress for human.

From now, we can apply this Lemma 1 to the game world. Not only do players need games, but games also need players. This is the best way for a game to retain players, including communities, teams, alliances, and teammates. These are the fetters in the game, and this can really make a player concern, and can promote the player's progress. Therefore, the second basic metaverse theorem can be derived from this.

Theorem 2: Metaverse must have bidirectional demands.

Any kinds of metaverse shall leave a responsibility to players, no matter what type it is, it can be a commission, give the world a time flow or just make the world perishable. Those examples can surely be used in the design of metaverse.

C. Entropy Increasing

Metaverse must implement the feature that the game needs players' governance, in order to make the players community more loyal to the metaverse. Next question, Is there any other tighter bond relationship that can make game players firmly attracted? That is the game itself. We need this game to be maintained only if players in it. In other words, we need to introduce a kind of maintenance, which can only be done by the players. Without players, world crash. That kind of relationship is not responsibility but the players controls the death of metaverse. Let us use another word: Entropy Increasing. Entropy, On the one hand it can be considered as a measure of the disorder of a Thermodynamic System; on the other hand its evolution indicate the only direction of Time, finally is a suseful methodoly, using models of the studied systems, for the calculation of the chaos level of a system.

We need a world with increasing entropy, so that once the world has no players, it will crash. From the perspective of the game world, if there are no players, the city in the game will slowly crash and eventually become a ruin. For the player, since the game world is constantly updated and changed, every time you enter the game world, the NPC may change, and the entire world will also change. This is the third theorem of metaverse.

Theorem 3: Metaverse must be an entropy increasing world.

The entropy-increasing world can increase the player's exit threshold, increase the player's sense of responsibility for the game world, and enhance the connection between the player and the game. Such a world is a sufficient and necessary condition to truly simulate the existence of the metaverse. Also, a world or city is more chaos, the rewards would be higher, that mechanism construct a positive loop, if the world crash, the players are willing to governance. Sooner, players would built up a conditioned reflex, and willing to maintain the world for a longer time period.

So far, I have proposed one lemma and three theorems. These five rules constitute the foundation of the metaverse world. Any game who follows the metaverse theory can be called a member of the metaverses.

Looking at the blockchain game world, although there are many projects, no game can meet the metaverse theory. The most important reason is that they lack a theoretical foundation and are in the first stage of blockchain game development. In the next section, I will propose four stages of blockchain game development. Currently, no blockchain game can reach the second stage.

IV. FOUR PHASES OF BLOCKCHAIN GAMES

Based on the metaverse theory, we know that this kind of metaverse will have the ability to gather a huge amount of intellectual properties and influencers, then the world will develop it's own culture, and may affect the real world's culture, after this chapter, we can find that metaverse is in the third phase of blockchain game.

The development of blockchain games will be composed of four stages, they are: 1. EPID(External Produce Internal Digest), IPID(Internal Produce Internal Digest), IPED(Internal Produce External Digest), APAD(Anywhere Produce Anywhere Digest)

A. External Produce Internal Digest

All current blockchain games, without exception, integrate some existing gameplay, and use this gameplay to add some profitable mechanism, then it becomes a new game. For game mechanics or game content, they come from the district. Outside of the blockchain, they were born in the traditional game world and introduced into the blockchain, allowing players to play games that can be played in the traditional world on the blockchain. This process is what I call external produce and internal digest(referred as EPID): Blockchain dapps and games use contents from real world, which is the outside of blockchain. Similarly, current NFT artworks, such as music, creation, are from real world. They put the artworks in the physical world on the blockchain for sale. This behavior is also a kind of EPID, which belongs to the first stage.

B. Internal Produce Internal Digest

Correspondingly, Internal Produce Internal Digest(IPID) is the second stage of the development of blockchain games. In

this stage, blockchain games will not rely on externally generated game mechanisms or content, but will use the blockchain to produce a unique gameplay that belongs to blockchain games. This unique gameplay does not exist in traditional games and can only be implemented on the blockchain (for example, the time concept mentioned in Lemma 1, this feature can be defined by block time, traditional games It is difficult to define a constant time, this time defined by a centralized organization is often not of practical significance). This kind of gameplay can be accepted by blockchain game players indicates this game has reached the second stage of blockchain game, IPID.

C. Internal Produce External Digest

The last stage of blockchain game development is Internal Produce External Digest. In this stage, blockchain games rely on the unique game mechanism born on the blockchain to attract many traditional game players into the blockchain world, as well as brings many intellectual property rights and influencers. Everyone is willing to enter the blockchain world in order to experience this unique game content, which marks this natural blockchain game can be accepted by traditional game players and allow traditional game players to transfer to this new game. This is the third stage of blockchain game development. Once a game reaches this stage, it also marks that blockchain games have officially launched an effective attack on traditional games, which also means that traditional games will have a trend of being replaced by blockchain games. IPED is a milestone event in the development of blockchain games.

It is worth noting that these three phases also apply to the development of blockchain applications, except that the only ones that can be exported are blockchain games.

And based on metaverse theory, we may find out that a metaverse game is naturally a third-phase game.

D. Anywhere Produce Anywhere Digest

At this stage, I am not sure if metaverse is a member of APAD, but a world that satisfies metaverse theory seems to be the most likely to reach this stage. Once there be a game reached that phase, it should not be a game, but a true omnipotent virtual world, both real world content and virtual world content can be smoothly transferred and digest. At that time, the virtual world and real world's information exchange boundary will be a great fuzzy. It is not only related to blockchain, but also the world pattern will be affected by this kind of virtual world, which may produce a new pattern based on this world. For the time being, I cannot imagine what the shape of such virtual world will be and can only make some theoretical predictions. This kind of world should have two characteristics:

1. The information boundary with the real world is almost 0.
2. The amount of content produced in the real world is equal to the number of users.

I cannot extrapolate other features of the stage four world, hope further researchers can explore deeper and add their work into the metaverse theory.

V. CONCLUSION

In this paper, I propose a new metaverse theory that define the basic elements of Metaverse. All blockchain games that satisfy this theory are included in the Metaverse category. Subsequently, I discussed the current goals and problems of blockchain game development and proposed four stages of blockchain game development. Nowadays most of the blockchain games are in the first stage, a metaverse game may reach the third stage, but we don't know what kinds of games can reach the fourth stage. Finally, I hope that paper can lead and make contributions to the prosperity of blockchain games. And hope other researchers can do more research work on metaverse theory, to contribute to the topic and build up a new world of game.

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