VR modernism: the newest technological solutions for urban development and preservation of cultural heritage

T E Fadeeva, A D Staruseva-Persheeva and D G Davidov

School of Design, Faculty of Communication, Media and Design, National Research University Higher School of Economics, Moscow, Russia

E-mail: tfadeeva@hse.ru

Abstract. Modern urban studies are developing in an inextricable connection with sociology and economic theory, since the city is thought of as a “machine” that summarizes all the processes taking place in society and, accordingly, through the development of cities, it is possible to solve such pressing issues as inequality, growth of crime, etc. However, no less important is the issue of the “organic integrity” of cities, which implies a careful treatment of a variety of buildings, including those that seem technologically and aesthetically outdated. This article highlights the basic contradiction between two approaches to urban planning: the pursuit of constant innovation and the desire to preserve the diversity of urban development. Virtual reality is becoming one of the most effective tools for solving issues of the city care today. The article will analyze international experience, demonstrating how the design of new buildings is carried out with the help of VR technologies and the work is carried out to preserve the cultural and historical heritage.

Key words: science-art, urban planning, modern art, VR-technologies, cultural and historical heritage.

1. Introduction

It is known that through the analysis of the past it is possible to develop correct methods of reflection on the present and build a successful future. Vissarion Belinsky wrote: "We question and interrogate the past, so that it would explain to us our present and give us a hint about our future" [1]. And if we transpose this idea into the material of urbanism today, speaking about the preservation of cultural and historical heritage, it is important to refer not to the abstract times of the “golden age”, but to the past, which many remember but sometimes do not even perceive as “historical”. The very close and relevant for the society past, which it is important to have a possibility to "interrogate". In the context of preserving the historical heritage, we are talking not only about miraculously preserved churches of the 15th-19th centuries in the Russian cities, but also about the industrial brick style of the 19th century, constructivist experiments of the 1920s, Stalinist architecture, Soviet modernism and post-Soviet buildings. Often, the aforementioned architecture is not perceived as a cultural and historical heritage, and therefore there is no proper public oversight of the processes happening to it: buildings do not receive protection status, are in emergency condition, and their location in the historical center makes such objects attractive "victims" for construction and development companies. The Bolshevka Labor Commune is one of the most remarkable constructivism monuments; it was a part of the historical image of the city and a “place of memory” for its inhabitants. This particular
example of how the “outdated” construction is sacrificed for the sake of innovation, shows a confrontation of theories of urban space development, which began with the emergence of modernism and continues in one form or another up to this day.

2. Modernization or preservation of the city “layering”
If we think of a city as a huge “machine for life” designed to solve functional problems, it is natural to strive for its constant renewal in search of the most economically efficient model. The history of this approach dates back to the Haussmann's renovation of Paris, when the historic center of the city was dismantled to improve the quality of life of the citizens in these areas and to strengthen local authority. This project was met with criticism, however, the desire for progress prevailed. The first half of the 20th century was the peak of the development of modernism in architecture, the “life-building” impulse of which meant a radical transformation of the entire infrastructure of the city and its appearance in the name of building a new regime of social community.

The flagship of modernism, architect and theorist, Le Corbusier looked at the city as if from an ivory tower (or from the Bentham panopticon), everything in his vision was rational, strict, unified [2] “The despot is not a man. It is the Plan. The correct, realistic, exact plan, the one that will provide you with a solution” [3]. Straight streets, standardized houses, precision of forms, clarity of design and formal simplicity, as envisioned by Le Corbusier and other modernists, were the way to achieve the functional efficiency of the new society. The ideas of modernism were systematically implemented all over the world, from Brazil to India, from France to the Soviet Union.

However, the utopian project did not fully justify itself, as evidenced by the fate, for example, of the Pruitt-Igoe residential complex, built in St. Louis in the mid-1950s to provide the middle class with housing, which was planned according to all the rules of modernist thought, as a dehumanized model of an ideal residential complex and after a few years of operation it has turned into a ghetto.

In the 1960s, criticism of high modernism in the field of philosophy, contemporary art and urbanism was formed, in particular, it manifested itself in the book by Jane Jacobs "The Death and Life of Great American Cities" (1961) [4], where the author tries to change the logic of perception of the city by retargeting the optics "from above" to optics "from the inside", i.e. to see the city through the eyes of a citizen and through microsocial connections and details that are not available to city planners who stand at the impeccable layouts. "The Death and Life of Great American Cities" is a fundamental work, initially a protesting one, over the past fifty years it has become a reference book for urbanists, city planners who do not strive to make the cities impeccable constructs, but aim to develop them as flexible ecosystems focused on the comfort of everyday life of the citizens [5, 6, 7]. In the context of this work, the chapter devoted to the preservation of old buildings, is of interest. By "old" buildings, Jacobs means "... many simple, ordinary, inexpensive old buildings, including those in poor condition" [4]. Old buildings, according to Jacobs, bring the effect of diversity to the city's public space, which opposes monopolistic network trade, it is in old buildings where "due to the low economic importance of the chair and table, such luxury as discussions, that do not promise profit, are possible" [4]. Preservation of old buildings, capturing different eras of the city's history, not only creates aesthetic diversity (important for both local residents and tourists), but also allows one to maintain an emotional connection with the experience, the "life world" of the people who constructed those buildings, to strengthen ties between generations. In this regard, both the "Khrushcheyovkas" [8], and the slums described by Jacobs are significant and worthy of reconstruction.

Supporters of innovation and constant modernization of the city justify their position by claiming that they are relocating people from dilapidated housing and improving their living conditions. However, this process becomes problematic when relocation is supposed to be to remote areas (as in both cases under Baron Haussmann and under the mayors of the 21st century). Jacobs-backed Stanley Tankel, planner and opponent of slum demolition, can be cited as an answer: “Why do we only accidentally discover that slums
sometimes create the ingredients of good housing policy within themselves? We suddenly see <...> that families do not always move out of the slums when their income rises; that paternalistic management does not eliminate the desire for independence in slum dwellers; and finally (incredible!) that slum dwellers, like everyone else, do not like to be driven out of their homes. <...> The next step will require a great deal of humility from us: we are now very much inclined to confuse large construction projects with major social achievements. We will have to admit that no one, no matter how strong imagination he or she may have, is able to create a human community: they are not created so easily. “We are repairing buildings, leaving people alone”; "No resettlement outside your neighborhood" - these are the slogans the state housing program should have, if they want it to be popular" [4].

Another urban theorist, Sharon Zukin, in his Cultures of Cities [9], describes the transition from Ford to symbolic economies through cultural imagery. Although Zukin considers cultural symbolism in this case as a repressive practice in relation to marginalized segments of the population, in our case an important idea is that these are the cultural symbols that form the image of the city, which further creates the collective identity of residents, as, for example, in St. Petersburg, where the majority of residents, regardless of income and education, consider their city to be the cultural capital.

The mental health of the citizens and the connection with the surrounding urban space are analyzed by Paul Keedwell, an English psychiatrist and neurologist who defended his thesis in psychology in the history of architecture. One of the parameters that Keedwell describes is the historical value of the place. Based on a number of studies [10, 11], Keedwell concludes: "The more original a place is and the more closely it is connected with the history, the higher is the likelihood of forming affection to the place among residents" [12].

The interaction of different cultural layers in the urban space is an issue that requires constant revision and a flexible approach that allows taking into account both rational and emotional arguments. The same can be said about the urban development planning, which is carried out by the specialists, however, it also requires the involvement of the citizens.

We suggest paying attention to how you can approach solving these problems by using augmented and virtual reality technologies.

3. VR technologies as tools for urban planning

Urban planning projects, created using virtual reality tools, can facilitate more productive discussions between concerned parties (client, contractor, community) and lead to more informed and balanced decision making. This is largely due to the fact that planning engineers can not only visually demonstrate their solutions using 3D models, but also provide the user with the opportunity to visit the virtual space of a future city and independently assess its appearance and, for example, its “fit” into the existing urban context. R. Hassan, Associate Professor at the Department of Computer Visualizations in Urban Planning and Landscape Architecture at the Faculty of Landscape and Society at the Norwegian Life Science University (NMBU), notes that there is a demand for urban non-professionals, such as politicians and the general public, to understand the overall urban planning concept that can be rendered with VR tools [13]. Hassan is known for his work on the preservation of the cultural heritage of Palestine, in particular of the Hisham Palace [14], in the “digital heritage” format [15]. R. Hassan is currently the founder and director of the Virtual Reality Laboratory at the Norwegian University of Life Sciences (NMBU). The virtual reality laboratory is an arena for experiments in the field of advanced technologies for 3D computer visualization of design project scenarios, cultural heritage preservation, environmental research and urban construction. According to Hasan, with the growing use of virtual reality in urban planning, it is likely that it will soon become a key link in the development of cities and towns [16]. Projects similar to Hassan's virtual laboratory are being implemented at other universities - for example, the University of Minnesota in 2015 launched a project using "social" virtual reality [17].
Creation of “virtual copies” of architectural objects, both old and modern, never fails to attract the attention of the audience. “Virtual tours” to various cities of the world, from London to Tokyo, are becoming more and more popular among users. A virtual tour is not a substitute for acquaintance with the “real” urban space, however, it can help to awaken the user's interest and the desire to "see everything with their own eyes." Also, through the use of the VR technologies, the viewer can get a unique experience of interacting with the so-called "Paper architecture". Thus, in 2019, the design company Kilograph completed work on the project "Imagined Landscapes", offering the user a new experience of virtual reality. The project used unimplemented architectural projects of Michael Graves, which he completed in the form of paintings. In fact, we are faced with one of the options for "paper architecture", architectural structures that are unrealizable in reality for one reason or another (scale, technical complexity, problems associated with financing, etc.). The VR space opens up new prospects for such projects, which have been previously regarded as “the art of utopia”. Thus, "Imagined Landscapes", based on Graves' paintings, offers the viewer the opportunity to visit the "watercolor" spaces created by Graves, turning the architect's pictorial works into an interactive experience for visitors.

According to G.M. Shapovalova, "popularization of cultural heritage objects, traditional art forms among the younger generation through the translation of a tangible traditional cultural paradigm into a technically accessible modern virtual cultural paradigm is a very effective way in the long term"[18]. The topic of preserving cultural objects by means of the latest technologies is increasingly expressed in scientific discourse [19, 20, 21, 22], and it should be discussed in more detail.

4. VR as a way to preserve cultural heritage and attract the interest of a wide audience to it

In many ways, projects aimed at recreating cultural heritage objects in the VR space are associated with their destruction due to wars, natural disasters and other catastrophes. Virtual reality technologies make it possible to "restore" lost monuments as three-dimensional virtual objects. Thus, in 2015, specialists from the "Visualise" company together with "The Economist" and the non-profit group "Rekrei" within the framework of the "RecoVR: Mosul" project began work on the reconstruction of the museum of the city of Mosul, destroyed in Iraq. In 2018, The Arc/k Project was launched, the goal of which is to restore with the help of virtual reality technology the historical appearance of Syrian Palmyra, which was nearly destroyed in 2015.

In collaboration with CyArk, a non-profit organization specialized on 3D laser scanning, Google Arts & Culture organized the Open Heritage Project, the main goal of which is to preserve historical heritage in the form of virtual reality. Using cutting-edge technologies, 3D laser scanning, high-resolution drone photography and digital SLR cameras, it is possible to virtually recreate historical architecture within CyArk in order to simplify the architecture’s research and restoration. Within the framework of the Open Heritage project over 20 monuments in 18 countries have been preserved in a digital form. One of these monuments is the Ananda Ok Kyaung Temple in Bagan, (Myanmar), which had been successfully digitized in VR before it was hit by the 2016 earthquake. In Russia, scientists are also responding to this trend, for example, specialists from the Novosibirsk State University of Architecture, Design and Arts in 2016 began to create detailed 3D models of the buildings in the historical center of Novosibirsk, including the Alexander Nevsky Cathedral [23].

Even conservative institutions like museums are increasingly using virtual reality technology to expand their capabilities as research and educational platforms. Among them are Versailles, the Metropolitan, the Pushkin State Museum of Fine Arts, the Tate Modern gallery, the National Museum of Finland, etc. The experience of being in a virtual reality space, on the one hand, is very popular among viewers accustomed to aesthetic immersion experiences, on the other hand, the latest technologies allow the museum staff to fully archive the information about key exhibitions, keeping a detailed exposition model in virtual reality. VR is also a tool to increase audience reach, allowing people with disabilities to visit an exhibition anywhere
in the world. In addition, some museums today "exist" entirely in VR, as, for example, the Kremer Museum, which has collected more than 70 paintings by Dutch and Flemish masters of the 17th century in its exhibition.

The 2019-2020 pandemic contributed considerably to the increased dependence of the humanitarian sphere on the technological progress. Most people were unable to leave their homes, which contributed to the transition of museums and galleries to the online format, to an increase in the number of VR tours offered to the viewer and the archiving of works in VR. After the end of the quarantine period, some galleries continue to work with the VR “extension”. For example, the Colnaghi gallery plans to install special stations with VR headsets, adding virtual works of art to its exhibition, the Pushkin State Museum of Fine Arts constantly develops the department of IT and information technology, etc. Such initiatives contribute to the development of cities, attracting investments to the projects, which use virtual reality and stimulate the strengthening of the city's image, as well as preserving objects of cultural and historical heritage for contemporaries and descendants.

5. Conclusion
The latest media technologies have long come to the attention of urban researchers. And if the authors such as Scott McQuire and Adam Greenfield look at the digitalization of cities with apprehension, arguing that along with the dissemination of information there is an increase in control over the lives of citizens [24, 25], then Richard Baldwin, on the contrary, believes that the methods of technological neoliberalism will lead the society of megacities to prosperity [26]. Considering the issue of digitalization of urban spaces and objects from a cultural point of view, we can talk about the duality of the current situation: technologies shrink space and accelerate the flow of time, making the service sector more flexible, and the virtual presence more effective, but though a walk through a virtual copy of the city can become a memorable experience for a tourist, this should not replace the real experience of being in the space of the city and getting to know it “in the flesh”. If we analyze the cases presented in this study from an art history point of view, the advantages of digital technologies become obvious, as today they enable us to efficiently collect, store and study information, and in the future they will be able to create a real “time machine” for the scientists. We believe that urban studies today are faced with a number of increasingly complex problems, including both rational and emotional components, and therefore we consider it important to emphasize that at a new round of technological progress, which a number of researchers associate with metamodernism, it is important to focus on the humanizing potential of architecture and design, taking into account not only the efficiency of the processes taking place in the urban environment, but also the versatility of the experience of urban residents and the uniqueness of their “life worlds”.

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