A Collaborative Spatial Decision Support System for Assessing Transformative Potential of Minimum Ecological Units (MEUs) in a Circular Regeneration Perspective

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Abstract. The need to respond to the challenges of our time requires a circular reinterpretation of the cultural and ecosystem heritage of our cities. In order to foster new ways of sustainable urban regeneration, it is essential to identify public green areas in which to promote cultural-based spatial regeneration processes consistent with the Circular Economy model. Different visions of urban landscape reform give an interpretation of these issues based on the model of the '15-Minute City' services and proximity logics contribute to the construction of enabling contexts, i.e. contexts in which the human beings are enabled to be active subjects, capable of pursuing their own well-being, that of their community and of their ecosystem. In particular, the ecosystem assets of cities can be read as a multitude of local proximity ecosystems or 'Minimum Ecological Units' (MEUs). Collaborative analysis of the use of MEUs can be the basis of Spatial Decision Support Systems (SDSS) which, through standardised techniques for accessing, understanding and interpreting data, facilitate stakeholders in decision-making processes. Starting from the results obtained by the multidisciplinary Collective "Needle Agopuntura Urbana", in the collaborative process of urban regeneration developed within the Needle Scampia (Naples) Living Lab, the contribution proposes the integration of Multi Criteria Decision Analysis (MCDA) tools with Participatory GIS (P-GIS) collaborative spatial survey practices. The proposed methodology aims to define a SDSS able to provide decision-makers and communities with a tool capable of considering qualitative factors with respect to the transformative potential of MEUs as well as providing the possibility of balancing these factors with quantitative dimensions.

Keywords: Spatial Decision Support System (SDSS) · Circular regeneration · Participatory GIS (P-GIS) · Multi-Criteria Decision Analysis (MCDA) · Minimum Ecological Units (MEU)

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1 Introduction

The need to guarantee timely responses to the many challenges that the present day calls us to face, gives rise to the need to reinterpret the cultural and ecosystemic heritage of our cities in a circular way [1]. This was evident during the COVID-19 pandemic, when urban green space was identified as the ideal place to deal with stress and anxiety [2], allowing for greater physical and social activity and helping to strengthen community relations [3, 4].

Identifying public green spaces in major Mediterranean cities in which to promote cultural-led spatial regeneration processes, consistent with the Circular Economy (CE) model, is crucial to foster new forms of sustainable urban regeneration. In this context, considering the idea of the "Third Landscape" [5] and the "cultural waste" [6–9], as a resource, can help to develop autopoietic systems [10] and to promote new processes of sustainable development based on the principles of common good and mutuality, as well as on the system of interpersonal and identity relations typical of Mediterranean cities [11].

Recently, various visions of urban landscape reform based on the valorisation of proximity relations [12] as a central element in the transition of cities towards sustainability have been widely echoed. The "Agenda for a green and just recovery" of the member cities of the C40 network "Cities Climate Leadership Group", interprets these issues with the definition of the "15-Minute City" strategy. The concepts underlying this approach stem from the "Neighbourhood Unit" model [13] complemented by proxemics studies [14] applied to the reading of urban spaces and research on the human scale of public space use [15].

As in the recent experiences of some cities in the C40 network [16], the interpretation of proximity services is increasingly linked to the concept of the common good [17, 18], focusing mainly on the relationships established between the good and the network of actors and users who inhabit the space. This network can be defined as a design community [19], i.e. communities that come together around a catalysing theme of ideas and collaborative projects [20]. According to this point of view, proximity services should be considered as enabling context factors through which human beings pursue their well-being and that of their community in a space in which they can share needs and foster the construction of shared projects and visions [21].

From a morphological point of view, the urban landscape can be interpreted as a complex expression of urbanisation processes of nature [22], which have led to a strong segmentation of the ecosystem heritage. From the perspective of proximity logics, the complex urban ecosystem can be read as a multitude of local neighbourhood ecosystems that can be identified as "Minimum Ecological Units" (MEUs) [21, 23] whose metabolism is as efficient as their ability to be self-sufficient [24], interconnected and supported by design communities. Reinterpreting the ecosystemic heritage of Mediterranean cities, from the perspective of proximity services, leads to prefigure planning and regeneration scenarios in which collaboration is at the basis of the public space use.

The most significant barriers to efficient planning and regeneration practices, which require new forms of governance, are related to the lack of involvement of citizens and local actors [25]. In this context, by monitoring, managing and evaluating the resources of the landscape in multidimensional contexts, the operational framework of Multicriteria

Decision Analysis (MCDA) has aided decision makers in efficiently making strategic decisions and defining concrete solutions [26]. The decision-making field has improved over the past three decades thanks to Spatial Decision Support Systems (SDSS) that combine MCDA and Geographic Information Systems (GIS) [27]. SDSS, by organising multidimensional knowledge layers, streamline the process of linking data to decisions through geographic mapping and GIS techniques [28, 29] and support choices through the MCDA. In this way, they enable decision-makers to perform sensitivity analysis, scenario analysis and optimisation to identify the most robust and efficient decision [30], facilitate stakeholder access to decision problems significantly outperforming previous decision support systems [27, 31, 32].

This contribution, identifies in the SDSS for planning [33–35], implemented in a GIS environment, a valid analysis tool that can support administrators and territorial communities in a transition process towards the enhancement of MEUs, i.e. towards the provision of proximity services based on the relations between urban public space and citizens. Such multidimensional and flexible tools are able to reconcile the experience and actual use of places and their potentials with the ambitions and needs of inhabitants, supporting multi-scalar choices related to spatial planning and urban design [36, 37].

In particular, the collaborative analysis related to MEUs, through the concept of Ecological Device (ED) [38], can underlie the construction of SDSS focused on the creation of new relationships and the strengthening of existing ones between human beings and ecosystems focusing on the mutual benefits that can be produced and experienced. The logic offered by EDs gives the opportunity to implement multi-scalar solutions for the transformation and management of the urban natural heritage in SDSSs, integrating collaborative processes of co-learning and co-design of urban public green spaces.

Starting from these considerations, the following research questions was identified: RQ1. Can the formal and informal use of the city's MEUs represent a criterion for assessing the capability of these areas to generate collaborative and enabling contexts for the formation of new design communities?; RQ2. Can these assessments support decision-making choices regarding new models of collaborative management and care of the city's green public spaces?

The article proceeds as follows: Sect. 2 describes the proposed methodology; Sect. 3 introduces the case study; Sect. 4 explains the data gathering and processing phases towards identification of criteria for SDSS; Sect. 5 presents the results and discussion; finally, Sect. 6 draw the conclusions, highlighting potentials and criticalities of the approach, and the research follow-ups.

2 Methodological Workflow

The goal is thus set: to identify, within a collaborative SDSS, sensitive areas for the activation of bottom-up circular regeneration strategies according to the areas' capability in delivering proximity services. The participatory process considers non-economic evaluations, which involve the collection of data related to the relevance or frequency of a given use or phenomenon, in the broader scope of social evaluations. Starting from the declared goal, a methodological workflow was developed (see Fig. 1).

The theoretical and operational background considers circular regeneration processes as a field on which to set up a collaborative SDSS to evaluate MEUs in their capability

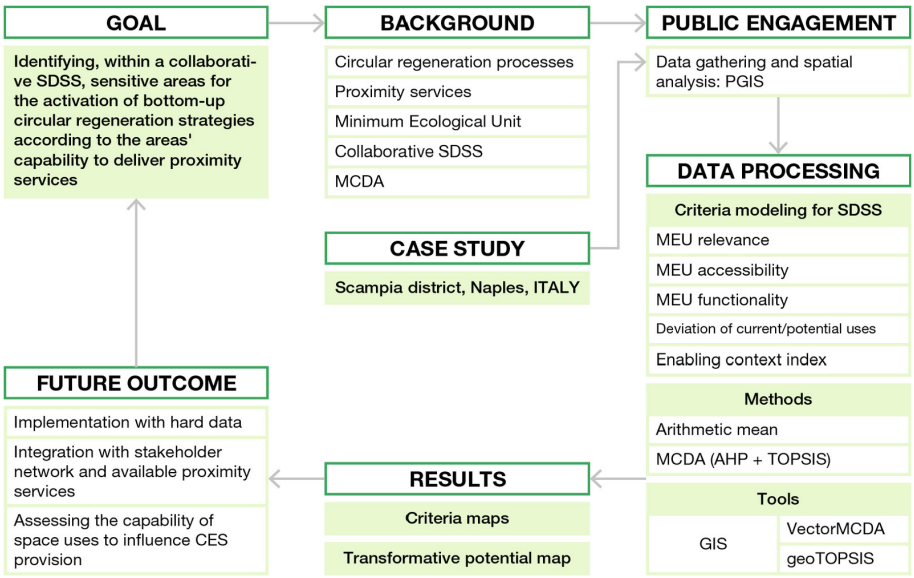

Fig. 1. The methodological workflow.

to deliver proximity services, by means of MCDA methods. The testing area consists of the case study of Scampia, a district of the municipality of Naples: a public engagement activity, involving a heterogeneous set of actors and citizens, constituted the data gathering phase, through the Participatory GIS (PGIS) tool. The data processing phase, on the other hand, was addressed to the modeling of criteria for SDSS, resulting in the following: MEU relevance; MEU accessibility; MEU functionality; Deviation of current and potential uses; Enabling context index. MEU values were thus obtained through arithmetic methods (the mean) and through multi-criteria evaluations, performed specifically through the AHP and TOPSIS methods with regard to the "enabling context" criterion. These methods were implemented in the GIS environment through the VectorMCDA package plugin.

In particular, the Analytic Hierarchy Process (AHP) method [39, 40] can be performed in involving local communities in the assessment, administering the matrix in community tables to define, by means of a pairwise comparison, a ranking of public green space uses according to their ability to define enabling contexts. The Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) method [41], implemented in spatial contexts, makes it possible to graphically return an immediate representation of the values, resulting from the comparative evaluation of the criteria with respect to their concurrence in a specific area. This technique makes it possible to define two ideal alternatives, the first defined as the positive ideal point and the second as the negative worst point. The positive ideal point is that solution which maximises all criteria identified as gains and minimises all those identified as costs, the negative ideal point is defined according to the reverse logic. The two points are positioned at the extremes of

a range of values from 0 to 1 in which all real alternatives are evaluated according to their distance from the two ideal points.

Lastly, two main results were obtained from such spatial data processing: the 5 criteria maps, and the transformative potential map, obtained through TOPSIS method.

3 The Case-Study

This contribution is based on a collaborative urban regeneration experience developed in Scampia, one of the suburbs of the city of Naples in southern Italy (see Fig. 2).

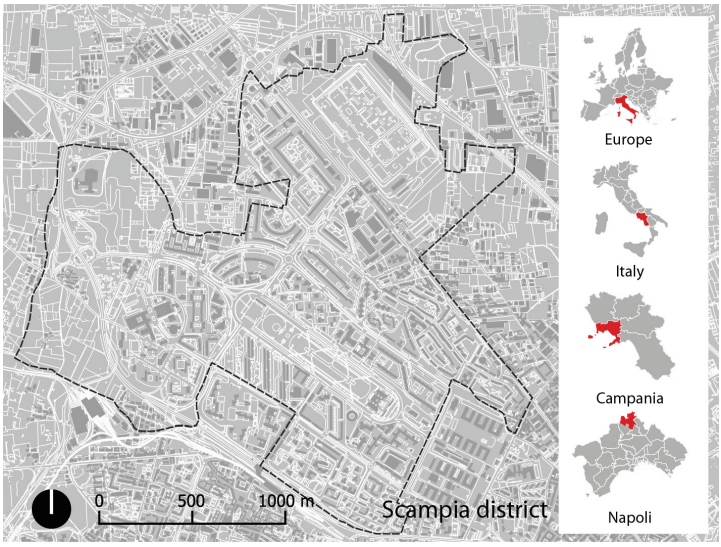

Fig. 2. The case study: Scampia district, Naples, Italy.

With an area of 4,23 sq. km and a resident population of more than 40.000 inhabitants, Scampia is the Naples municipality district with the highest amount of green areas. The Scampia district was born in a relatively recent period [42, 43], characterised, between the end of World War II and the 1970s, by unprecedented building growth interrupted abruptly by the 1980 earthquake that marked its definitive transition to "dormitory suburb" [44]. Between the 1980s and 1990s, the area was affected by multiple subsidised building projects and private cooperatives. The dislocation of the blocks of land, the cross-section and layout of the streets and the large number of buildings intended for infrastructures that was never completed, and above all the lack of maintenance of the public spaces and common areas, contributed to the degradation of the neighbourhood.

Between the 1990s and the early 2000s, the population of the Scampia neighbourhood recorded a high presence of criminal organisations, such as to give it the stigma of being "Europe's biggest drug-dealing square" [43]. The latest data collected by the "Parliamentary Commission of Inquiry into the conditions of security and the state of decay of cities and their suburbs" [45] show that the social and material vulnerability

index is 121,1 (city mean 111,2), the index of non-completion of secondary schooling is 19,7 (city mean 10,7%), and the unemployment rate is 46,9% (city mean 27,8%). What emerges from the statistics, therefore, is the image of a neighbourhood in a constant state of emergency.

At the same time, a strong social cohesion has increasingly developed in the neighbourhood. More than twenty associations and third sector and private social actors coexist in the neighbourhood, promoting numerous informal experiences of civic and political activism. Since the early 2000s, the interest of participatory companies, universities, research centres, foundations, third sector associations, and participatory design groups has favoured the realisation of a number of highly innovative urban regeneration projects [46].

4 Towards Criteria Identification for SDSS

With the goal of setting up a database of MUEs and the types of formal, informal and potential uses of these areas, we provided appropriate research tools that were able to involve and activate local communities in both the survey and co-design phases of bottom-up regeneration actions and public space use and management activities.

The multidisciplinary Collective "Needle Agopuntura Urbana", together with the project partners, activated the "Needle Scampia"[1] Living Lab between 2019 and 2020, according to an action-research approach [47] focused on the community and territorial networks, framed in the perspective of "prosumers", and on MUEs, as resources to be reinserted into the productive and cultural cycle of the Scampia neighbourhood. The Living Lab activities were designed to start processes of 'taking charge' by the community (shopkeepers, territorial operators, administration, training bodies, etc.) of small areas of the neighbourhood concerned by urban transformation actions. The objectives underlying the approach adopted were: i. to implement a 'crowd-mapping' process to define potential green public areas in which to promote urban regeneration actions, according to the needs and capacities of the community; ii. to activate a 'design community', to coordinate participation in space management and use choices; iii. to guarantee 'in itinere' monitoring of activities.

The collaborative listening activity led to the identification by the community of 45 areas of perceived degradation, 14 areas of perceived maintenance and 3 inaccessible areas. For each of these areas, the perception of care was qualitatively assessed through the description of mapped structural elements. From the mapping exercise generated a fragmented perception of the neighbourhood by the participants themselves is revealed. This interpretation returns a spatially limited sociality, where the inhabitants mostly live in the areas surrounding the blocks of flats for short daily activities, and almost all work or leisure activities are carried out outside the neighbourhood, especially by the youngest.

[1] Initiative promoted by the Directorate General for Contemporary Creativity - DGCC and MIBACT, in the context of the 'Creative living Lab II edition' award. The "Needle Agopuntura Urbana" collective's members are: Abbate L., Cuntò S., Napoletano F., Pacera L., Dinardo M., Pone A., Sodano S., Diana S.. The project local partners are: Aps Jolie Rouge, Asd Stella Rossa 2006, Aps Banda Baleno, Gruppo di Risveglio dal Sonno GRIDAS, Centro Hurtado, Liceo Elsa Morante Scampia. The scientific partners are: Department of Architecture and Department of Social Sciences of University of Naples Federico II.

During the mapping process, the stakeholders reported the current uses of the identified areas, describing their morphology and social uses in relation to the accessibility and functionality dimensions of the area. The identification of uses was conducted collaboratively from a small pre-set that was implemented during the survey phases according to the alerts assigned to the MUEs. Once the structural elements of the territory were identified and current uses analysed, potential uses or uses to be enhanced were identified. The formal and informal uses of public space deduced from the process are the following: dog walking area, children's playground area, bus waiting area, proximity markets area, natural recreation area, skateboard area, recreational and social area, relaxation area, outdoor sport area, event area, mixed use area.

Finally, the research focused on the frequency of reports, in order to identify the most relevant areas for the community to choose as possible intervention areas. To do this, the 6 areas with the highest frequency were selected, in whose proximity there were associations that could support the regeneration process in terms of their capacity to take charge.

4.1 Public Engagement

The collaborative survey methodology was structured through numerous focus groups [48], a qualitative technique used in action research, in which a group of people, representative of more or less defined categories, are invited to talk, discuss and compare their personal attitudes towards a specific topic. In the investigation of the formal, informal and potential use of the public green space in the neighbourhood, the focus groups centralised on observing how a community interaction takes place and how a community creates a dialogue on the topic of MEUs.

In order to collect information from the focus groups at the same time as they took place, a Collaborative Mapping (CM) was performed. CM facilitated the identification of the structural components of the territory and the viewpoint of the relative communities by integrating it with the knowledge of technicians with respect to numerous issues, overcoming communication gaps between actors [49]. To explore and assess the critical elements of an area, as in the case of a neighbourhood, the involvement of the local community is a key factor [50, 51]. Indeed, the spatial representation of opportunities and critical issues can guide towards a participatory planning project that implements more accurate regeneration strategies [52, 53].

The 2D mapping, created on scale maps on which people drew with markers, pens, stickers and drawing pins, was implemented with Web-GIS[2] mapping methods to provide users with a simple, intuitive and inclusive tool to visualise the survey results. The process was based on models of "participatory GIS" (P-GIS), tools consisting of multiple methods and integrated technologies to enable collaborative planning and support inclusive public participation [54–57]. This device is oriented to the empowerment of a community [58], through the application of demand-driven research integrated with geospatial representation tools. Also, social data and geographic maps support the participatory approach as a wide-ranging 'policy process' [59] with the combination of experts and socially diversified knowledge generated from the community [60, 61].

[2] Needle Scampia - Collaborative Neighbourhood Uses Map, Available at: https://www.google.com/maps/d/u/0/edit?hl=it&mid=1FNBmdfqSMOvelZwreC5WCyH46T82IGIg&ll=40.899578002260625%2C14.247766710674558&z=15.

4.2 Geo-Data Processing: Criteria Modeling

In order to assess the transformative potential of the selected MEU, a multi-criteria evaluation has been performed. This decision-making process involves evaluating and comparing several options based on multiple criteria. Defining criteria is a crucial step in the multi-criteria evaluation process because it helps to establish a clear and objective framework for assessing different options.

The data gathered in the previous phase was processed according to 5 relevant criteria for the objective of the assessment. Table 1 shows the list of criteria, the input data collected within the PGIS phase, and the processing method for each criteria. It should be noted that all processed data were standardised by rescaling the values of the variables on a common scale (from 0 to 1), in order to facilitate the comparison of variables with different units of measure and to make the visualisation of the data distribution easier.

Table 1. The criteria set.

ID	Criteria	Data input	Processing method
1	MEU relevance	Reporting frequency of MEU	-
2	MEU accessibility	Frequency of accessibility related to current uses	Mean
3	MEU functionality	Frequency of functionality related to current uses	Mean
4	Deviation of current and potential uses	Frequency of current uses and potential uses	Mean difference
5	Enabling context index	Score for typologies of current uses	MCDA: AHP
		Frequency of current uses	MCDA: TOPSIS

Below is a detailed description of each criterion and the related processing method:

1. **MEU relevance:** measured through normalised values of the reporting frequency of areas, with the aim of identifying the most highly acknowledged MEUs by the participants. The qualities attributed to the areas by the respondents, in terms of perceived care and degradation, were not taken into account for the purposes of the criterion, which only measures their frequency: this benefits the possibility of considering areas potentially sensitive to transformation beyond their conservation status.
2. **MEU accessibility:** measured through the normalised mean of the qualitative judgements values expressed on the accessibility of areas with respect to the uses reported in each of them. The objective is to identify the most perceived accessible MEUs with respect to the specific uses.
3. **MEU functionality:** measured through the normalised mean of the values of the qualitative judgements expressed on the functionality of the areas with respect to the uses reported in each of them. The objective is to identify the MEUs most perceived as equipped with respect to the specific uses.

4. **Deviation of current and potential uses:** measured through the normalised means of the reporting frequency of current and potential uses in each area, then calculating the difference between the values. The objective is to identify the extent of the distance between the supply of current uses and the demand for potential uses.
5. **Enabling context index:** obtained from the evaluation with TOPSIS method of the normalised mean values of the reporting frequency of current uses, weighted through AHP method according to the capability of uses to enhance enabling contexts, for each area. The objective is to identify the MEUs in which the uses most likely to generate enabling contexts are concentrated.

More specifically, the definition of this last index originated from the scores assigned by the participants to each use, according to four specific predetermined criteria: a) time spent in the area, i.e. the ability of an activity to maximise the time people spend using the place; b) involvement in the use of the area, i.e. the ability of an activity to effectively engage users in the physical use of the place; c) specificity of interest in the use of the area, i.e. the ability of an activity to satisfy a specific and shared need of the community in the use of the place; d) social aggregation capacity of the use of the area, i.e. the ability of an activity to involve the greatest number of people in the use of the place.

By assessing the uses against the above-mentioned criteria using the AHP method, the relative importance of each criterion was obtained. These values provided the weights to be associated with the uses in the TOPSIS evaluation, which was performed with respect to mean values of the reporting frequency of current uses. The resulting values shown in Table 2, then normalised, made it possible to obtain the enabling context indices for each area.

Table 2. The TOPSIS matrix.

Uses	AHP weight	Preference	Ideal point	Worst point
Recreational and social area	0,16	gain	1	0
Event area	0,15	gain	1	0
Outdoor sport area	0,12	gain	1	0
Children's playground area	0,1	gain	1	0
Skateboard area	0,09	gain	1	0
Relax area	0,09	gain	1	0
Proximity markets area	0,08	gain	1	0
Mixed use area	0,07	gain	1	0
Natural recreation area	0,07	gain	1	0
Dog walking area	0,03	gain	1	0
Bus waiting area	0,03	gain	1	0

5 Results and Discussion

The spatial values of the areas for each criterion were visualised through GIS maps. The maps follow the choropleth logic, in which data values are mapped to a colour scale, with each colour representing a range of data value, identifying areas with high or low values of a particular variable.

The relevance map (see Fig. 3) shows which MEUs are most recognised and reported by the community by defining their degree of relevance (increasing values from 0 to 1) in relation to the perception of the participants.

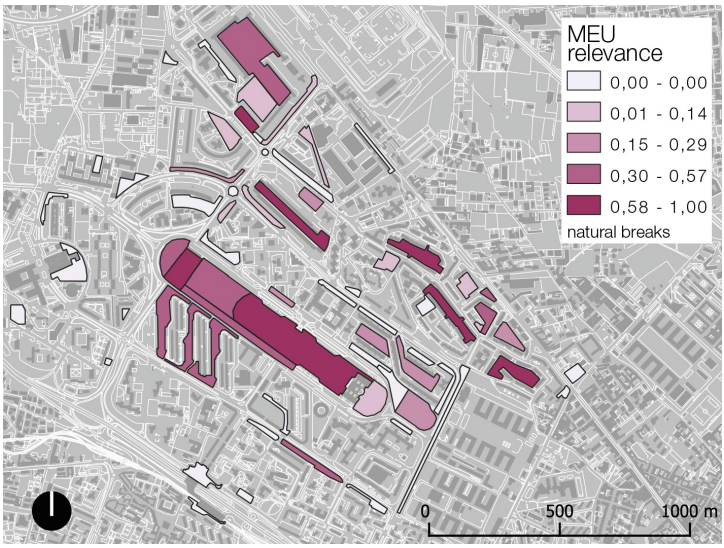

Fig. 3. MEU relevance map.

The results show the emergence of several clusters, the most consistent of which are: East Cluster, characterised by the presence of three MEUs that are part of economic and social housing complexes that are older than the rest of the neighbourhood, and are concentrated in an area where the architectural and urban characteristics guarantee greater conditions of proximity; North Cluster, which sees the presence of large green areas servicing large and dislocated residential complexes where, however, strong social values linked to the management practices of these areas are recognised; Central Cluster, made up of central territorial park MEUs, shows how the latter is perceived in a fragmented and non-homogeneous manner.

The accessibility map (see Fig. 4) shows which MEUs are most recognised as areas with good accessibility (increasing values from 0 to 1) with respect to the specific uses identified by the community.

The results confirm the definition of the first two clusters (East and North) deduced from the relevance map, and show how the Central Cluster's MEUs benefit from varying degrees of accessibility of use.

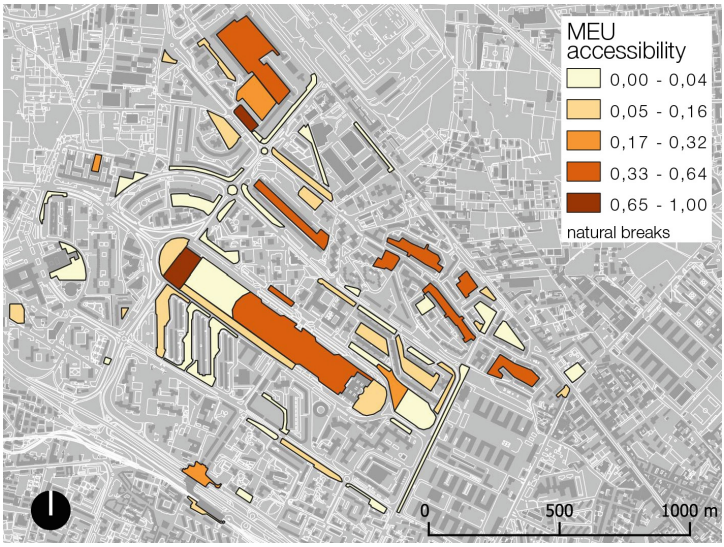

Fig. 4. MEU accessibility map.

The functionality map (see Fig. 5) shows which MEUs are most recognised as equipped areas (increasing values from 0 to 1) capable of supporting the specific uses reported by the community.

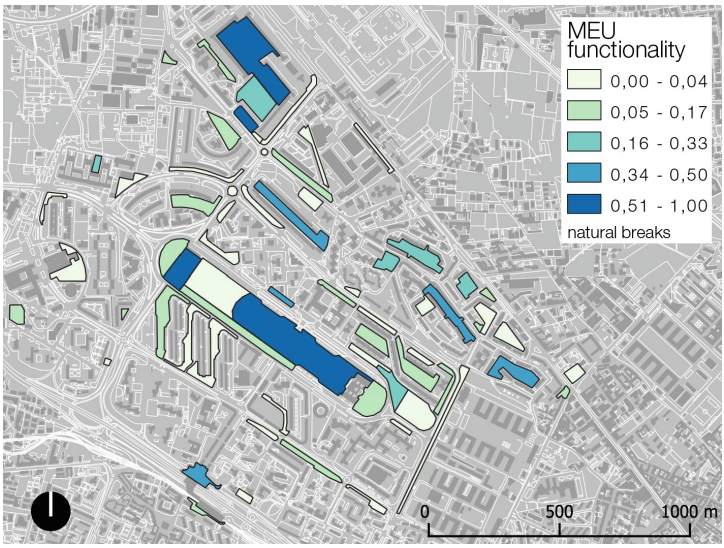

Fig. 5. MEU functionality map.

The results show that the degree of accessibility of MEUs is not always proportionate to their ability to support the uses that are identified. For example, the areas of the East cluster, which appear to guarantee good accessibility to the uses in the area, do not, on the other hand, guarantee optimal support for these uses in terms of functionality.

The deviation of current and potential uses map (see Fig. 6) shows which are the MEUs in which the distance of the supply of current uses over the demand for potential uses is concentrated, compared to the participants' reports, showing the community's interest in the need to increase the use of certain areas (decreasing values from 1 to 0).

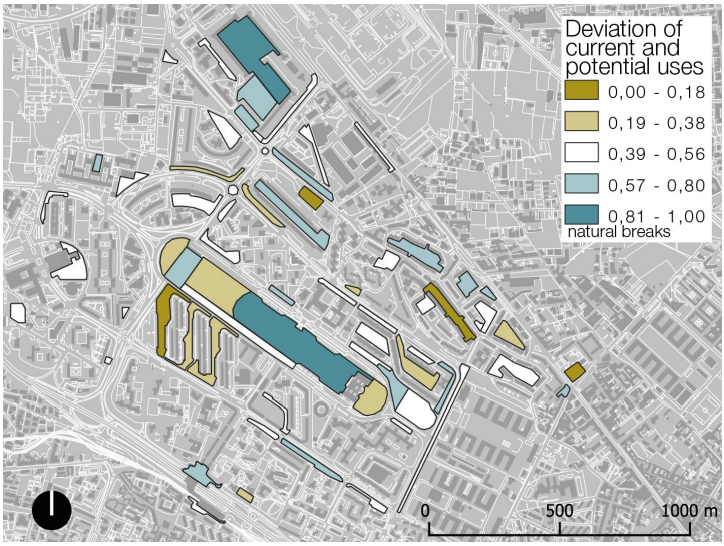

Fig. 6. Deviation of current and potential uses map.

The results identify 4 MEUs that are homogeneously distributed throughout the neighbourhood and are recognised as having great unexpressed potential. Here again, the East Cluster is found to be of interest.

The enabling context map (see Fig. 7) shows which MEUs have the highest concentration of uses that can promote the construction of enabling contexts (increasing values from 0 to 1).

The results confirm the presence of the three main clusters with a similar distribution of values in the areas. Each of them contains a focal area in which uses capable of creating enabling contexts are condensed. The surrounding areas result as satellites of the main MEUs characterised by gradually decreasing values.

Downstream of the values obtained for the 5 criteria, a TOPSIS assessment was performed to evaluate the areas according to their overall transformative potential. Equal weights were considered for all criteria, which were all meant as gain, with the exception of criterion 4 (Deviation of current and potential uses), which was meant as cost: this is due to the fact that during normalisation, the values that express the highest deviation between current and potential use are closer to 0.

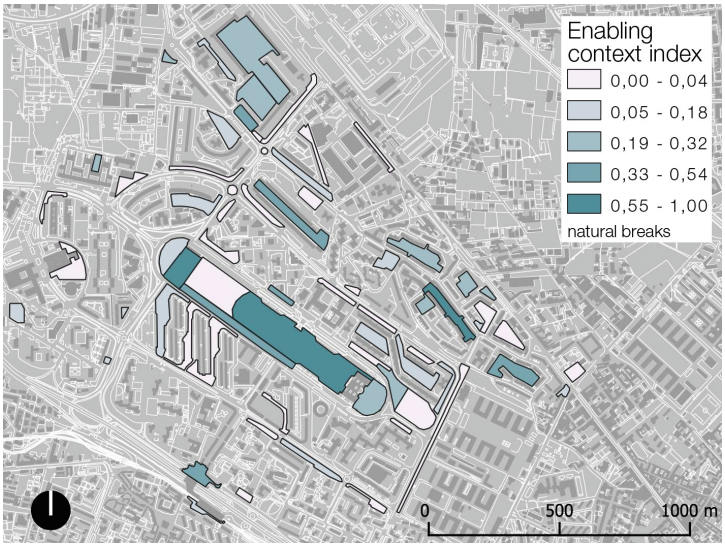

Fig. 7. Enabling context map.

The map of this potential (see Fig. 8), therefore, shows which MEUs are most likely to promote bottom-up urban regeneration processes aimed at activating design communities (values increasing from 0 to 1).

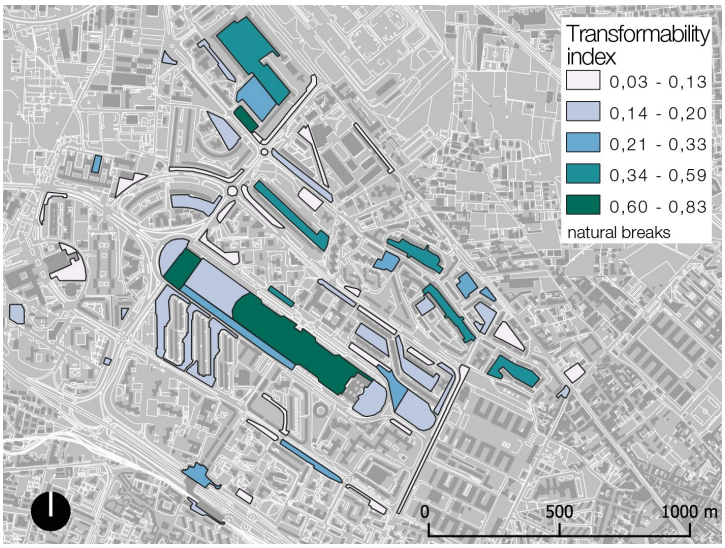

Fig. 8. Transformative potential map.

The results show that the areas most likely to activate such processes are condensed in the MEUs of the identified clusters. The Central Cluster contains two of the best-performing areas, although they are surrounded by MEUs with little transformative and networking capability. The North Cluster appears to have a defined core around which several areas with uneven values gravitate. The East Cluster has a number of MEUs with good transformation potential and a particular spatial distribution that itself suggests a possible interconnection between the areas, which are at medium-high values, foreshadowing scenarios of possible activation of design communities.

6 Conclusions

The proposed methodological process made it possible to build a collaborative SDSS enabling the identification of areas of transformation, thus setting up an MCDA-based and community-driven approach.

The main potentials are to be found in the involvement of communities and territorial networks, which makes it possible to collect the "insiders" points of view, since the data derived from the community are an expression of their needs and expectations with respect to the proximity services that the neighbourhood can or could provide. Moreover, the spatial dimension of the decision support system allows for clearer and more immediate communication between actors, according to the geographical visualisation of output values.

Some limitations of the methodology are related to the reliability of the collected information, which is tied to the quantity and type of actors involved, as well as their specific knowledge of the study area. A thematic division of the tables, also with respect to the power/interest they express, would allow for a more balanced and representative collection of judgements. Moreover, the survey process requires a time-consuming presence in the area, foreshadowing the need to set up permanent workshops and neighbourhood living labs to ensure proper continuity in the collection of judgements and monitoring of the areas. Finally, specific statistical tests to verify the correlation between the values obtained for the criteria should be carried out to refine the selection of criteria and improve the mathematical soundness of the process.

Future research outcomes concern the implementation of qualitative data inferred from the SDSS with quantitative information that could inform multilevel decision-making processes [62] aimed at different forms of transformation and management of MEUs according to climate change adaptation, such as projects to contrast urban heat island, flooding phenomena or foster solutions for disaster risk reduction. The integration of the performed assessment with the urban service and stakeholders network could enhance the construction of visions of transformation and co-management of urban public space through Geodesign practices on MEUs [63].

Ultimately, it is believed that this decision-making problem could also focus on the services that urban ecosystems provide and that directly affect human well-being, i.e. Ecosystem Services (ES), the availability of which can be directly influenced by the availability of neighbourhood services, and vice versa. In particular, Cultural Ecosystem Services (CES) are the only class of ES that do not represent purely ecological phenomena, but rather are the result of complex and dynamic relationships between ecosystems and humans, structured over long periods of time [64, 65]. From their assessment

and implementation of the framework in SDSSs, it will be possible to structure urban landscape planning and management processes to identify place-based and bottom-up strategies [66].

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