

Summaries

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TURNING ENVIRONMENTAL DESIGN SIMULATION ALGORITHMS INTO PARAMETRIC OBJECTS: EXPERIMENTAL STUDY OF BIM-COMPATIBLE DYNAMIC BLOCKS

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Keywords: environmental design, climate-data, sustainable architecture, Rhino, VisualARQ, Grasshopper Styles, Ladybug Tools

European building legislation increasingly emphasises improved indoor comfort, higher energy efficiency, and systematic reduction of CO₂ emissions across the building life cycle. In response, environmental simulations are becoming integral to architectural design workflows, particularly within the Building Information Modelling (BIM) environments. However, simulation processes in parametric platforms such as Rhinoceros 3D and Grasshopper typically remain dependent on active script files, limiting interoperability, scalability, and accessibility for non-expert users.

This study proposes and experimentally validates a workflow that transforms Ladybug Tools-based Grasshopper environmental simulations into BIM-compatible parametric objects using VisualARQ GH-Styles. Instead of managing simulations as external or file-based scripts, the approach encapsulates simulation logic within reusable object-based elements embedded directly in the modelling environment. The objective is to develop and test an exemplary interoperability workflow for early-stage environmental simulation that overcomes identified GH/LB limitations.

The restructuring of a Ladybug Incident Radiation script into a VA GH-Styles definition is documented and compared with the standard Grasshopper workflow. Quantitative evaluation across multiple grid sizes shows convergence of both approaches at high resolution, with deviation below one per cent, while the object-based workflow exhibits reduced sensitivity to grid variation. In addition, the proposed method removes dependence on an active Grasshopper window and simplifies variant management within the modelling environment.

The experiment is conducted in Rhinoceros 3D (Rhino 8 SR27 2026-1-19) using Grasshopper (build 1.0.0008), Ladybug (version 1.8.0), and VisualARQ 3 (version 3.7.1.20537). A simplified urban 3D model of the Student Dormitory Jura Hronca in Bratislava serves as input geometry for a Ladybug Incident Radiation simulation, using a Bratislava .epw weather file and a full-year analysis period. A standard GH/LB workflow (Workflow A) is developed and subsequently restructured according to VA GH-Styles conventions (Workflow B). Both workflows are compared under identical simulation settings using total incident solar energy (kWh) as the benchmark metric, and usability, interoperability, limitations, and future potential are discussed.

While the study is limited to a single case and specific software ecosystem, it demonstrates the feasibility of environmental simulation as a parametric BIM object. The novelty of the study lies in demonstrating environmental simulation as a parametric

BIM object rather than as a standalone script, contributing a functional interoperability strategy for early-stage environmental design integration.

MINIMAL ADAPTIVE CONSERVATION FOR SAVING URBAN MEMORY IN CONFLICT AREAS: GAZA, PALESTINE

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Keywords: architecture, culture, conservation, urban, memory, genocide, Gaza, Palestine

Historical buildings in difficult situations of conflict areas deserve greater attention to keep urban memories of people as an important part of their culture and identity. For decades, Palestinians have suffered from the Israeli violations of all international conventions and treaties of all types. One unhuman aim of the Israeli atrocities in Palestine and especially in Gaza has been to destroy all signs of Palestinian urban memory. This brought many international institutions to stand beside the Palestinians and support their efforts to preserve their urban memory and culture on their land. However, the problem has another, equally important aspect: architectural conservation theories and methods are also powerless in the face of the difficult and dangerous situation of conflict areas. Most current theories and approaches address architectural conservation in politically, socially, and economically stable contexts. These approaches include strategic planning for architectural conservation, adaptive conservation, reuse, and, more recently, sustainable architectural conservation. (Doratli, 2004, De Filippi, 2005, Steinberg, 2009). At the Palestinian side in Gaza, several studies dealt with architectural heritage conservation. Almughany et al. (2009) examined sustainability in the architectural conservation of Hammam Al-Samra without introducing a theoretical or practical model of conservation. Al-Qeeq (2011) studied how to enhance the sustainability of architectural conservation of the main historical monuments in Gaza city by applying the concept of adaptive re-use. Ammar and Amro (2024) presented the architectural conservation project of Al-Khader library. They referred to the Quintuple Helix Model in Heritage Building Rehabilitation but failed to explain how it was used to examine the conservation project of Al-Khader library. After presenting in detail the conservation process, they examined the post conservation use of the project with the United Nations Sustainable Development Goals. Mohamed (2025/1) attempted to provide a comprehensive approach for architectural heritage conservation called GRASP. Although GRASP was used to examine the conservation of a historical building in Gaza, it came generally in line with the above-mentioned studies. It ignored the implications of the special circumstances of conflict areas for the theory and practice of architectural conservation. The widespread prevalence of wars and conflicts around the world today increases the suffering of many people and destroys more historic buildings. This highlights the need for a more innovative approach to architectural conservation in conflict areas. The most important needs of people in conflict zones are security, safety, health, food, and education. In difficult conflict situations, these services deteriorate significantly. This is where the role of local, regional, and international humanitarian relief organisations emerges, helping to provide some or all of these services, even if only to a limited extent to heritage conservation. The International Committee of the Red Cross (ICRC) was one of the first to respond to this need in Gaza where it was involved in the conservation and maintenance of historical buildings, the most distinguished of which was Al-Alami house. This new direction provided a suitable foundation for cooperation between ICRC office in Gaza and Iwan Centre for Architectural Conservation (Iwan Centre) at the Islamic University of Gaza (IUG) which is believed to be the first project of its kind (Mohamed, 2025/2). After the success of the experiment at Al-Alami house and the great results it fulfilled, Iwan Centre continued its efforts to repeat it in other historical houses in Gaza. Several house owners positively responded, among them were the owners of Al-Ashi house. An agreement of partnership with the owners was signed in 2011. The conservation project waited until 2016 when the German development Bank agreed to financially support the project under the supervision of the United Nations Development Program UNDP-Palestine. The work was completed and the house was opened in October 2021. Al-Ashi house faced the same fate as all historical remains in Gaza and was destroyed by Israeli warplanes in 2024.

FUNCTIONAL MICRO-REGION AND ITS CULTURAL POTENTIAL: SKALICA, SLOVAKIA

Pavel Beták

Keywords: micro-region, regional development, cultural potential, cross-border cooperation, cultural landscape, Horné Záhorie, regional identity

The paper examines cultural potential as a key endogenous development resource within micro-regional cooperation, focusing on the Horné Záhorie micro-region in the Skalica District, Western Slovakia. The research is positioned in debates on territorial cohesion, place-based development and cross-border cooperation, with particular attention to historically interconnected border areas in Central Europe. Micro-regions are understood as functionally coherent territorial units between the local and regional scales, able to address development challenges through coordinated action, mobilisation of local resources and the strengthening of territorial identity.

Horné Záhorie represents a cross-border territory shaped by long-term historical, cultural and socio-economic linkages with South Moravia, Czech Republic. Its geographical setting between the White Carpathians, the Little Carpathians, and the Morava River forms a distinctive landscape framework in which cultural landscapes, historic settlement cores, sacral and archaeological sites, vineyards and agricultural structures, and living cultural traditions are closely interwoven. Despite these advantages, the use of cultural resources in development practice remains fragmented and only weakly integrated into strategic and spatial planning.

The aim of the paper is to analyse the cultural potential of Horné Záhorie in relation to spatial structure, demographic development and the institutional framework of planning, and to identify factors that influence cooperation among municipalities and cross-border actors. The research is designed as an interdisciplinary case study combining spatial planning, urban and architectural analysis, regional development, and cultural geography. Quantitative methods include demographic analysis of population change and ageing patterns in comparable reference years, supported by GIS-based spatial analysis of the settlement structure and functional linkages. Qualitative methods comprise systematic mapping of tangible and intangible cultural heritage, cultural landscapes and cultural events, complemented by content analysis of municipal strategic and development documents assessing how identity- and culture-related themes are translated into objectives, measures, and implementation tools.

The results reveal pronounced internal disparities within the micro-region. Towns such as Skalica and Holíč function as stable centres concentrating services, cultural functions and employment, while smaller municipalities face demographic decline and population ageing that weaken local capacity and increase polarisation within the settlement system. Cultural potential is spatially uneven: major concentrations appear in historic cores and key heritage sites, whereas many values occur in dispersed form across the surrounding rural and landscape context. This pattern highlights the integrative role of cultural landscapes, thematic routes and soft mobility in linking dispersed assets into a legible micro-regional system and in supporting forms of tourism based on authenticity, slower rhythms, and local identity.

The analysis of cross-border linkages confirms a strong functional orientation towards Hodonín, Strážnice and Mikulčice, where cultural, educational and tourism attractors form a complementary cross-border system. Existing routes, cycling infrastructure and everyday mobility support interaction, yet the potential remains constrained by limited coordination of strategic documents, differing municipal planning capacities and the absence of a shared micro-regional vision. Regional identity and cultural potential are often reflected only formally or sectorally in local strategies, while lacking any systematic linkage to spatial planning instruments and mechanisms for inter-municipal coordination.

From an architectural-urban perspective, the paper emphasises the settlement structure, historical continuity and the settlement-landscape relationship as durable carriers of territorial identity. In Skalica, weakened pedestrian, visual, and functional links between the historic core and the surrounding landscape illustrate broader challenges related to expansion, mono-functional zones, and spatial fragmentation. Revitalising

the transition zones and activating landscape-based public spaces—particularly by connecting heritage areas to recreational networks and cultural landscapes—is identified as a key opportunity for identity-building and sustainable tourism.

Overall, the findings confirm that cultural potential becomes an effective development resource only when it is systematically valorised, institutionally anchored, and integrated into coordinated micro-regional and cross-border strategies. In Horné Záhorie, cultural potential functions less as a straightforward growth driver and more as a stabilising factor supporting social cohesion, territorial identity, and internal coherence. The paper concludes that strengthened cooperation, aligned strategies, and an integrated spatial approach are prerequisites for unlocking the development potential in culturally rich cross-border micro-regions, and that the lessons are transferable to comparable European border regions facing similar demographic and institutional constraints. It also points to the need for shared governance arrangements, joint project pipelines and consistent territorial communication (branding and interpretation) that translate cultural values into concrete, implementable measures and indicators.

PLASTICITY OF PUBLIC SPACE: FRAMEWORK FOR SPONTANEOUS USER-DRIVEN TRANSFORMATION

Juraj Horňák

Keywords: public space, urban design, participation, plasticity, appropriation, flexibility, adaptability

Contemporary public spaces are increasingly defined by institutional over-regulation and digital displacement. Modern urban environments are often "pre-scripted," leaving little room for spontaneous human intervention. This rigidity conflicts with the innate human drive to shape one's surroundings—a need that persists from our evolutionary history but is now suppressed by specialists and bureaucratic maintenance regimes. While cities have introduced participatory mechanisms, these often remain top-down and limited in practice. In response, this article introduces the concept of spatial plasticity: the capacity of a public environment to absorb spontaneous, user-initiated physical and programmatic modifications without losing its essential functions or character.

The article utilises a dual methodological approach. First, it establishes a theoretical framework by translating the concept of plasticity from physics and art theory into urban studies. Second, it employs a "research-by-design" strand based on systematic interventions conducted between 2019 and 2026 across Slovak cities Bratislava, Košice, Poprad, and German city Berlin. These "live laboratories"—ranging from modified shopping carts to oversized games—tested how various urban conditions (historic centres, housing estates, and residual spaces) respond to user modifications, revealing both material limits and regulatory barriers.

The concept of spatial plasticity draws on the physical notion of plasticity—the ability of a material to undergo permanent deformation under external forces without structural failure—and the art-theoretical understanding of plastic form as mutable yet persistent (Bois, Krauss, Malabou). By analogy, plasticity of public space denotes a public environment's capacity to absorb user-initiated physical and programmatic modifications across varying scales and timeframes, while maintaining its essential functions and recognisable character. In urban studies terms, it measures how far ordinary users—not just planners or institutions—can reshape spaces through spontaneous rearrangements, informal appropriations, or tactical interventions, provided material and immaterial conditions align to stabilise such transformations.

The article argues that while rural environments naturally satisfy the human need for "spatial agency" through private gardens and fences, dense cities create an acute deficit. Urban residents instinctively attempt to personalise ambiguous spaces, yet these behaviours are often criminalised or suppressed. Plasticity redistributes agency back to the citizen, transforming "spectators" into "co-authors."

Case Studies: Snow and Front Gardens. Two emblematic cases illustrate plasticity in action: Snow creates a temporary, highly malleable layer that enables spontaneous

interventions (igloos, slides) without formal planning. This results in an intensification of use during otherwise underactive seasons, proving that people naturally reshape their surroundings when conditions allow.

In apartment-dominated estates, residents appropriate land strips to create micro-laboratories of adaptation. These gardens foster neighbourhood identity and produce more spontaneous interactions. The 2025 Bratislava Front Garden Championships demonstrate how this bottom-up plasticity can be turned into a civic policy.

Plasticity allows for the systematic analysis of urban spaces by identifying natural/artificial, material/immaterial, spatial, and temporal dimensions, and demonstrates its value as both an analytical tool and a design principle. By observing these qualities, planners can identify "critical points" where spatial design and regulation either enable or suppress urban initiative.

The article distinguishes plasticity from related concepts like resilience, flexibility, and adaptability. While flexibility typically refers to pre-scripted, institutionally defined multi-use (e.g., a plaza programmed for a market), plasticity addresses unscripted, user-generated intervention. It moves the focus from who participates to what kind of spatial conditions make bottom-up action materially possible and sustainable.

The article concludes that urban vitality depends on the capacity of environments to absorb unscripted change. Plasticity reframes public space as a structured yet malleable medium. By supporting strategies like modularity, reversibility, and adaptive governance, designers can bridge the "mismatch" between rigid institutional frameworks and the everyday agency of residents. Ultimately, plasticity serves as an evaluative lens to ensure that the production of public space remains a collaborative, living process.