Empirical study of the mental representation of the image of the city (on the example of Kazan and Naberezhnye Chelny)

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Abstract. The purpose of the study is to identify the formed image of the territory in the perception of its inhabitants, using empirical research data for this. The main results of the study are that a comprehensive analysis of the mental representation of the urban space was carried out, on the basis of which the key elements of the image of the territory, the boundaries of the vernacular districts of the city, their urbanonymy were identified, as well as the significant role of urban open public spaces in the formation of the image of the territory. The authors come to the conclusion about the peculiarities of building images of cities, centered on symbolically significant elements and spaces that act as anchors for forming the image of a city in the perception of residents, attaching the population to the territory and constructing local identity.

Keywords: urban planning, the image of the city, territorial identity, mental cards, local identity.

1 Introduction

The mental image of a city is a cumulative subjective image that reflects the spatio-temporal features of the city, as perceived by a large number of citizens. It is these collective images of the city that are of particular value. G. Gornova notes that the city identity contains a person's stable image of himself as a resident of a certain city, fixes the citizen's emotional and value attitudes to the history and culture of the city, to the city community, influences the individual's self-esteem and his productive activities [1]. In this study, we have made an attempt to understand how the city's residents see the image of the city and which methods of empirical research are most optimal. In this work, we will rely on the data collected in two cities of the Republic of Tatarstan, differing in their scale - Kazan and Naberezhnye Chelny.

Kazan is the capital of the Republic of Tatarstan. The largest city in terms of population in the Volga Federal District. Today, 1.257 391 residents live on the territory of Kazan. The planned radial-ring layout of the city is implemented by means of intra-city small and large rings, radial highways and the M-7 bypass highway. Today, there is a process of active consolidation of existing residential quarters and the creation of new residential micro-

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districts of mass multi-storey buildings (Dubrava eco-park, Lesnoy Gorodok, Solnechny gorodok, Kazan XXI century and others). The peripheral zone of the city is spontaneously formed by microdistricts and villages of low-rise individual cottage buildings. The current general plan outlines the main directions of the city's growth in the south-east direction. Kazan has a rich cultural heritage and history. Today, programs for the development of social and cultural infrastructure facilities and the creation of recreational urban public spaces are being actively implemented here.

Naberezhnye Chelny is a large industrial center, the main city of the Naberezhnye Chelny agglomeration. The second most populous city of the Republic of Tatarstan with 533 839 inhabitants. The planning structure of Naberezhnye Chelny is a combination of a linear city and a microdistrict development. During the construction of the city, priority was given to the construction of the city-forming enterprise «KAMAZ», which affected the subsequent lack of social infrastructure and the lack of provision of open urban public spaces. As of 2020, the city does not have a formed civic center, the urban environment is characterized by monotony, an insufficient degree of livability and the priority of developing the automotive infrastructure. When there is mono-type housing and similar building heights the city seems to be visually and aesthetically unbalanced [2]. All these factors have a significant impact on the perception of the city's image by its residents.

The purpose of the study is to reveal the formed image of the city territory in the perception of its inhabitants, using these empirical research data.

The research objectives are:

1. To study the methods for identifying the image of the territory and mapping information;
2. To use mind maps in scientific research;
3. To reveal the symbolic capital of the territory.

The topic of the mentality of space has long been touched upon in the scientific works of specialists from various fields, such as humanitarian geography, sociology, psychology, architecture and urban studies. The heyday of research in the field of mental mapping fell in the 1960s, it is associated in turn with the behaviorist revolution in geography, the essence of which is «the perception of space as a link between human activities and his environment». Mind maps were seen as a key to uncovering the connections between a person's understanding of his environment, his spatial choices and behavior in the environment. For the first time, mental maps were mentioned in the works of Christopher Trowbridge as «imaginary maps». Trowbridge develops the idea of an egocentric perception of space, which is at odds with geographical maps and requires separate study. From geography, mental maps move to cognitive psychology, where they get another name - «cognitive maps». The theoretical basis for the study of mental mapping is the works of leading foreign scientists: Edward Tolman, a pioneer in the study of the spatial image and its relationship with human behavior, and Kevin Lynch. In 1960, his book «The Image of the City» served as a catalyst for a detailed study of the mentality of cities.

In the 1970s, the issue of multidirectional understanding of mental maps was widely covered in the professional environment. The American geographer I-fu Tuan argued that mental maps remain one of the varieties of the geographical image. Psychologist Douglas Pocock in the study (1976), spoke of the importance of distinguishing between personal and collective images of a territory in the minds of the researcher and his interviewed recipients.

In the 1980s, Roger Downs continued to develop the theory of mental maps in his works, who presented mental maps as a reflection of reality living in the mind. Downs noted that it is the objects located on the recipient's daily routes that act as signs and landmarks in his mind, as opposed to recognized urban landmarks. He also expressed his opinion that any map is an analogue of the real world.

In the 2000s, the concept of mind maps appeared. The authorship belongs to the psychologist Tony Busen, a pioneer of the technique of memorizing, creating and organizing thinking with the help of mind maps [3].

Besides foreign researchers, there are Russian researchers who started their work in the 2000s: N. V. Veselkova, K. P. Glazkov, M. N. Vandyshev, T. N. Timofeeva. E. V. Ozerova, I. S. Mamicheva, V. A. Sapegin, L. M. Andryukhina are engaged in the study of mind maps [4].

2 Materials and methods

To date, many different approaches and methodologies have been developed to study the perception of urban space by its inhabitants. The most common are the architectural, sociological and GIS approaches [5]. Also, a number of scientists have applied computational approaches to the image of the city [6, 7]. Studying the perception of the city image by means of simulation of the city environment through the modelling of 2D and 3D spaces, the authors note that mental images of the urban environment of the majority of recipients are very different from the perceptions of the real environment. However, the orthogonal street grid is the strongest marker for the decoding of urban environments. Some researchers talk about the need to study and decode mental images of the urban environment in terms of space, events, time, activities, as well as a sense of community [8]. Belanche, D., Casaló, L.V., Flavián, C. note that socio-demographic characteristics and Urban social representations referring to city's culture, history, politics, social factors and environmental issues influence urban identity [9].

Empirical study of space representation of Kazan and Naberezhnye Chelny is based on a comprehensive analysis of the mental representation of the city space, the study of environmental features of the territory and its symbolic capital, as well as urbanonymy of places and includes the following methods:

- generalization of domestic and foreign experience in the study of the image of the city, the study and systematization of theoretical and literary sources

- field and remote study of the urban environment of Kazan and Naberezhnye Chelny, collection and study of cartographic materials that allowed collecting data for subsequent analysis of individual territories and objects;

- mental mapping of Kazan and Naberezhnye Chelny;

- in-depth interviewing of city residents, implemented in the format of live communication with the informant;

- online survey of residents by means of google forms and Instagram social network, by means of surveys in posts and comments of city residents on actual topics;

- the formation of collective visual images of the territory, by identifying the «architectural face» of the city;

As research materials, we also considered data from the cloud-based urban indicators platform Urbanmetrics, created at KB Strelka LLC, on the demand for urban pedestrian infrastructure, the index of urban spaces attractiveness among city residents and tourists (Fig. 1.), as well as data on urban population density (ArcGis Web AppBuilder). The experience of mental representation of urban space was studied in the example of Murmansk, Yekaterinburg, Moscow, Myshkin and Doha [10, 11, 12].
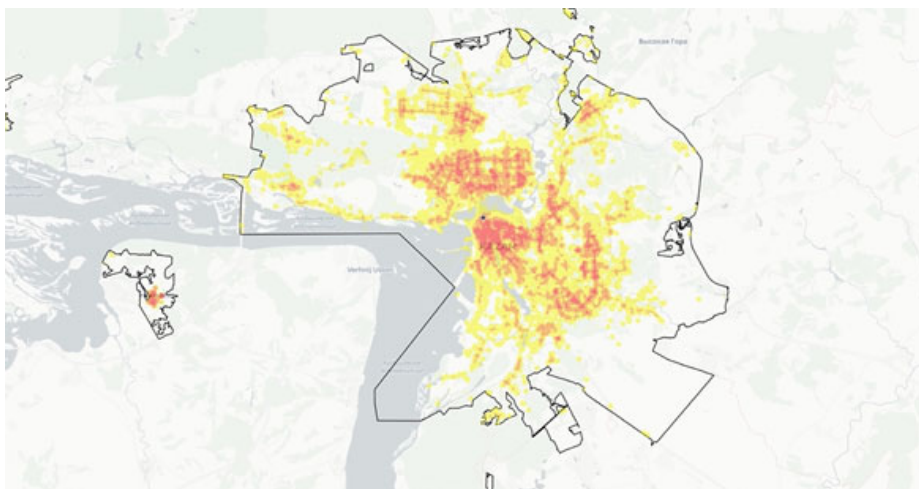
Fig. 1. Kazan urban space attractiveness index «Urbanmetrics».

3   Results and discussion

We carried out two separate studies in Kazan and Naberezhnye Chelny, both using the same methodology. We conducted in-depth interviews with the informants, in which we talked about places in the city that are important to people. At the same time, the informant was asked to indicate these places on a mental map of the city that he or she drew. We also carried out an online survey of the residents of Kazan and Naberezhnye Chelny using google forms and the social network Instagram. Our study of the city of Kazan involved 170 recipients, 110 of whom completed an online survey, 30 interviews, and 30 people drew a mental map. For Naberezhnye Chelny, the total sample was 60 people, 50 of whom completed the online survey, 10 people participated in the interview and the mental mapping.

3.1 Revealing the «architectural face» of the city

It is important to remember that up to 90 % of people receive information about their surroundings through visual perception. In this regard, the study of the visual representation of the urban environment is promising and relevant. Although researchers are mainly focused on studying the mental representation of the environment, it is important to study the influence of architectural structures as one of the main components of the visual environment in cities [13]. One of the methods from the wide field of visual research is collage on a given topic. Within the framework of this study, in order to form a collective visual image of the urban space performed by the authors of the study, the subjective assessments of respondents about various components of the urban environment were used, namely, the data of a sociological survey (questionnaire survey – 110 people for Kazan and 50 people for Naberezhnye Chelny). Based on the analysis of the collected interviews, the main types of images in the perception of the territory of cities were identified.

In the image of Kazan, the objects of the water system of our city play a key role: the largest artery is the Volga, the Kazanka flows into it, dividing the city into two parts in its center, Lake Kaban and the Bulak canal. The railway «crashes into the city» from the northwest, forming a difficult barrier between the city and the Volga in the central region. The historic center of the city, which also includes the Admiralty Sloboda, is rich in iconic

objects of cultural heritage that serve as landmarks for residents in space. For example, the «Humpbacked Bridge» across the old riverbed of the Kazanka River, the Zilantov Monastery and the Alafuzov Factory are well known to many Kazan residents and form the image of the Admiralty Sloboda. The place where the identity of the city is really felt is the territory of the Old Tatar Quarter with its authentic architecture, the Kamal Theater and the new embankment of Lake Kaban. On the outskirts of the settlement there is a Tinchurin square, where every Sunday the spirit of the past soars - a flea market. The southern part of the Vakhitovsky district is an industrial zone with factories, pipes, cranes and ships on the Volga. The landmark object of the Soviet District is the Gorkinsko-Ometyevsky Forest, the largest park in Kazan, the Wings of the Soviets park in the Aviastroitelny District and the Millennium Bridge in Novo-Savinovsky. The living environment of Sovetsky, Privolzhsky districts and Novo-Savinovsky districts is formed mainly by standard housing that does not influence the formation of urban identity. The recipients singled out suburban objects that they often visit: Raifsky Mother of God Monastery, the island town of Sviyazhsk, the Blue Lakes nature reserve, the Lebyazhye forest park, the village of Pechishchi.

Collective visual image of the urban space of Naberezhnye Chelny (Fig. 2) is formed by the axes of the Kama River and Mira Avenue, located parallel to each other. The image of the river is enhanced by the images of coastal vegetation and sunset in the area of one of the main viewpoints of the city. Naberezhnye Chelny is an industrial city, the main production is the KAMAZ plant. In the collage it is the dominant mass, expressed in the produced truck kamaz, cooling towers and red farm. It, as a pillar of the city, goes beyond the collage. Mira Avenue with its iconic Tyubeteika business center and Azatlyk Square leaves the central part of the city for the area of Zyaban and HPP. Here the iconic objects are religious sites and the monument of the Motherland. The architecture of the church hides behind a typical panel building.

Fig. 2. Collective visual image of the urban space of Naberezhnye Chelny.

3.2 Mental mapping

Classic works on the identification of the image of the city, using mind maps as a tool, carried out in the 1960s include studies by C. Lynch and S. Milgram. Kevin Lynch, in his book «The Image of the City», said that in any city one can identify several universal elements: «The research results allow us to identify the content of city images correlated with object forms and classify the latter for convenience: paths, borders, districts, nodes and landmarks. These elements have a truly universal character, as they manifest themselves in a multitude of environment image types» (Lynch 1982).

In our study, we also follow the traditional scheme of studying the image of the city [14]. In the study of the image of Kazan (Fig. 3), we examined 30 mental maps of recipients who were residents of the city. Most of the subjects resorted to an invariant image of the city: schematically depicted streets, water bodies, recreational facilities and buildings. However, 33 % of the recipients also used variant image elements: symbolic representations of iconic buildings and individual residential formations conditioned by their individual perception. For a further more detailed analysis of the recipients' maps, we identified the five elements of the city image proposed by Kevin Lynch (paths, borders, districts, nodes, landmarks) (Fig. 4).

Boundaries. The boundaries of the image of the city were determined by the recipients themselves. Only 5 % of the respondents have drawn the boundaries of the city in accordance with reality. There are several waterways on the territory of Kazan, which dictate the features of the planning structure of the city: the Kazanka River, the system of Kaban lakes, Bulak duct. All the respondents also pointed out that the Volga River is one of the natural boundaries of the city. The railroad and large urban green areas were also highlighted as boundaries.

Districts. In the mental maps, only 3 % of the recipients identified all or most of the city's administrative districts. However, part of the recipients also marked the boundaries of local areas of «natural communities».

Pathways. Pathways can be divided into two large groups: walking and transport. It was found that 7 % of the subjects drew and signed connections between nodes and landmarks. This indicates a lack of systematisation of the perception of the urban structure. Unfortunately, the pedestrian connections were predominantly displayed in the central part of the city, while in the bedroom communities they were present in a fragmented way, near local landmarks such as shopping centres, cultural centres, district parks and squares. One of the main pedestrian routes in Kazan, highlighted by recipients during the study, is Bauman Street, as well as Profsoyuznaya Street, Tatarstan Street, Peterburgskaya Street, Bolshaya Krasnaya Street, Pushkin Street, Kremlin Street, Karla Marksa Street, Mushtari Street, Moskovskaya Street, Right and Left Bulachny Street, embankments of Kaban Lake and Kazanka River, the old dam from the river port through Lokomotiv Beach to the central railway station. Main roads that are perceived as «roads» have multi-lane traffic, they include: southern highway (Prospekt Pobedy/Victory avenue), Tatarstan, M. Salimzhanov, Vishnevsky, N. Ershova, Gvardeyskaya, R. Zorge, Tankovaya, F. Amirkhan, Vosstaniya, Dekabristov, Chistopolskaya, Belomorskaya streets, Yamashev and Ibragimova Avenues, Sibirsky, Orenburgsky, Mamadyshsky Trakts, Gorkovskoe Highway.

Fig. 3. Mental map of Kazan.

Nodes are another key element of mental maps. Nodes can be referred to as places, spaces to and from which the observer moves. Nodes are places or strategic points in a city to which the observer can have freely access, focal points. They most often occur at the intersection of paths. Nodes can act as connections between transport and pedestrian connections, or they can simply be places of maximum concentration of a particular function or feature. Nodes have a close relationship with paths, being their connecting element, and the neighbourhood, becoming the «core» generating activity of the whole neighbourhood, becoming their centre of gravity.

Recipients most often singled out transport and transfer hubs as urban nodes, as they are the mechanism for getting around within the city and in the suburbs. The main nodes present in most maps are Pobedy Avenue (meeting many modes of transport: car, metro, tram, trolleybus, suburban buses) and Kompressorny (+ suburban electric train), also river port, bus stations, railway stations, major transport interchanges, out-of-town exits. Also,

for many informants, the node can be their own home, place of study or work, becoming a starting point for constructing their own image of the city.

Urban landmarks are usually places of group significance and places of local perception, which are important elements of the city's image, its symbols and a kind of «face». As a rule, informants first of all depicted them on their mental maps. Informants singled out high-rise dominants (distant landmarks) as landmarks, as well as local landmarks: iconic architectural objects (icon buildings) and monuments [15], urban public spaces. Iconic buildings stand out in the urban environment with their non-standard volumetric and spatial solution, unique solution of the façade, size and performance material. The central part of the city is rich in distant and local landmarks: the Kremlin, the Ring, Epiphany Cathedral, Kamal and M. Jalil theatres, Kul Sharif, Registry Office «Chasha/Bowl», circus, stadiums and other facilities. Green public spaces include the Gorky Central Park of Culture and Leisure, Lyadsky Garden, Black Lake Park, etc. Outside the city centre, in dormitory districts, the most significant objects are recreation centres, shopping centres, sports facilities, district parks and squares. It can be concluded that the landmarks in Kazan are mostly public buildings and architectural monuments.

Fig. 4. K. Lynch's mental map analysis.

The central part of the city is formed by a well-developed structure of transport and pedestrian routes, at the intersections of which urban nodes have emerged. The natural boundaries of the central area are shaped by the shorelines of water bodies. As a result of the study on the city of Kazan, it was found that the city centre is saturated with landmarks, which attracts citizens, which cannot be said about the periphery of the city. D. Boussa

notes that in addition to the construction of new buildings inspired by the past, the revitalization of historic districts can play an important role in the reconstruction of current cities, in which identity is lost [16]. In residential areas of the city landmarks have a sparse structure and discontinuous structure of pedestrian routes. The boundaries of administrative districts are extremely blurred in the perception of residents. They mentally subdivide the urban structure into local vernacular districts that span both the city's median and peripheral zones.

For Naberezhnye Chelny 10 sessions of mental mapping were conducted. Most respondents provided a sketch of the mental representation of the city in the form of a transport frame with a division into vernacular districts, within which the city landmarks, borders, paths and nodes are collected (Fig. 5).

Districts. It is worth noting that the division by districts was pronounced. Respondents represent the city as divided into 7 districts – GES settlement, ZYAB settlement, New Town, also a couple of respondents mentioned Sidorovka settlement, Orlovka, Zamelekesye and Elevator Hill. The industrial zone of KAMAZ plant is absolutely not perceived by residents as a part of the city.

Boundaries. Respondents define the borders of the districts by the geographical barriers in the form of the rivers Kama, Melekeska, Chelny. The Kama river, the main water body of the city, was marked in only 20 % of mental maps.

Ways. According to the opinion of the respondents the key connecting element between districts is Mira Avenue, which is often marked in the sketches and collects landmarks and landmarks. Chulman Ave., Khasan Tufan Ave. and Sarmanovsky Trakt are also often noted among the connections. These vertical long avenues build a connection between the vernacular areas. Local walking routes have also been noted.

Nodes. The bridges over the Melekeska and Chelna rivers are a nodal element between the boundaries of the vernacular districts and have been marked on 8 out of 10 maps. The nodes are reinforced by the religious objects standing next to them, and the node with the Melekeska River is also the city embankment. One of the respondents marked the bridge to the Borovets forest over the river Shilna. Also the intersection of Mira Avenue and Khasan Tufan form a powerful node with shopping center Palitra, Azatlyk Square, City Hall.

Landmarks. High intensity of mentioning of objects and spaces is typical for the settlement of GES and New Town, the lowest intensity for the settlement of ZYAB. Some respondents sign the names of the avenues and mark the boundaries of the complexes by which they orientate themselves in the space. Among the objects residents often mention office center 2.18 (skullcap), a number of shopping centers (TC «Omega», TC «Palitra»), the sculpture «Guardian Angel», the memorial «Motherland», Tauba Mosque, the City Hall, the Church of Saint Seraphim of Sarov and the Church of the Holy Hands of Kosma and Damian. Among the public spaces, residents often mention Azatlyk Square, Entuziastov Boulevard, the central embankment, Victory Park, G. Tukai Embankment and the Park of Culture and Recreation. The marked objects themselves are often located next to the marked public spaces.

The center of the «New Town» district stands out in particular. Here the avenues (paths) intertwine to form the central space of the city, which is now actively shaped by the municipality. On the axis, descending to the embankment of the Kama River, are planted landmarks: business center 2.18, Entuziastov Boulevard, sculpture Guardian Angel, City Hall, new city space Azatlyk Square, shopping center Palette. Mira Avenue, crossing the Chelna River, comes to the «Zyaban» district. A certain center of landmarks and iconic places of the city is formed here: stores, church. The axis of Naberezhnochelnensky Avenue passes through the bridge to the «hydroelectric power plant» area, where the main way is the Tukaya embankment, improved in 2020. Here is the Tauba Mosque and the Motherland

Monument. The rest of the districts lack obvious centers: the paths and landmarks are not connected into a single system.
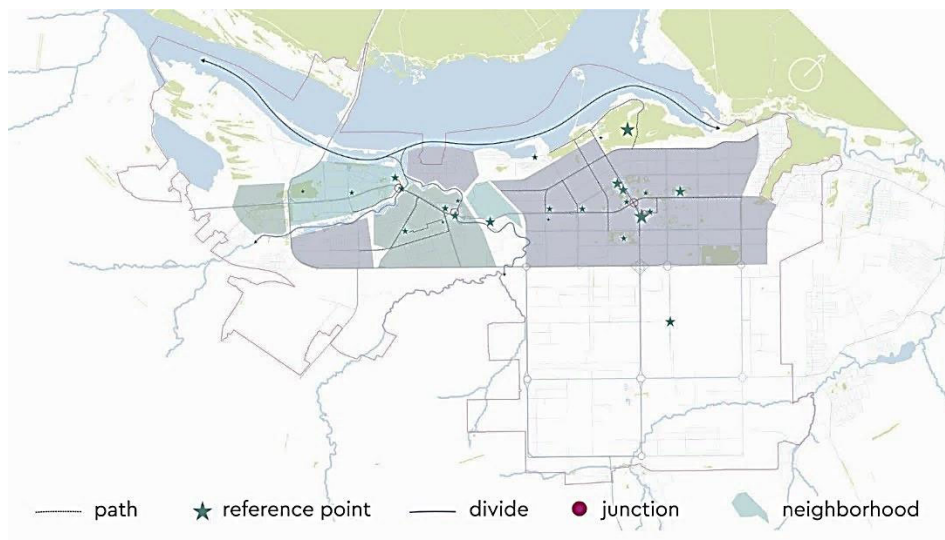
Fig. 5. Analysis of the mental map of Naberezhnye Chelny by the method of C. Lynch.

3.3 Defining the boundaries and urbanonymy of vernacular districts

It is human nature to divide territory into districts, marking their boundaries and naming them. This is how he builds in his mind a general image of urban space. In the late 1960s, American geographers called such natural boundaries of the city, formed by the citizens themselves in their daily activities, «vernacular district», which means «local, national, native». They differ from administrative boundaries and reflect the real practice of using urban space: the historical identity of city districts, the boundaries of activities formed by the morphology of development and the built environment. The French philosopher Guy Debord, walking around Paris, said that the city is not at all a structure of streets or squares, once and for all set by a map, but a dynamic and flexible structure of individual districts, each filled with its own atmosphere. Such neighborhoods were also sometimes called «exceptional» and «folk». It was then that the discussion began that the boundaries of districts should be determined not «from above» - the decision of administrative bodies, but by the citizens themselves - through human practices and the experience of using urban space. In the 1930s, the idea of «natural communities» that exist in «natural habitats» put forward by the Chicago School of Sociology became the basis for the administrative division of Chicago, which has survived to this day.

In recent years, Russian urbanists have also been actively developing this theme at a workshop at the Institute of Design and Urbanism at ITMO University (Alexandra Nenko) and the architectural bureau MLA+ with the QULLAB laboratory SPb Livehgoods (Artem Konyukhov).The way residents themselves define the urban environment is often linked to their self-determination and the local identity of the territory [17]. A person's awareness of belonging to a territory has a beneficial effect on his psychological comfort. The natural boundaries of vernacular areas help to define the area of territories with their own cultural and design codes, which should be taken into account in the design. In this regard, the study of spatial identity becomes more relevant than ever. At the same time, methods of studying identity are not limited to the analysis of the results of social surveys,

questionnaires and in-depth interviews. A necessary element of the study of public preferences regarding the quality of the environment is the use of various methods for delimiting urban space [18]. Today, the scientific community is in search of methods to identify in-depth parameters analyzing indirect data sources, which include urbanonymy, which studies the names of intra city topographical objects (urbanonyms). Some authors also single out the category of micro-urbanonyms (unofficial linear and informal names of urban objects), reflecting the local specificity of the names of urban objects and having a significant impact in the formation of the image of the territory, local identity [19]. Micro-urbanonyms are natural markers of the territory that form the self-identification of the territory's inhabitants.

Officially, there are 7 administrative districts in Kazan: Kirovsky, Moskovsky, Aviastroitelny, Novo-Savinovsky, Privolzhsky, Sovetsky and Vakhitovsky. In the course of our study which includes opinion polls, interviews and mental mapping it has been revealed that Kazan citizens distinguish 24 vernacular districts as well as about 20 residential areas with individual housing on the periphery of the city, although they consist of low-rise buildings, but territorially belong to the urban boundaries (Fig. 6). The formation of vernacular districts in Kazan was significantly influenced by the period 1980s-1990s, associated with the growth of crime and the spread of criminal groups tied to certain areas of the city, which for this reason received their informal names:

− The Novo-Savinovsky district is most often referred to by the citizens as «kavartalA/quarters»;

− The Privolzhsky district is subdivided into the «teply» («tyap-lap»), Khadi Taktash, Boriskovo, Pervye Gorki, Vtoriye Gorki, and Mirny, the latter occupying the left bank of the Kaban Lake;

− The Sovetsky district is subdivided into: Adelka, Azino 1, Azino 2, Nagorny, and Derbyshki;

− The Vakhitovsky district is mainly designated simply as «CENTRE» because it is the cultural and geographical heart of the city. It also highlights the territory of the «Staro-Tatarskaya Sloboda» (Old Tatar Sloboda), a preserved fragment of the historical area of the city associated with the identity of the Tatar people;

− The Kirovsky district consists mainly of the following settlements: Yudino, Zalesny, Arakchino, and «Televyshka» (TV Centre). The area of «Admiralteika» (Admiralteyskaya Sloboda) stands out as a preserved fragment of the city's historical identity;

− The Moskovsky District: «Zhilka», «Mosbrigada» and Levchenko;

− The Aviastroi district, popularly known as Aviastroy, combining the territories of Sotsgorod and Severny settlement.

Perhaps, after the change of generations, these toponyms will become a thing of the past, as some of them, based on the survey, are known only by older citizens, while the younger generation hears them for the first time. Also, some recipients orient in vernacular districts only within the boundaries of their administrative district. In Kazan the main boundary is the river Kazanka and most residents are poorly aware of «the other side of the river», those who live on the left bank, have a vague idea of the structure of «zarechye» as do their neighbours on the right bank. Residents mentally divide the territory based on the history of the place (which may also be linked to its criminal past) and the connection with the industry or other iconic urban objects that were or now exist in the territory. In the minds of residents, these mental boundaries are fixed through urbanonyms and micro-urbanonyms of existing objects in the territory. The following conclusions were made during the analysis of micro-urbanonyms. The largest share of names are connected with the themes of geographical factor (Yudino, Zalesny, Arakchino settlements) and organized crime groups («teply» («tyap-lap»), Khadi Taktash), which can be explained by the scale of awareness of the city population about this problem and the relative proximity of this

historical period. There are relatively few microurbanonyms associated with the surviving fragments of the city's historic districts: «Admiralteika», «Staro-Tatarskaya». Iqbal T., Rani W.N.M.W.M., Wahab M. H. consider the relationship «genius loci», the sense of place and place of attachment as attributes of the recreation of the identity of historically significant territories [20].

Fig. 6. Scheme of the vernacular areas of Kazan.

Naberezhnye Chelny is divided into three administrative districts: Avtozavodsky, Central and Komsomolsky. Komsomolsky District includes settlements GES, ZYAB, Sidorovka, Surovka, Orlovka, Elevator Hill, Zamelekesye microdistrict, 32 and 62 complexes, BSI, Energodistrict. Central district includes 1-19, 31, 36-45, 55, 56, 58, 59, 60 complexes, Medgorodok, industrial and communal facilities located south-west of the highway number 2. Avtozavodskiy district includes 20-30, 46-54 complexes, 50A, 65 (microdistrict «Yashlek»), 67A, 68, 70A, 71 areas of low-rise residential development, industrial and communal facilities located to the north-east of the road number 2, Togaevsky quarry.

For the study of vernacular districts of Naberezhnye Chelny in addition to the survey of citizens, interviews and mental mapping of recipients, the method of zoning was also used. Twenty-five residents were offered a map of Naberezhnye Chelny, on which it was proposed to mark the boundaries of the city districts, as well as to name them. As a result of the study the following was revealed: the boundaries of vernacular districts pass through different barriers: production boundary, water bodies, railroads. Administrative division does not coincide at all with the boundaries of vernacular districts identified by residents. The settlements of the Komsomolsk district also differ in their boundaries. And the

industrial zone of the KAMAZ plant is not singled out by the residents as part of the city. It should be noted that residents attribute peculiarities to each district. Mainly it concerns the contingent living in the territory and the degree of marginalization. From the specifics of names: the district «Zyab» got its name from the Cellular Concrete Plant - ZYAB, which is located here. The «Zamelekesie» district is really behind the Meleka River. In the area of «Hydroelectric Power Plant» there is a hydroelectric power plant, which defines the entire area. Also, district «Elevatorka» includes Naberezhnochelninsk elevator. District «New Town» also justifies its years of construction - the 1970s. We can conclude that the names of vernacular districts to a greater extent reflect the dominant industrial facilities of the territory, water bodies, geographical location (Fig. 7).
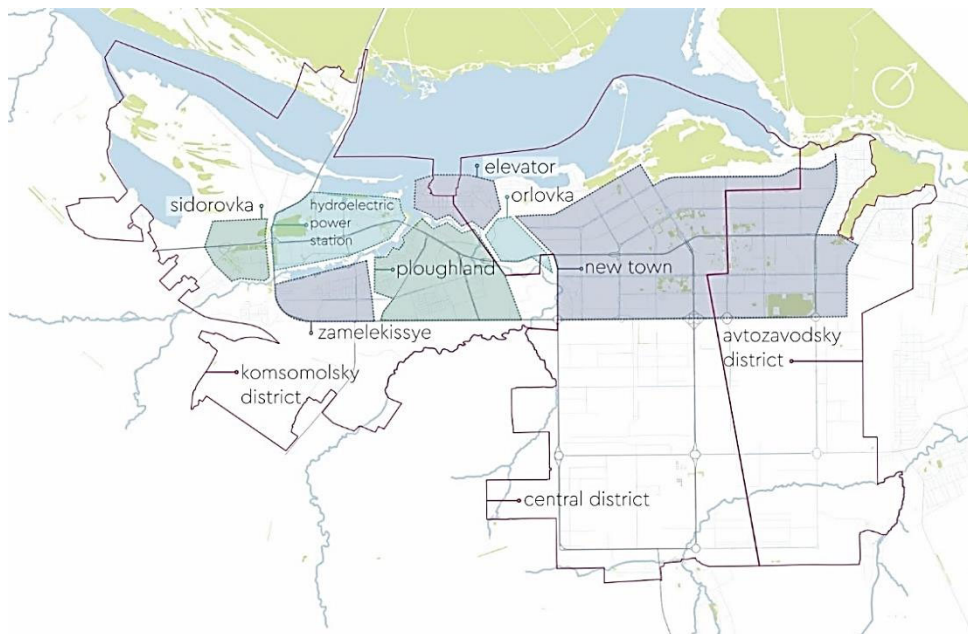
Fig. 7. Scheme of the vernacular areas of Naberezhnye Chelny.

3.4 Identifying a system of open urban public spaces

Open urban public spaces are often centres of attraction for residents. Public places enjoy a good reputation in the general opinion because they represent a common space, usable by all, designed for the good of all [21]. Acting as nodes or landmarks on mental maps, they become key elements of the city's image. Integrity and consistency in the citizens' perception of open urban public spaces forms a stable basis for the mental image of the city and contributes to easy orientation in the space. D. Oktay note public urban spaces are major functional and visual factors in determining the urban quality and they mirror our culture and time and reflect the wellbeing of the dwellers [22]. The quality of surrounding architecture and urbanism plays a crucial role in enhancing the experiential value of a destination and influencing space consumption preferences [23]. Properly designed spaces and places - with material and immaterial values are the ones that are designed in accordance with needs of all the users [24].

As part of the study of the system of open urban public spaces in Kazan, the following categories have been identified: green public spaces (turquoise), embankments (pink), boulevards (yellow), pedestrian streets (orange), undeveloped coastal areas (blue), urban beaches (green) and squares (purple) (Fig. 8).

The results of the survey identified the most popular places for walks, with the most notable ones being the Kremlin embankment and the Kaban Lake embankment: Kremlin embankment and the Kaban Lake embankment. The right bank of the Kazanka River near the Kazan Family Centre (registry office) is not so actively used. Natural landscapes near water bodies that have not been subjected to anthropogenic impact, such as Lokomotiv beach on the Volga or the banks of the Kazanka, characterized by a natural landscape, accessibility of water and privacy, are also widely popular among the citizens. The main pedestrian routes of the city centre run along the following streets: Baumana, Peterburgskaya, Karla Marksa, Pushkin, Tatarstan, Profsoyuznaya, Gabdulla Tukaya, leading pedestrians to the coastal areas of the Kazanka and Kaban Lake.

The boulevards act as green bridges between the larger recreational facilities, forming an integrated system of open urban public spaces. In the Novo-Savinovsky district, the White Flowers Boulevard connects Victory Park and Istanbul Square, overlooking the promenade by the Kazan Family Centre (registry office). Festival Boulevard continues from the Kazan Family Centre towards Kozya Sloboda Metro Station, Tandem Shopping Centre and Sosnovaya Roscha Park. In Privolzhsky District, linear and nodal recreational facilities are placed in a chain around Prospekt Pobedy TPO: Kaleidoscope Children's Park, Boulevard along Griffyanov Street, Slavy Square and Square along Akademika Parina Street. A boulevard on Fučika Street connects the Gorki neighbourhood with the forest on Dubravnaya.

The urban centre is well provided with garden and park facilities. The most popular with residents are: Gorky Park, Lyadsky Garden, Leninsky Garden, Black Lake, Hermitage Garden. In the dormitory districts of the city, residents have singled out only 3 parks: in the Sovetsky District - the largest park in Kazan - Gorkinsko-Ometevsky Forest, Wings of the Soviets in the Aviastroitelny District and Uritsky Park in the Moskovsky District, also wooded areas - Lebezhie, Noxinsky Forest, Derbyshkinsky Forest.
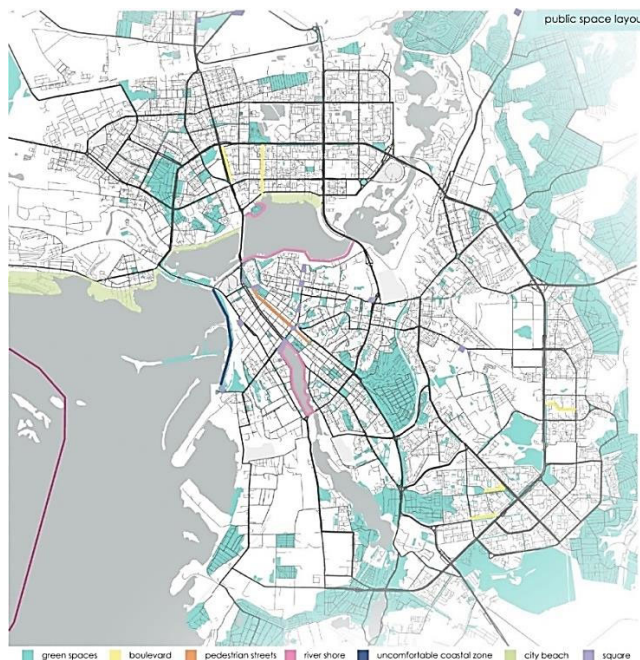
Fig. 8. Layout of open urban public spaces in the structure of Kazan.

The basis of the scheme of urban open public spaces in Naberezhnye Chelny are common areas with high social activity. Public spaces form the recreational and business environment of the city, visiting such places is often in demand, so they can act as landmarks or nodes in the urban space. Public spaces on the map are divided into 5 categories and painted in different colors: parks (light green), squares (blue), squares (green), boulevards (maroon) and embankments (yellow) are marked here. The map shows that public spaces are distributed throughout the southwestern and northeastern residential areas of the city. High intensity of public spaces is characteristic of the HPP settlement, among which are noted the Park of Culture and Recreation, May 9 Square, Komsomolsky Square, the square of housing workers, the square of them. E. N. Batenchuk Square, «Literary Yard» Square, M. Dzhalil Park, Tinchurin Boulevard and Tukai embankment. There is a small cluster of public areas in ZYAB settlement, which includes the Theater Park and the Titov Park. The southern part of this area is deprived of any public spaces. In the New Town there are: Grenada Park, Azatlyk Square, Entuziastov Boulevard, Victory Park, Pribrezhny Park, Central embankment, T. Kereselidze Boulevard, and Borovets Boulevard.

As a result of research 5 parks, 7 squares, 5 boulevards, 2 squares and 2 embankments were distinguished (Fig. 9). Their location in the urban structure has a focal character. A unified system of public spaces of the city has not yet been formed. The main part of public gardens fall in the Komsomolsky District, and in the Central and Avtozavodsky districts they are absent. The presence of a park is characteristic of each vernacular district of the city, which has a positive impact on the perception of the residential environment by residents. Embankments and squares are found only in the HPP and Novy Gorod settlements, and they are absent in the ZYAB settlement. A large empty fragment located between the borders of ZYAB and Novy Gorod, where there are no public spaces, stands out on the map. To improve the attractiveness of the area, which involves the stimulation of social activities and the creation of promising urban landmarks, it is necessary to develop the existing public space in the southern part of the village ZYAB as well as the creation of new public space in the area between the village ZYAB and Novy Gorod.
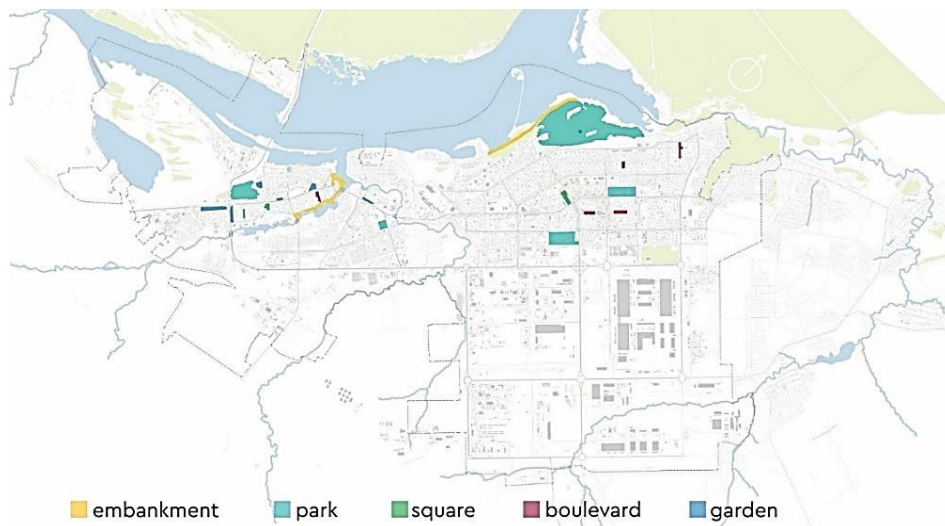
Fig. 9. Layout of open urban public spaces in the structure of Naberezhnye Chelny.

3.5 Heat map of the emotional perception of the area

A. Steger notes that human experiences are inherently emotional and spatial; joy, hope, fear, anger, love, stress and excitement transform our attachment or antipathy within and towards places [25]. The main characteristic for the heat map was the data from the online questionnaire, revealing the proportion of places with a high «level of imaginability» (Lynch 1982), i.e. those mentioned most often. In the questionnaire, city residents answered questions about their favourite places and areas that they think are of a negative nature. There was also a question about which objects or spaces they consider to be iconic for the city. After collecting the information, a heat map was made with the identification of negative and positive areas, fixing the objects and spaces that the residents consider to be iconic. Such places are basic elements of the collective image, which means that identifying them is the primary task of any study that uses mental mapping.

A total of 85 places were identified as part of the study of the image of Kazan, of which 11 (13 %) had a high frequency of mention. A high degree of imagination in this case was understood as a situation where a mention of the same place appeared in the stories of every fourth informant. Based on the survey of residents, it was found that Vakhitovsky (27) and Novo-Savinovsky (15) districts are the most positively perceived. The objects with the highest «degree of imagination» are in Vahitovsky district: the territory of the Kremlin (35), Bauman Street (29), the territories along Kaban Lake (21), Old-Tatar Sloboda (10). On the territory of Novo-Savinovsky district, the respondents also marked out areas that they consider unsafe: block 39(2), supposedly connected with concentration of marginal personalities and also the riverside area of the Kazanka river behind the sport stadium Kazan-arena (3).

Popular and frequented urban sites, outside the city centre, are located chaotically, suggesting an uneven development of urban space and the location of hubs and landmarks. Predominantly these include: shopping centres, large sports facilities, recreational areas and public open spaces (Fig. 10).

Most of the negative areas are in Aviastroitelny (16) and Kirovsky Districts (10), micro-district Azino (4), villages Boriskovo (32) and Derbyshki (5). Presumably, opinion of respondents was influenced by the history of these territories, associated with the 80-90's, as well as the architectural appearance of the urban environment and a high degree of depreciation of the building. A pattern was traced that many citizens feel uncomfortable near markets and major transport hubs, such as Pobedy Avenue (2), Moskovsky (5), Kompressorny (2), Kolhozny (3), Gardens (2), and the central railway station (4), where large crowds occur.

In Naberezhnye Chelny only 34 places were identified, 15% of which with high frequency of mentioning. The total number of respondents in the electronic questionnaire was 50 people.

Most of the positively perceived territories for the residents are located in the central part of the New City, as well as noted in the Komsomolsky district. The main areas that residents like are public spaces of the city (boulevards, squares, parks, squares, embankments), among which shopping and entertainment facilities, office centers, monuments and sculptures were also mentioned. Some of the most frequently mentioned areas are the Central embankment, Entuziastov Boulevard, Azatlyk Square, Pribrezhny Park, Peace Avenue and Khasan Tufan Avenue. The map shows iconic objects and spaces according to the residents' opinion, as well as their number of mentions in the survey. Most of iconic objects and spaces are in Noviy Gorod (18), the most frequently mentioned are the Central embankment (10), Entuziastov Boulevard (9), Office Center 2.18 (8), City Hall (8) and Azatlyk square (6). For pols. ZYAB residents noted 2 iconic objects, and for the HPP settlement – 5.
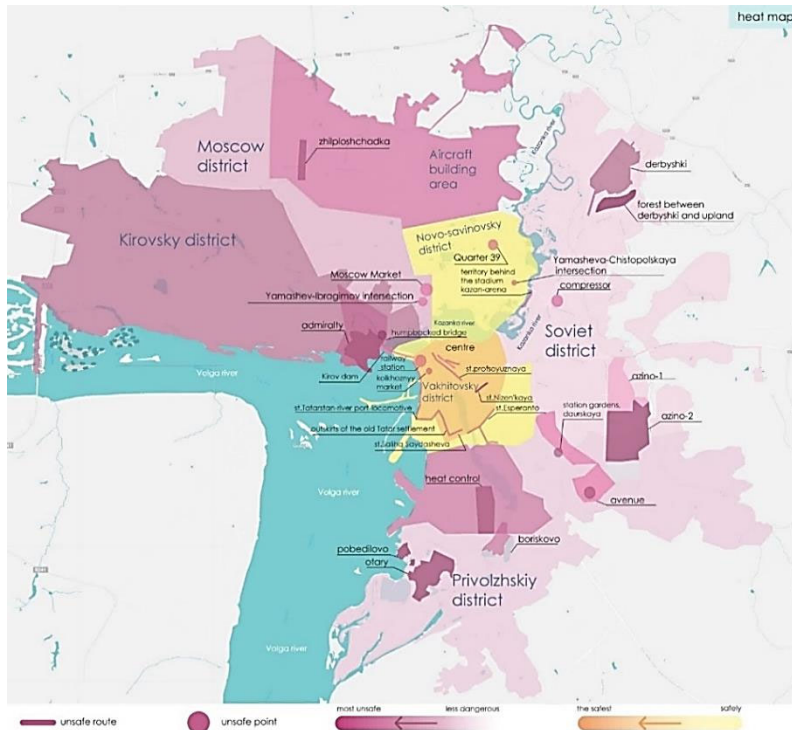
Fig. 10. Heat map of emotional perception of the territory of Kazan.

The main part of the negative territories is for the Komsomolsky district, the older part of the city. In the composition of these territories residents often mention Zyab settlement (6), GES settlement (5) and Sidorovka (7), also a small number of respondents mentioned Elevator Hill and the industrial territory near Orlovka (Fig. 11).
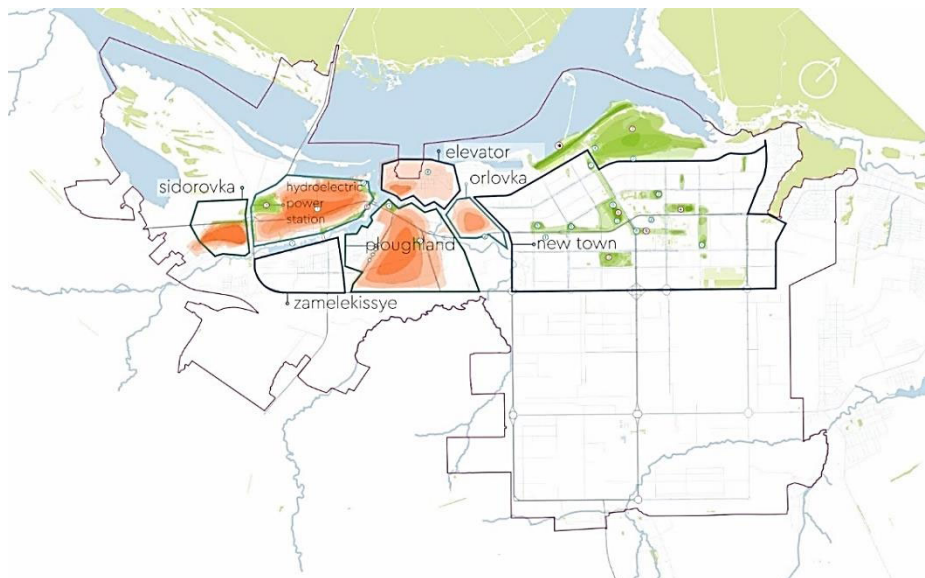
Fig. 11. Heat map of emotional perception of the territory of Naberezhnye Chelny.

According to this data we can see how the total number of the mentioned places decreases following the population, and at the same time the share of places with a high degree of imagination is growing. The data about which architectural objects have a low or high coefficient of attractiveness can be used in the future to improve the visual qualities of the urban environment and will have a positive impact on the psycho-emotional state of the person.

4 Conclusions

The article presents the results of the empirical study of the mental representation of the space of Kazan and Naberezhnye Chelny, carried out through the methods of mental mapping, in-depth interviewing, questioning, as well as the analysis of GIS data. On the basis of the analysis of the collected interviews the main types of images in the perception of the territory, as well as the boundaries and toponymy of the vernacular areas of the city were described. By means of the analysis of mental maps, the key elements of the image of the territory and the most significant spaces and objects for the residents were considered. The definition of significant places was based on the mental maps created by the informants and the results of the survey. The results of the study made it possible to identify not only the peculiarities of the residents' perception of the territory, but also to determine the places where the symbolic capital is concentrated. With the help of correlation of the information we were able to identify the holistic image of the cities and understand how the mental perception of the territory is correlated with the real image of the recipients in the research process.

The authors conclude that the image of the city is formed on the basis of symbolically significant elements of the environment - iconic urban objects, iconic buildings and spaces of «signs» that form a heat map of the emotional perception of the territory, as well as acting as material for self-identification of the population with specific urban areas and the formation of its local identity. The authors consider the system of placement of landmarks in urban space as a way of its social construction, as a system of influence on the aesthetic sensations of the citizens, as the formation of their attitudes in a particular activity.

A fragmented image of territory can lead to a decline in territorial identity and cultural decay. In the concept of the French historian Pierre Nore, the formation of territorial identity occurs through the symbolic highlighting/underlining of special places. That is why it is important to study and understand the established image of the territory and subsequently identify voids, which need to be filled with emotional and informational content, as well as to emphasize and consolidate the positive effects.

The perception of the territory is considered from the point of view of the emotional aspect, which is manifested through the territorial identity of the residents and plays one of the key roles in filling the image of the territory with certain content (information and aesthetic) characteristics. Symbolically significant elements of environmental formation determined as a result of the study allow to divide the city into commensurate vernacular areas and spaces, as well as to form a complex model of mental representation of the city space existing in the minds of residents.

The resulting methodology can be applied to other territories under study as well. It can act as a universal tool for determining the specificity/character of residents' perception of the territory and the defining elements of the image.

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