

# Virtual Urban Realm

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**Abstract.** Analyzing current big-city urban areas authors of paper point at actual problems of residential zones in city planning. As one of decisions a notion of virtual urban realm is explored. The basis of this notion is special principles of functional and universal design, comprising of multipurposeness, flexibility, and accessibility. In addition to this idea there are significant city-planning concepts which can be philosophically put into effect on a short-term horizon (50 – 100 years). Road traffic problems, social and humanitarian problems, issues of psychological and emotional individual's climate within the boundaries of human habitat are considered. Also the problems of urbanization connected with population development and increasing of density and standard housing number of storeys are under consideration. Authors offer the multicenter study with the problem areas actualization, and their understanding and interpretation in order to theoretically integrate the notion of virtual urban realm into city-planning field of world big cities.

## 1. Introduction

The urban realm is not just a formation of biotic, abiotic and anthropogenic factors which have an effect on the development of a particular system. It is also a philosophical notion that establishes ontological, epistemological and axiological constants (or *vectors*) aimed at qualitative changes in the living conditions of individuals. The realm where an individual lives has to combine the personal and impersonal features. These features must be independent from each other. It leads to the actual problem of residential zones in city planning. The virtual urban realm can be considered as one of realistic decisions. Undoubtedly, there are many significant city-planning concepts which can be philosophically put into effect on a short-term horizon in the next 50 or 100 years. Authors set sights on the virtual urban realm (VUR) from the perspective of the future city-planning concepts. Therefore, the problem statement is clear, and the issues of today's world must be dealt fundamentally on the side of Theory and History of Architecture and Urban Development in conjunction with philosophy and dialectic principles and laws of development.

In view of the fact that the urban realm of lots of world big cities and Russian cities do not promote the harmonious development of the individual, do not create the high-quality housing conditions, it leads to an apathetic and to a certain extent pessimistic view of life. The notion of VUR as one of the future urban city-planning concepts can neutralize these negative factors. The basis of this notion is special principles of functional and universal design, comprising of multipurposeness, flexibility, and



accessibility. Urban planners should consider the VUR notion constructing new cities and improving old ones (in regards to residential districts, constructions and etc.). Consequently, it helps to establish more favourable conditions for living in modern cities.

Any urban realm is basically dialectic. The principle of dialectics is subject to the ensembles of architectural structures as well as the particular architectural objects. "Practice shows that the architectural object is viable only if its form evinces from the structure's nature. This process is not mechanical, but dialectical" [2].

Constructing the VUR notion let's take a closer look at the significant future city-planning concepts intending to solve the following problems.

Given the active process of urbanization and the outdated principle of urban settlement, people spend a significant amount of way time (an average of 1 to 3 hours per day). The result is inefficient use of time resources, a decrease in labor productivity, a worsening course of the emotional state of an individual living in a big city, and a high ecosystem load.

One of the solutions to the actual problems referenced hereinabove can be the implementation of the "the city in the city" program and the formation of local centers with a full infrastructure. Lewis Mumford rightly remarked that "the city is a fact in nature, like a cave, a run of mackerel or an ant-heap. But it is also a conscious work of art, and it holds within its communal framework many simpler and more personal forms of art. Mind takes form in the city; and in turn, urban forms condition mind" [4]. The concept of "the city in the city" meets partly the Mumford's position and it is outlined as follows: the residential areas are formed around the business center comprising offices and commercial premises, branches of institutions, a shopping and entertainment complex, a hotel, etc.

The green zone is divided the business center from the residential area creating a recreational space. It consists of sports centers and particular zones for leisure and recreation. Thus, the pedestrian paths between the residential areas and the center is sufficiently used. As a result, time resources keep safe, labor productivity increases, the emotional state improves and the ecosystem load decreases.

Destruction of the historical appearance of the central city zone is no less important modern city-planning problem. The architectural character formed over the centuries can be disfigured by modern buildings. The concept of a "vertical city" is a possible solution to this problem. The first floors of high-rise buildings (up to the 6<sup>th</sup>) are made in the architectural style or styles of the historical center city zone (classicism, modernism, eclecticism, etc.). The next floors are faced by solid glass units reflecting the sky, and are decorated with landscaping on steep terraces. These terraces with vertical elements are resting places for workers, employees and / or residents. This concept allows us to save the historical appearance of the city and simultaneously form a modern urban realm (for instance, a city block with an orthogonal grid of streets can be designed as the main city-planning unit).

At present, the world's leading architects and architectural and design bureaus realize several ambitious and unique city-planning concepts. One of the most famous is the concept of a "self-building city" in the desert. Swedish architect Magnus Larsson introduced the concept of "dune" for the Sahara Desert. His idea is to create a 6,000 kilometer-long inhabitable green sandstone wall. With the help of *bacillus pasteurii*, a bacterial microorganism abundantly available in marshes and wetlands, the loose sand will be transformed into a fibrous porous structure that will sustainably control desertification while housing thousands of refugees. The crux of the project however lies in the natural microbial reaction of the bacteria with the sand particles that turn them into organic dunes of structurally-sound sandstone. He stated that "structure is made straight from the dunescape by flushing a particular bacteria through the loose sand...which causes a biological reaction whereby the sand turns into sandstone; the initial reactions are finished within 24 hours, though it would take about a week to saturate the sand enough to make the structure habitable" [3].

The concept of "environmentally friendly city" realizing in Masdar City, the Emirate of Abu Dhabi, is based on a specific goal - "to become a kind of "Silicon Valley" for the development and production of clean, green, and alternative energy. Masdar City also serves as a think tank, where new solutions for climate protection and renewable energy can be developed. The developers of Masdar City are employing best-practice benchmarks, sustainable building materials and energy-efficient

technologies. As a result, the city's energy consumption was 55% lower and water consumption was reduced by 54% compared to the 2011 average figures in Abu Dhabi. The energy used in the buildings completed thus far comes entirely from renewable sources. It is generated by a 10 megawatt solar power plant and 1 megawatt of rooftop photovoltaic panels. Masdar City is also implementing environmentally friendly transportation concepts: cars with combustion engines have to be parked at the edge of town. "More specifically, it will seek to position the country as 'a world-class research and development hub for future energy technologies' and 'drive the commercialization and adoption of ... technologies in sustainable energy, carbon management and water conservation'" [1].

These future city-planning concepts can be integrated into the Russian city-planning field. It ought to be noted that people should live in ecologically clean cities or cities with a minimum carbon dioxide emission into the atmosphere. The concept of a vertical city has common features with the modern skyscrapers located in Moscow (Moscow-City), St. Petersburg (Lakhta Center), and Yekaterinburg (Vysotsky). Because of the high level of urbanization in the big Russian cities it will become relevant for the cities with a million-plus population. But it cannot be the only possible solution. Authors propose for consideration the virtual urban realm (VUR) from the perspective of the future city-planning concepts.

## 2. Problem statement

In current times, it is obvious to create the virtual urban realm (VUR) for reasons of high level of urbanization, which leads to the transformation of the big cities into the million cities. Such growth leads to the development of a new territory outside the cities. The number of buildings' storeys increase, the green cover level reduces, the transport infrastructure becomes more complex. As a result, the general temperature in the city changes upwards. Another important problem is the citizens' emotional state. It is becoming unsustainable. A fretful temper, apathy, mental stress, depression are the consequences of the modern-day urban realm. Constructing new cities urban planners ought to consider the VUR notion as the possible solution for making an attractive look of the urban realm.

## 3. Research Questions

The virtual urban realm (VUR) is a particular and dynamic virtual space (and *a system*) smoothly integrated in current urban environment. Special principles of functional and universal design, comprising of multipurposeness, flexibility, and accessibility are used in engineering and project conception development.

The VUR system allows to make artificial changes in the current urban realm of big cities. It is controlled by the single control center responsible for functioning of the common base. Using the BIG DATA technologies the common base is charge of tooling, methods, and process for planning and operating new *smart* city and its virtual realm. The urban environment should exclude sudden changes in level grounds. It helps to provide people with limited mobility move freely. And the VUR system changing the visual look of buildings and residential districts around the geographic, historic and cultural center makes public spaces more attractive. The city districts (no matter where they are situated) operated by the VUR can improve the emotional individual's state. Also it is achieved by means of coloristic building faces designing. Thus, the emotional individual's state starts changing positively. The VUR system is remarkably relevant for the cities with adverse climatic conditions prevailing most of the day. The gray shades of color should be gradually diluted with more somber ones. It can lead to psychological shift in the brain when individual's visual and auditory sensation, warmth sense and general well-being start transforming in a quite noticeable way.

In witness whereof there was a scientific experiment considered the general physical and mental state of persons. Office employees were divided into 3 small groups. The first group was asked to stay all day long in a working room with natural lighting. There was a window looked out over the garden. The second group was asked to stay all day long in a working room without any windows. But there was an air conditioner. And, finally, the third group had to work in a room, where a wall was covered with a mural depicting natural landscape. Based on the research findings the office employees of the

1<sup>st</sup> group felt much better compared with the initial pre-experimental state. The 2<sup>nd</sup> group employees showed the emotional state instability and mood fading. And the 3<sup>rd</sup> group felt something in between (*so-so condition*).

The modern society of the big world and Russian cities is in need of a strong and powerful boost to the development of current urban realm, the residential areas and neighborhoods. The current urban realm can completely stop using the excessive decoration of the building faces. Coloristic solutions of them must depend on context area. All buildings must be construct in the same color composition. Functional zoning should come to the fore in the city planning pattern.

#### 4. Research Methods

General scientific methods of analysis and synthesis were widely used in this paper as well as comparative method. Dialectical method was also used, which was expressed in law of unity and struggle of opposites, law of double negation. Modelling method was also applied for creation and theoretical definition of the VUR notion. To achieve the objectives of the scientific research system and structure-functional approaches were applied.

#### 5. Conclusion

The virtual urban realm (VUR) as a particular and dynamic virtual space and system are going to serve for citizens and residents of small residential areas and neighborhoods in the big cities. The actual practice is the extreme and full process of residential buildings' classification. Where it can be feasible and practical there is a fast growth of residential buildings upward. It leads to the high population density in in the vertical plane (5000 – 8000 persons per square km.). The VUR system allows to reduce the negative emotional background and crime in agglomerations and the outmost and densely populated areas. Close to each residential area there will be sports zones and virtual park. The VUR simulates the weather conditions, the alternation of day and night, color tones and brightness, synthetical oldness of buildings, styles of building faces, and etc.

It is not one-day business to launch the VUR. The most outstanding engineers, architects, analysts, scientists, sociologists, psychologists, philosophers and people itself have to have intentions to live in a new world solving current problems including the issues of city-planning and urban realm.

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