Sports metaverses:
theory and practice

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Abstract
Objective of the study was to identify the current state of the problem of developing a sports metaverse in the digital space based on a theoretical analysis of information sources, as well as cases of holding sporting events in metaverses.
Methods and structure of the study. Scientific work was carried out during 2021-2024. and included a set of methods for collecting information (analysis of literary sources and content analysis of specialized Internet resources; conversations with heads of IT companies; participant observation at competitions in digital sports; testing of domestic VR games; participation in thematic scientific conferences of various levels and etc.).
Results and conclusions. Based on the analysis, the authors propose the creation of sports metauniverses, which, based on artificial intelligence technologies, allow us to customize the choice of sport and the process of sports training, depending on the level of individual preparedness. In the future, the user himself can create sports and physical activities based on his own preferences with consulting support from the platform, as well as the possibility of implementation using current technologies.

Keywords: sports, metaverse, digitalization of sports, digital sports, e-sports, physical sports, games of the future.

Introduction. In the theory of sports and the practice of holding competitions, digital technologies are increasingly being used, which allow us to talk about a new phenomenon - sports metaverses. The multidisciplinary tournament "Games of the Future", which took place in Kazan and initiated by the Russian Federation, shows the relevance of working with audiences in digital environments. Today, the topic of sports metaverses is not the subject of scientific discussion among domestic scientists and, as a result, is not at the stage of practical implementation. Around the world, IT companies create innovative platforms (like prototypes of metaverses) and test their digital services in all industries, including sports, as a developed social institution. Therefore, it is important to study the prospects for the development of metaverses in sports.

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Results of the study and discussion. Futurologists describe metaverses as a logical transformation of the medium of mass communication, which is currently carried out in instant messengers and social networks: "Metaverse technology is aimed at creating a virtual world parallel to the real one and integrated with it. This is the most advanced form of development

Comparative and comparative analysis of metaverses that are used in the practice of holding sporting events

Metaverse name/ resource	Genre	Platform	Application in sports
Zwift https://www.zwift.com	Sports simulator	Windows, Android, iOS, tvOS, Mac OS	In 2020, due to the COVID-19 pandemic and the restrictions it caused, part of the Tour de France cycling race was held on the Zwift platform. Its developers specialize in creating virtual platforms and holding virtual events. One of these orders was a virtual platform for cycling racing, which was connected to exercise bikes
Roblox https://www.roblox.com	FPS, Simulation, Platformer	Windows, macOS, PlayStation 4, Xbox One, iOS, Android, Meta Quest	Nike has teamed up with teen gaming platform Roblox to create a virtual world called Nikeland. Nikeland is modeled after the company's real headquarters (located in Oregon). Users can dress their digital doubles in sneakers and company clothing
Decentraland https://decentraland.org	Virtual Reality	Browser	A large number of sporting events are held here, including in an inclusion format. For example, the virtual marathon Degree Metathon with an emphasis on inclusion. It also hosts major sporting events using NFTs. For example, the Australian Open tennis tournament with unique tokens. Each token was tied to a specific area of the Melbourne Park tennis complex. Therefore, along with a unique NFT ball, a fan of the tournament also bought a virtual piece of the court. This metaverse also hosts physical health events. For example, "Decentraland Wellness Week" took place from January 24 to 26, 2024
LootMogul https://metaverse.lootmogul.com	Virtual Reality	Browser	This is a virtual space for professional athletes to live. Many sports stars have bought virtual real estate here for real money. There are currently over 181 registered professional athletes, as well as 15 sports leagues from the NBA, WNBA, NFL, MLB, UFC, etc. Platform owners allow gaming organizations or companies to own or lease NFT stadiums, seats, banners, celebrity avatars, gaming experiences, wearables, and users can host special events during NBA All-Star Weekend, NFT Superbowl, and the World Cup featuring real-life sports celebrities
DRL Metaverse https://metaverse.drl.io	Virtual Reality	Browser	The Drone Racing League is the first organization to spend an entire season in the metaverse. The event does not require the community to have special equipment - you can access the link to the sporting event from mobile devices and/or PCs.
LegionFarm https://legionfarm.com/	Communication platform	Browser	Platform for training gamers and athletes. It allows you to have cooperative sessions with experienced players, as well as go through different levels of the game with them in online multiplayer games. Used for online competitions
gangwon-2024 https://xrgw.kr/en	Virtual Reality	Windows, Android, iOS	The first official metaverse for fans of the 2024 Gangwon Winter Youth Olympic Games (held from January 19 to February 1, 2024). After creating their avatar, users navigate through a virtual 3D world. Viewers were also able to virtually experience some winter sports using simulators, graphic panels and a virtual reality kit. Creators: International Olympic Committee (IOC), Gangwon 2024 Organizing Committee (YOGOC) and Gangwon Province with support from the Ministry of Science and Information and Communications Technology (MSIT)

of Internet technologies, which has broad application prospects, which will inevitably lead to significant changes in social and cultural life. Metaverse technology will develop and integrate many high-tech advances such as VR, AR, XR, AI, game engines, blockchain, cloud computing, etc., which will be quickly copied and updated, and then give rise to and promote the rapid development of various sciences and "comprehensive governance" [1].

It should be noted that researchers, when determining the component composition of the digitalization of sports, identify semantic parts and means of digitalization that are different in orientation. The very definition of what is a metaverse, a virtual world, or just a computer game today is not clearly defined [9].

Scientists call the first metaverse "CitySpace" and after it the number of metaverses grew, for example, such as "Active Worlds" and "There". The most popular is considered "Second Life", developed by Linden Lab in 2003. The Metaverse was an alternative world where you can create avatars and choose their features. In this world, a person could communicate, buy real estate, engage in design, and even get a university education. Second Life had its own economy, even its own currency - the Linden Dollar. There are examples of government representation in metaverses - for example, the government opened an embassy in SL, where many cities, universities, artists and individuals created virtual assets [8].

There are other examples in the academic world of exploring metaverses for educational purposes, such as Roblox, Minecraft, and Fortnite. A significant number of works on the use of metaverses in education touch on the natural science block of disciplines, describing the functionality [2, 11, etc.]. A significant part of the work is devoted to economic problems; generating income in the virtual world and ownership of content are discussed. Problems of marketing, regulation of trade activities and currency control in metaverses, including the success of investments [13]. Individual works were devoted to various forms of self-expression, including art, and the conclusion was made about the emergence of a new form of art, where the viewer is an accomplice of the work of art. This feature can also be transferred to sports activities. Questions were raised about the relevance of cyberpsychology and the interaction of the human personality with several of its (different) avatars. The problem of virtual reality churches and the activities of their missions is also being developed [6].

Separately, we can highlight studies on the popularity of metaverses among athletes.

The first works on metaverses in sports were devoted to the problems of designing online arenas, and also discussed the social, political, economic and ethical consequences of online games.

There are examples in sports where virtual reality is already used to teach certain sports; this has become especially popular during the pandemic. Thus, there are examples of basketball training [12]. Another example is training in sport climbing - augmented reality is used when the avatar shows the athlete the next position to complete the route and in this case the athlete can choose the route he wants to learn and can train for as long as he wants without the help of an instructor [4]. A review of golf simulators using metaverse technologies includes four actively selling models, where the player can not only compete and train in the virtual world, but also receive advice from an avatar coach [3]. It has been shown that such an interaction with data control is significant for people whose physical activity is not simply associated with socialization, but is determined by the desired result, like sports [5]. The users of these platforms themselves tend to make decisions based on data and listen to professional opinion about their health status [10].

Current trends in sports metaverses, according to the latest data from researchers, are shifting from simple user enjoyment during physical exercise to improving sports results with the help of new technological solutions [7].

An analysis of foreign scientific literature allows us to state the following: sports metaverses have firmly entered the orbit of scientific research and currently there is a discourse not only from ontological, but also from axiological and anthropological perspectives. However, there is no scientifically based consensus on the content and technical implementation. Therefore, it is important to study the topic comprehensively, including trying to study and systematize practical solutions.

Practical cases of implementing sports events in metaverses are characterized by a great variety of both technological solutions and the range of social impact. For example, on February 12, 2022, an army of fans watched two former UFC champions - Russian Khabib Nurmagomedov and American Max Holloway. This fight was memorable not only because Khabib became an undefeated fighter in the digital world, but also because fans bought $3.2 million worth of tokens in the Legionfarm metaverse.

To illustrate the diversity of sports metaverses, a comparative analysis of the metaverses that are used in the practice of holding sporting events was carried out (see table).

It should be emphasized that the presented analysis does not claim to be a complete coverage of all sports metaverses that currently operate. The last two years have seen the rise of metaverses related to the wellness and beauty industry. In these worlds, a lot of attention is paid to sports as an important part of a healthy lifestyle.

In the Russian Federation, there are scattered practices of holding competitions in an online format (including in virtual reality), and there are also breakthrough technical solutions for sports.

The most interesting, from the point of view of interactive interaction with fans, is the "virtual stadium" from the company "Electronic Mashroom" LLC. Also technologically advanced, in terms of providing a unified mass competitive virtual space without signal delays even in remote areas, is the "virtual airsoft" product from Game Systems LLC. However, it is too early to say that popular domestic sports metaverses have been created.

Conclusions. Promising, in our opinion, is the creation of sports metaverses, which, based on artificial intelligence technologies, allow us to customize the choice of sport and the process of sports training, depending on the level of individual preparedness. In the future, the user himself can create sports and physical activities based on his own preferences with consulting support from the platform, as well as the possibility of implementation using current technologies.

Provisions up for discussion:

- sports metaverses require study and scientific and methodological support;

- digital environments significantly change not only the format of sporting events, but also create new channels of communication with fans, which is associated with the ability to interact with digital assets;

- when training personnel for the sports industry, primarily managers, it is necessary to develop the competence to work with sports metaverses.

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