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APPLICATION OF THE METAUNIVERSE IN CITIES, ITS CONCEPT, ADVANTAGES AND DISADVANTAGES

ПРИМЕНЕНИЕ МЕТАВСЕЛЕННОЙ В ГОРОДАХ, ЕЁ ПОНЯТИЕ, ПРЕИМУЩЕСТВА И НЕДОСТАТКИ

In the second half of 2021, companies around the world decided to make a massive digital transition into the virtual space. The development of metaverse poses a lot of questions for the society, but so far, few people think about how the appearance and structures of cities will change if the majority of residents go into virtual reality. The article discusses the latest trends and directions in society and science, which is known to us as the metaverse, attempts to discuss this trend and its connection with architecture and urban planning through scientific literature, their analysis and the actual stage of development of this trend.

The purpose of study is to provide a basic understanding of the metaverse and its application analyses to cities at this stage.

The tasks of the study are: definition and understanding of the metaverse and its working systems; application of this direction/trend in cities; reveal the main advantage and disadvantage of using this direction for cities. To achieve the proposed result, it is necessary to use the method of analysis of scientific literature and documents related to the metaverse concept and its application in cities to reach and form conclusions. This study concluded in studying the latest direction and application of metaverse in urban planning and identifying some of its advantages and disadvantages.

The scientific novelty of the study lies in the study and application of the metaverse concept in cities and the identification of its main advantages and disadvantages. The author emphasizes that this direction does not actually reconstruct cities, but on the contrary, a new function of reality appears in the city that people want to see and, as a result, should make cities more livable.

Во второй половине 2021 г. компании по всему миру решили устроить массовый цифровой переход в виртуальное пространство. Развитие метавселенных ставит перед социумом массу вопросов, но пока мало кто задумывается о том, как изменится облик и структура городов, если большинство жителей уйдут в виртуальную реальность. В статье рассматриваются новейшие тенденции и направления в обществе и науке, которые известны для нас как метавселенная, попытки обсуждения этого направления и его связи с архитектурой и градостроительством через научную литературу, их анализ и фактический этап развития этого направления.

Цель исследования: дать базовое представление о метавселенной и анализе ее применения в городах на данном этапе.

Задачи исследования: определение и понимание метавселенной и ее рабочей системы; применение данного направления в городах; выявление основных преимуществ и недостатков применения данного направления для городов. Для достижения предлагаемого результата необходимо использовать метод анализа научной литературы и документов, связанный с концепцией метавселенной и ее применением в городах для достижения и формирования выводов. Данное исследование заключается в изучении новейшего направления и применения метавселенной в градостроительстве и выявлении некоторых её преимуществ и недостатков.

Научная новизна исследования заключается в изучении и применении концепции метавселенной в городах и выявлении ее основных преимуществ и недостатков. Подчеркивается, что это направление фактически не реконструирует города, а наоборот, в городе появляется новая функция реальности, которую люди хотят видеть и, как следствие, которая должна делать города более удобными для жизни.

Keywords: urban design, metaverse city, virtual city, augmented reality (AR), virtual reality (VR), Extended Reality (XR), virtual life, parallel world

Ключевые слова: градостроительство, город метавселенной, виртуальный город, дополненная реальность (AR), виртуальная реальность (VR), расширенная реальность (XR), виртуальная жизнь, параллельный мир

Introduction

The relevance of the work. Despite starting the metaverse idea in 1992, the concept of the metaverse gained attention after Facebook changed its name to Meta in 2021 and announced a major investment in the idea. Then the creation of their metaverses was announced by Microsoft, Epic Games, Roblox and other corporations. By 2026, a quarter of people will spend at least an hour a day in the metaverse, according to a study by Gartner. According to experts, users will visit virtual offices, classrooms and shops, build houses in the digital space and even buy land [1].

With the spread of the Internet, people began to perform some of the activities online. Today we play sports on YouTube videos, for learning languages there are online resources that replace language schools, instead of libraries and cinemas, we can use streaming services and applications with books and audiobooks. To make purchases, it is not necessary to leave the house, even the products will be kindly delivered by a ccybermarket or a scooter. We use applications to interact with government agencies and can file a tax return online instead of going to the tax office.

Now the term metaverse is used in the meaning of some alternative digital reality that forms a single virtual space. This is a collaborative open hybrid mixed reality environment that combines the virtual and physical worlds, in which people and intelligent algorithms/things/devices can interact within multiple virtual worlds on a single technological and economic platform. Users will be able to interact with each other in real time and have an experience similar to what they experience in the real world.

City governments are currently spending a lot of money to make our cities more livable, but what will happen if the citizens of tomorrow begin to live in the city only virtually?

The purpose of the work: basic understanding and working system of the metaverse, analysis of the application of this direction for cities in the present.

Tasks to be solved:
– a short overview of the metaverse;
– working mechanism of the metaverse;
– identify the application of the metaverse for cities;
– identify the main advantages and disadvantages of using metaverses for cities.

The research methodology are a review and analysis of scientific literature and their interpretation related to the metaverse, as well as an analysis of the application of this concept in cities which makes it possible to find a solution to the identified problems in order to achieve the goals of the study. This study can be used in the course of actions for the preparation of urban planning.

Main part

The pandemic situation in 2020 has shown us how it can be really boring to work from home and not go out and it's around the clock. Thus, working and living in the metauniverse in this situation definitely helps people to have fun in another world; work, study and do their daily real life there at the same time. Many experts believe that the metaverse will soon become a replacement for social networks, but so far this is just an emerging trend.

I. What is the Metaverse?

The first idea of the metaverse appeared in 1992 in the science fiction novel Avalanche by Neil Stevenson. According to the plot of the book, in the 21st century, corporatocracy reigns on Earth – all power belongs to the large corporations – and in addition to the real world, which is shrouded in chaos and split into several corporation states, there is another one – a virtual one. There, people interact with each other in the same way. The real and virtual worlds are intertwined: events in one can affect what happens in the other. The same book became the origin of the term "avatar".

The Metaverse is a convergence of physical, augmented (AR) and virtual reality (VR) in a common online space. The prototype of the Matrix in the real world is the Internet. The difference between augmented reality and virtual reality (VR) is that augmented reality only adds individual elements to an already existing world. Virtual reality artificially recreates the whole world. Having created his avatar in the metaverse, a person will be able to do almost everything in VR that he does in the real world, for example, search for information, communicate with friends, work, go for a walk. In short, to live in the new universe the way he wants and own anything (Pic. 1) [2].

Some people may think that the metaverse equal video games, but they should not be compared. There are many metaverse concepts, but
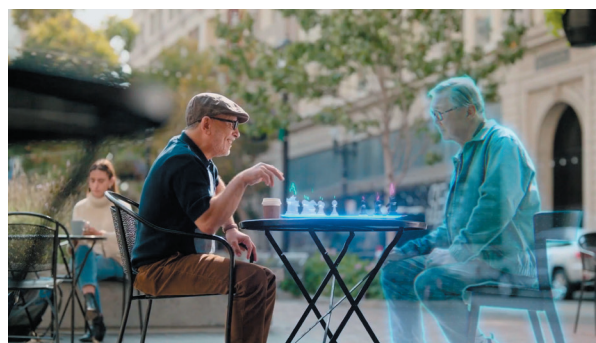
Pic. 1. Convergence of physical
and virtual reality concept

the most famous one belongs to venture capitalist Matthew Ball. In his presentation, Ball gives seven characteristics of the other world:

1. The Metaverse does not stop: it cannot be paused, erased or terminated;

2. All events within the universe occur in real time, and actions do not depend on external factors;

3. There is no limit to the number of those who inhabit the metaverse;

4. The metaverse has its own economy: people receive "money" for the "work" done, own and manage property;

5. In the metaverse, you can use elements of the real world: for example, work on your laptop in a virtual space;

6. Data and digital assets from different platforms are combined: you can use things from Counter-Strike and Fortnite, buy a car from Need for Speed and sell it to friends on Facebook;

7. The Metaverse is filled with "content and experiences" created by its users, both individuals and organizations.

II. Virtual world to metaverse

In terms of functionality, all Metas can be divided into the following 3 groups:

Gaming: this is the most popular and developed direction in the Metaverses. Given technology maturity, user fit and content adaptability, games are a great way to explore the Metaverse.

Crypto-worlds: these are immersive virtual worlds with huge social and financial potential.

Business, work, and learning: the Metaverse opens up new opportunities for immersive virtual collaboration in terms of remote work.

We, as architects, urban planners, or as an ordinary citizen, are more interested in the later option, which affects the life of a greater number of the population. But it must be recalled that for all 3 categories, a minimum 3D designer and visualizer is needed, where professional architects and urban planners are more widely needed. Just this space should look and justify like the real world, it definitely needs all the details as it really does for the architecture and urban planning design.

III. How does metaverse even work?

Designing a metaverse is relevant in the educational and corporate environment, in the field of communications. We need 4 basic factors in order to realize metaverse working: software, equipment, data centers and blockchain.

Software: With the help of 3D engines, projects of the virtual world are created. The most famous of this kind of platforms are Unreal Engine and Unity.

Equipment: These are the user's guides to the metaverse. VR glasses, AR and XR (Extended Reality) gadgets, and in general everything that will help you interact with the platform. Virtual and augmented reality glasses are optional. The main thing is that the two universes unite, so that it can even be a sound reality without visualization.

Data centers: These are cloud storages for the data of the metaverse, server and network equipment are placed here, and there is a connection to the Internet. The main suppliers are well-known companies such as Amazon, Google and Microsoft.

Blockchain: This thing attaches the data and money of each user to his digital account and allows you to use the purchased products throughout the metaverse.

IV. Metaverse and City

As we know, pandemic situation in 2020 have many negatives on humans' life, but it helps to know and review many things and daily manner in our life like as: our health and to take more times for ourselves, family, close friends, walking, shopping, study, working etc. Without a doubt, COVID-19 had a powerful impact on some the innovation development and digitalization like as: online commerce and robotic delivery, electronic and contactless payments, remote work, distance learning, telemedicine, online entertainment, supply chain 4.0, 3D printing, robotics and drones, 5G and information and communication technologies (ICT) [3, 4]. This list certainly accelerated the emergence, appearance and needs of the metaverse in the present.

Today, there are a large number of separate metaverses in the world. The first and most famous ones are developing on the basis of games (Fortnight, Roblox), gamified blockchain projects (Decentraland) or workspaces (Horizon, Microsoft mesh), which have become necessary since the beginning of the pandemic. But speaking of the metaverse and the unified 3D internet, it is impossible not to talk about cities and the integration of public services, as well as the emerging desire of the authorities of different countries to develop digitalization, laid down by the concept of a smart city and to use the opportunities that the metaverse will provide.

Dubai, Abu Dhabi, and Seoul could be the first cities to appear in the metaverse. Previously, developers created only fictional worlds or individual fragments of real cities, but now they expect to recreate cities, respecting the real scale of buildings. Users will be able to visit cities for the purpose of tourism or shopping, as well as receive public services there. However, experts doubt that they will become popular: it is easier to get banking or government services using the site, and such tourism will become more prepare for a trip than a full-fledged replacement.

The beta version of the project Metaverse Holdings for Dubai and Abu Dhabi is planned

to be launched at the end of 2022, and soon after that it will be available for users around the world. The company said: Unlike existing VR projects, where developers create small fantasy worlds, this metaverse will be based on the real world. After the launch of the beta, the metaverse will also recreate the key places of the UAE (United Arab Emirates), which will be "visually, topographically and geometrically" correctly correlated with real objects. Users will be able to visit the metaverse using a VR headset, an application on a smartphone or other device. According to Karin Neidu (strategic advisor at Metaverse Holdings), among the candidates for digitization after the launch of the UAE are Saudi Arabia and Qatar.

The main opportunities of the metaverse for city dwellers consisted of:

Availability and effectiveness of the services received: First of all, this is an opportunity to get more services without a personal visit to various institutions and with great immersion. This, for example, concerns such areas as education and tourism. Of course, we would prefer to do both personally, but the metaverse is able to make these areas more accessible (no need to travel to another country to attend the event). Compared to existing digital tools, the metaverse will provide a more lively communication and presence effect. Video broadcasting an event or recording a lecture and being in a virtual 3D environment is not the same thing. The presence in space (even if it's virtual space) creates a brighter image and contributes to better memorization of information.

A new layer in the urban environment: The digital layer is perceived through glasses. For example, if I wanted to play chess with a friend, I could find any free table and move virtual pieces around the virtual field. User could upload a street design created by another user and now instead of a gray fence you look at an animated painting. Creating content and making it easier to influence the environment around you is another plus. Influencing space on the virtual layer is the realization of the values inherent in civic activism and participatory design – in order to feel like residents and owners of their area, city and people take part in its development (Pic. 2).

V. Main advantages of metaverse

At the moment, the metaverse for architects and urban planners is playing a new trend and opportunities for 3D visualization, 3D design and their expansion.

On the other hand, the metaverse facilitates the land and transport restrictions of the city due to the possibility of services and virtual spaces. There is such doubt and criticism that the metaverse reflects realities and limits our vision to what we can

Pic. 2. New virtual layer in the urban environment (concept)

imagine [5]. In response, it must be reminded that the metaverse is a choice, and not an obligation for each person. Literature reviews shows main advantages of metaverse as below:

This is communication from any corner of the world;
▪ New work format;
▪ It can also change the scope of education;
▪ It could engage virtual influencers and models;
▪ We can open a shop there;
▪ We can implement outdoor advertising;
▪ We could hold events and concerts;
▪ Buying, Selling Metaverse Objects and Investing;
▪ And of course, you can create your own universe and make the space branded, sell your services in the virtual world and communicate with customers through such an unusual communication channel.

VI. Disadvantages of metaverse

Despite the optimism of the ideologues of the metaverses, many unsolved questions remain. Because of them, the creation of a full-fledged virtual universe will stretch for several years [5, 6]. The main unsolved questions category listed below:

First of all, related to technology: now VR glasses and tactile gloves are heavy and uncomfortable and it's hard to stay in them for several hours. Some users get seasick when they use standard VR glasses. Mark Zuckerberg believes that these should be glasses that are close to ordinary glasses for vision, like Google glass. More compact and light weight counterparts are needed. In addition, while the quality of graphics in the VR environment leaves much to be desired (although progress is already noticeable). To feel completely immersed in the process, it is important that we see with our own eyes – a realistic 3D avatar or a pixelated man with a triangular head.

The second point is the safety of the physical body while traveling through the metaverse. A person in

a VR helmet can easily trip and hit the furniture in their apartment. So, in addition to diving equipment, there must also be safety equipment. As an option, use virtual reality running platforms like Virtuix Omni 2.0.

The third point is internet. Life in the metaverse requires stable Internet access. But for many users, this is a problem, which means that these people will be cut off from the opportunity to settle in the metaverse.

The main disadvantage: *Metaverse is not equal to the transition from reality to virtuality!* The advent of online services has not made our streets empty, we still go to sports clubs and group workouts, watch movies in cinemas eating popcorn and personally go out for buns in bakeries. What has changed is that in a situation where you prefer to save time on the road, or today is the day when you don't want to leave the house and smile at neighbors and sellers, you have this alternative. The emergence of the metaverse does not necessarily pull us further from reality. The development of the Internet and Internet services is due to convenience and efficiency, so that a person can spend less resources to get the result, changing the quality of the process. The metaverse faces the same task – to make it possible for people to solve the problems facing them even more effectively. We are already spending the time that we will spend in it online; in some professions, working hours will be added here. "To what extent are existing projects coping with this", that's another question, but we have to start somewhere [4, 7].

Results

Summarizing the consideration of approaches to the application plan of the metaverse concept in the city, we can draw the following conclusions:

– the main goals are to increase the efficiency of serving people in cities with an increase in the quality of their lives, and attention to people;

– despite the good purpose of the application plan of this concept in cities, the final result of this concept / direction is still far away and the concept needs to be finalized in all aspects;

– today, this direction is being developed for large international corporations, the government and rich people, and the infrastructure system for mass people has not been finalized;

– more attention to the application of this direction is focused on the digital direction of the city and has not yet been specified how citizens will apply it in their lives and use it.

The analysis helped determine the conditions for the application plan of the metaverse concept in the city and revealed the advantage and disadvantages of its application in the present. How much

this direction changes the face of the city and the life of citizens, and how much this direction successfully achieves its goals, must be assessed after the completion of the work and analyzed from all aspects of the life of the city.

Conclusions

The Metaverse is a huge simulation. It cannot completely replace the real world and it's not meant to be. The metaverse will become a continuation or addition to the real world with all its pluses, and for some minuses. If it is implemented as they are promised, it will be a breakthrough in virtual and augmented reality technologies and change the fate of many people. The general under-standing from the metaverse is to say that this new trend does not actually reconstruct cities, but on the contrary, a new function of reality appears in the city that people want to see it. Ultimately this should make cities more livable. Will the developers succeed in creating a metaverse or will it re-main an unrealizable fantasy – we will see in a few years.

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