Faculty of Civil Engineering and Architecture

Heritage in Depopulated European Areas (HerInDep)

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Methodological Guidelines for the Spatial and Experiential Analysis of Urban Heritage

Kaunas, 2026

CONTENT

INTRODUCTION

Project information

The project "Heritage in Depopulated European Areas (HerInDep)" was launched in April 2023. Project coordinator: Charles University in Prague, CUNI, Faculty of Humanities. The project consortium consists of the main project promoters: Charles University of Prague (Czech Republic), Kaunas University of Technology (Lithuania), University of the Highlands and Islands (Shetland, United Kingdom) and associated partners: Hradec Králové Region, Kaunas Association of Community Centres, Shetland Heritage Association, Broumov Region Development Agency, Department of Cultural Heritage under the Ministry of Culture of Lithuania, Gemer-Malohont Museum, "Bewitch Thread" non-governmental organization, "Hontiansko-Novohradská A. H. Škultétyho" library, St. University of Ss. Cyril and Methodius in Trnava. Project funded by: Ministry of Education, Youth and Sports (MSMT), Czech Republic; Research Council of Lithuania (Research Council of Lithuania); Arts and Humanities Research Council (AHRC UKRI). Project website: https://herindep.fhs.cuni.cz/FHSH-1.html.

The project targets European territories experiencing demographic decline, which leads to the loss of tangible and intangible cultural heritage, the deterioration of historic environments and cultural landscapes, and affects communities striving to make sense of life in depopulating or transforming areas. The main objective of the project is to investigate how local communities respond to the effects of demographic and environmental change, giving meaning to new realities related to policy, regulation and economic resources, and how this influences cultural heritage change. The object of research is the cultural spatial environment and its relationship with local communities. The project partners chose different case studies for the research, which analyze the relationship between local communities and environmental changes. The Lithuanian case study examines the transformation of interwar Lithuanian architecture and its impact on the social and urban development of the city. The greatest diversity and concentration of interwar architecture is located in the central part of Kaunas city (New Town), which underwent major urban transformations during the Soviet era, and since 1990 has been under pressure from business development.

Milestone information

Urban spaces are not just physical structures – they are intersections of social practices, cultural narratives, collective memory and emotional experiences. The integration of these aspects into the urban analysis allows for a better understanding of the identity of the city, the relationship of the inhabitants with the environment and the impact of urban transformations on communities. As a result, in recent decades, more and more research into urban planning, human geography and environmental psychology. Attention is paid

not only to the physical structure of the city, but also to the experiential and symbolic aspects of the place.
Researchers of the Faculty of Civil Engineering and Architecture of Kaunas University of Technology, taking into account the cultural, social and spatial importance of the chosen territory, the central part of Kaunas city, carried out research and prepared methodological guidelines for the spatial and experiential analysis of urban heritage on the basis of them. This document provides a framework of urban and heritage guidelines designed to integrate the analysis of local identity, emotional geography and urban readability (visibility, accessibility and intelligibility) into urban planning and heritage management processes.

What is the purpose of these guidelines?
The guidelines are designed to help stakeholders who want to effectively address change by combining urban preservation with urban development and regeneration, and local communities who want to get involved in the protection and development of the city's cultural layer. The methodological guidance contained in the guidelines can be used by local authorities; specialists working in the fields of heritage protection and urban planning; researchers, academic staff and students of higher education institutions.

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1. IMMOVABLE CULTURAL HERITAGE AND ITS ROLE IN THE HISTORIC PARTS OF CITIES

Immovable cultural heritage is an important part of the cultural identity of a society, reflecting the historical, architectural, and social processes of urban development. It includes buildings, building complexes, urban structures, archaeological sites and other objects of historical, cultural, architectural or other value. In the historic parts of cities, this heritage not only bears witness to the past, but also shapes the city's identity and contributes to social, economic and cultural development (Ashworth & Tunbridge, 2000). Historic urban centers have often been formed over several centuries, so their urban structure reflects different architectural styles and planning principles. Immovable cultural heritage objects in these territories help to preserve the authenticity of the city and the integrity of the historical landscape. For this reason, heritage protection is considered an important part of urban planning and territorial development (UNESCO, 2011). Properly integrated heritage protection policy allows us to reconcile the protection of historical values with the modern needs of the city. However, the preservation of immovable cultural heritage in historic parts of cities faces various challenges. Urbanization, real estate development, infrastructure modernization and the uncontrolled tourism can threaten the authenticity of historic areas. Therefore, it is important to apply sustainable planning principles that allow the preservation of heritage values while ensuring the functional development of the city (Bandarin & van Oers, 2012).
In Lithuania, the protection of immovable cultural heritage is regulated by legislation and institutions such as the Department of Cultural Heritage. Parts of historic city center, such as Kaunas Old Town and New Town, are protected as valuable urban ensembles and included in national and international heritage lists. This shows that cultural heritage is considered an important value of not only national, but also global significance (Department of Cultural Heritage, 2026).

2. RESIDENTS' SENSE OF PLACE AND CULTURAL HERITAGE

The relationship of the population with tangible cultural heritage is an essential component of a sense of place. Preserving heritage strengthens identity, emotional connection, and community engagement.
The concept of the sense of place that arises from the interdisciplinary fields of environmental psychology, geography and urbanism. Different disciplines and authors offer slightly different definitions of the meaning of place and different methodological systems of evaluation. In general, however, a sense of place involves the emotional attachment of individuals or groups to specific places. In this way, *the abstract space* becomes a meaningful *place*.
A sociological survey was applied to determine the relationship between the residents' sense of place and cultural heritage. 82 respondents participated in the survey. The

sociological survey was made up of several structural blocks. In the first part, socio-demographic data (age, gender, education, life expectancy in the city) were collected, allowing to analyze the differences in the sense of place between different social groups. The second part contains questions aimed at assessing the emotional connection of residents with the center of Kaunas city, their identification with the living environment and practices of daily use. The third part focuses on the assessment of tangible cultural heritage – respondents were asked to assess the importance of heritage objects, the need for their preservation and their personal significance for the city's identity.

Respondents were asked to assess whether the protection of immovable cultural heritage in the center of Kaunas is important to them personally and to justify their opinion. The answers to this open question were analyzed using the principles of qualitative content analysis, which allowed to identify the main thematic categories reflecting the respondents' attitude towards the significance of cultural heritage. During the analysis, several main groups of responses were distinguished:

- *Preservation of national history and national identity.* The responses emphasized that architectural heritage is considered an important part of the historical narrative and a symbolic representative of the nation's identity. Such statements show a close relationship between the city's architectural heritage and its ability to represent the historical and cultural narrative. This approach is in line with the role of cultural heritage in the formation of collective memory and local identity, discussed in theoretical literature, where heritage is perceived as a means of identity formation and its protection as a cultural and moral responsibility.
- *Preserving the identity and uniqueness of Kaunas.* Heritage was perceived by the respondents as an essential part of the urban and architectural character of Kaunas, shaping the city's image, uniqueness and attractiveness for both local residents and visitors. These answers allow us to state that architectural heritage is important to the respondents as an element that forms the identity and uniqueness of the city.
- *Aesthetics and environmental assessment.* The responses emphasized that cultural heritage objects contribute to the visual quality of the city, create an aesthetically attractive environment and shape the character of the city. This approach reflects the role of heritage in the formation of urban aesthetics and visual identity of the city, which is discussed in the theoretical literature.
- *Cultural and artistic value.* Some of the respondents based the importance of heritage protection on the cultural and artistic value of heritage objects. The responses emphasized the importance of architecture, historical sites and cultural artefacts as elements of cultural memory and historical continuity, which are important to preserve and pass on to future generations.

- *Tourism development.* Some respondents linked heritage preservation to the economic development of the city, especially in the context of tourism. Heritage sites have been identified as a factor in the attractiveness of the city, contributing to the attraction of tourists and the economic well-being of the city. This approach is in line with the role of heritage sites as an economic resource for urban development, which is examined in the theories of heritage economics and sustainable tourism.
- *A controversial and critical attitude.* Some of the responses revealed the respondents' critical attitude towards the current heritage protection practices. Respondents expressed disappointment due to inadequate maintenance of heritage objects, their disappearance or uncoordinated new construction in historical contexts. Such responses reflect the problems of heritage policy and practice often discussed in academic literature related to the effectiveness of regulation, control mechanisms and the implementation of heritage protection.
- *Emotional connection with the place.* Some of the respondents emphasized the emotional connection with the city and its heritage in their answers. Such responses show that architectural heritage contributes to people's emotional attachment to the place and strengthens the sense of place. This aspect is related to the formation of local identity and emotional relationship with the urban environment, which is examined in local theories.

The findings show that respondents hold heterogeneous views regarding the protection of immovable cultural heritage. The identified thematic categories reflect the importance of heritage protection in the contexts of urban identity, aesthetic environmental quality, cultural value and economic development. At the same time, the answers of the respondents also highlight certain problems of heritage protection practice, which indicate the need to improve the heritage protection policy and its implementation mechanisms in order to ensure more effective and sustainable protection of immovable cultural heritage in Kaunas city.

3. EMOTIONAL GEOGRAPHY AND LOCAL IDENTITY

Emotional geography reveals how the experiences and feelings of the inhabitants shape the identity of a place. Emotionally significant spaces strengthen the connection with the city and become important for social vitality in the conditions of a changing demographic layer. Local identity is the uniqueness and uniqueness of a place, which is formed due to the physical, cultural, historical and social characteristics of a place and the relationship of people with that place.

Understanding

The concept of emotional geography encompasses an interdisciplinary approach that seeks to analyze how emotions are related to specific places, how they arise, change, and are collectively experienced in them (Zaleckis et al., 2022). Emotions are perceived here not only as individual psychological experiences, but also as socially and spatially rooted phenomena that can reflect broader urban processes, power relations, cultural meanings or collective memory (Caquard and Griffin, 2018). Emotional geography emphasizes a two-way connection: places affect people's emotions, and emotions affect the perception and identity of places.

The identity of a place is a complex concept that describes the uniqueness and recognizability of a place. It is formed through the interaction of the physical environment, social processes, cultural meanings and human experiences. From an urban point of view, local identity is an important factor in shaping the structure of the city, the use of public spaces and the emotional connection of residents with the environment. Local identity is often associated with the concept of "genius loci" – the spirit of the place. This concept emphasizes the unique character of a place, which is revealed not only through architecture or urban structure, but also through the relationship of people with the environment.

Methodological tools

One of the most important methodological tools of emotional geography is emotion mapping (emotional mapping), where emotional responses are associated with specific geographic locations and visualized in space (Caquard and Griffin, 2018). Such maps allow us to reveal emotional "hot spots", "accumulations" of sentiments and spatial patterns of the distribution of emotions in the city. Mapping of emotions becomes particularly significant in the context of urbanism and planning, as it helps to understand how different urban spaces are experienced in people's everyday lives, and allows to analyze not only the physical but also the experiential characteristics of the city.

The study of emotional geography is closely related to the concept of local identity. Local identity is formed as a complex set of physical, social, cultural, and emotional elements that define the uniqueness and recognizability of a place (Merschdorf and Blaschke, 2018). Modern research suggests that integrating emotional data into urban planning and management can help uncover hidden, intangible local values – historical meanings, symbolic layers, social connections, and community attachments that cannot be identified based on physical indicators alone (Hawthorne et al., 2022; Zaleckis et al., 2022). Knowledge of the emotional attachment of communities to places can become an important argument when making decisions about landscape management, urban interventions or heritage protection at different scales (Hawthorne et al., 2022).

Emotional geography can be applied in the context of urban renewal, public space planning, heritage protection and sustainable development, especially in historical or socially sensitive areas. By identifying places with strong positive or negative emotions, it is possible to identify priority areas for interventions more precisely, solve community problems, reduce negative perceptions of place and strengthen social cohesion. In the context of human-centered and smart city concepts, emotions become an important factor in creating a more inclusive, responsive urban environment that responds to residents' experiences (Stals et al., 2018).

Methodological foundations of emotional maps and their application

In recent years, in the context of urbanism, human geography and GIS, there has been a growing desire to systematically include the emotional dimension in the analysis of place. The literature emphasizes that places are not just physical spaces – they evoke emotions, and these emotions shape how people perceive and use the environment (Korpela, 2002; Manzo, 2003; Mody et al., 2009).

It is important to distinguish between emotion and sentiment. Sentiment usually describes the evaluative attitude expressed in the text and is usually measured by polarity (positive / negative / neutral) or numerical interval (Gao et al., 2022). Sentiment analysis allows for a generalized assessment of public attitudes about places and events, and "urban sentiment" is considered an indicator of the quality of life and identity of the city. Meanwhile, the analysis of emotions seeks to reveal the diversity of emotional states (not only "good-bad") and therefore relies on typologies and psychological models of emotions (Misue and Taguchi, 2015. One of the most widely used models is the circle of emotions of R. Plutchik (2001), which structures emotions and allows a consistent classification of emotional experiences expressed in the text. The literature emphasizes that sentiment and emotion analysis can be integrated to achieve a more complete understanding of the emotional landscape of a place (Zaleckis et al., 2022).

Such techniques allow for the capture of the "invisible" layers of space – symbolic meanings, collective memory, attachment, and experiential value, which often remain outside of traditional urban analysis (Hawthorne et al., 2022; Zaleckis et al., 2022).

An important part of emotional analysis is spatial visualization, where emotional data is linked to specific locations and mapped by GIS tools, creating maps of emotions that highlight emotional "foci" and patterns in the distribution of sentiments (Caquard and Griffin, 2018; Park et al., 2018; Zaleckis et al., 2022).

Research on the geography of emotions in the city is being developed in several directions:

- through tracking, real-time data collection and physiological recording techniques (Shoval et al., 2018),
- analyzing textual data, especially user-generated content (e.g., social networks) and open survey responses (Park et al., 2018; Stals et al., 2018).

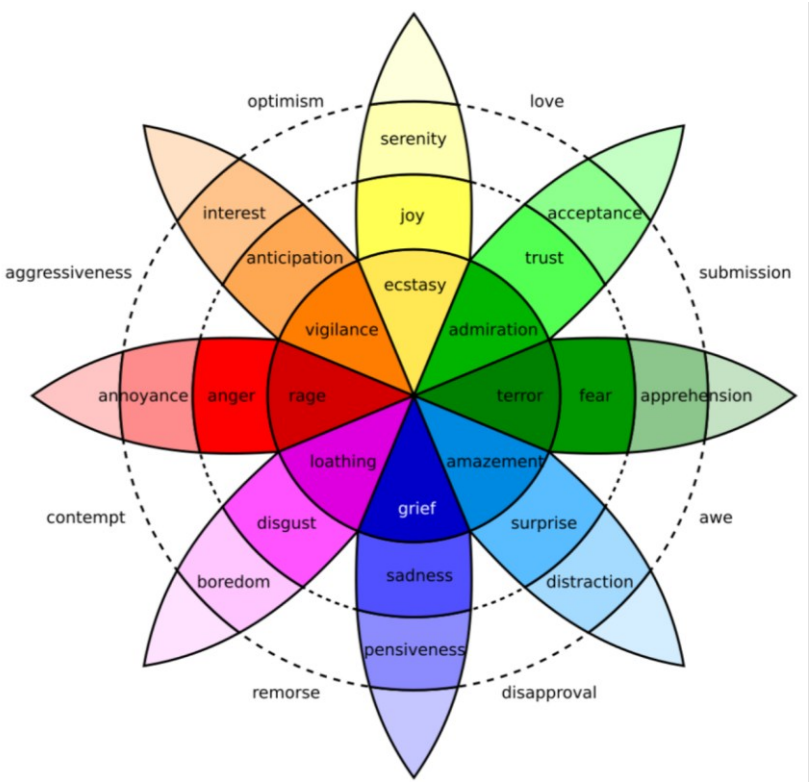

Figure 1: R. Plutchik (2001) Emotion Circle is a model of classification of emotions applied to qualitative analysis of comments. *R. Plutchik (2001) The Circle of Emotions structures basic and complex emotions according to their polarity and intensity. In this study, the model was applied to identify and classify emotional reactions in Facebook comments and sociological survey open responses. The typology of emotions allowed to systematically distinguish between different emotional states (e.g., joy, interest, anger, fear, sadness, etc.) and to reveal a wider emotional spectrum of perception of place than just the analysis of the polarity of sentiments*

When researching Kaunas City Centre, two complementary sources of textual narratives were used:

- Facebook posts and comments geographically marked in the territory of Kaunas center are publicly available. 1335 posts and comments from public pages were collected (data collected in June 2018). In order to get a richer text that is conducive to the expression of emotions, the 10 longest posts or comments are selected on each page. These data include both comments directly related to the city center and content related to services or events, which still allows us to capture a broader emotional background and perception of the city center (Park et al., 2018; Gao et al., 2022),
- Open-ended responses to the sociological survey received in the online survey (the survey was conducted in December 2023 – March 2024 and April 2025 – September 2025). 82 respondents participated in the survey; 39 submitted open comments about Kaunas, 27 – about the residential environment/district, of which 16 comments were directly related to the center of Kaunas.

Research methodology

The methodology of emotional analysis used in the study is *mixed-method*, combining qualitative classification of emotions and quantitative analysis of sentiments and spatial visualization using GIS tools. The analysis was carried out according to a sequence of six steps:

1. Data collection

Geographically marked Facebook posts and comments from public pages in the center of Kaunas were collected, as well as open responses to the sociological survey (see description of the data).

2. Data preparation

Since most of the sentiment analysis tools are optimized for English, all Lithuanian comments have been translated into English, and the quality of the translation has been checked by researchers. At this stage, the "cleaning" of the text was also carried out: insignificant characters, special characters or elements unrelated to the content were removed. It should be noted that translation can change the linguistic subtleties of the expression of emotions, so translation control was an important part of the methodology.

3. Qualitative analysis: identification of emotions

The model of R. Plutchik (2001) was applied to the qualitative analysis of emotions. The study used 16 categories of emotions (e.g., Calm, Joy, Interest, Anger, Fear, etc.) to select

a balanced range of positive, negative, and intermediate emotions. Each comment was manually assigned to a single emotion using expert evaluation:

- identifying clear emotional "keywords" (when they occur),
- assessing the overall context and connotations of the text,
- if there are several or contradictory emotions in the text – by assigning the most vivid/clearly expressed one,
- in ambiguous cases, by carrying out additional reviews until a consensus is reached between the researchers.

4. Quantitative Analysis: Polarity of Sentiments (NLTK VADER)

After the classification of emotions, an analysis of the polarity of sentiments was carried out in order to assess whether the "general tone" of the comments is positive, negative or neutral. The NLTK library VADER analyzer was used, which is widely applied to social media texts and evaluates context, intensity, and negativity (Park et al., 2018). For each comment, a total (compound) indicator is calculated, and a polarity category is assigned: positive / neutral / negative.

5. Mapping

The results of the analysis of emotions and sentiments were linked to geographical locations:

- Facebook posts/comments have been used as geotagged dots and visualized in a GIS environment. For spatial clustering and identification of emotional "foci", GIS-based Kernel Density Estimation (KDE) was applied, allowing to reveal the accumulations of emotions and sentiments in the city center.
- The open-ended responses of the sociological survey were manually linked to the mentioned places (where the comments were directly related to specific places in the center).

6. Interpretation of results

The final results are presented with emotional maps and sentiment polarity maps, which allow:

- identify emotional "hot spots" (places where emotions are concentrated).
- compare the qualitative typology of emotions with the quantitative polarity of sentiments.
- to form insights for urban planning, localization and heritage management, with an emphasis on the experiential and symbolic dimension of the city center (Caquard and Griffin, 2018; Hawthorne et al., 2022; Zaleckis et al., 2022).

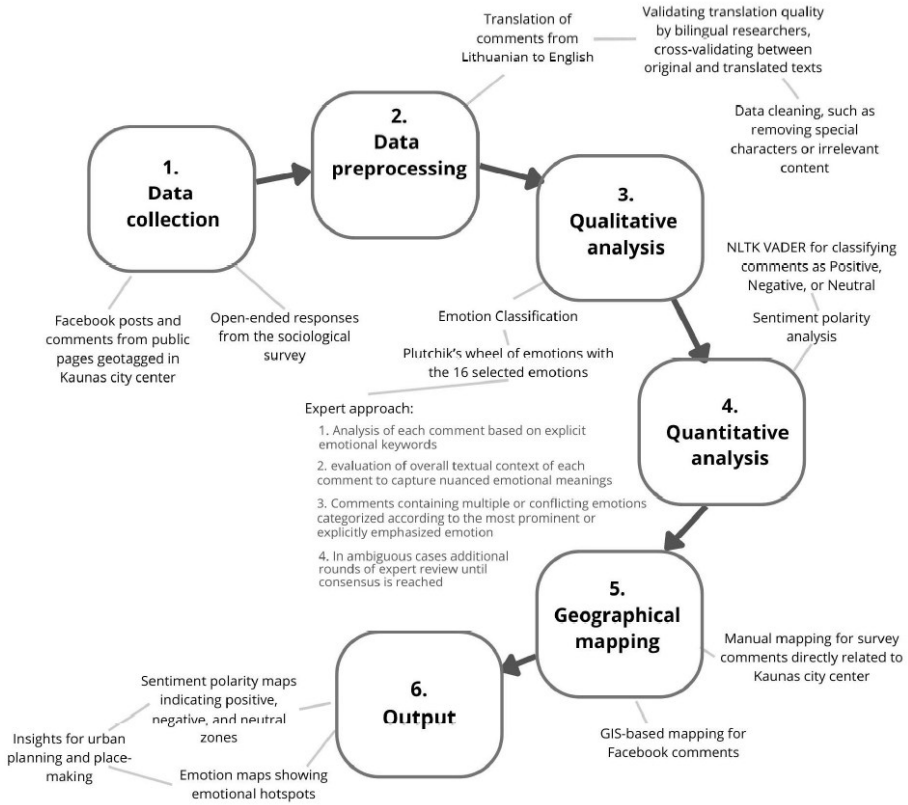

Figure 2. Methodological sequence of emotional analysis: from data collection to spatial interpretation of results. *The diagram illustrates a six-step process of emotion and sentiment analysis: (1) data collection from social networks and sociological survey, (2) data preparation and translation, (3) qualitative identification of emotions using the R. Plutchik (2001) model, (4) quantitative analysis of sentiment polarity using the NLTK VADER tool, (5) mapping of emotion and sentiment data with geographic locations and GIS-based mapping, and (6) interpretation of the results in urban planning and heritage governance context. The scheme reflects a mixed (qualitative and quantitative) methodology that allows the integration of experiential and spatial analysis*

The Importance of Emotional Geography for Local Identity

Local identity is formed as a complex system of interaction between material and intangible factors, in which the physical environment, social practices, cultural narratives and collective memory merge with personal and community experiences. Places are not

just objective spaces – they become "places" only when they acquire experiential, symbolic and emotional significance (Tuan, 2001; Selten and van der Zandt, 2022). Emotions play a fundamental role in this regard, since they mediate between the physical environment and its perception, helping to shape meanings, evaluations and attachment (Caquard and Griffin, 2018; Manzo, 2003).

Emotional geography provides a methodological framework to analyze these processes, i.e. to study how people react emotionally to specific places, how these reactions are distributed in space, and how they relate to urban structure and historical layers (Zaleckis et al., 2022). Mapping emotions allows us to identify not only emotional "hot spots", but also deep layers of local meanings that often remain invisible in traditional urban or heritage analyses (Caquard and Griffin, 2018; Hawthorne et al., 2022). In this way, emotional geography becomes an important tool in the study of local identity.

Figure 3 reveals how emotional analysis can contribute to a deeper understanding of local identity and urban planning processes. One of the main meanings of emotional geography is the revelation of invisible, profound values and the depth of time. Emotional reactions to historical events, architectural layers, or cultural symbols can help identify local meanings that are not directly visible in the physical structure but are important for the community's self-perception and collective memory (Hawthorne et al., 2022; Norberg-Schulz, 1980). In this way, emotional analysis becomes a tool that allows to supplement the traditional discourse on heritage protection with subjective but socially significant data.

Emotional connections and collective memory form an important part of local identity. Nostalgia, pride, sadness or annoyance, expressed when talking about specific places, reveal how individuals and communities perceive their relationship with the environment. Such emotions can express both strong attachment and conflicting or traumatic experiences. Emotional geography allows these signals to be systematically identified and spatially localized, thus contributing to a better understanding of local identity (Caquard and Griffin, 2018; Zaleckis et al., 2022;).

The scheme also emphasizes the role of cultural narratives and symbolic meanings. The analysis of emotions can reveal what narratives, events or symbols are significant to a particular place and how they consolidate its identity. The concept of the local spirit (*genius loci*) (Norberg-Schulz, 1980) is closely related to emotional experience – the unique character of a place is revealed not only through architectural forms or urban structure, but also through the emotions it evokes. Thus, emotional geography helps to recognize and conceptualize that experiential layer of a place that often remains outside the physical parameters.

An important dimension of emotional geography is also the development of perceptions over time. Emotional reactions can reflect a changing attitude towards past events, urban transformations or social processes. By analyzing the dynamics of emotions, it is possible

to better understand how the identity of a place changes, which aspects of it remain stable and which are transformed. This is especially true in historical areas or in the context of urban change, where physical changes inevitably affect both the symbolic and emotional field of the place (Caquard and Griffin, 2018; Manzo, 2003).

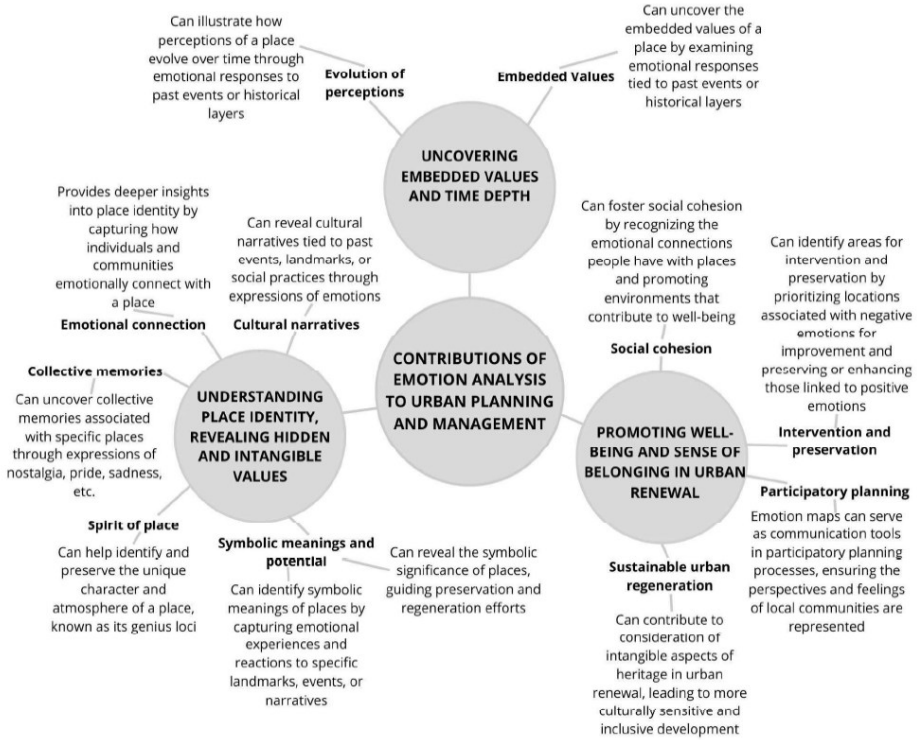

Figure 3. The Significance of Emotional Geography for Local Identity and the Possibilities of Its Application in Urban Planning and Management *(Grazulevičiūtė-Vileniškė et al., 2025). The scheme summarizes the contribution of emotional analysis to the understanding of local identity and urban governance, distinguishing between the revelation of invisible, intangible values, symbolic meanings and the depth of time through emotional connections, collective memory and cultural narratives that shape the spirit of the place (genius loci). Emotional geography acts as an integrative dimension that connects the material and intangible aspects of a place. At a practical level, emotion analysis and mapping can contribute to strengthening social cohesion, sustainable urban regeneration, heritage preservation and participatory planning, helping to identify emotional priorities and sensitive areas of intervention*

In addition to its theoretical significance, the scheme also highlights the practical potential of emotional analysis:

- Integrating emotional data into urban planning and management processes can contribute to strengthening social cohesion, promoting participatory planning and sustainable urban regeneration.
- Emotion maps can become a communication tool that allows for a visual reflection of the feelings and expectations of communities, thus enabling more inclusive decision-making (Zaleckis et al., 2022; Piga et al., 2023).
- Emotional analysis can also help identify areas where negative emotions predominate and prioritize interventions focused on improving the quality of the environment or solving social problems. At the same time, places associated with strong positive emotions can be identified as important nuclei of identity, the preservation or actualization of which becomes a strategic goal (Hawthorne et al., 2022). In this way, emotional geography contributes to the strengthening of well-being and a sense of belonging in cities and to a more culturally sensitive and human-centered urban development (Stals et al., 2018).

In conclusion, emotional geography is not just an additional analytical layer next to traditional urban or heritage conservation methods. It acts as an integrative dimension that connects the tangible and intangible aspects of the place, individual experiences and collective narratives, layers of the past, and the transformations of the present. In this way, emotional analysis becomes a significant tool that allows not only to better understand the identity of a place, but also to shape it in a reasoned and sensitive way in urban planning and management processes.

Example of the results of the study

The intensity maps of the distribution of emotions and sentiments are made using the GIS-based Kernel Density Estimation (KDE) method, where each geographically marked point of data on emotions contributes to the identification of emotional intensity clusters in the study area. Higher concentrations of similar emotional reactions emerge on maps as clear "hot spots."

Maps of the distribution of emotions and the polarity of sentiments allow us to analyze the connections between the urban form, social interactions in the virtual space and individual perceptions, revealing the regularities of emotional involvement and their possible connections with the urban environment.

The distribution of emotions in the centre of Kaunas city (Fig. 4), determined on the basis of qualitative analysis by applying the classification of R. Plutchik (2001), reveals clear spatial patterns. Interest emerges as the most widespread and intense emotion – this can

be seen both from the map of the intensity of the distribution and from the number of emotions per point, forming wide clusters throughout the analyzed area. It should be noted that the accumulations of interest coincide with the main arteries of pedestrian movement – Vilniaus Street in the Old Town and Laisves Avenue in New Town. These commercially active streets and corridors for the movement of visitors can be considered bright places of interest.

The concentration of the second most common emotion – Joy – is also evident in specific clusters that only partially coincide with the main pedestrian arteries but are clearly correlated with the banks of the Nemunas, the Nemunas Island, the spaces around important public areas, pedestrian and entertainment areas, historical sites and the shopping center.

When analyzing the distribution of the emotion of Peace, it was expected that this emotion would correlate with greenery or quieter spaces in the city center. However, this hypothesis has not been confirmed, although it has been observed that the distribution of Rest is less related to the main pedestrian arteries and the concentration of commercial activities. Interestingly, emotional "hotspots", although formed on the basis of virtual space interactions, correspond quite precisely to the main urban structures and functions.

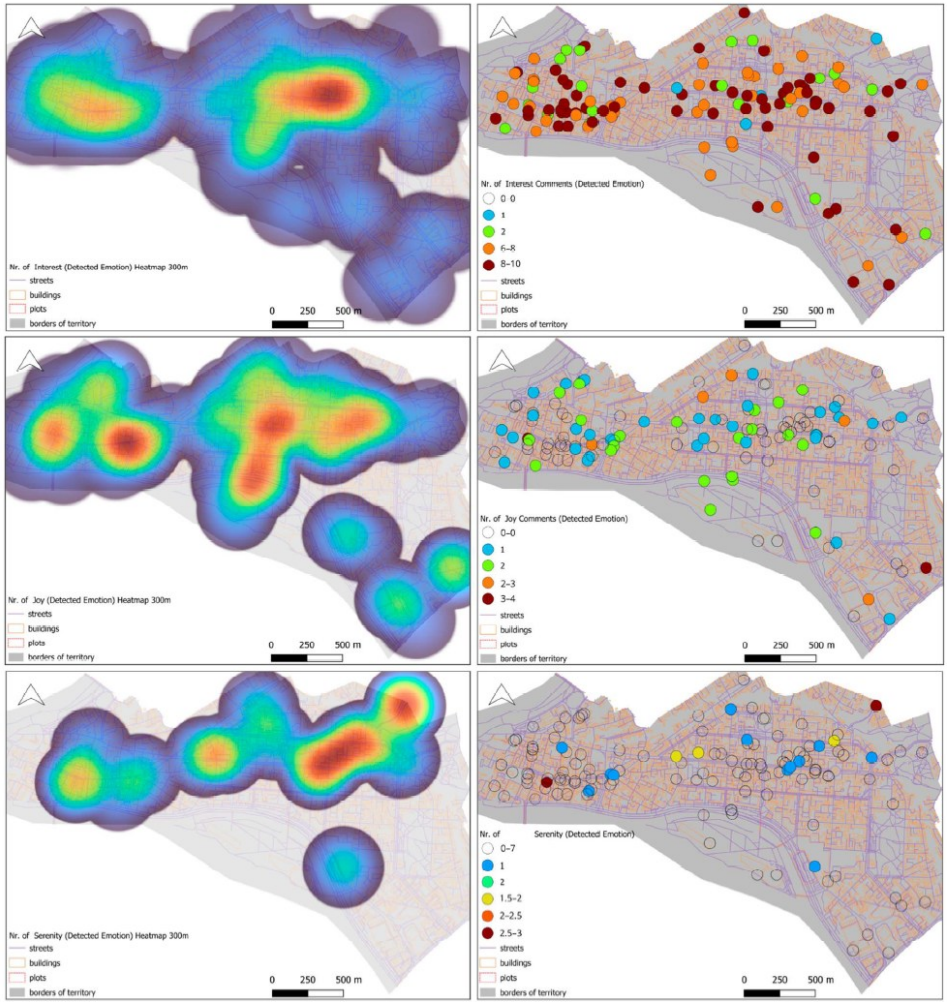

Figure 4. Results of the analysis of the emotions of Facebook posts and comments distributed on the map of Kaunas Centre Eldership: Distribution of Interest, Joy and Peace

4. APPLICATION OF VISIBILITY, ACCESSIBILITY AND INTELLIGIBILITY RESEARCH IN URBAN PLANNING AND HERITAGE PROTECTION

The visibility and accessibility of interwar modernist buildings determine their role in the structure of the city and in everyday experiences. Better integrated heritage becomes more recognizable, contributes to the image of the city and the attractiveness of the place. The comprehensibility of heritage influences the readability of urban spaces and the orientation of residents. Changes in comprehensibility change the way heritage is perceived and given meaning in the urban environment.

Visibility in urban research is an indicator of the visual integration of a heritage object into the structure of the city, i.e. to what extent and from where the heritage object is perceived in the context of daily movement. It is not only a physical opportunity to see the building, but also its participation in the visual structure of the city – perspectives, axes, silhouettes, street corridors.

Visibility can be understood as *the extent of an object's participation in the visual field*, *its relationship with the network of public spaces*, *its ability to act as a landmark or visual accent*. Visibility is not the same as aesthetic assessment – it is a spatial feature that depends on the position of the building, the surrounding volumes, greenery, street structure and relief.

Functions of visibility of cultural heritage objects:

- *Orientation function.* The orientation of the city is based on visual reference points. Highly visible buildings form a mental map of the city help to perceive directions, centers and hierarchy. If the heritage object is located in a place of high visibility, it contributes to the perception of the structure of the city.
- *Identity formation.* The city's identity is created not only through architectural quality, but also through visual recognition. The building, which often falls into the field of vision of residents and visitors, becomes part of the collective memory.
- *Indicator of public importance.* Visibility shows how much the object is "included" in the public life of the city. Even an architecturally valuable building, if it is visually isolated, can have a limited impact on the cityscape.
- *A reflection of urban hierarchy.* The distribution of visibility helps to reveal which objects in the structure act as dominants and which act as background elements. From the point of view of heritage protection, the question arises whether visibility can complement the descriptions of the valuable properties of cultural heritage objects? Traditional descriptions of valuable properties usually emphasize the architectural composition of a building or complex, a network of streets, etc., but it is rarely assessed how an object functions in the spatial system of the city.

The inclusion of visibility would allow:

- *To supplement the descriptions of immovable cultural heritage with the characteristics of spatial position*:
  - "The object is characterized by high visibility on the main urban axis",
  - "The object forms the completion of the street perspective",
  - "The object is visually isolated from the main public spaces."
- *Differentiate protection modes*. If the building is located in a place of high visibility, stricter regulations may be justified: height control, protection of visual axes, regulation of advertising and materiality.
- *To assess the impact of changes not only materially, but also perceptually*. Even if the physical properties of the building remain unchanged, the new surrounding volumes can reduce its visibility, thereby changing its role in the cityscape. Visibility analysis allows such effects to be assessed objectively.
- *To associate architectural value with urban function*. Architectural quality acquires a broader significance when it is known to what extent the building actually participates in the visual structure of the city.

Application of the Visibility Survey to Heritage Sites

Since a city is usually perceived as moving around it (Lynch, 1960; Cullen, 2006), it is very important to evaluate not only the panoramic viewpoints, but also the visibility from the inside of the streets and other public spaces. The recommendations are based on a study conducted during the analysis of Kaunas New Town (Zaleckis et al., 2025 b).

Objective: to assess the visual exposition of cultural heritage objects in public spaces and to determine their role in the visual structure of the city.

1. Required data

- Digital Surface Model (DSM) with buildings and greenery and only with buildings
- Building contours (vector data)
- The central lines of the street network, which show the routes of the movement of observers

2. Tools to use

Software:

- ArcGIS Pro (Viewshed Analysis tool)
- QGIS (Visibility Analysis plugin)

3. Recommended Steps for Analysis

1. Generate observation points in the street network (e.g. every 10 m).
2. Set the height of the observer (e.g. 1.75 m).
3. Perform a viewshed analysis:
   - with greenery,
   - without greenery.
4. Calculate:
   - the visible part of the perimeter of the building,
   - normalized visibility index (0-1).

5. Recommendations for interpretation

- High visibility objects are possible landmarks and dominants.
- Low-visibility objects are potentially isolated or "hidden" heritage.
- To evaluate not only the absolute values, but also the visibility that may be characteristic of the heritage object in the past.

Example of the results of the study

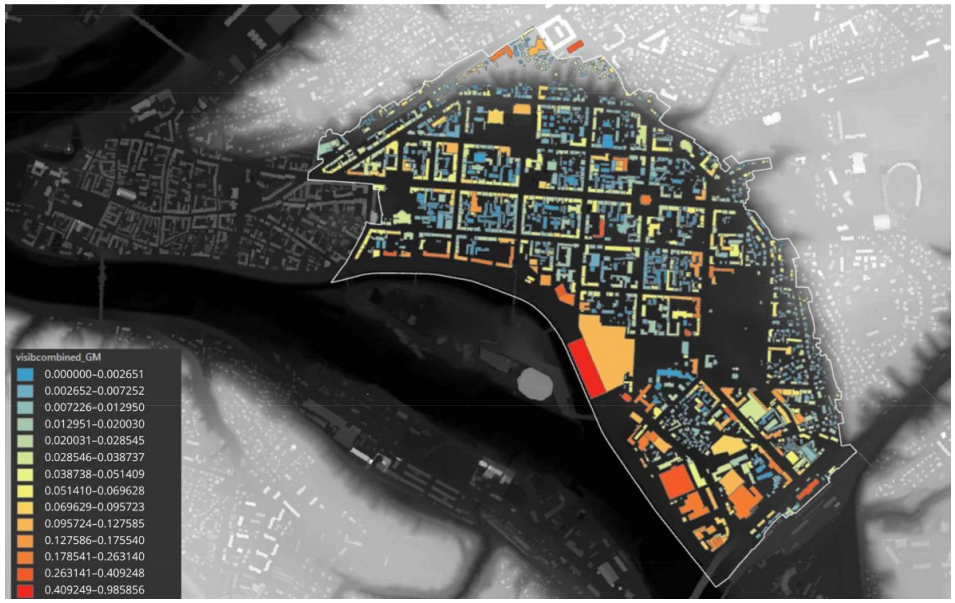

Figure 5. Overall visibility index

In Figure 5, the visibility part shows how observation points are generated from the spatial structure of the city – the geometry of buildings and the street network – and line-gaze analysis is performed to determine which parts of the facades are visible from public

spaces. The results of these calculations are aggregated and normalized to form a general visibility index that quantifies how often and from how many places a particular building enters the potential field of view of the observer.

Accessibility in urban heritage research is the level of integration of an object into the city's movement system, indicating how easily it can be accessed from other parts of the city. When assessing the accessibility of heritage objects, it is appropriate to do so, first of all, taking into account the movement of pedestrians.
Accessibility includes the location of the object in the street network, its proximity to the streets of intense traffic, its relationship with the centers of everyday life or the best accessible places.
Accessibility associated with cultural heritage sites can be seen as:

- *Functional viability factor*. Objects located in places with high accessibility have greater potential to attract visitors, generate activity, and be a part of everyday city life.
- *Social visibility indicator*. Even an architecturally valuable building can be visited little if it is structurally insulated. Accessibility indicates the real inclusion of the object in the life of the city.
- *Urban hierarchy indicator*. High-reach locations often become centers, nodes, or intersections.

By including an accessibility assessment, it is possible *to supplement the descriptions of the valuable properties of heritage objects*:

- "The object is located in a high-reach urban node",
- "The building is located in a local, but globally weakly integrated structure",
- "The facility is characterized by limited structural integration."

This would allow to differentiate adaptation strategies, justify the selection of functions, and assess the impact of transformations on the structure of the city. Accessibility would expand the assessment of heritage from architecture to the functioning of the city.

Apply accessibility survey to heritage sites
The accessibility of the urban structure can be analyzed using mathematical graph models and spatial syntax techniques (Hillier, 2007; Sevtsuk & Mekonnen, 2012). The recommendations are based on a study conducted during the analysis of Kaunas New Town (K.Zaleckis et al., 2025 b). The aim is to evaluate the integration of cultural heritage objects into the movement and functional structure of the city.
1. Required data

- Street Network Segments (Vector)
- Intersection Nodes

- Outlines of buildings

2. Tools to use
Software:

- DepthmapX (Space Syntax Analysis) or another program that simulates the movement of people in the street network based on mathematical graph models.

3. Recommended indicators

- *Integration (Closeness centrality)* or accessibility showing the best accessible places in the street network at different distances of movement,
- *Betweenness centrality (Choice)* or transit flows at different distances of movement

4. Recommended Analysis Steps

1. Prepare a segmental street graph.
2. Determine the movement distances relevant to the analysis (e.g. 400 m, 800 m).
3. Calculate the two above indicators.
4. Link results to heritage objects (for example, by using the spatial join feature in ArcGIS Pro or its equivalent in other apps).

5. Recommendations for interpretation

- Objects with high reach or adjacent to transit flows are functional nodes.
- Low-reach objects are peripheral objects.
- It is recommended to assess accessibility over several moving distances.
- It is recommended that you consider the accessibility of a heritage object in stories within the course.

Example of the results of the study

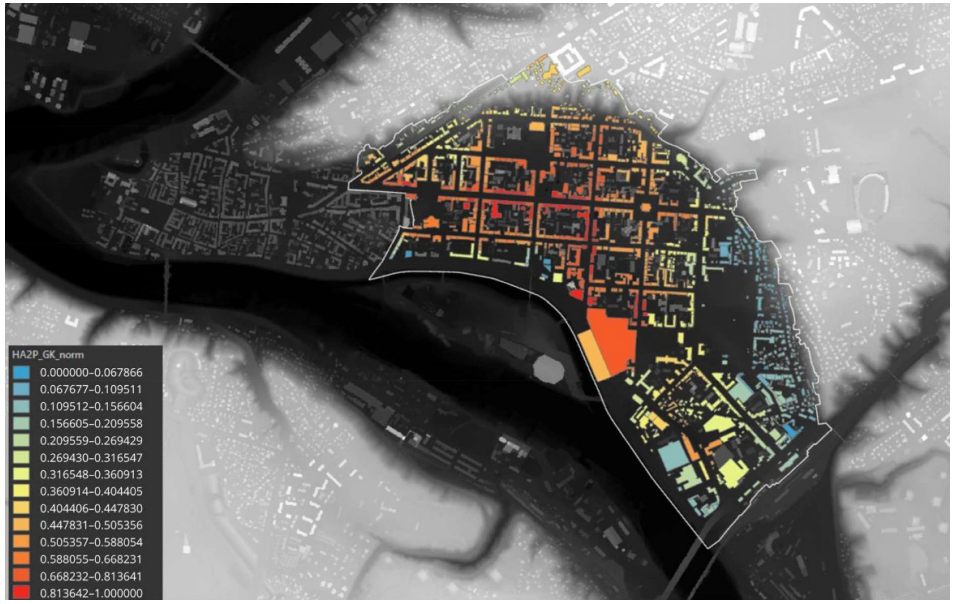

Figure 6. Availability Index (HAP2GK) assigned to buildings

The figure makes it possible to identify the most "accessible" objects that enter the trajectories of the movement of the population on a daily basis, and those that are less accessible, and therefore less integrated into the daily life of the city. Such analysis helps planning professionals and heritage authorities to identify where infrastructure or orientation solutions should be improved to make cultural heritage more accessible to the public.

Visibility and Accessibility of Interwar Modernist Objects: An Exemplary Assessment

Interwar modernist buildings in Kaunas New Town are characterized by different levels of visibility and accessibility, which reflect both their original and changed role in the urban structure.

Visibility analysis shows that objects located on the main axes of the city (e.g. representative streets or squares) have a high visual exposure index. Such buildings form the perspectives of the streets, complete the compositional axes and act as landmarks.

They are often seen from many points in public spaces, thus becoming part of the visual structure of the city and contributing to the formation of identity.

Meanwhile, the modernist buildings in the depths of the blocks, although architecturally valuable, are characterized by limited visibility. Their visual exposure is limited to local spaces, so their role in the cityscape is more local than representative.

Accessibility analysis reveals that modernist objects integrated into a denser network of streets and located close to the main trajectories of movement are characterized by high structural accessibility. Such objects have a greater potential to act as everyday city hubs – they are easy to reach both on foot and within short connections with other parts of the city. In contrast, objects located in less integrated parts of the network are structurally less accessible. Even if their architectural value is high, limited integration can reduce their functional activity and public significance. In the street network, transformations can drastically dilute the visibility and accessibility of objects, so it is important to take this into account when managing the heritage area.

In conclusion, it can be said that the urban significance of interwar modernist objects depends not only on their architectural features, but also on their place in the spatial system of the city. Objects with high visibility and accessibility act as nuclei of the urban structure, while objects of a lower level contribute to the formation of the identity of the local environment. Such analysis allows to differentiate heritage protection and planning solutions, considering the real role of objects in the cityscape, to foresee different scenarios of heritage use, etc.

Visibility and accessibility indicators are not static: they change along with the transformations of the urban structure. In the case of interwar modernist objects, several possible scenarios can be distinguished.

Some of the buildings, especially representative administrative or cultural objects, have been designed as clear urban dominants since their construction. They were integrated into the main axes of the city, compositional nodes and public spaces, therefore characterized by high visibility and accessibility. If the structure of the city has remained stable enough, these objects still retain their orientation and structural role today.

Other objects of modernism may have been of local significance at first, but later urban interventions (the emergence of new streets, the redistribution of traffic flows, the densification of blocks) may have increased or decreased their accessibility. For example, new intensive movement corridors can enhance the functional integration of an object, even if its architectural form has not changed.

The opposite situation is also possible: new volumes, densification of buildings or changes in greenery can reduce the visual exposure of buildings that were previously clearly seen. In this case, it is not the heritage itself that changes, but its role in the cityscape.

By modelling possible urban scenarios (new buildings, changes in height, transformations of street structures) it is possible to predict:

- whether the object will remain a landmark,
- or become less "readable" in the urban structure,
- whether his role in the mental image of the city will strengthen or weaken.

In this way, visibility and accessibility indicators become not only analytical, but also predictive instruments that allow to assess how heritage will function in the structure of the future city.

Example of the results of the study

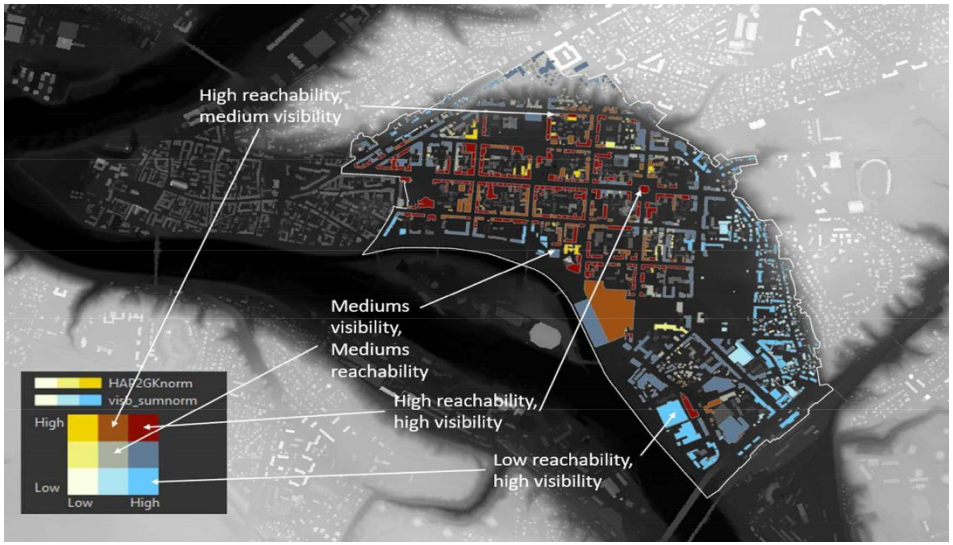

Figure 7. Visibility and Reach Matrix

Figure 7 illustrates a matrix in which the positions of objects are determined by their visibility (horizontal) and reach (vertical) indicators. This makes it possible to distinguish between zones where objects are: *both highly visible and easily accessible* – these places act as city *markers and active centers*; *well-visible but poorly accessible* – visually important but functionally isolated objects; *poorly visible, but easily accessible* – everyday, functional points in the city network; *Poorly visible and poorly accessible* – closed or less visited urban fragments.

It helps to understand how spaces and heritage objects function in the city, not only as visual signs, but also as functionally accessible elements in the urban network, and is therefore useful for planning infrastructure, movement and the integration of heritage into everyday life

Intelligibility is a quantitatively modeled characteristic of urban structure, indicating the extent to which a heritage object, due to its visibility and accessibility, is included in the spatial logic of the city and has the potential to become an element of the mental image of the city (according to Kevin Lynch). Comprehensibility can be specifically analyzed based on the Quinn Lynch model of the metal city image and evaluated by analyzing the possibility of heritage objects becoming:

- *Urban landmark* – when the object is characterized by high visibility (visual dominant standing out from the background, frequent appearance near the most active axes of movement) and sufficient accessibility to allow it to be experienced from different points of the city.
- *Node or part of a node* – when the object is located in a high-reach location (in the area of intersecting traffic flows) and at the same time has sufficient visual distinctiveness to allow it to become a reference center.
- *District element* – when an object is characterized by local accessibility and consistent, but not dominant, visibility, which helps to shape the character of a certain territory.
- *Structural boundary (edge)* – when the object is located in a transitional or peripheral area of the structure, where accessibility and directions of movement change, and visibility helps to perceive the boundaries of territories.
- *Path Element* – when the object is encountered on the main movement routes and has sufficient visual activity to allow it to be memorized as a route guide.

The study of comprehensibility and importance for cultural heritage. Intelligibility is a characteristic of the urban structure, which determines the extent to which local spatial characteristics allow to perceive the general structure of the city and the importance of cultural heritage in the 6th context. Comprehensibility can be based on a combined analysis of the visibility and accessibility of heritage objects. Intelligibility in urban analysis is defined as the relationship between an object or space, a specific location, and its importance in a city, e.g., being in a central part of the city, which is reached by many people or in a less known and less visited periphery (Peponis & Wineman, 2002; Hillier, 2007).

In the context of cultural heritage, comprehensibility becomes a unifying concept, encompassing both visibility and accessibility. Visibility determines the participation of

the object in the visual structure of the city, accessibility – its integration into the network of movement, and comprehensibility shows whether these characteristics are in harmony with the general logic of the city. In other words, whether a heritage object is not only visible and accessible, but also structurally understandable and meaningful. This concept allows us to link heritage objects with Kevin Lynch's model of the mental image of the city. Objects of high comprehensibility have the potential to become landmarks, nodes or elements of paths, thus comprehensibility allows to view heritage as an active element of the urban system, and not only as an architectural value.

Comprehensibility as part of heritage change monitoring. Comprehensibility indicators can be applied as an instrument for monitoring the spatial status of heritage sites (Zaleckis et al., 2025 a). Its change in time reflects the transformations of the urban system and the role of heritage in it.

The monitoring process analyses:

- Visibility
- Accessibility
- The relationship between these two indicators

By comparing models from different periods or simulating planned changes, it is possible to determine whether the comprehensibility or role of heritage in the cityscape is increasing or decreasing. Declining comprehensibility can signal structural fragmentation, the emergence of new barriers, or the weakening of historical hierarchy. Increasing – indicates the consolidation of the structure and a clearer urban logic.

Such monitoring allows us to assess not only physical changes, but also their impact on the readability of the city. This is especially true in historical territories, where it is important to maintain not only the material heritage, but also the spatial structure that gives it context.

The influence of changes in comprehensibility on the orientation of the city and the perception of heritage. Urban orientation is based on the ability to perceive the overall structure when moving around the city. If the territory is characterized by high comprehensibility, residents and visitors can easily form a mental map of the city – recognize the main axes, centers and landmarks. In such territories, heritage objects naturally become part of the mental image of the city.

Decreasing comprehensibility can weaken the orientation system: although heritage objects are not destroyed, they become less involved in the system of perception of the city. Therefore, the comprehensibility analysis allows us to assess how urban changes affect not only the physical structure of the space, but also the collective experience of the city. It provides an opportunity to predict whether heritage will remain part of the mental image of the city, or whether it will gradually be "transferred" to the periphery of perception.

Example of the results of the study

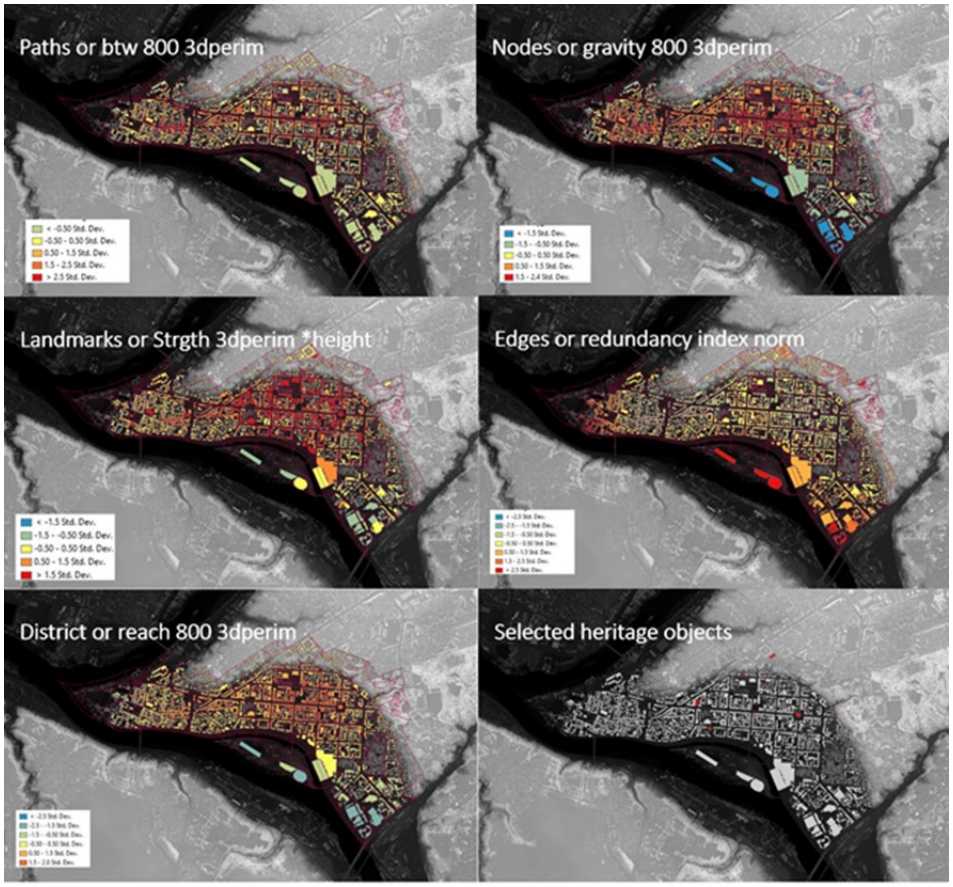

Figure 8. Results of the intelligibility modeling based on calculations of the centrality of the graphs and the structure of the Lynch mental city image and the location of heritage objects

Analyzing the maps, it can be concluded that they demonstrate a fairly clear, visually recognizable pattern: roads as the main pedestrian streets, with nodes, centered around

them at certain points; Edges as zones that offer more alternative routes, along with accessibility differentiation, identify three historically distinct zones and potential neighborhoods: the Old Town with its network of medieval streets; The part of the New Town with the most clearly expressed and preserved structure of the classicist street layout; The southern part of the New Town with a more organic and deformed layout of the twentieth century. The most obscure picture is provided by landmark modeling, since it presents a fairly large number of buildings suitable for this. In the future, two ways could be chosen to improve the results: to increase the value of the standard deviation or to look for additional indicators and perhaps not only quantitative but also qualitative methods. However, even in the current situation, landmark modeling reduces the number of potential candidates and works well in the Old Town, where it identifies the main churches and the Town Hall. Figure 8 results for all five indicators are presented.

5. INTEGRATED HERITAGE MANAGEMENT

In order to assess the most relevant challenges of heritage protection in Kaunas city center and the practical relevance of the methods used in the HERINDEP project, a qualitative expert survey was conducted by e-mail. The questions included the harmonization of heritage protection and lending requirements, the relationship between tourism and traditions, the need for compensation mechanisms, the involvement of communities and the evaluation of the applied research methods (urban, demographic, sociological and emotional analysis). The responses received from the experts were summarized by applying qualitative content analysis (identifying recurring themes and main tension directions). The results obtained formed the basis for the role of emotional analysis depicted in Figure 5, complementing other urban and sociocultural research.

The scheme summarizes how different strands of analysis – urban analysis (including visibility and accessibility research), demographic research, sociological surveys and emotional analysis – allow to identify the tensions and conflicts that shape the experience of place. The relationship between population declines and heritage protection, the harmony of heritage use and protection requirements, the balance between the preservation of tourism culture and traditions, or the relationship between legal norms and community involvement – these are not only planning issues, but also elements of the emotional field of the city. They are reflected in the attitudes, emotional reactions and assessment of the location of the population. The scheme proposes a broader integrative approach, in which emotional analysis acts as a connecting link between urban, demographic and sociological research. Urban analysis allows to assess the comprehensibility of the spatial structure, the logic of visibility and accessibility (Zaleckis et al., 2025c), demographic studies reveal changes in population size and social structure, and sociological surveys reveal declared attitudes and assessments. However, emotional

analysis provides an opportunity to understand how these processes are lived and given meaning in everyday experience.

The diagram shows that emotional geography can help to identify conflict or tension zones where different interests intersect: population decline and heritage protection requirements, tourism development and preservation of traditions, legal constraints and community expectations. Such tensions often manifest themselves not primarily in the physical space, but in the emotional plane – in the forms of disappointment, resistance, nostalgia or even indifference. Mapping emotional data can help to localize these reactions spatially and complement formal urban analysis.

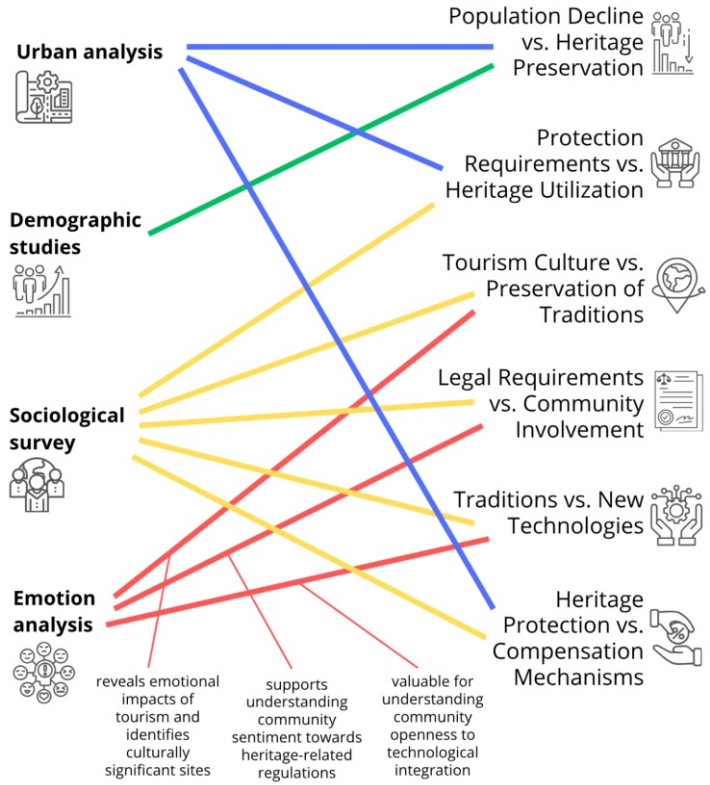

Figure 5. A model of interaction between heritage protection challenges and applied research methods, based on the expert survey of the HERINDEP project. *The scheme was prepared by summarizing the answers of heritage protection experts working in Kaunas city centre about the most relevant challenges, conflict situations*

and the significance of the research methods used (urban, demographic, sociological and emotional analysis). It reveals the main axes of tensions – between conservation requirements and heritage lending, legal norms and community involvement, tourism development and preservation of traditions, compensation mechanisms and heritage constraints – and shows how emotional analysis can complement other methods by identifying experiential and value aspects of these processes. The scheme is based on an analysis of the content of the expert responses

A particularly significant dimension of emotional analysis is revealed in the context of depopulation. As the population decreases, some territories may lose not only functional, but also symbolic and emotional meanings. Empty spaces, abandoned buildings or weakening social ties can generate negative emotional associations that further accelerate the "psychological *detachment*" of the place. Meanwhile, strong emotional ties to certain objects or spaces can act as a resilience factor that supports a community's identity and motivation to maintain or revitalize a place.

By integrating visibility and accessibility indicators with the analysis of emotional reactions, it is possible to identify areas where there is an imbalance between spatial potential and experiential value. For example, places of high visibility and reach, but weak positive emotional reactions, can signal untapped symbolic potential. In contrast, territories with strong emotional ties but poorly integrated or with little visibility may require targeted interventions that enhance their functional or visual integration into the urban structure (Zaleckis et al., 2025c). Emotional analysis does not replace other methods but gives them an additional dimension – experiential and symbolic. In the face of the challenges of depopulation, such an integrated approach makes it possible to assess the urban environment not only in terms of physical or legal parameters, but also in terms of its ability to maintain a sense of place, social cohesion and cultural resilience.

CONCLUSIONS

1. Immovable cultural heritage is an important factor in the formation of the identity and sense of place of historic parts of cities. The results of the survey show that residents associate cultural heritage with the preservation of national history, urban identity, aesthetic quality of the environment and cultural value. Architectural and urban heritage objects help to maintain the authenticity of the city, strengthen the emotional connection of residents with the place and contribute to the formation of the community's identity.
2. Although heritage is considered an important cultural and economic resource of the city, its protection faces practical challenges. Respondents' responses reveal that the importance of heritage protection is associated not only with cultural but also with economic aspects, such as tourism development and urban attractiveness. At the same time, however, a critical attitude towards the existing heritage protection practices emerges, emphasizing the need to improve heritage protection policy, regulation and its practical implementation in order to ensure more sustainable protection of historic urban areas.
3. Emotional geography is an essential tool for understanding and analyzing local identity. Research shows that local identity is formed not only through the physical environment, but also through social practices, cultural narratives, collective memory and emotions of the inhabitants. Mapping of emotions and sentiment analysis allows us to identify invisible layers of place, symbolic meanings and emotional "hotspots" that help to better understand how communities experience, value and attach to specific urban spaces.
4. The integration of emotional analysis methods into urban planning and heritage protection promotes sustainable and human-centered urban development. Emotion maps and sentiment analysis provide a practical basis for identifying priority areas for interventions, promoting social cohesion, participatory planning, and culturally sensitive urban regeneration. In this way, emotional geography becomes not only an analytical tool, but also a strategic instrument for the preservation and development of local identity.
5. Studies have observed that high-visibility cultural heritage objects form the visual structure of the city, act as landmarks and elements of the city's identity. Visibility analysis allows us to assess the role of buildings in street perspectives, urban hierarchy and mental image of the city, regardless of their architectural quality.
6. High-accessibility objects are integrated into the city's movement system, becoming functional nodes and an active part of everyday life. Accessibility analysis helps to differentiate heritage protection strategies, predict the impact of transformations and assess the potential of objects as centers of public life.
7. Intelligibility combines visibility and accessibility, showing the extent to which heritage is structurally embedded in the logic of the city. Objects of high comprehensibility can become landmarks, nodes or elements of movement trajectories, therefore the analysis of this indicator allows to assess heritage as an active participant in the urban system, and not only as an architectural value.
8. Effective management of heritage protection must combine urban, demographic, sociological and emotional research. Visibility and accessibility indicators, together with emotional analysis, allow to identify conflict areas, imbalances between spatial potential and experiential value, and to formulate interventions that strengthen heritage both functionally and symbolically, especially in the context of depopulation.

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Annex "Phases of Visibility Studies"

Figure P1. *Raster surface data with building polygons, walkways, and streets attached. The white line marks the boundary of the area under study.*

Figure P2. *Observation points (marked in green) with a step of 10 meters were generated on all the streets of the study area and some streets outside it, from which this area is visible.*

Figure P3. *The results of the analysis of the field of vision are presented as the areas visible from the observation points (yellow) and the boundaries of the test area (red). The analysis of the visibility zone was carried out in both rasters: with trees and without trees.*

Figure P4. *Points generated at a distance of 1 m around each polygon of the building (marked in green).*

Figure P5. *Visibility is the number of points from which each point on the façade is visible, based on GIS spatial connection analysis. Visibility analysis was carried out in both raster's: with trees and without trees.*

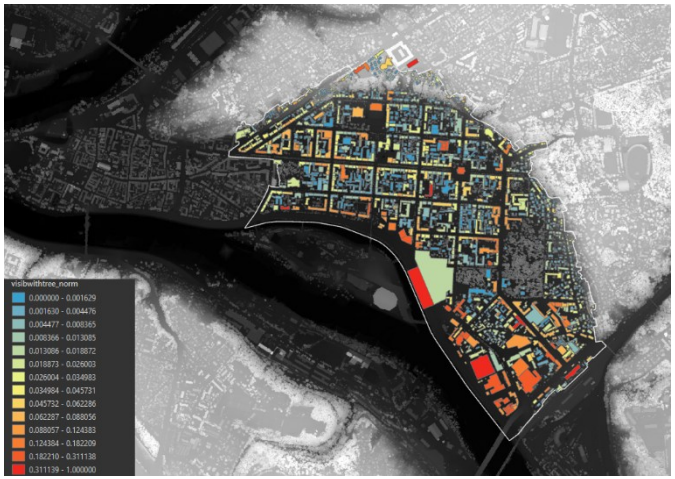

Figure P6. *The visibility of buildings as the sum of the visibility points of the façade, normalized by dividing by the maximum value, based on the raster with tree crowns.*

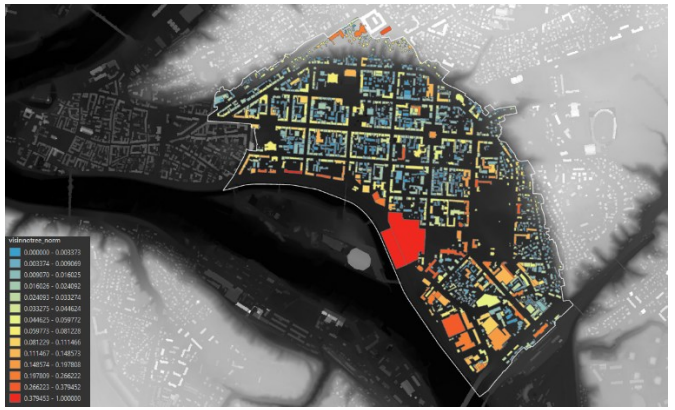

Figure P7. *The visibility of buildings as the sum of the visibility points of the façade, normalized by dividing by the maximum value based on the raster without tree canopies.*

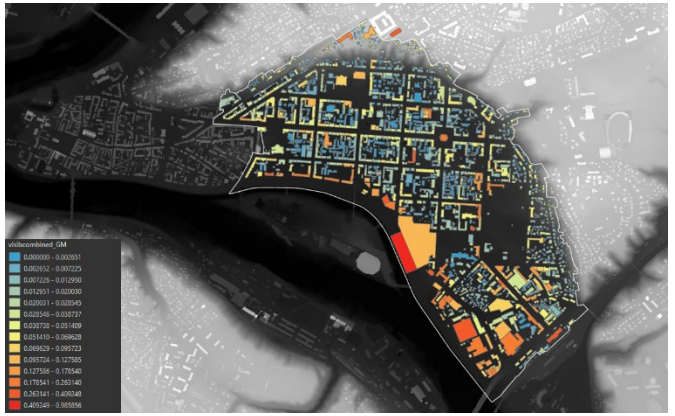

Figure P8. *Total visibility with and without trees is calculated as the geometric means of both values for each building.*