

RECOGNIZING AND FOSTERING LOCAL SPATIAL IDENTITIES USING A SUSTAINABILITY ASSESSMENT FRAMEWORK

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ABSTRACT

The paper discusses the importance of considering local identities for a successful retrofitting of neighbourhoods. We define the concept of the spatial identity in a relation to the framework of a neighbourhood and its characteristics through the metrics, used for evaluating performance or level of quality. Databased systems to support decision-making process in urban planning and gradual retrofitting are essential for achieving resilient cities or to successfully following the existent local identity as a quality. In the paper, we outline the on-going research that seeks for a reliable metrics to assess the characteristics of urban environments in terms of its efficiency and performance, as well as in terms of its spatial authenticity and celebrated identity on the level of neighbourhoods. Specifically, the research develops the evaluation model for Slovenian neighbourhood, based on the modular system of indicators and to it connected methodology for the interpretation of resulting values.

Keywords: spatial identity, urban design, sustainability, assessment model, neighbourhood

INDIVIDUARE E RAFFORZARE L'IDENTITÀ DEL QUARTIERE UTILIZZANDO UNA STRUTTURA DI SOSTENIBILITÀ DEL QUARTIERE

SINTESI

Il documento discute l'importanza di considerare l'identità basata sul luogo per un rimodernamento di successo nei quartieri. Viene definito il concetto di identità spaziale in relazione alla struttura di un quartiere e alle sue caratteristiche attraverso i criteri utilizzati per valutare le prestazioni o il livello di qualità. Per supportare il processo decisionale nella pianificazione urbana e nel rimodernamento graduale sono essenziali i sistemi delle banche dati per ottenere città resilienti o per adeguarsi con successo all'identità locale esistente intesa come valore. Nel documento si delineano la ricerca in corso che cerca criteri affidabili per valutare le caratteristiche di un ambiente urbano in termini di efficienza e di prestazioni, nonché nei termini della sua autenticità spaziale e di identità riconosciuta a livello di quartiere. In particolare, la ricerca sviluppa il modello di valutazione per un quartiere sloveno basato sul sistema modulare di indicatori e sulla metodologia ad esso connessa per l'interpretazione dei valori risultanti.

Parole chiave: identità spaziale, progettazione urbana, sostenibilità, modello di valutazione, di quartiere

INTRODUCTION

Rapid change in the appearance of places, urbanization, deagrarianisation, and littoralization in coastal regions has brought the concept of the spatial identity intensely on the agenda of urban planning, urban design, and renewal. Along with the tendencies towards rational use of resources, and resilient solutions in urban planning/design, the aspiration for authenticity of places or landscapes has become even stronger.

We argue that in the face of challenges for preserving the place-related identities and boosting sustainable development in the built environments, the scale of a neighbourhood¹ plays an important role. The relation of the neighbourhood in its spatial terms with the community (in the societal terms) constitutes the integrity that reflects the interpreted identity. Essential for managing the expressions of local identity and achieving urban resiliency are the instruments based on data and information related to smaller spatial entities. The scale of the neighbourhood foresees better opportunities and a higher level of efficiency on diverse levels, including maintenance of built fond, preservation of cultural heritage or the approach to decision-making. Whilst often portrayed as a procedural matter, orchestrated through the top-down tenacities of government and major corporate actors, especially the shifts in the system of decision-making also entail efforts to fundamentally reconfigure relationships between the local community and policy-making authorities in a particular local reach. For the practitioner concerned with urban development, urban planning, and especially urban regeneration, including renovation of the built environment, the neighbourhood, always bear a strong physical cover (Blum, Grant, 2006). As such, the starting point of our perspective will be a smaller or larger ensemble of buildings with the in-between spaces and infrastructures, which undergo the retrofitting with the objective of greater levels of sustainability, by which preserving spatial identity shall have a distinguishable share.

In the paper, we outline our on-going research that seeks for a reliable metrics to assess the characteristics of urban environments in terms of its efficiency and performance, as well as spatial authenticity on the level of neighbourhoods. We gather, combine, and structure the indicators into a covering index of *sustainability performance*². Specifically, the research develops the evaluation model for Slovenian neighbourhood, based on the modular system of indicators and to it connected methodology for the interpretation of resulting values. The envisioned instrument evaluates the potential of

the neighbourhood for a sustainability performance within the diverse set of indicators through five crucial categories: energy efficiency, environmental efficiency, efficient organization and management of the built environment, communities' engagement level, and exploitation of ICT (*Information Communication Technologies*) solutions to foster other four categories of efficiency. Each of the categories is observed from the aspect of three strategic levels of implementation: (1) buildings or households, (2) public and in-between spaces, (3) traffic organization and infrastructure.

Such structuring introduces possibilities for evaluating neighbourhoods from the aspect of ecology and environment, built environment characteristics, appearances and functionalities, as well as activities, habits, attitudes and engagement of their inhabitants – all being crucial factors in achieving better performance and efficiency of cities and their parts, as well as preserving their existing spatial identity and bonds with the prior development.

The reason for addressing the issue at hand is a significant lack of instruments to collect data, track and assess different categories of sustainability in Slovenian neighbourhoods, with regard to standardized frame of criteria and indicators, which provide a basis for consistent tracking, comparability and targeted actions. As noted by Karol (2009), in the interests of sustainability, the pressures of urban development need to be mitigated and conventional development techniques changed to alleviate the impacts and damage. In our case, special concern goes to less explicit metrics. Given the necessities of smart and resilient retrofitting, the conception of preserving the place-based identity, for instance, turns out to be notoriously loose guideline. Similarly occurs with other scopes (categories) of assessment, somewhat substantial from the aspect of retrofitting and renewal. To provide a solid basis for the actions and interventions when retrofitting, evaluation methods should rely, as much as possible on quantifiable metrics and indicators that can be easily measured and tracked over time (Rashed-Ali, 2013), which means that even the expression of spatial identity as a quality, despite the elusive nature, must meet certain indicators to be measured with.

SPATIAL IDENTITY AS AN EXPRESSION OF QUALITY

The identity of a place, local identity, also referred to as geographical identity or a spatial identity all stand on similar bases. However, by all of them, there is one distinct division in the meaning of this concept.

1 The term *neighbourhood* is considered here a functional geo-unit (belonging to a certain settlement) of basic services and facilities gathered around dwelling activities – such neighbourhood represents a typical cornerstone of urban, sub-urban or rural settlement fabric in Slovenia.

2 The term sustainability performance index or sustainability index is used to facilitate the understanding of the concept and literally means the model of assessing sustainability efficiency based on the basic modular system of indicators and the related method of values interpretation.

On one hand, the identity of place represents the key characteristics with which a particular place (region, village, town, neighbourhood, public place, etc.) is associated. It is an expression of uniqueness³ and authenticity. Spatial characteristics depend on the intertwinement of a large range of factors: from morphological features, vegetation, climate, built structures and infrastructures, historical character and existence of cultural heritage, land use patterns, to more indirectly visible, less tangible, such as inhabitants' habits and customs, governmental regulations or behaviour patterns. The numerous combinations and constant change of these factors bring additional complexity to this term. Lynch (1960) regarded identity as a part of the image of a city. Although the image of a city is not necessarily the same as its identity (Arreola, 1995), it is the physical and most instantly perceived reflection of its identity (Kaymaz, 2013), even if we neglect the subjective interpretation of it.

On the other hand, place identity is often referred to as a *sense of place, genius loci and even attachment to this place*⁴. This means that it is a subjective feeling or perception held by people and refers to a cluster of ideas about the place. It concerns the meaning and significance of places for their inhabitants and users, and how these meanings contribute to individuals' conceptualizations of self (Butina Watson, Bentley, 2007). Identity in this view is seen as a dynamic, social product of the interaction of the capacities for memory, consciousness, and organized construal (Lappagard, 2007). Such comprehension of the identity inevitably encompasses the individual subjective insight and implies one's identification *with* place.

The distinction in the comprehensions of the term is sometimes explained with the split between the objectively and subjectively perceived spatial realities and its identities (Relph, 1976). In terms of individual perception, the perceived identity of place is always leaned on subjective recognition of structures in space and developed with the strong impact of the community consensus, public views, media or collective memories⁵.

Thus, the identity of a place is more than just the physical setting and appearance with the reflection of social activities and use but also involves a "meaning" for the individual and the community (Kaymaz, 2013). Brought from the subjective perceptions, each place then has multiple identities (Relph, 1976); however, in this paper, we will rather refer to it as a multiple interpretations of it. The subsequent question whether *collective* or common perception of spatial identity is yet *objective*, we will leave aside for some other discussions.

Within this paper, we will refer to the identity of place in both discussed senses – as key characteristics of it and as a cluster of the ideas and meanings attached to it. Both seem to be inevitably related; however, here our primary focus is dedicated to the first, embracing the appearance with built structures, infrastructures, natural elements and reflection of spatial use and functions altogether forming authentic local character and appeal. As such, spatial identity is never a stable construct. Local character or identity (in this terms) of each place is continuously evolving (Kaymaz, 2013) on the long term bases, however, the essence of it might persists due to the more constant factors influencing its appearance. In addition, urban renewal is amongst the strongest processes to influence the spatial identity, or is at least among the most visibly evident.

In that sense, the European Urban Charter in 1992⁶ was at European level among the first concerted efforts to bring the existing local and urban identity in line with efforts linking legislative reform with spatial and architectural development. Following this agenda, also other more contemporary planning and strategic documents highlight the need to preserve or reinforce the locally specific character and identities, which refer to newly created or retrofitted places. Also, a number of contemporary policies have responded by integrating the protection of traditional cultural landscape into their objectives and measures (Golobič, Lestan, 2016).

The Slovenian legislation concerning planning and design recognizes the term identity in relation to architecture, landscape and urban environment. Most

3 The uniqueness in these terms does not relate to exceptionality but rather represents the solitary in type or characteristics. It is the quality that makes a place recognisably distinct from other types and also recognisably belonging to particular type by particular sub-elements.

4 Notions of place attachment, "*genius loci*", also sense of place – all relevant to explore the nexus between identity and place and quality of people's relationships with a place – have been extensively researched since the early 1970s in the fields of environmental psychology, urban sociology, geography and landscape architecture. A major contribution to the investigation comes from the seminal works of authors such as Proshansky (1978, 1983), Relph (1976), Tuan (1975), Norberg-Schulz's (1980, 1971), among many others. The theories explore the character of places on the ground of their meanings for people, but with substantial differences in the significance of the physical place in this relationship. Quite paradoxically, the mainstream of the psychological views have neglected the physical built environment as a factor of importance in the identity development, whereas geographers for instance have recognised predominant role of it.

5 Places also represent personal memories, and because places are located in the socio-historical matrix of intergroup relations, they represent social, common memories and interpretation of space (Lappagard, 2007). Lowenthal (1979) has suggested that 'the past' exists as both individual and collective construct, with shared values and experiences being important within cultural groups. Group identity is thus closely linked with the form and history of place, creating an identity of place.

6 In 1992 the Congress of Local and Regional Authorities of the Council of Europe adopted the first European Urban Charter which lays out a series of universal guiding principles and set of methodologies concerning the improvement of the quality of living in European towns and cities with a focus to specific responsibilities relating to different aspects of urban development and good urban management at local level.



Figure 1 & 2: Piran and Lozisca, Brac: The identity of place as an expression of local or regional authenticity in architectural terms. Slovenian planning legislation recognizes the term identity in relation to architecture, landscape and urban environment.

frequently is used in the strategical document of *The Spatial Development Strategy of Slovenia*⁷ as an expression of local or regional authenticity in place-based and architectural terms.

Similarly, the UK central government guidance outlines the importance of a wider context of the architectural settings. The document lays attention to a wider portrait of the locality that determines certain architectural settings and thus contributes significantly to the identity and character to it: *“Considerations of design and layout must be informed by the wider context, having regard not just to any immediate neighbouring buildings but the townscape and landscape of the wider locality. The local pattern of streets and spaces, building traditions, materials and ecology should all help to determine the character and identity of a development/.../* (Planning Policy Guidance Note 3: Housing PPG3, 2000, 19).

Returning to the foretold research: the concept of the spatial identity as described is incorporated in the proposed methodology for the assessment of local envi-

ronments and resources⁸ (also rational use of resources brought together into sustainability performance index) in Slovenian neighbourhoods. More specifically, the expressed identity of neighbourhoods indicated through a set of indicators, represent a significant share of the overall score in the proposed assessing methodology.

ASSESSMENTS OF LOCAL ENVIRONMENTS AND ITS RESOURCES

As a leverage to support preservation of spatial identity as a quality and to support prudent decision-making regarding urban renewal at the neighbourhood level, the methods for the assessment of neighbourhoods' resources, management and sustainability performance are searched for. One of the burning research issues in last decades has been the identification of suitable criteria and indicators for the assessment of high-quality living- and energy efficient- residential environment in neighbourhoods, where we can observe large discrepancies

⁷ Strategija prostorskega razvoja Slovenije, 2004. Ministrstvo za okolje, prostor in energijo, Direktorat za prostor (Ur. list RS 76/2004).

⁸ The term local resources are used in this paper in its widest sense. They stand for the natural, architectural, cultural and social assets associated with a certain spatial unit (e.g. neighbourhood).

in the sense of the purpose of the different researches/tools and the scopes undergoing impacts assessment.

However, most of the sustainability assessment tools, as often denoted, are designed to ensure that outcomes of plans and activities make an optimal contribution to urban sustainability and create the possibility for comparison (Pope *et al.*, 2004) among the single objects, neighbourhoods or different plans. Alternatively, as Blum and Grant state (2006), in general a good assessment tool transfers data overload into information useful for better decisions.

Sustainability assessment tools usually evaluate and rate the performance of a given neighbourhood against a set of criteria to assess the neighbourhood's position on the way towards approaching sustainability goals (Sharifi, Murayama, 2014). A diversity of schemes/tools exists and they vary considerably in what and how they measure and how the measurement results are presented and interpreted (Karol, 2009). Most of them have a strong focus on environmental issues and the majority are designed for the building scale on the one hand or looking more globally at the urban scale on the other (Bird, 2015). There is of course also a major difference, whether the development concerns new building projects or deals with the existing building stock. New building projects facilitate the employment of the most recent technologies, materials and experience to build, for example, superior energy or access standards. Developments using the existing building stock contribute to the improvements (in terms of energy and emission efficiency), conservation of natural resources (material, land in particular) and cultural heritage and identity (Blum, Grant, 2006), which brings different measures and indicators into the scheme.

In European and Slovenian legislation frames, the methodology for energy impact assessment at the level of individual buildings has already been developed, enacted and implemented⁹. In addition, the International Organization for Standardization (ISO) has been active in defining standardised requirements for the environmental assessment of buildings and on the level of the cities¹⁰. Currently, no standardized indicators for neighbourhood sustainability assessment had been developed at ISO. The closest is the ISO 37120:2014 at the level of flexible-sized communities (*see footnote 10*), which mostly relates to community aspects of quality living and access to services.

Nevertheless, certain standards have evolved in different countries worldwide to assess sustainability performance also at the neighbourhood level in terms of urban design and planning. Special concern in these

regards goes to well-known standards such as CASBEE for Urban Development (Japan), BREEAM Communities (UK), LEED ND (USA), DGNB Urban Districts (Germany), HQE2R (France), SBTool (Canada) among many others. These frameworks are multi-stage rating schemes for urban developers, which, as Sharifi & Murayama (2013) claim, can often be classified as "spin-offs" of building environmental assessment tools. As noted by Karol (2009), there are common themes emerging in these assessment tools such as the need to restore native vegetation, reduce private car use, reduce the use of non-renewable energy in buildings, minimize waste, improve water efficiency, provide high quality public transport and safe access to a broad range of social facilities; however, here is little or no consistency in how to measure progress and set benchmarks for achievement.

Other related research and studies in the European frames can be divided into two groups: first, those in search of suitable metrics and actions in accordance with the guidelines of European energy and sustainability policy in the existing small agglomerations and their parts; and second, implemented pilot cases of sustainable efficient and high-tech constructions in smaller neighbourhoods resulting from previous research and assisting as a research polygons for determining new metrics and actions. In both cases, enormous attention is paid to energy efficiency and emissions reduction in comparison to other rather neglected categories of sustainability.

As noted before – in Slovenian legislation the methodology for energy impact assessment at the level of individual buildings is the only mandatory step implemented. Other attempts in terms of quantitative or descriptive sets of metrics that provide a standardized set of definitions and methodology for – (A) more holistic (not just energy-related) assessment and (B) assessment scaled to the neighbourhood level – have not been implemented in Slovenian legislation nor were applied in terms of the pilot cases.

In the years 2011/12 and 2012/13, two campaigns of the project Energy efficient neighbourhoods in Slovenia were run by the Ministry of Environment and Spatial Planning. The project is interesting from the point of public informing and awareness raising on the benefits and the meaning of efficient energy use. 22 different participating neighbourhoods participated (five groups took part in both campaigns), which represents more than 140 households. The project was more action- than research-oriented; therefore, the potential to transfer the results into further studies is limited. The project dealt mostly with energy efficiency, partially also with emission reduction on the level of households.

⁹ Energy act and related legislation, e.g. Pravilnik o učinkoviti rabi energije v stavbah PURES-2 2010 stavbah (Ur. l. RS, št. 52/30.6.2010)

¹⁰ ISO Technical Committee 59 "Building construction" and its Subcommittee 17 "Sustainability in building construction" have published two technical specifications (ISO/TS 21929-1:2006 and ISO/TS 21931-1:2006) to assure sustainability in building construction; ISO 15392:2008 identifies and establishes general principles for sustainability in building construction, throughout their life cycle - from cradle to grave. However, this standard does not provide benchmarks for the assessment (Andrade *et al.*, 2012); also, indicators for service delivery and quality of life ISO 37120:2014 have been evolved on the level of flexible-sized communities.

Building and Civil Engineering Institute of Slovenia regularly issues publications that relate to sustainable building. These mostly contain the guidelines for building design. The actions and guidelines on the level of neighbourhood are not particularly discussed, nor have they developed the methods for assessing sustainability on larger scales. In the individual studies with a smaller scope of research, we can find a few attempts to determine the parameters of sustainable efficiency on the level of cities (Berdavs, 2010) and neighbourhoods (Mrda Kovačič, 2012). The second study, in particular, holds great promise to contribute to the set of parameters that are crucial in neighbourhood assessment. The central part of the study covers the meta-analysis of five existing European neighbourhoods i.e. Malmö (neighbourhood Bo01), Linz, (SolarCity Pichling), Hannover (Kronsberg), Stockholm (Hammarby Sjostard) and Helsinki (Vikki). This analytical comparison of popular “eco-cities” provides a useful set of basic directions that could be used on the level of neighbourhoods, however with substantial further structuring and establishing tangible indicators as well as extending it to other relevant scopes (apart from energy and emissions or natural resources).

ENVISIONED ASSESSMENT MODEL

The envisioned model of assessment, which we develop in our research shall evaluate sustainability performance through five crucial categories each set as a cluster of sub-categories and indicators. While energy efficiency and emissions reduction are encompassed in the system, however, we plan to lay more attention to cover other, less often evaluated features, among which the indicators of spatial management, spatial identity and community engagement take place.

Slovene neighbourhood

In geo-spatial terms, the research examines the Slovene neighbourhood as a functional residential unit of basic services/facilities gathered around dwelling activities. Such entity represents a typical cornerstone of urban, sub-urban or rural settlement fabric. Due to past socio-cultural and political-economic situation, Slovenia's settlement system and housing stock have a specific structure (heterogeneity, proprietorial structure, size and distribution of the settlements), which is reflected in the dwelling types and residential infrastructures (Čok, 2014). The variation of density and building types in combination with the variation of population density, climate, morphological and seismic factors, distinct commuting patterns and population aging process in Slovenia (Kerbler, 2015), distinguishing Slovene cultural landscape typicality, which we strive to preserve, do not allow single transfer of foreign practices (whether in terms of retrofitting practice or sustainability assessments methodologies). They require, at least in part, the

development of identifiable, unique system of assessing common efficiency and sensible management of local resources that would support their modular, sustainable retrofitting adapted to Slovene natural and cultural environment.

Categories of the assessment

Sustainability performance within our index is planned to be assessed/evaluated through five crucial categories of which three are independent categories and two are corresponding and relate to all the others. The examination covers the categories with particular targeted issues (see also *Table 1*):

- (1) energy efficiency (*cooling systems, heating systems, ventilation, building envelope/isolation, orientation of buildings, daylight entry,...*),
- (2) environmental efficiency, (*waste/water management, greenery maintenance, clean energy sources, emissions (reduction), soil/ground managing, organic waste/biomass/biogas production,...*),
- (3) efficient use, management and preservation of the built environment (*use/organisation of space in/ around buildings, functionality of dwelling, management of cultural heritage and cultural values, walkability/bikeability,...*),
- (4) residents' and communities' engagement level (*habits and attitudes towards household consumption, eco-central perspectives, civil initiatives activity, community decision-making, community awareness,...*),
- (5) exploitation of ICT smart solutions (*use of smart thermostats, intelligent lightning, smart watering systems, use of smartphone as sensors, ICT-based road system, apps for car sharing,...*).

Each of the given categories is to be observed from the aspect of the three strategic levels of implementation:

- (1) individual buildings/households;
- (2) public spaces, in-between spaces, public infrastructure;
- (3) traffic (infrastructure, organization, flows).

Such clustering ensures pragmatic amalgamation of indicators that goes beyond the scale of individual building and its functional properties, rather serves to holistically capture the efficiency and performance of public places, squares, streets, parks, infrastructure, etc. As such, the index enables the comparison between neighbourhoods' settings and support strategic decision making. Due to transparent system of indicators and their relation to existing phenomena and concrete actions, the instrument can assist one to reconstruct the hidden complexity of a certain neighbourhood. This allows for identifying how dynamic and interactive a certain geo-unit is, as well as to understand why this occurs and what contributes to a certain setting and quality.

Table 1: Neighbourhood Sustainability Framework – assessment categories through the three relevant levels of retrofitting. Not all the targeted topics will be adequately addressed; potential other topics will be added if found suitable or essential for the overall index.

Levels of examination/ implementation Assessment categories	BUILDINGS/HOUSEHOLDS	PUBLIC PLACES/ “SPACES BETWEEN”	TRANSPORTATION INFRASTRUCTURE/ MOBILITY
ENERGY EFFICIENCY	Targeted topics: <ul style="list-style-type: none"> • heating systems • cooling systems • ventilation • building envelope/isolation, • orientation of buildings, • daylight entry • ... 	Targeted topics: <ul style="list-style-type: none"> • orientation of places • sun exposure • daylight entry • pavement albedo value • lightning • shading by green • ... 	Targeted topics: <ul style="list-style-type: none"> • mobility demand • modal split shift • public transport use • 1 in car/4 in car • infrastructure lightning • walkability/bikeability • ...
ENVIRONMENTAL EFFICIENCY	Targeted topics: <ul style="list-style-type: none"> • greenery maintenance • waste/water management • clean energy sources • emissions (reduction) • soil/ground managing • organic waste/biomass/ • biogas production • ... 	Targeted topics: <ul style="list-style-type: none"> • clean energy sources • waste management • organic waste/biomass/ • biogas production • water management • emissions management • green areas (maintaining) • ... 	Targeted topics: <ul style="list-style-type: none"> • use of fossil sources • clean energy sources • mobility demand • distances (reducing demand) • traffic emissions • green buffers • noise buffers • ...
SPATIAL/URBAN EFFICIENCY	Targeted topics: <ul style="list-style-type: none"> • use/organisation of space in/around buildings • dwelling comfort • functionality of dwelling • management of cultural heritage and cultural values • preserving local identity • ... 	Targeted topics: <ul style="list-style-type: none"> • organisation of public spaces • ease of use (infrastructure, urban furniture...) • supply and services organization • places appeal and amenities • management of cultural heritage • place identity preservation • ... 	Targeted topics: <ul style="list-style-type: none"> • organisation of traffic infrastructure • organisation of traffic flows • accessibility • walkability/bikeability • distances between POIs • infrastructures sharing • ...
COMMUNITY ENGAGEMENT (parallel category - relates to all above categories)	Targeted topics: <ul style="list-style-type: none"> • habits an attitudes towards household consumption • personal motivation for engagement in decision- making • personal believes about the environment • eco-central perspectives ... 	Targeted topics: <ul style="list-style-type: none"> • neighbourhood organisation and activity • community decision-making • civil initiatives activity • community attitudes • community awareness • community education/ learning • ... 	Targeted topics: <ul style="list-style-type: none"> • traveling habits: <ul style="list-style-type: none"> _ car(s) ownership _ use of public travel modes _ use of private travel modes _ from door to door demand • road, rail infrastructure and organisation decision- making ...
ENGAGEMENT OF SMART TECHNOLOGIES (parallel category - relates to all above categories)	Targeted topics: <ul style="list-style-type: none"> • use of smart thermostats intelligent lightning, smart watering systems ... • digital apps for organising the household supply and demand • smart gadgets • use of smartphone as a sensor • ... 	Targeted topics: <ul style="list-style-type: none"> • intelligent lightning, watering, shading... • use of digital sensors and apps for managing the consumption • use of digital sensors and apps for informing about emissions • apps for decision-making or informing ... 	Targeted topics: <ul style="list-style-type: none"> • ICT-based road systems • ICT-based transport logistics • public transport ICT- solutions • ICT-based traffic info • apps for car sharing • apps for city bike rent • real-time route planers • ...

Modularity and flexibility of the system

Two of the most important objectives ensuring the pragmatic potential of the instrument are modularity and flexibility of the system of indicators in a manner that allows for assessment and comparison of various neighbourhood types with locally specific features and at the same time preserves a sufficient degree of universality allowing comparison, repetition and control. Secondly, the modularity in assessment enables the modularity in actions, which provides the opportunity for gradual re-fitting and improvement in sustainability of neighbourhoods, starting with most urgent, economically necessary or feasible actions. Third, individual indicators and related categories are prudently connected in such a manner that allow for reaching partial results even if a certain item of information is not available or is irrelevant in a given neighbourhood. The level of “resolution” and “finess”, as well as the level of reliability increase with multiplication of input data from two or more sources, where this is possible. In the case, one source falls behind or is non-existent; another one is used to make the assessment. In the case of unavailability of data in particular segments or lack of time and means, the index can be used partially (elimination of certain sub-segments).

Methodologies and approach

To establish the described assessment model two main research pillars are addressed: 1) the development of the structured and modular system of indicators; and 2) the development of the methodology to interpret the resulting values (efficiency, ability and productivity on different levels of human activity). The methods applied are modularly arranged and go for theoretical, numerical and empirical. In the initial phases, we conduct a meta-analysis of the existing, more or less established parameters that affect distinct segments of the neighbourhood efficiency. The theoretical part also revises the interrelations of selected elements/phenomena of built environments and their impact on the selected segments of sustainability performance. Following the research timeline, each spatial level (see *Table 1*) of examination represents a distinct research module. The parameters extracted within each module will be gradually embedded in the final structure of the instrument. Using a robust multi-criteria and compensatory decision-making method (such as *AHP - analytic hierarchy process; parameters pairwise com-*

parison) we will simplify the decision-making procedures by selecting the suitable parameters and defining their weights in the model. The combination of mathematically numerical methods shall be applied in the further process of establishing the new model for interpreting the data and weighting their significance for partial and final values of the index. Based on the analysis carried out and algorithmic modelling, the hierarchy and modularity of the system shall be attained, where qualitative and quantitative datasets are combined and then appropriately numerically revalued.

Empirical part of the research

After the initial phases of this research project, six Slovene pilot neighbourhoods will be selected and applied to assist as a “research testing ground”. Empirical examination within these study cases follows a list of objectives, i.e.: (a) the validation of theoretical knowledge, (b) the identification of differences in respect to local specifics of the selected neighbourhoods and consequently identification of reservations regarding the application of the existing evaluation methods, (c) the examination of theoretically less supported correlations and impacts among individual features of neighbourhoods (built structure, natural conditions, economic sustainability, population demographics, habits, etc.) and their sustainable efficiency (according to set categories), (d) the examination of indicators’ accessibility, reliability, datasets frequency, geographic data resolution, etc. Our experience shall be used efficiently to design and overview indicators system, which will be able to resolve data deficits also with its modularity, (e) testing the individual segments of neighbourhoods efficiency, (f) the examination of neighbourhoods’ community and its potential with regard to crowd-sourcing (the use of smart phones, cooperation through sourcing and forwarding the data and indicators appropriate for this kind of sourcing).

The selection of pilot neighbourhoods shall follow four key selection criteria¹¹ ensuring heterogeneity of sample neighbourhoods and thus allowing for a greater universality of the final instrument for the Slovene territory.

Data gathering

Majority of the indicators for the assessments shall be calculated, gained or extracted (e.g. using GIS) from

11 Criteria: 1) level of urbanization of the neighbourhood according to its urban/rural origin (urban, suburban, semi-urban, semi-rural) – this is an important factor of choice as regards the morphologies, densities, communal waste water and public services equipment, centrality and traffic flows (gravitation), also demographic structure; 2) age (oldness) of the neighbourhood or the level of retrofit of the neighbourhood as a whole – age/renovation of a significant part of the building stock and infrastructure – this is crucial factor of choice as regards the existing sustainability efficiency due to various building and planning standards/norms in the time of their design, construction or renewal; 3) type of building stock and housing typology (single family or multifamily housing, common public spaces etc. – this is an important factor as regards ownership structure and management (collective, individual), and the share of open space under the public management; 4) declarative (promoted) sustainability or energy efficiency of the neighbourhood – this is relevant solely for those neighbourhoods with any of the segments of efficiency particularly declared/promoted.

the existing official databases (GURS-REN, EUROSTAT, SURS, ZK KS, GJI, ARSO)¹², as well as from the energy source's distributors and local operators of public infrastructure.

Foreseeing the lack of available data and reliable indicators at the neighbourhood level, the research contemplates special examination (transversal objective) of their availability, accessibility, adequacy and usefulness of the existing indicators, and the possibility of unleashing the potential of smart services and networks for sourcing micro-spatial data. Modern technology at disposal (GPS technology, geo-located services, geo-referential data, e- and m- services, etc.) provides various possibilities for mass crowdsourcing («collective sensing» concept, see Resch, 2013, 391-406), which can represent a valuable source of time-specific and locally-specific data and details, comprising various aspects of our everyday, our habits, views, observations, attitudes and preferences. Thus, other sources shall include crowdsourcing via smart phones, data gathered through surveys and research among stakeholders; data gained through expert evaluation, qualitative evaluation and data extended with field measurements (when there is no other option available).

POTENTIALS

The objectives of this research project coincide with the efforts of many other research groups and projects in European or worldwide frames. The common strive for more sustainable living environments expands from household management, single house planning to neighbourhood and city levels. However, along with the differences in scale levels by which a certain sustainability performance indexes are defined, there are vast differences in the aspects of sustainability to be addressed. In this regards we conceived of a framework relevant for Slovenian neighbourhoods and fitting to Slovenian planning and environmental policy, by which the common retrofitting strategy can be developed and by which more suitable decisions according gradual renewal can be attained.

Although currently this research bears its initial stages, there are several aspects that can be exposed as regards the foreseen results and potentials. In relation to the existing cases of similar practices in Slovenia, the contemplated approach strongly emphasizes the more holistic, far from solely energy-driven assortment of metrics and measures. Architectural development, functional arrangements, conservation of the place identity and community engagement among others play an important role here. The development of metrics system is

therefore being gradually built on the basis of the tangible spatial elements (as the factors of impact), which can most easily be connected with positive or negative effects on the quality of dwelling at all levels, from household and own house, to public space and infrastructures. Progressively other key factors shall be incorporated in the system originating from broader time- and spatial- context, if proved to be of significant importance to the final values of the index. The potential of such structuring corresponds to geographic concept of mutual interrelation among spatial features and mutual influencing among phenomena, even if rooted outside the investigated neighbourhood.

Second, combination of quantitative and qualitative approach to definition and evaluation of neighbourhood identities will be demonstrated. Quantified form shall be supported by a strong qualitative meaning of separately included sub-indicators. An index designed in this manner does not answer only the question of *how much*, but also *why that much*, placing the instrument on the intersection of informative, educational, or instructional realm. By addressing traceable and tangible spatial phenomena and elements and their cause-effect connection to everyday experience of dwelling on the level of neighbourhood, building, and public space, the abstract notion of sustainability becomes concrete and tangible. The structured nature of sustainability performance index allows it to be used as an educational or demonstrational tool. Especially by integrating the developed method of assessment with innovative applications (ICT-driven) or extending it in terms of visual representations, the results are widely accessible and provoke public spatial literacy, as well as encourage direct engagement with the inhabitants or the community to better understand their interests, concerns and priorities in their neighbourhoods. With this we are addressing one of the main objectives of our previous work (*blinded ref.*) – the development of methods and tools that support participatory urban design and the transfer of spatial information in user-friendly and visually supported form.

As stressed initially, concurrently to central objectives (dedicated to establishing an assessment instrument) we shall also be studying the availability/accessibility of data, and the potential of the instrument to take advantage of contemporary pervasive technologies both, in terms of data capture, data reuse and data/information representation. Especially data reuse is a strong goal of this research. Existing relevant indexes and indicators are examined in terms of the possibilities to connect them and integrate them within the assessment model. Fine-grained urban sensing coupled with well-established remote sensing mechanisms (Resch, 2013;

12 GURS-REN – the Surveying and Mapping Authority of the Republic of Slovenia - Register of real-estate property, SURS – Statistical Office of the Republic of Slovenia with the data from the fields of population, labour market, education, transport, environment, etc.; EURO-STAT; ZK – Land Registry, KS – building register; GJI – Economic Public Infrastructure Register; ARSO – Slovenian Environment Agency – climate and other environmental data; GIS – local and individual bases of geographic information systems.

Resch *et al.*, 2015) and gross data (official statistics datasets, records) greatly enhances our potentials in terms of increased geographical resolution of captured data, denser timescale and finer eloquence. Consequently, the instrument makes it easier and more cost effective to identify segments of high and low sustainability performances within the neighbourhoods, as to differentiate and manage them, understand their dynamics, and thus, guide urban diagnostics, responsive interventions and policies as well as prioritize smart investments

CONCLUSION

Rerecord-keeping and monitoring the evolution of neighbourhoods throughout their identities and from the broad concept of sustainable development, as well as short- and long-term benchmarking/comparability of retrofitting implementations are some of the primarily targeted goals of our research and envisioned instrument. The methodology for energy impact assessment at the level of individual buildings has already been implemented; also, attempts to provide standardized sets of definitions and measurements in terms of more holistic and complex multi-criteria systems have been developed to reach improved building sustainability. However, as many other authors claim, most of the past studies on sustainability assessment have focused on either the city level or building level whereas the assessment of neighbourhood sustainability, an intermediate level, has received little attention in general (Yigitcanlar *et al.*, 2015), especially in terms of modular retrofitting. Second, the complex concept of sustainability and

the coverage of different themes by different assessment instruments make it difficult to transfer the existent models of assessment in locally specific environments or to adapt it to specific goals of evaluation.

The envisioned instrument reaches out for the evaluation methodology that extends to the scale of neighbourhood as of vital residential, economic and functional significance. At the same time, it examines geo-entities analytically, in relation to its individual parts and features; it transparently identifies leverages that impact rational use of local sources which further affect environmental capacities, economic vitality, spatial identity or the quality of dwelling. In this regards such databased approach represents the basis for high-tech and ICT-based measures, i.e. smart cities principles, as well as for low-tech solutions such as the use of algae technologies for the needs of water treatment or biomass production. We are aware that such spectrum calls for knowledge and research methods from a wider range of disciplines, which can – bonded together – support higher responsiveness of urban planning. For this reason, this research project involves extensive support of experts with adequate scientific and technical capacity, expertise and skills necessary to accomplish such interdisciplinary task.

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PREPOZNAVANJE IN OHRANJANJE LOKALNE IDENTITETE PROSTORA
SKOZI MODEL PRESOJE TRAJNOSTI V SOSESKAH

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POVZETEK

V članku obravnavamo problematiko prostorske identitete in njen pomen pri uspešni prenovi lokalnega urbanega okolja oziroma sosesk. Posebej se osredotočimo na problem presoje trajnosti v soseskah in izbor kazalcev, ki jo določajo. Pri tem je identiteta prostora (kot izraz lastne prepoznavnosti) pomembna kvaliteta grajenega okolja, njena ohranjenost pa pomenljiv kazalec pri presoji trajnosti. Reševanje te problematike na sistematičen in metodološko dorečen način narekuje zanesljive metrike oziroma kazalce za vrednotenje lastnosti urbanega okolja. Obenem daje konsistentno in jasno definirane ciljne kvalitete, ki lahko opredmetijo cilje trajnostnih politik in so obenem ključni nosilci pomena, tako za prebivalce kot načrtovalce in izvajalce smotrne prenove sosesk. V članku predstavimo zasnovano tekoče raziskave, ki obravnava dani problem. Natančneje, znotraj raziskave razvijamo model vrednotenja trajnostne učinkovitosti na osnovi modularnega sistema kazalcev in povezane metode interpretacije vrednosti. Gre za zasnovano instrumenta, ki na osnovi merljivih kvantitativnih in kvalitativnih kazalcev presoja trajnostno učinkovitost sosesk skozi pet temeljnih kategorij, in sicer z vidika: (1) energijske učinkovitosti, (2) okoljske učinkovitosti, (3) racionalne rabe in ureditve grajenega prostora, (4) stopnje aktivnosti prebivalcev in (5) stopnje uporabe pametnih tehnologij/rešitev. Vsaka od danih kategorij je motrena skozi optiko treh strateških ravni, in sicer: (a) stavbe oziroma gospodinjstva, (b) javnega/vmesnega prostora (c) organizacije prometa in infrastrukture. Takšen okvir prinaša možnosti za vrednotenje sosesk tako v smislu naravnih in grajenih lastnosti, videza in funkcionalnosti, kot tudi aktivnosti, navad in demografsko-socialne strukture prebivalcev. Skozi te elemente in pojave je mogoče kvalitete prostora prenesti v merljivo obliko, ne zgolj v raziskovalne namene, ali kot podporo odločanju v prostorskih intervencijah, pač pa tudi kot sredstvo izobraževanja o prostorskih danostih ter spodbujanja odgovornega odnosa do njegovih zmogljivosti.

Ključne besede: prostorska identiteta, urbano oblikovanje, trajnost, vrednotenje, soseska

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