Visual-communication environment of a modern city

V P Dubinskiy¹ and A A Nesen²

¹ Department of Architectural Design, Kharkiv National University of Civil Engineering and Architecture, Kharkiv, Ukraine
² Department of Architecture, O. M. Beketov National University of Urban Economy in Kharkiv, Kharkiv, Ukraine

vdubinskiy60@gmail.com

Abstract. The article aims at presenting an updated outlook on theoretical developments on the space of a modern city focusing on the formation of new dynamic environments, in particular the formation of a new object of the architectural space of a modern city – a visual-communication environment. The analysis of the research on the problem allowed authors to define conceptual issues of the subject of the research corresponding to modern world trends and scientific terminology. For the further emphasis of main subject of the research, the definition of the visual-communication environment of a modern city has been suggested. The importance of developing a comprehensive master plan of visual-communication environment of a modern city as the basis for possible solution of a number of problems of modern large cities has been determined. In addition, the definition and characteristics of the main structural parts of the comprehensive master plan of the visual-communication environment of a modern city (visual-communication frame, visual-communication outline) have been given. These categories allowed to reveal the nature of the visual-communication environment reflecting its compositional features.

“The life of the village is narrative... In the city the visual impressions change, overlap, intersect, they are “cinematic”. Ezra Pound [1]

1. The research of a modern city environment

The environment of a modern city is a space oversaturated with a variety of the latest innovative technologies and devices that are introduced into all spheres of human activities. The sphere of architecture is no exception: the architecture of the last decade of the twentieth century focuses on new super-power digital technologies and media.

At all stages of its development mankind tended to create the best means and ways of exchanging information for breaking down time, language, spatial and other barriers. It can be seen in the real world, when the steeple of the Catholic church is able to inform us that it is the place for meditation and religious meetings, bricks and ivy of the universities mean the years of education and scientific researches and the white smooth walls of the Greek temples reflect the birth of science, while the bright colors of the children's playgrounds denote games and joyfulness.

The form of media, their artistic and functional role in architecture, has been changing under the influence of society’s needs. In the century of scientific and technical progress they became completely
independent from the traditional architectural form, separating into an individual set of means of space systems organization. Now, they are on the level when it is possible to determine the tools and approaches applied in this sphere.

In the pursuit of satisfying practical needs, such as safety, convenience and comfort, as well as environmental friendliness and ergonomics of forms, the environment of a modern city demonstrates a complex urban network that is oversaturated with “bursts” of digital technologies. Such an environment manifests its architectural and design “interior” when interacting with a resident of a modern city in its daily routine. At this instant – the moment of interaction – chaotic “bursts” occur. First of all, it is a consequence of unawareness of theorists, designers, urbanists, project developers and residents of the city as a whole of the peculiarities of these systems, as well as restricted professional approach of some sciences to the study of this problem.

1.1 Current situation and trends
Synergetic, non-linear thinking and computerization of the general culture provoke re-thinking of the existing architectural space and determining the ways of its future development. According to Lev Manovich, “today we are witnessing the emergence of a new medium – meta-medium – a digital computer”, which forms some kind of media systems, running through all spheres of life [2]. At present, there is no well-established general definition of these systems among the specialists of aforementioned fields; there is no derived general terminology. The analysis of the theoretical advances shows that initially media components were considered as an addition to the objects of an architectural design of a city. However, with the dynamic growth of cities and introduction of innovative technologies, they separated into an independent system, requiring a comprehensive consideration in real time. According to Norberg-Schulz, the main problem of the researchers studying urban space is considering this space a priori, though everyday life is to be the main task of architects and planners [3]. While studying such systems, first of all, it is necessary to accept their dynamism and flexibility, as in the result even an extensively designed city object faces physical changes at different levels throughout its existence.

Sometimes works researching this problem are called digital studies. Nevertheless, at present there is no single established academic term for such an interdisciplinary space. Such notions and terms as “information environment”, “adaptive architecture”, “intellectual architecture”, “media city”, “cyberspace” etc. are used.

The interpretation of “intellectual architecture” as a communication open system occurs for the first time in theoretical and practical research studies of the late 60s in Europe. British cyberneticist Gordon Pask suggested a model of an interactive environment including the real and the virtual, in which “computer systems, materials and space enter into a dialogue with their user having wide opportunities of studying him and adapting to his needs” in his work “Essays on Cybernetics” [4].

A significant contribution to the theory of urban planning was made by Kevin Lynch, who developed the theory of an urban form. He was the first to pay attention to the visual elements and cognitive ideas of the urban environment, the peculiarities of a city perception by its residents, which led him to drawing up the concepts of a mental image of a city and mental maps [5].

The concept of an architecture that responds to the changes in the environment easily, became the central subject of the leading trends after World War II. It aimed at creating a unique urban infrastructure, satisfying individual needs, and the architecture, which is constantly evolving socially, ecologically and technologically. French architect Ion Friedman, the founder and the leader of the Group of mobile architecture (GIAM), dedicated himself to the development of new “mobile” urban structures. His theoretical investigations crystallized into a complete project “A city in space”, presupposing the creation of an enclosed, flexible space and temporary structures (“agglomerations”), able to rebuild itself if necessary. Friedman considered that the classical architecture underestimated the role of a resident and created a subordinate indifference. He believed in the main role of a resident in relations with an urban body – “The structures, forming a city, are to be skeletons, which are filled in accordance with the individual wishes of its residents” [6].
Nicholas Negroponte, an American information scientist, whose scientific work is related to an artificial intelligence, was the first to introduce a notion of an adaptive (sensitive) architecture. His works “The architectural machine” and “The machine of soft architecture” represent the first attempts of defining “sensitive architecture” as a product of natural integration of computer technologies into the space and structure of a modern city [7].

Australian media theorist Scott McQuire carried out a thorough cultural and historical analysis of the combinability of media technologies development with the progressive urbanization of the world. He paid special attention to the integration of media into modern urban life. This phenomenon is denoted by him as “relationship space”, formed by the media which are becoming increasingly mobile, scalable and interactive [8].

According to their theory of tactical urbanism, architects Mike Lydon and Anthony Garcia believe that for progressing ahead even some prerequisites are enough. They consider that short-term creative projects make it possible to react to constantly changing living conditions and technologies [9].

In modern theoretic studies of such researchers as Akhmedova L.C. [10], Bilgin Altinöz [11], Dubinskiy V.P. [12], Esaulov O.V. [13], Kudaeva E.A. [14], Cihanger D. [15], Hudnik Sh. [16], Yarimbas D. [17] the focus is made on the emergence of new qualities and peculiarities of the urban environment. Various hypotheses on the formation of the environment of a modern city are put forward proposed but they are considered from the point of view of one of its functional characteristics and are not thoroughly investigated.

The analysis of the research works on the problem allowed the authors to single out a new special environment – visual-communication environment, fulfilling a number of functions (aesthetic, communication, psycho-physiological, orientation, social, semiotic, ergonomic) encouraging qualitative perception of a modern city by its residents.

1.2 Problem formulation

The environment of a modern city, influenced by the processes of globalization and mass consumption, is a kaleidoscope of various media components that are not subject to a single order. A modern city is no longer just a vacuum for living. The space is transformed every day – it becomes a layering of various structures and systems connected with several historical eras of a city transformation. New dynamic, innovative environments able to adapt and evolve are formed and each of them requires detailed investigation. The visual-communication environment is one of them.

A resident of a modern large city often falls into a dissociative network of media technologies, the components of which cause disorientation, loss of awareness of the current moment as it is. Widespread computerization engulfs all sections of a city. Furthermore, the authenticity of a city image, the idea of its subject-space environment and its unique historical heritage are lost. It becomes empty, vague, non-ergonomic, prone to gradual collapse. All these features lead to an unsatisfactory state of the visual-communication environment, dissatisfaction of the residents-users of this environment, in particular, and the dissatisfied city as a whole, making this issue an urgent and important subject for the research.

Innovative Internet technologies make us revise the most basic principles of designing architectural objects; correct, predict and clarify the changes in the environment of a modern city.

2. Visual-communication environment of a modern city

Due to the fact that the study touches upon the problems at the intersection of architecture, urban planning, cybernetics, semiology, sociology and psychology, their usage of similar research vocabulary became apparent, but the notions and terms in use are not always correlated. Thus, basic definitions were specified in the research process. It allowed the authors to derive a research vocabulary on the subject, corresponding to the current world scientific trends.

What is a visual-communication environment? What is its role in the formation of a modern city?

Visual-communication environment (VCE) is an independent functional object of an architectural design; a hierarchical system of a city, the forming components of which are anthropogenic and natural elements of an urban environment, equipped with visual and communication means.
Gradually, the elements of VCE have evolved from the primitive wall paintings and pictograms to modern innovative devices and full-fledged independent objects of a city environment: video walls, media facades, objects with systems of mobile reactive media, etc. Its functional potential has significantly expanded as well as its sphere of influence. Modern buildings are no longer monotonous static objects. These are full-fledged media components of VCE, able to read, analyze and respond to the surrounding vital processes. VCE of a modern city becomes “smarter” and more interactive.

In the course of the research it was revealed that VCE is a complex hierarchical system requiring a comprehensive investigation based on the principles of environmental and systematic approaches. VCE is directly related to the physical reality (for example, architectural buildings, natural and anthropogenic objects), as well as to people and their activities. Furthermore, there are less perceptible bonds describing the real state of VCE, such as socio-demographic situation, culture and general atmosphere.

It is known that any system is a set of interconnected components of various types, characterized by their unity. The first task of the analysis is to reveal the structure of the VCE system, its functions and features.

The main characteristic features of VCE are the following:
- a new form of communication based on the Internet;
- a new system of storing, moving and reading information in space;
- mimicry to the existing environment;
- a departure from stable geometric forms to smooth and flowing shapes;
- introduction of innovative technologies and devices;
- a new way of interaction with human sensations and feelings.

The main components of VCE are visual-communication frame and visual-communication outline, forming the skeleton and the body of VCE.

Visual-communication frame (VCF) is the main means of revealing and forming the visual-communication environment of a modern city, which clearly identifies the hierarchy of compositional axes and visual-composition junctions; it forms the “skeleton” of the visual-communication environment, being a well-established transport and pedestrian infrastructure of a city, including city highways and district roads, pedestrian streets.

VCF is formed by a set of composite centers (nodes) and composite axes. In the hierarchical VCE system, composite nodes and axes are considered as additional (secondary) structure-forming elements.

Visual-communication outline (VCO) is a set of information elements, visual tools and objects, structured and subordinated to the general hierarchy of compositional axes and visual-composition junctions, creating the “body” of the visual-communication environment; it includes a diverse range of natural and man-made urban objects.

VCO is increased on VCF, and is a set of visual-communication zones with their visual-communication borders.

All of the aforementioned structural elements are parts of a comprehensive master plan of the visual-communication environment of a modern city.

The next step is to consider the purpose and features of the comprehensive master plan of the visual-communication environment of a modern city.

Visual-communication master plan (VCMP) is a design document determining the fundamental model of the development of the visual-communication environment of a modern city, its layout, character, zoning and infrastructure not as a sum of separate parts but as a complex unity.

Designing of the visual-communication environment of a modern city, influenced by the interdependence of qualitative and quantitative changes, is carried out on the basis of this document. The main part of VCMP is a large-scale display of a city with a drawing of the designed object - the VCE system, plotted on it using a graphic overlay.

It is possible to solve a number of problems of modern large cities by following the regulations and restrictions of the comprehensive VCMP. Among such problems are: achieving the proper organization of information and orientation means in a city, preserving its historical heritage and emphasizing the authenticity of buildings, creation of a high-comfort and ecologically balanced environment for human
life and activities, improving the aesthetic characteristics of objects, increasing safety, reducing time spending of people looking for something in a city. Certain regulation of advertising elements will allow to settle the problems of information pollution and media ecologization of a modern city environment.

Visual-communication environment is a sum of architectural functionality, visual epistemology and new interface operations. Since its components are introduced and implemented randomly now, the development of a comprehensive VCMP at the legislative level will allow to avoid further problems in the architectural design of modern cities.

It should be emphasized that the formation of VCE is to be carried out by taking into account the nature of the existing architectural and planning composition of a city consisting of anthropogenic and natural elements of the urban environment. The introduction of the VCE components can be a radical interference in a city and its architecture, but nevertheless one should take care of the architecture of individual buildings and take into account the peculiarities of the neighboring structures. The historical heritage of a city should be preserved, improved and complemented with the latest technologies. The interrelation of anthropogenic and natural components, improved and supplemented with innovative technologies, makes it possible to derive the following formula of VCE:

\[
VCE = \text{InnT} \times (\text{AE} + \text{NE}),
\]

where \(\text{InnT}\) – innovative technologies; \(\text{AE}\) – anthropogenic elements of the urban environment; \(\text{NE}\) – natural elements of the urban environment.

This formula shows that anthropogenic and natural elements are parts of a city. But their symbiosis with innovative technologies creates VCE of a modern city.

Since VCE is a dynamic, interactive system, it is influenced not only by qualitative and quantitative characteristics of a city but also by such constants as time (when/how long) and space (where/how). Due to built-in innovative technologies, it can change in space and time, adapt and transform depending on its environment.

\[
T > (VCE < R) < S
\]

where \(VCE\) - the visual-communication environment of a modern city; \(T\) – time; \(S\) – space / environment; \(R\) – a resident of a modern city / a person-user.

Technologies development, computerization processes and architecture are in constant close interaction, influencing each other. A computer, as one of the components of VCE, and a person enter into progressively deeper relationship and the architecture acts as a platform, providing their interaction. Special attention should be paid to the important role of a resident-user in the system of complex relations between VCE and a modern city. Initially, a city forms the space and the environment, and influences the perception of a person. An architect transmits information to the resident through an architectural image, with any element of the subject-spatial environment participating in communication due to the data encoded in their form. But there is also a reverse effect coming from a resident, when he transmits specific information and data.

The narrative of the architecture on behalf of an architect may differ greatly from a resident’s point of view. Moreover, each participant of this “conversation” may read a different plot … that is why the perception of the same architectural object by a tourist and a student of architecture differs so much, though both of them are acceptable for architecture.

A resident of a modern city is not just an ordinary man, but also an active user of all interactive devices. In his relations with architecture a resident-user selects clues from the environment, as well as his memories and knowledge, which make him build a holistic comprehension of the environment. It is some kind of a test of his experience and immediate reaction. Thus, he can communicate with the environment he lives in, being an interface for transmitting information, but the environment can communicate with him as well. In this case, the aforementioned environment is VCE, responding to his requests, adapting and analyzing his characteristics and peculiarities.

Some design theorists believe that there is a constant reflexive conversation between a resident of a modern city and urban environment [18]. That is, people initially perceive the environment with already
established preliminary comprehension, vague projection of the “complete product”. But in reality, this projection is then re-projected, requiring dialectic refinement and re-determination of its parts. Hence, a constant dynamics of reprogramming of this image occurs, which makes VCE so inconstant and dynamic in its development but, at the same time, a unique environment of a modern city.

As previously noted, architecture turns from static to dynamic, establishing some kind of “receptive field” for interaction with a resident-user of a city, represented as VCE. It can read biometric data and adjust to a specific person or a group of people; remember his moods and requests; respond to the climatic conditions; constantly share information; be innovatively flexible. Buildings move, smell, talk and maintain themselves. However, proper dissemination of information among all residents is still burdensome and mutual dialogue is not always successful (that is, who, when and what data obtains?). Nevertheless, a modern city of the future turns to a smart cyber-space and an architect becomes a guide into this new space.

3. Conclusion

The study of an architectural environment of a modern city showed that city dwellers are in a continuous information flow. A city has passed from the static state of vacuum for living into the dynamic environment, which is in constant development and renovation. Although, according to their main purpose the buildings are considered to be an accommodation, they are presently on the way to media-computer renovation.

This leads to a progressive appearance of new environments, able to adapt, transform and pass from one state to another, regardless of their initial purpose. The visual-communication environment of a modern city (VCE) is one of such environments.

Because of the mass chaotic introduction of innovative technologies and devices of different forms and types, that have not been properly predicted, the environment of a modern city is now experiencing some of an information collapse. The chaotic use of the VCE components causes the pollution of an architectural image of a city. All these factors negatively affect a resident-user of a modern city (by disorientation, noise, information overload, abundant advertising, functional disparity of its urban elements, destruction of the stylistic unity of the architectural environment of a city, etc.).

Architecture has always been a reflection of the state of the world and a “testing ground” for the introduction of innovations, a stepping stone on the way to the future. However, currently architecture is characterized as a crucial period of its development due to the influence of several factors, changing both the fundamental nature of architecture and its role in everyday life. Said factors are the development of information technologies and widespread computerization, as well as a chain of global problems superimposed at one point.

Architects are faced with diverse tasks requiring immediate solutions and forecasts for the development of the future architecture and a city as a whole. Since each situation and context of the VCE components is unique, their careful consideration and analysis are required, taking into account the specific circumstances. All this takes architects to a completely new level of creative activities, focusing not only on the experience of previous centuries, but also on innovative technological progress.

VCE affects all aspects of human life, but its dominant sphere is the information component of a modern city. The solution of negative phenomena in this sphere can be in the so-called ecologization of the information environment. Although this problem does not have top priority in the world community now, it will be evident in a couple of years, as scientific and technical progress does not stay still.

Harmonization of a modern city life can also be achieved on the basis of a comprehensive master plan of the visual-communication environment. The creation of a coherent and unified system, where different layers do not contradict each other but join together in VCE, is the priority task. The city designed according to the requirements of the visual-communication master plan (VCMP) will stop being a projector with a large amount of visual load in the form of neon advertising, banners, storefronts and multi-colored light boxes. The city will become, first of all, a highly efficient comfortable environment, the utility coefficient of which will greatly increase due to the correct use and location of all structure-forming elements of VCE, subordinate to the unified system. Further development of a
modern city’s VCE is probably connected with the use of innovative technologies and the experiments in creating an environment capable of self-regulation, self-improvement and self-reproduction. It should be also noted that mutual co-existence of innovative technologies and the existing elements of the urban environment of anthropogenic and natural character is very important for improving the characteristics of VCE.

Considering VCE of a modern city, it can be concluded that it is a specific hierarchic system, penetrating the whole city and affecting all spheres of human life. Its formation and integration with the architectural environment occurs at different spatial levels and affects all areas of a city. It is also considered as an innovative component of a modern city, its unique digital code is used for transmitting all types of data and experience, and its language is built into the interfaces of innovative devices, building facades and street elements.

The essence of the above comes down to the fact that only the strict conformity to the developed comprehensive plan VCMP, based on innovative principles of its formation, will allow to create a quality visual-communication environment. Planning and forecasting of the development vectors of the visual-communication environment of a modern city makes it possible to provide comfort and safety, to avoid informational and media pollution. The criteria and indices of the comprehensive VCMP are the basis for planning activities, aimed at sustainable development of smart cities of the future, which is particularly urgent in the age of digital technologies.

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