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Integrated Urban Planning: An Example of the Historic Centre of the City of Zagreb

Jadranka Veselic Bruvo, Mirna Meštrović

(Jadranka Veselic Bruvo; Institute for physical planning of the City of Zagreb, Department for intersectoral cooperation and projects; Zagreb, Croatia; jadranka.veselic-bruvo@zagreb.hr)
(Mirna Meštrović; Institute for physical planning of the City of Zagreb, Department for intersectoral cooperation and projects; Zagreb, Croatia; mirna.mestrovic@zagreb.hr)

1 ABSTRACT

The processes of transformation of the spatial and functional structure of city centers are driven by global demographic, social, technological, economic, cultural, political, and environmental changes, especially natural disasters whose intensity of reflection on the city depends on the interaction with the character and specifics of local conditions.

Faced with the increasingly intense development and resilient challenges of cities, traditional sectoral spatial planning, which is focused on location, intensity, form and balanced growth, is transforming its (over)regulated bureaucratic approach towards a strategic development approach, which offers a more coordinated and coherent spatial logic and the integration of economic, social and environmental dimensions of urban programming, planning and implementation. Traditional urban plans are becoming increasingly inefficient because they cannot be a timely guide through urban transformation processes.

Encouraged by the consequences of the 2020 earthquake, the City of Zagreb has implemented a new urban paradigm that ensures the possibility of transformation through the harmonization of different disciplines, as opposed to traditional urban planning – a static image of the physical dimension of space, and the City of Zagreb has started programming a comprehensive renovation of the Historical unit of the city of Zagreb, which proposes a strategic, process-based approach to creating urban space ("place-making") that enables dynamic transformation possibilities to anticipate possible challenges, threats and opportunities with a pro-active planning system and thus (strategically) plan future development, and/or reconstruction (ex-ante), instead of responding to unexpected events (ex-post) with a reactive planning system.

With the method of thematic modeling of the space of the center of the city of Zagreb and interdisciplinary programming of spatial values, limitations and sustainable urban potentials, a new platform was created – urban planning agenda – principles, as well as recommendations and guidelines that aim to achieve the development goals of comprehensive urban renewal, as well as the preconditions for their realization.

By parallel management of multisectoral processes through the proposed participatory platform consisting of all active participants in the City planning process, a comprehensive pattern/model has been generated according to which integrated urban renewal activities are carried out following the most advanced European policies.

This paper provides a framework for a sustainable way of use, conditions for the use, and protection of space and management. It is an expert basis for the development of a new generation of spatial planning documents, especially the urban and conservation plan of the Historic Urban Core of the City of Zagreb, which will unite urban and conservation guidelines and be the initiator of urban changes in the center of the historic city, directed towards the Green Center 2050.

Keywords: integrated urban planning, historic center, interdisciplinary programming, comprehensive urban renewal, urban and conservation plan

2 INTRODUCTION

Already in the early 1990s, Zagreb had a multi-generational and sensibility diverse "house" for spatial planning with European knowledge and eager for new knowledge, with a technically and digitally supported system of strategic spatial planning, digital orthophotos, a photo library of aerial photographs of Zagreb and the proposal for the New Urban Strategy of Zagreb, transformed into a package of the new city spatial and urban plan Zagreb 2000+: Spatial Plan of the City of Zagreb and General Urban Plans of the City of Zagreb and Sesvete, with a proposal for a comprehensive spatial planning system (Gradski zavod za planiranje, 2000). Institute for Physical Planning of the City of Zagreb, the largest and strongest public urban planning professional and scientific institution in Croatia, the successor and follower of the institutions responsible for spatial and urban planning of the City of Zagreb and the Zagreb region, focused on professional and

scientific research work on sustainable spatial and urban planning, has been particularly active through work on European projects in exploring the possibilities improvement of the planning system and modernization in terms of content and procedure.

The strong earthquakes that hit Zagreb in 2020 pointed to the long-term neglect and vulnerability of the city center (Fig. 1), raised awareness of the high risk of earthquakes, and additionally pointed out the need to find different planning tools and instruments for its renewal. Facing local challenges and solving them with the ultimate goal of long-term improvement of the physical, social, economic, and environmental factors of the wounded area under the continuous threats of the process of gentrification and pauperization (Svirčić Gotovac, 2010) was the imperative of sustainable urban renewal.

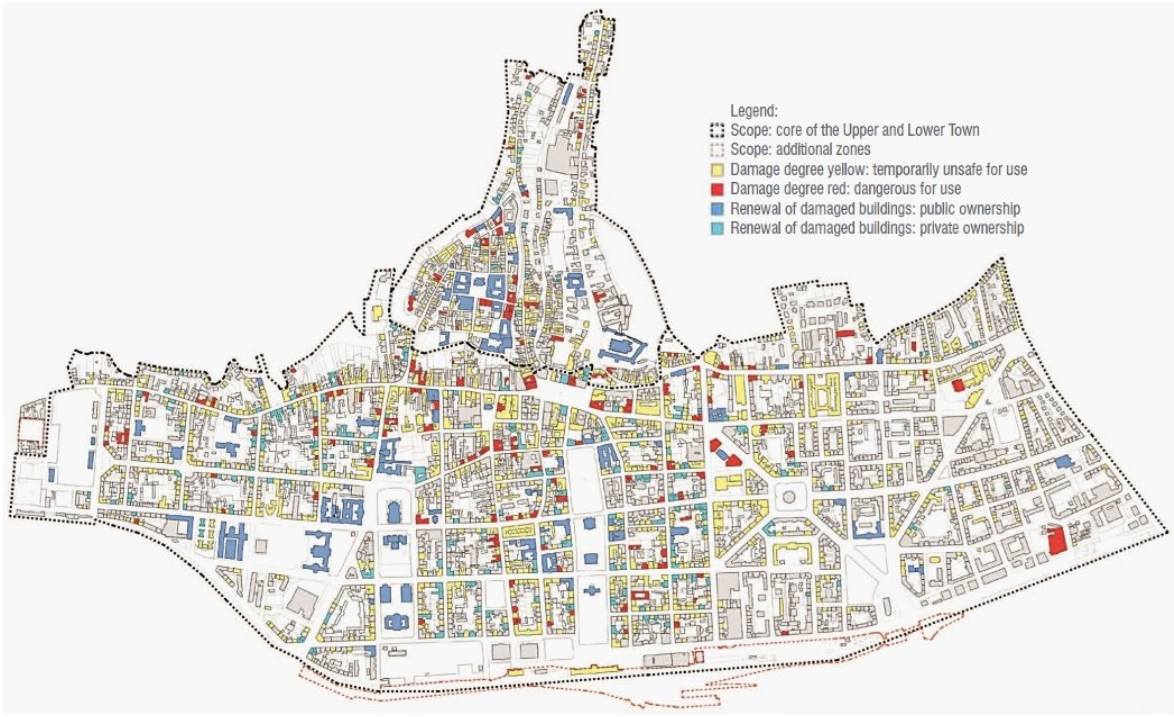

Fig. 1: Comparison of damaged buildings (acc. to the register of the Institute for Physical Planning GIS June 2020) and those undergoing renewal (public and socially-owned buildings, and privately-owned buildings); Source: Identity Topography of the Historic Urban Core of the City of Zagreb, Faculty of Architecture, University of Zagreb/for the purpose of the Comprehensive Renewal Programme of the Historic Urban Core of the City of Zagreb, Zagreb, 2023.

As a response to the accelerated changes in contemporary urban development and planning from urban entrepreneurship, through neoliberal (Swyngedouw et al., 2002) to globalization urbanism, all the way to social justice as the development challenges of cities and planning, a change from a regulated bureaucratic approach to planning and a step from traditional sectoral planning to a strategic approach driven by implementation, development, monitoring and improvement, i.e. integrated spatial planning, was necessary. The fundamental principles of integrated planning in the process of urban renewal are therefore: 1. detailed multidisciplinary analysis of all components of the existing state and local conditions of blocks and insulas; 2. defining development problems and needs with sustainable and efficient use of natural, economic and human resources; 3. establishment of clear and measurable goals of the process; 4. compliance of goals with the principles of sustainable development; 5. inclusion and interaction of different groups of stakeholders; 6. coordination of all levels of government from national to local, all to improve the physical condition of buildings, social structure, economic and environmental conditions for more precise guidance of the urban renewal process (UNDP, 2023).

Programming and planning of urban renewal is also an opportunity to improve the network of public spaces and systematic transition from grey to green infrastructure, which is especially important concerning the high population density of the city center as a prerequisite for adapting to the increasingly pronounced effects of climate change. Although the methodology for the urban renewal process is almost the same, integration into the historical urban entity is crucial.

In the process of integrated planning, special importance has the participation of relevant stakeholders – prominent representatives of the four main social actors (“quadruple helix”), whose synergistic effect ensures

a balanced platform for a multidisciplinary innovative approach to integrated development, and consists of: representatives of different areas and fields of science – higher education institutions, scientific and research centers, representatives of the economy, administration and civil society organizations – citizens (Varmland county, 2019). Recently, the "quintuple helix" model has been introduced, which introduces the natural environment as the fifth component, which enables social-environmental interactions, including application to sustainable development, including climate change (Veselić Bruvo, 2023).

3 INTEGRATED VS. TRADITIONAL PLANNING

New development processes in cities are resulting in the need for new forms of urban management (Albrechts, 1991; Salet, 2008). Traditional (sectoral) spatial planning focused on location, intensity, form and balanced development, which lacks the aspect of active encouragement and synergy with other policies, needs to be harmonized with strategic documents that include a large number of stakeholders and that, through a long-term vision, measures, activities and means of implementation, establish the form and framework for the transformation of strategically key areas and focus on decisions, activities, monitoring and evaluation of results (Veselić Bruvo, Jakovčić, 2019).

The new urban paradigm in the form of integrated planning represents the provision of transformation opportunities through the harmonization of different disciplines (Medeiros et al., 2020), in contrast to traditional urban planning – a static picture of the physical dimension of space. Traditional spatial and urban plans are becoming more and more ineffective, because they cannot be a timely guide through the processes of urban transformation (Carta, 2014) and an integrated, process-based approach to the creation of urban space ("place-making") is proposed, which enables dynamic transformations (Ellin, 2013).

Although spatial and urban plans are extremely complex interdisciplinary spatial documents, they should be part of a comprehensive system of spatial planning and, as such, are only sectoral urban planning documents since procedural and institutional solutions are based on the partnership of the basic participants in spatial management. Integrated spatial and urban planning with its holistic approach is a powerful tool for ensuring ecologically sensitive and socially just urban development which refers to the practice of integration and synergy of environmental, social, cultural and economic aspects in order to create a sustainable and high-quality environment (ECTP-CEU, 2013). From the focus on static images of the physical dimensions of space in the traditional approach to planning and the primary goal of capacities, ways and conditions, integrated planning focuses on accessibility and quality of life (including social justice and equality, health and environmental quality and economic viability) with a shift towards sustainable mobility and strong integration of infrastructure, markets, legal frameworks, databases and their accessibility, information and promotion (European Commission, 2020).

The political platform of the proposed new generation of integrated spatial and urban plans should be subsidiarity and participation of all social actors in decision-making, and the technical platform – openness for greater financial sustainability and public space for the community, acceleration of the procedure, transparency and reduction of administrative and legal procedures and obstacles with greater respect for the profession of urban planners and architects.

With an integrated approach, traditional plans cease to be sectoral plans and effectively address the complexity of urban development. They are linked to other development areas and include a long-term vision and strategies, and are developed by interdisciplinary planning teams, stakeholders, and citizens who are involved in the process from the very beginning, who are at the heart of the planning process, which is transparent and collaborative. Impact is also systematically assessed to enable learning and improvement. The multidisciplinary approach ensures resilience to unexpected development challenges and flexibility to adapt to change. It also involves a wide range of stakeholders, urban planners, and other experts to develop comprehensive solutions, which is a strong support for the implementation of urban development projects.

At the heart of integrated planning is cooperation between sectors, rather than negotiations between them – since cooperation is not focused on averages, but to maximum values (Ovink & Boeijenga, 2018). The interconnectedness and complexity of the challenges mean that the added value of these solutions leads to multiple benefits for different sectors and at different planning levels. The key element for achieving integration is a thorough assessment of the current situation (baseline) and future trends (scenarios, planning is always a process of choosing between different images of the future) aligned with a widely accepted

common vision with strategic goals (Blyth, 2005) and a package of legal, promotional, financial, technical and infrastructural measures to achieve these goals – the implementation of which must be accompanied by systematic monitoring and evaluation (Veselić Bruvo, 2023).

4 HISTORIC URBAN CORE OF THE CITY OF ZAGREB IN STRATEGIC AND URBAN PLANS

The existing strategic, spatial, and urban planning documentation for the centre of the City of Zagreb is an indispensable starting point for considering and proposing a new planning framework.

In the development strategy of the City of Zagreb – ZagrebPlan (Gradski ured za strategijsko planiranje, 2012), the historical core of the City of Zagreb and its urban revitalization, especially the block structure of the Lower Town, is considered as an area of special significance for the identity of the City and for a balanced process of urban development. In accordance with the ZagrebPlan, the 168 blocks of the Lower Town urgently need to redefine their own identity and purpose and the necessary protection and restoration of the architectural heritage. The most pronounced challenges of the Lower Town are: the withering away of the existing way of using and the facades of city streets, the interior of the blocks and the built fabric as a whole, the spatial reduction of zones and the representation of trade and services with the concentration of public and social life, and the saturation of traffic, especially that at rest. In addition to the above challenges, potential obstacles to the revitalization of the Lower Town are complex property relations, lack of cross-sectoral cooperation, population stagnation, changes in consumer habits, and possible resistance of residents to change.

The last detailed plans for the Historic Urban Core of the City of Zagreb were designed almost 40-45 years ago: Implementation Urban Plan for the Development and Revitalization of the Upper Town and Kaptol (UZGZ, 1979) and Implementation Urban Plan for the Lower Town (UZGZ, 1989). Most of the development challenges that occupied urban planners forty years ago are still present today. However, a completely different social platform, economic and ownership system, a more cautious attitude towards space, new standards and requirements, as well as the application of modern technological solutions, with an integrated approach and the increasingly important role of the participation of residents and users from the very beginning of the programming and planning process, and coordination of all levels of government, call for a different approach and a new planning paradigm (UN-HABITAT, 2009), and the area of the Historic Urban Core has not been fully assessed in the form of a spatial planning document.

In 2003, a new General Urban Plan for the City of Zagreb was developed for the urban area of the City of approximately 220 km² (with several cycles of amendments and supplements – Zavod za prostorno uređenje, 2003; 2007; 2009; 2013; 2016). The General Urban Plan (Master plan), although ambitiously prepared and created (as part of a comprehensive spatial planning system, with all the necessary tools for implementation), is adopted as a generated and hybrid spatial planning document at a scale of 1:5000, which is an implementing document for most situations, and a guiding document for the remaining transformation zones or new regulations on undeveloped areas. The General Plan defines the areas of the Historic Urban Core of the City of Zagreb (Lower Town, Upper Town and Kaptol) as highly consolidated with the established urban rule "Protection, development and extension in historic architectural entities" as well as general and detailed urban planning guidelines, and enables direct implementation through location and construction permits, while only exceptionally for some of the blocks (due to the potential of the interior of the blocks) is the preparation of more detailed urban plans mandatory. The overall scope of the Historic Urban Core of the City of Zagreb is an immovable cultural asset (Fig. 2) and as such is subject to special conditions of conservation protection by the competent administrative body for the protection of cultural monuments, and following the sectoral study "Conservation documentation – Conditions for the Protection and Preservation of Immovable Cultural Assets" (Gradski zavod za zaštitu, 2004; 2008; 2012; 2015), which are not integrated with the general and detailed urban planning guidelines of the General Plan.

5 COMPREHENSIVE RENEWAL PROGRAMME FOR THE HISTORIC URBAN CORE OF THE CITY OF ZAGREB (2023.)

The urban renewal of the existing protected urban fabric of the Upper Town and Kaptol and the Lower Town, the most valuable historical, cultural, urban, and identity heritage of the City of Zagreb, is the greatest challenge in recent city history. The medieval part of the city and the city of the late 19th and early 20th

centuries need to be secured for the highest possible seismic loads while preserving its physiognomy and making it the most attractive part of the city for living, working, and visiting.

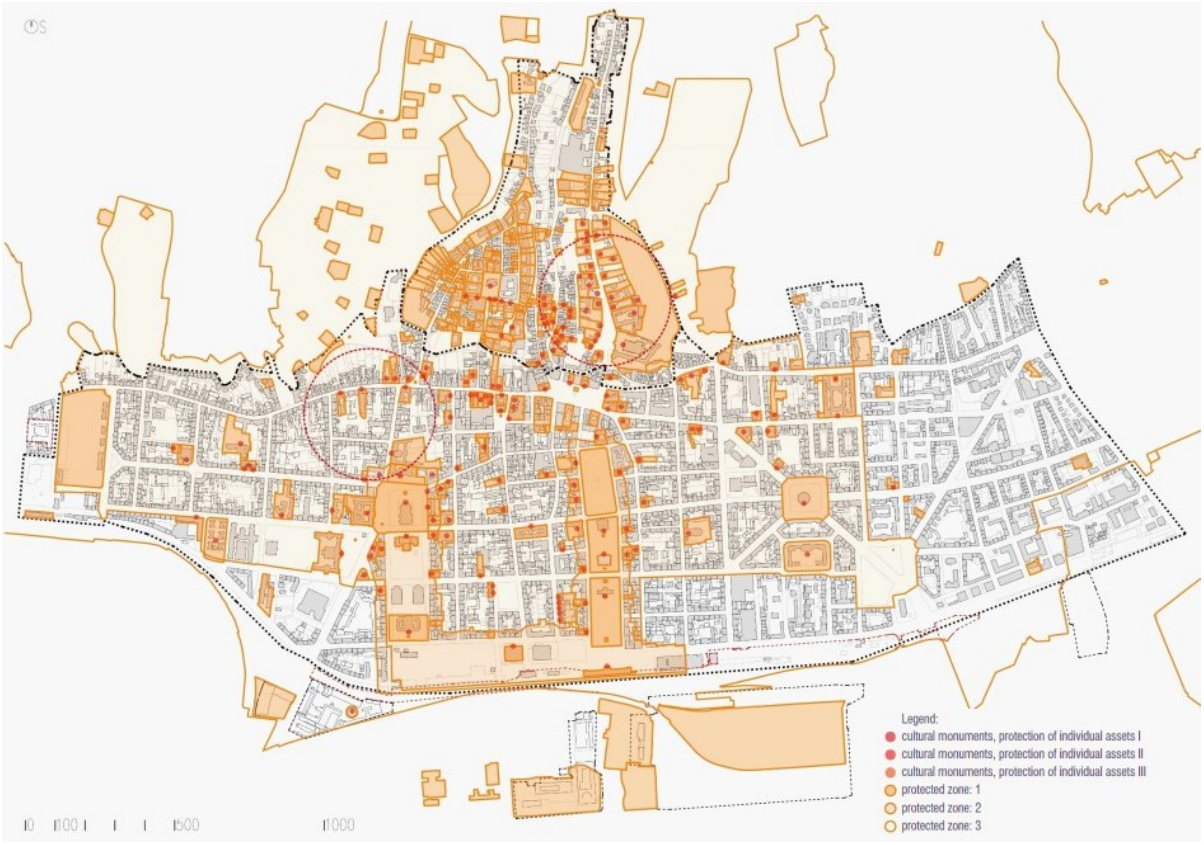

Fig. 2: Cultural monuments and protected zones (according to GIS, Ministry of Culture and Media); Source: Identity Topography of the Historic Urban Core of the City of Zagreb, Faculty of Architecture, University of Zagreb, Zagreb, 2023.

5.1 Design methodology and process: an innovative urban approach

The layering and complexity of space of the Historic Urban Core of the City of Zagreb required a new planning paradigm and instruments for finding integrated spatial solutions aimed at a high level of earthquake hazard insurance and a high standard of energy efficiency, while preserving the unique ambience and architectural value, retaining residents and preserving the socio-demographic vitality of the city center, and finding a sustainable organizational and financial-economic framework. To this end, the Institute for Physical Planning of the City of Zagreb gathered a multidisciplinary platform consisting of fifteen expert working groups of scientists and professionals who, within the framework of their professions and in mutual coordination, worked on research, and studies together with the Institute's urban planners.

Through the creation of the Programme (Zavod za prostorno uređenje, 2024), the Institute inaugurated an urban/planning breakthrough by introducing several new (and forgotten) topics that were not an integral part of the spatial planning regulatory framework or urban practice, aligned with the EU Green Plan (European Commission, 2020), such as early participatory processes, connection of urban and strategic planning, earthquake hazard and stability of the existing building stock, energy efficiency, energy transition and decarbonization, adaptation and mitigation of the impact of climate change, sociological analysis and quality of life, economic and property law possibility of implementation, principles of the 15-minute city and super-blocks and circular management of buildings and space, taking into account horizontal and vertical links.

The focus of the work on the Comprehensive Renewal Programme for the Historic Urban Core of the City of Zagreb is the interaction between urban planning and strategic economic development, i.e., the results that are created through interdisciplinary cooperation in situ and have implications for urban space. Development scenarios in time dynamics – spatial planning documents, by their nature, provide frameworks for action in space but do not determine the sequence or priorities, only the planned framework for action. Thus, urban plans do not include any emphasis on strategy, prioritization, or steps in spatial interventions, and different

solutions or alternative options are, by definition of unambiguity, difficult to implement without changing the plan.

5.2 A balanced hierarchical approach to sectoral research

For the realization of such a task, experts from all disciplines (Fig. 3) were mobilized, united in a single professional platform for a comprehensive systematic renewal of the center of Zagreb based on preserving the urban identity of the Historical Urban Core of the City of Zagreb, its ambience and views, improving housing and preserving the neighborhood, carefully programming the contents and activities of the blocks, improving mobility and the use of public space, establishing a green infrastructure system, energy transition and adaptation to climate change, designing a strategy for the seismic preservation of cultural heritage buildings and implementing a comprehensive earthquake-resistant rehabilitation of the valuable building stock of the City of Zagreb and reviewing financing options. In doing so, the synergy of science and profession, administration and economy, with timely participation of citizens, was of immense importance. The renovation/restoration of historical parts of the city requires effective and concrete, professionally relevant, and scientifically based activities.

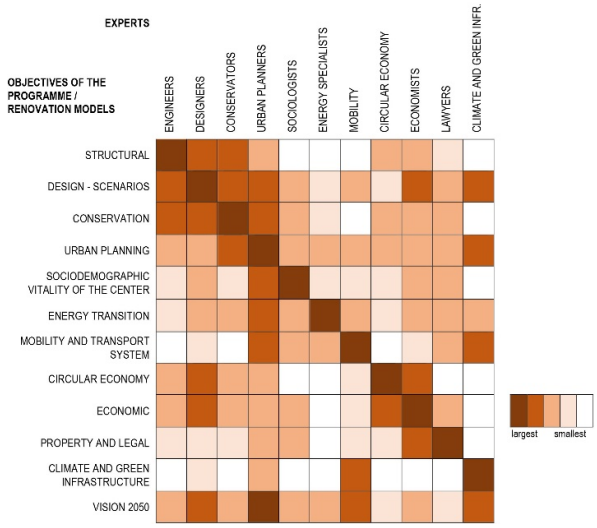

Fig. 3: Proposal of the necessary experts/studies related to the goals of the Comprehensive Renewal Program. Source: Institute for Physical Planning of the City of Zagreb, July 2020.

The Institute for Physical Planning of the City of Zagreb has developed a working framework together with the organizational structure and determined the dynamics of work on the Programme through two main stages: work on the Pilot Project Block_19 and work on the entire scope of the Historical Urban Core. Working groups were formed, work tasks were defined, and they were all carried out through research and the preparation of studies and expert papers and integrated into a comprehensive study through intensive inter-sectoral coordination (Fig. 4). A financial plan was drawn up. As a "project" in the project, an interoperable digital (GIS) database is being developed in which data from all relevant sectors is collected in a way that they can be grouped or aggregated and integrated for research and analysis, and the proposal of spatial solutions.

Work on the Programme was carried out simultaneously with activities on multiple levels: in parallel, detailed sectoral research was conducted at the level of the (selected) Pilot Project Blok_19, which was dealt with by most expert groups, at the level of the Historical Urban Core of the City of Zagreb, but also research that crosses the borders of the Historical Urban Core and has much wider zones of influence than the block/insula unit (mobility and transport systems, macroeconomic analysis and energy concept, identity). At the same time, attention was also paid to the dynamics of possible solutions, which were divided into short-term, medium-term and long-term frameworks.

5.3 Participatory process

Workshops and communication with residents and users were continuously conducted, as well as familiarization with the activities in their environment, surveys about their needs, ideas, suggestions and proposals about the space where they live and work. Sociological research was conducted in a mixed way –

partly “face to face”, partly in direct contact with respondents, and partly with the help of an online service/Online Survey (lockdown period due to the COVID-19 pandemic), i.e. qualitative sociological research on the quality of life and complete urban renewal and revitalization through focus groups with residents and through interviews with experts and actors of special importance for the urban renewal of that part of the historic urban complex.

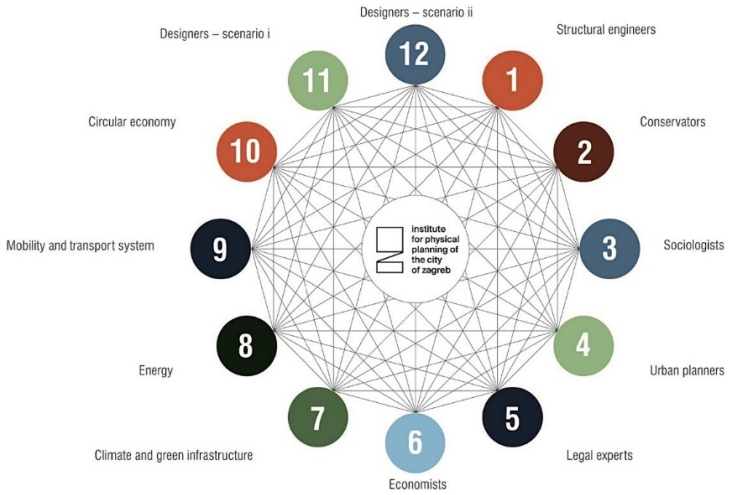

Fig. 4: Inter-sectoral coordination in developing the Comprehensive Renewal Programme. Source: Institute for Physical Planning of the City of Zagreb, July 2020.

During the work, the first results of sectoral research were presented, and the basic starting points, directions and visions, the main goals of the research, intersectoral connections, sectoral recommendations and directions for improving further work, as well as the guidelines of the new planning paradigm for an innovative urban approach – green urban renewal were determined.

The Comprehensive Renewal Programme proposal was presented throughout the process in various phases, with workshops, thematic discussions and public forums to the executive and representative authorities of the city, representatives of state and city administrative bodies, representatives of the Croatian Academy of Sciences and Arts and other scientific and professional institutions, representatives of professional and non-governmental organizations, citizens and representatives of the media, with constant coordination and harmonization of the work of 15 expert working groups.

5.4 Spatial scope of the Programme Development

The spatial scope of the Programme includes 168 lower city blocks and 36 insulas of the Upper Town and Kaptol, which is a total coverage of over 400 hectares with approximately 31,000 inhabitants (DZS, 2022), compared to approximately 45,000 inhabitants in 2001. The area of the thoroughly researched area of the pilot project Block_19 (the area of the block bounded by Ilica, Frankopanska, Dalmatinska, and Medulićeva streets, for which two scenarios of a possible design model of renovation were developed in order to explore spatial possibilities) is 3.3 ha.

5.5 Vision of comprehensive urban renewal and goals

According to the Vision of Urban Renewal and Development_GreenCenter 2050, the Historic Urban Core of the City of Zagreb in 2050 is a part of the city that, through the joint efforts of the city and state administration, the scientific and academic community, business people, residents and users of the space, is: organized and safe, attractive and lively, a multifunctional area of the city, with ensured socio-demographic vitality, inclusiveness and consideration, has experienced a new level of modernization and transformation, has been renovated and transformed circularly and innovatively, is a leader in energy transition, digitalization and economic development, has achieved climate neutrality, is relieved of transit automobile and freight rail traffic, has been redefined in terms of content and is the most desirable place to live among all city districts, and is an example of a competitive renovated city center.

After researching development problems and needs and defining the long-term Vision for the urban renewal of the Historic Urban Core of the City of Zagreb – GreenCenter 2050, five goals for comprehensive urban renewal were set and within them 54 appropriate measures were defined to achieve the given goals: 1.

innovative/circular renewal of the perimeter and structural transformation of the interior of the blocks/ insula; 2. sociodemographic vitality, social cohesion and fairness; 3. identity, ambient characteristics and recognizability of the city center; 4. resilience to climate change and climate neutrality through the use of nature-based solutions (NBS); 5. energy transition and improvements to the circular economy of a smart and green city based on digitalization.

5.6 Thematic modeling of space

Using the method of thematic modeling of the space of the Historic Urban Core of the City of Zagreb and interdisciplinary programming of spatial values, limitations and sustainable urban potentials, a new platform has been created – an urban planning and programming agenda – principles, recommendations and guidelines that aim to achieve the development goals of the comprehensive urban renewal of the Historic Urban Core and the City of Zagreb as a whole. After collecting thematic data and conducting basic analyses, identifying development problems and needs, and establishing strategic goals to be achieved, projects, measures, and activities have been proposed to implement them, and the prerequisites for their realisation have been highlighted.

Fig. 5: Assessment of usability of buildings in Block_19 after the Zagreb earthquake; Structural Models of Renewal (part of the comprehensive renewal of the protected Historic Urban Core of the City of Zagreb – Lower Town); Source: Faculty of Civil Engineering, University of Zagreb, Zagreb, 2021.

The components of thematic spatial modeling are: seismic hazard and stability of the existing (age and maintenance) building stock – structural models of renovation (Fig. 5), protection and preservation models – conservation models of renovation, affordable housing and sustainable mixed-use facilities – design models of renovation (Fig. 7), models of improving mobility and transport systems/sustainable mobility, models of preserving identity systems, models of improving the quality of life – sociological analyses, models of energy efficiency, energy transition and decarbonization, models of adaptation (and mitigation) to climate change (Fig. 6), models of circular management of buildings and space, models of quality planning and management of the development of green infrastructure by introducing the NBS system (Nature-Based Solutions) in the part of pluvial water drainage, property law models and feasibility of solutions, and models of possible financing.

Fig. 6 (left): Proposed green infrastructure solutions for Block_19; Adaptation to Climate Change Impacts and Green Infrastructure Usage – Block_19 Pilot Project; Source: North-West Croatia Regional Energy Agency – REGEA, Zagreb, 2021. Fig. 7 (right): Block_19 SCENARIO I: Planned construction – floor plan of the roof; Design Models of Renewal – Block_19 Pilot Project – SCENARIO I, Hržić; Source: Architecture Atelier, Zagreb, 2021.

By conducting multi-sector processes in parallel through a participatory platform consisting of all active participants in the City planning process, a comprehensive form/model was generated according to which activities are carried out to determine principles and develop recommendations and guidelines aimed at achieving the development goals of comprehensive urban renewal, as well as determining criteria for prioritizing/evaluating projects and activities (short-term and long-term), and ultimately determining performance indicators for monitoring implementation and evaluation.

5.6.1 Urban models of renewal

Through research conducted during the development of the Comprehensive Renewal Programme, key spatial aspects for the implementation of the comprehensive renewal of a historic urban core were identified: built structure, protection and preservation, facilities, housing, sustainable mobility, green spaces, nature-based solutions, property aspects, identity, modernization and urban safety, as recommendations, guidelines and prerequisites at the level of short-term and long-term measures, regardless of whether they relate to urban spatial planning or spatial management.

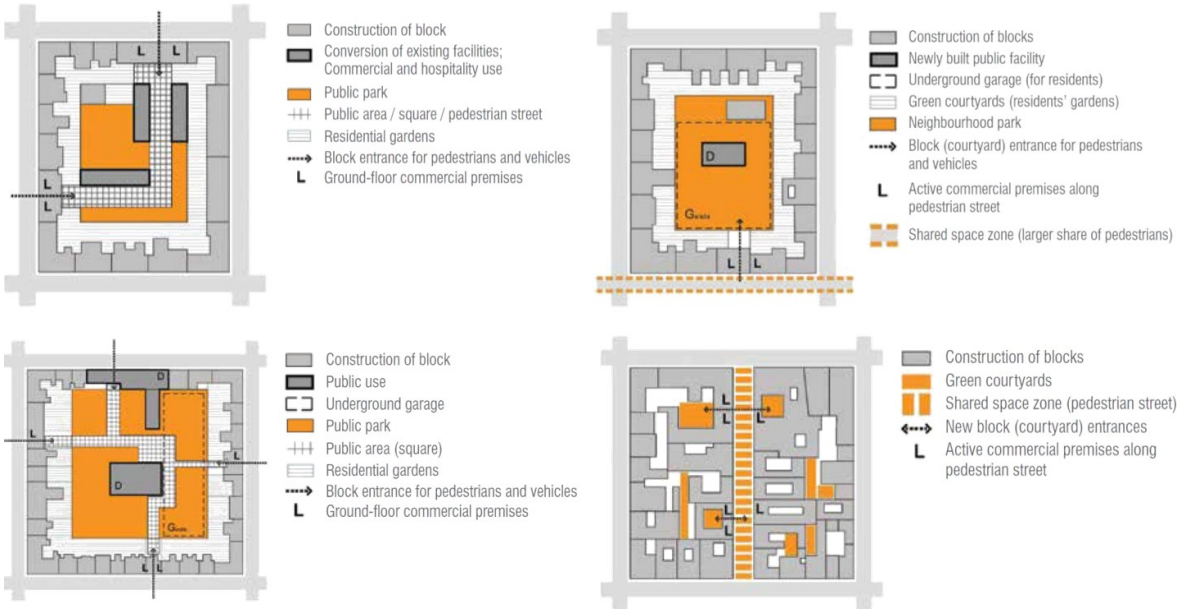

Fig. 8: Four proposed basic block renewal/transformation types/models for the Lower Town area: 1. Open block design – a new neighborhood sub-center; 2. Open block design, highly public character – public use, square, park; 3. Closed block design – garden with public amenities and underground garage; 4. Closed block design with a pedestrian street; Source: Urban Renewal Models, Faculty of Architecture, University of Zagreb/for the purpose of the Comprehensive Renewal Programme of the Historic Urban Core of the city of Zagreb, Zagreb, 2021.

Thus, four characteristic types of renovation (Fig. 8) are proposed for the area of the Lower Town and its 168 blocks based on the typological classification of blocks with the same or similar characteristics of the blocks and considering their structural and functional transformations and the possibility of property law implementation: a block of open character as a new sub-center of the neighborhood (1), a block of open, distinctly public character with a public purpose, square and park (2), a block of closed character as a park with public facilities and an underground garage (3), and a block of closed character with a pedestrian street (4), designed within the framework of the Comprehensive Renewal Programme for the Historical Urban Core (AF, 2021; 2022).

For the area of the Upper Town and Kaptol and the 36 insulas in its scope, the basic guidelines proposed by the Programme are: ensuring different intensity of use of individual parts, better connection with the Lower Town, balancing tourist facilities and relocating part of the Government facilities (Upper Town), harmonizing further activities of the City and the Zagreb Archdiocese and opening individual manor courtyards for public use (Kaptol), and avoiding commercialization and unification of catering facilities (area between Tkalčićeva – Nova Ves streets).

5.6.2 Conservation models of restauration

Based on architectural and photographic recording, archival and historical research, analysis of the existing condition, interpretation and detailed conservation valorization of the Historic Urban Core of the City of

Zagreb to propose conservation guidelines – the characteristic Lower town block – Block 19, the Upper town insula – Insula 11 and the Kaptol – Opatovina (within the framework of the Comprehensive Renewal Programme for the Historical Urban Core) conservation models of renewal have been proposed that include the conservation and restoration of historical structures, but also new urban and architectural interventions (IPU, 2021; 2022). In addition to the renovation of building structures, the revitalization of the historic core also requires the retention of key public functions and the population. In addition to conservation rehabilitation, the vision of the city's renewal should certainly include modern interventions, both urban and architectural.

The research proposed conservation models of renewal and conservation guidelines for the area of the Historic Urban Core of the City of Zagreb. Conservation models of renewal range from the model of complete protection of historical buildings (1), which is applied to the group of the most valuable historical buildings – individually protected cultural assets entered in the Register of Immovable Cultural Assets of the Republic of Croatia and the most prominent buildings erected along the perimeter of the block for which a final decision on renovation and restoration will be made only based on conservation studies that include restoration sounding of the facade, main parts of the interior and detailed architectural survey. As a rule, buildings from this group are preserved in their entirety, with the modernization of secondary interior spaces. Furthermore, the conservation model of partial protection of historical buildings (2) is applied to all buildings categorized lower than the previous two groups, for which it is proposed to preserve and restore street facades and roofs and representative common parts of the interior, while the design of other parts is free. The demolition and replacement with facsimile model (3) is applied if the degree of damage to the building is such that the building cannot be restored – partial facsimile reconstruction – a facsimile of the facade and possibly communication spaces, the rest is free design for lower categories of conservation protection or complete facsimile reconstruction for the highest level of conservation protection. The demolition and replacement with new construction model (4) is applied for buildings of the lowest architectural value, and the character of interpolation and design is taken over (conditioned by) the overall image of the block or neighboring buildings on the plot.

6 CONCLUSION: RECOMMENDATIONS AND GUIDELINES FOR THE DEVELOPMENT OF AN URBAN PLANNING AND CONSERVATION PLAN

The strong earthquakes that hit Zagreb in 2020 pointed to the long-term neglect and endangerment of the city center, made people aware of the great risk of earthquake hazard, additionally pointed to the need to find different planning tools and procedures to speed up the process of urban renewal – functional and qualitative changes to the economic, social, cultural and environmental deficiencies of the degraded central historical part of the city. In addition to the renovation primarily aimed at achieving the highest possible level of safety of the building stock, while respecting the preservation of morphology, ambience, atmosphere and achieving socio-demographic balance, the Institute's urban ambitions were also aimed at modernization in the form of green development and accelerated energy transition towards renewable energy sources and climate neutrality.

A total of 15 interdisciplinary teams with almost 200 scientists and experts participated in the research and task of developing the vision of urban renewal – GreenCenter 2050, as well as in defining the program models of renewal. Given the wide range of topics and sectors covered by the Programme, its role in directing planning activities through a high degree of respect and consensus of different professions, the involvement of local residents throughout all phases of the program-planning process, and a high degree of cooperation between all levels of government, is also evident. The focus of the work is the interaction between urban planning (spatial-urban plans) and all strategic development guidelines (strategies), i.e. the results that are created through interdisciplinary cooperation in situ and have implications for urban space. Historical urban entities require additional attention directed towards cultural heritage, which is one of the key components of the identity of the space (Hosagrahar et al., 2016). Planned activities for the preservation and sustainable development of historic urban core (Miele, 2005) therefore necessarily require the integration of cultural heritage into spatial planning documentation (Bandarin et al., 2012) in the form of the development of an integrated Urban Conservation Plan – by combining conservation guidelines with urban planning guidelines for optimal inclusion in development activities/programs (Ministarstvo kulture, 2022).

The program does not have an implementation character, but the program-plan synthesis of individual recommendations, guidelines and prerequisites developed by the Institute, in cooperation with the main social actors – the "quadruple helix" (which, with their synergistic effect, provide a balanced platform for a multidisciplinary innovative approach to integrated development) is also the starting point for the elaboration of the Urban Planning and Conservation Plan of the Historic Urban Core of the City of Zagreb (Kerr, 2013; Kropf et al., 2023) according to the following thematic areas:

1. Built structure – the importance of ground floor content/interaction with public space, removal of neglected substandard construction inside the blocks, functional additions/extensions/superstructures in order to improve the quality of life (elevators, public and social facilities, neighborhood garages, etc.), structural changes in the interior of the blocks, modernization of existing construction in accordance with special regulations, connection of open public spaces to achieve recognizable systems of undeveloped public space (existing and newly realized);

2. Facilities – improving the quality, number, and distribution of facilities important for the daily life of residents (kindergartens, daily consumption shops, recreation and sports, culture) to retain existing and attracting new residents, a harmonized relationship between residential and business purposes;

3. Housing – improving existing and planning new facilities important for daily life, encouraging the modernization/transformation of blocks – complete renovation with functional and structural transformation, removing substandard construction inside the blocks, arranging the interior of the blocks;

4. Green infrastructure – increasing the share and quality of green areas at the block level, encouraging comprehensive concepts of arrangement, affirmation and functional transformation of green courtyards at the level of several blocks, by implementing elements of green infrastructure, increasing the attractiveness of the street system and encouraging citizens to actively use public spaces, ensuring at least 20% of natural soil for new construction;

5. Sustainable mobility – encouraging the development of the center according to the "15-minute city" traffic model, improving and adapting the parking/garage concept in the city center, exploring the spatial and financial possibilities of building block garages to eliminate parking spaces along the street network;

6. Nature-based solutions – using nature-based solutions to mitigate heat islands and drain pluvial waters (in situ stormwater drainage solution, retention and gradual release of water into the underground, increasing natural terrain, green roofs);

7. Modernization/transformation – enabling adaptation to modern life needs, in accordance with new requirements, standards and technological achievements (with respect for the architectural and cultural-historical heritage and the improvement of inherited identity values), ensuring and encouraging the application of new technical and technological solutions while maintaining the ambiance, encouraging and implementing energy renovation, reducing energy consumption, green construction, mobility and decarbonization (smart, resilient and creative city).

From the presented thematic spatial modeling and interdisciplinary programming of spatial values, constraints and sustainable urban potentials in the development of the Comprehensive Renewal Programme for the Historic Urban Core of the City of Zagreb, with the cooperation of all stakeholders participating in the development of the city and different levels of government, it is clear that the interconnectedness and complexity of the challenges provide added value and that it leads to multiple benefits for various sectors and at different levels of planning. Therefore, the development of an integrated Urban Conservation Plan by unifying conservation guidelines with urban guidelines for optimal inclusion in development activities/programs requires a transformation/transition from traditional, "static" approaches to plan development towards an integrated, "dynamic" process that includes the interaction of all relevant stakeholders to recognize the character and specificity of local conditions for the purpose of developing a resilient city that can respond to current and future challenges (UN-HABITAT III, 2016).

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