A conceptual model providing superblock's definition, selection criteria, indicators & typologies

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TuneOurBlock

Transforming urban quarters to human scale environments: applying superblock concepts for different urban structures

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Project Partners

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Executive Summary

Deliverable 2.2 will establish five points:

- a definition of superblocks including essential components, etc.
- a metric to measure Superblocks
- the understanding, that the Superblock concept is flexible and adaptable and appropriate for built environments different than that found in Barcelona's Eixample (indicators, etc.)
- the notion, that the Superblock concept should be understood as a replacement regime for automobility, not as isolated traffic calming and public space improvement (socio-technical transitions, MLP)
- the idea, that the widescale implementation of superblocks is (in theory) capable of triggering socio-technical transition (regime destabilization and replacement)

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1 What is a superblock?

The question “what is a superblock” is actually a complicated one. From the initial theoretical conceptualization of the Superblocks concept by Salvador Rueda (2014) where an individual superblock consisted of nine blocks of around 400 x 400 m in the orthogonal grid of the city of Barcelona, this theoretical concept has been evolving; after first implementations with a limited success, it was made more flexible to be more easily implemented in complex local situations. Another reason that the original concept might be outdated, is the need for its expansion and internalization so that it would have been also suited to other urban, social and political environments. In the meantime, the focus of urban policies across the world shifted towards even a greater importance of combatting climate crisis, indicating to the need to develop more radical solutions in terms of urban transformation.

To reach a working, broad definition of the Superblock concept, useful for the subsequent project activities, we decided to run a **e-Delphi method**, consisting of a three-round online survey among a diverse group of experts to validate the basic assumptions in regard to the Superblock concept. The first step was to form a **panel of experts**, which consisted of acknowledged academics and practitioners in the field of sustainable urban mobility, planning and transformation. The formal criteria were the authorship of (scientific) articles, leaders of corresponding projects and initiatives and membership in the network groups. We also paid attention to the diversification of profiles and therefore chose experts from different fields, such as urban planning, architecture, landscape architecture and geography covering a range of topics, such as mobility, urban planning, urban sustainability, urban transformation, social justice and participation. In the end, the panel consisted of 119 members, mainly from Europe but also involving experts from other continents, who were invited to participate in the research.

The e-Delphi method consisted of three rounds of online survey. In November 2021, different WP2 contributors and all work package leaders formed the “**Delphi Core Group**”.

1.1 First Survey

The preparation of the first questionnaire began with a review of the existing literature and knowledge as documented in D2.1. Based on this review, key research questions and open research questions were identified and initial key questions were formulated. The process of questionnaire design underwent multiple iterations. The first draft of the questionnaire was put on the established online survey platform 1KA, on which Delphi Core Group members could test and comment on the content and appearance of all questions. A second draft was reviewed by all consortium members (N=18) in December 2021. Based on the comments, the online questionnaire was re-designed and finalized in February 2022.

The questionnaire consisted of few informative data (gender, professional background, years of experience, familiarity with the concept) and the core part with 27 statements concerning Superblock key elements, urban morphology, traffic organization and public space to be answered on a 5-point Likert-type scale. Each section was followed by an open-ended question with the possibility to comment these elements or add new ones. The final section consisted of three questions on the Superblock implementation (goals, barriers, other thoughts). The survey was expected to have duration of around 10 minutes. The invitation

letter was also carefully designed, consisting of key information about the research and trying to motivate the experts to participate. During the process of questionnaire design, the key principles of the survey methodology were followed, especially concerning the quality of individual questions (clarity, unambigousness etc.) (Willis & Lessler 1999; de Leeuw et al. 2009).

The invitation letter with the link to the online questionnaire was sent out between 17 and 24 February 2022 from the official project email address to the available email addresses of the experts. All invitations were personalized. Some of them were additionally individualized (from a personal email addresses with a more informal invitation) in order to increase the response rate. A reminder was also sent at three dates – on 4, 9 and 21 March 2022. For 8 people, the delivery failed (e.g. non-existing e-mail address). On 31 March 2022, the survey was closed.

1.1.1 First Survey Results

Among other 88 experts, 55 participated in the survey, from whom 46 provided a full response and 9 of them answered only to certain questions. The response rate was thus 62.5 %, which was beyond our initial expectations.

The sample was gender balanced: 27 participants were male, 26 female, two of them preferred not to answer this question. Regarding their professional background, most of them come from academia (22) or public administration (22), followed by NGOs (10), private sector (9), other background (4) and politics (2). 48 experts had at least five years of professional experience, 27 of them between 15 and 30 years. Most of them confirmed that they are quite familiar with the Superblock concept: 40 know the concept from professional discourse among colleagues or at conferences (74% of all participants), while 32 have heard about it in the popular media. A quarter of them have also visited actually implemented Superblock projects.

In the first set of questions (**core aims & key principles**, Figure 1), all the statements reached a high level of agreement (with average between 4.1 and 4.7 on a 5-point Likert-type scale). Among them, the statements related to the gaining of public space through reclaiming it from motor vehicles as the defining characteristic of any Superblock model (4.7) and seeking to reduce the motor vehicles while pushing forward active mobility and public transportation (4.5) achieved especially high consensus. The experts also thought that the elements, such as systemic transformation, sustainability, participatory design, promoting climate change adaptation measures, twofold organization (district/cells) are essential to the concept. They are more inclined to Superblocks as living laboratories instead of finished products (average scores between 4.1 and 4.3).

Four of 16 responses on the open-ended question suggests that in the reality the Superblock model should not strictly follow theoretical/abstract concept, but rather be flexible and adaptable to different urban contexts (e.g. according to urban morphologies, identified problems, city size …). One expert also stressed that the model needs to be applied across the entire city. Due to difficult implementation, one of the other respondents suggested a shift from Superblock ‘cells’ to networks of individual streets within a city, while another one said that Superblocks need to be eventually seen “*as ‘ordinary’ and ‘everyday’ rather than a special destination location*”. Two of them also pointed out the potential of following and extending (green) neighbourhood concepts – instead of living laboratories, which need constant monitoring. Another expert emphasized that a Superblock model is defined by the

street network, and not the urban cell nor geometry; it aims to maximizing the public space, maintaining the functioning of transport at the city level but also reducing dysfunctionalities of the current model.

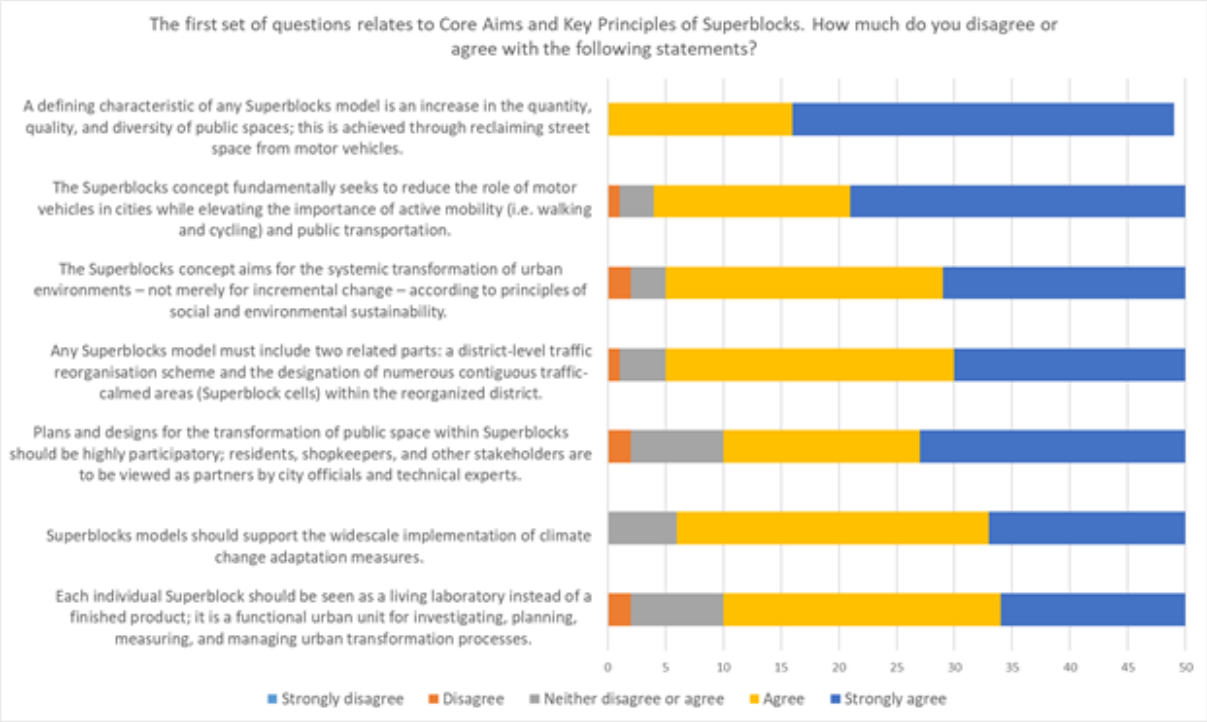

Figure 1: Level of agreement with the first set of questions relating to Core Aims and Key Principles of Superblocks

In the set of question related to the **urban morphology** (Figure 2), the experts' views were much more mixed. Only for two questions the percentage of those who agreed or strongly agreed was higher than 80% - that Superblock concept can also be applied outside the areas with orthogonal street grid (4.1) and that the size of Superblocks should find the balance between having enough interior streets and comfortable walkability (4.0). The similar level of agreement was found also regarding medium to high density with mix of functions (3.9). Many experts were skeptical about marking the edge of a Superblock cell by a visual border (3.7). In an open-ended question, one expert suggested shifting from defining the edge of Superblocks with through-traffic arteries to a more "gradual" approach that "*allows slow moving motorised traffic on some streets*". Another expert emphasized that the approach should be very simple, clear and convenient, without abundance of information, signs and rules. Experts' views also slightly differed on the question if a Superblock is merely one spatial unit among many within a restructured traffic grid (3.7). Even lower was the agreement about the (walkable) length of the edges of Superblock cells (3.6), while the overall scale of a Superblock model ("between the city district and the entire city"), reached one of the lowest scores (3.1) among all the statements in the survey – less than half of the respondents agreed with such a scale.

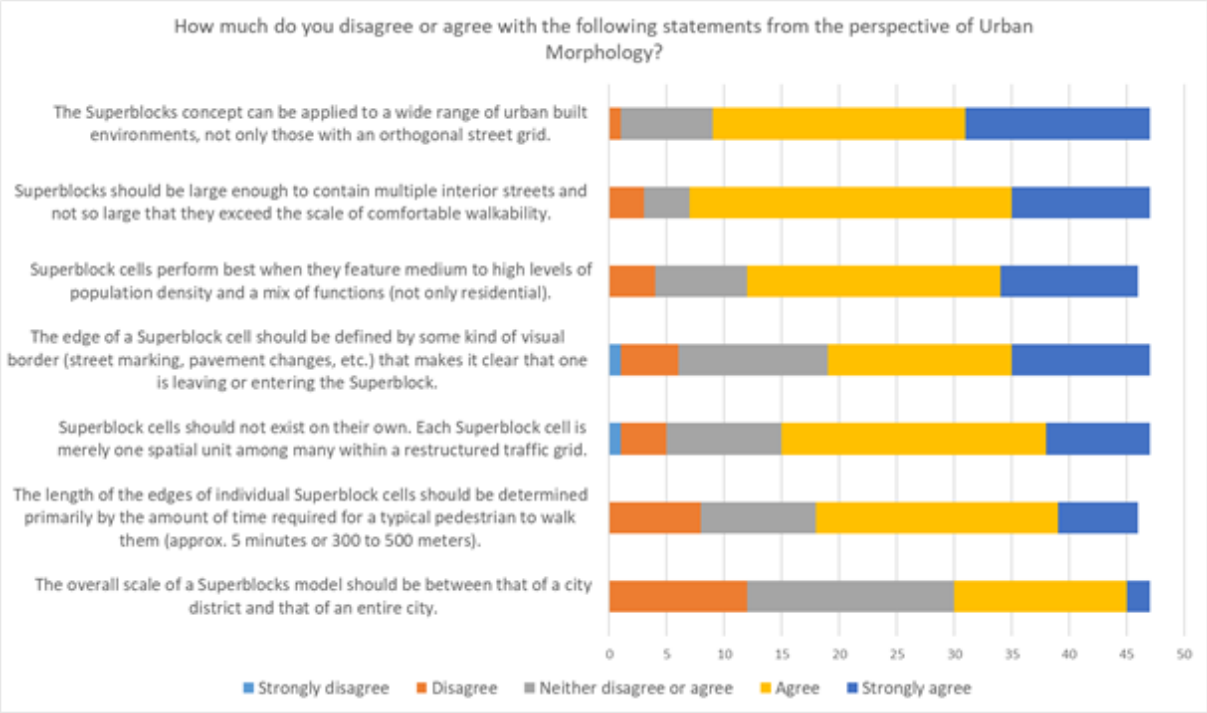

Figure 2: Level of agreement with the statements on Urban Morphology

From the perspective of **traffic organisation** (Figure 3), the level of agreement was generally higher. Four statements received the average score 4.0 or more. Almost all experts agreed that walking and cycling should be prioritized and allowed without any restrictions (4.5). Three experts additionally commented on size of Superblocks, especially from the aspect of walkability. They agreed that walkable distances should be one of the essential criteria. This is very important also from psychological point of view, and attention should be paid to the (lower) walking speed of vulnerable groups. Most of participants also agreed that speed limits should be reduced so that they are compatible with (prioritized) pedestrian traffic (4.3). One expert emphasized that pedestrians should be given a maximum priority also concerning safety. Another expert proposed a feminist or “intersectional gender” perspective to be adopted in the Superblock concept in order to create highly safe, inclusive and accessible public space. The experts also agreed that on-street parking should be reduced to a minimum (4.2). However, one expert mentioned importance of only-for-residents parking to maintain the socio-economic stability, especially in shrinking central neighborhoods. Opinion about the restrictions of motor vehicles to pass through the Superblock cell was more mixed, but a majority still agreed with it (4.0). Even less, only around a half of respondents, agreed that through traffic should primarily define the edges of Superblock cells (3.5) and that public transport lines should only run at the edges and not within the cell (3.4). Two experts emphasized that public transport is essential and should be allowed to easily run through a Superblock, as well as taxis and deliveries. In general, the experts were neither in favour of the idea that all points within a Superblock should remain fully accessible to motor vehicles (3.1).

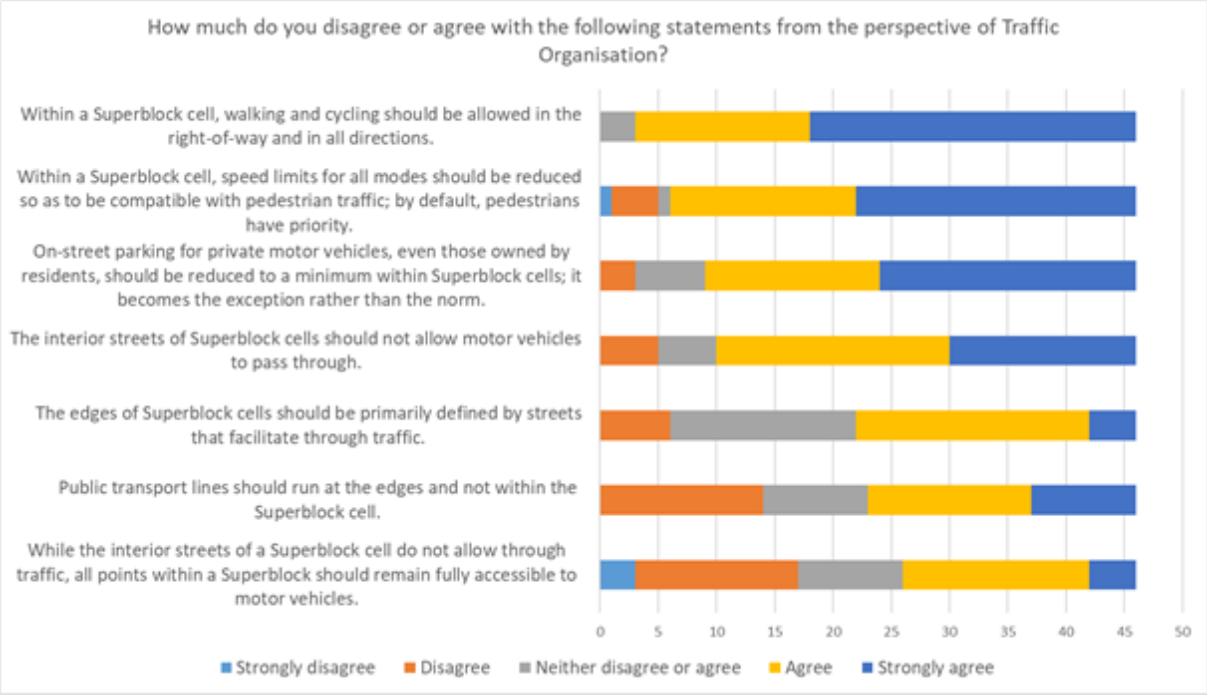

Figure 3: Level of agreement with the statements on Traffic Organisation

Among the statements concerning **public space** (Figure 4), maximizing blue and green infrastructure across all Superblock area (4.5) and providing public space for a wide range of users (4.5) received a high approval. Slightly less, but still a large majority of the experts agreed that Superblock cells should also provide social infrastructure (4.0) and a network of diverse micro-spaces (4.0). Considering infrastructural measures, children infrastructure and mobility stations for "fine mobility", including both parking facilities for individual and shared vehicles/equipment were explicitly mentioned in the open-ended question. Views differed on whether Superblock interventions should also include private spaces (3.7); one of the experts pointed out that this should not be "*a black and white question, as this way of thinking can reinforce the public-productive-masculine/private-reproductive-feminine binaries*" … and that "*identifying and incorporating hybrid spaces (i.e., semi-private entrances to buildings or inner courtyards) into the superblock network can create synergies*". An idea that Superblock cells should require a central public space was one of the less accepted (3.2) among all the statements in the survey. One of the experts commented that a central point is always an asset but should not be a requirement as Superblock areas can vary in size.

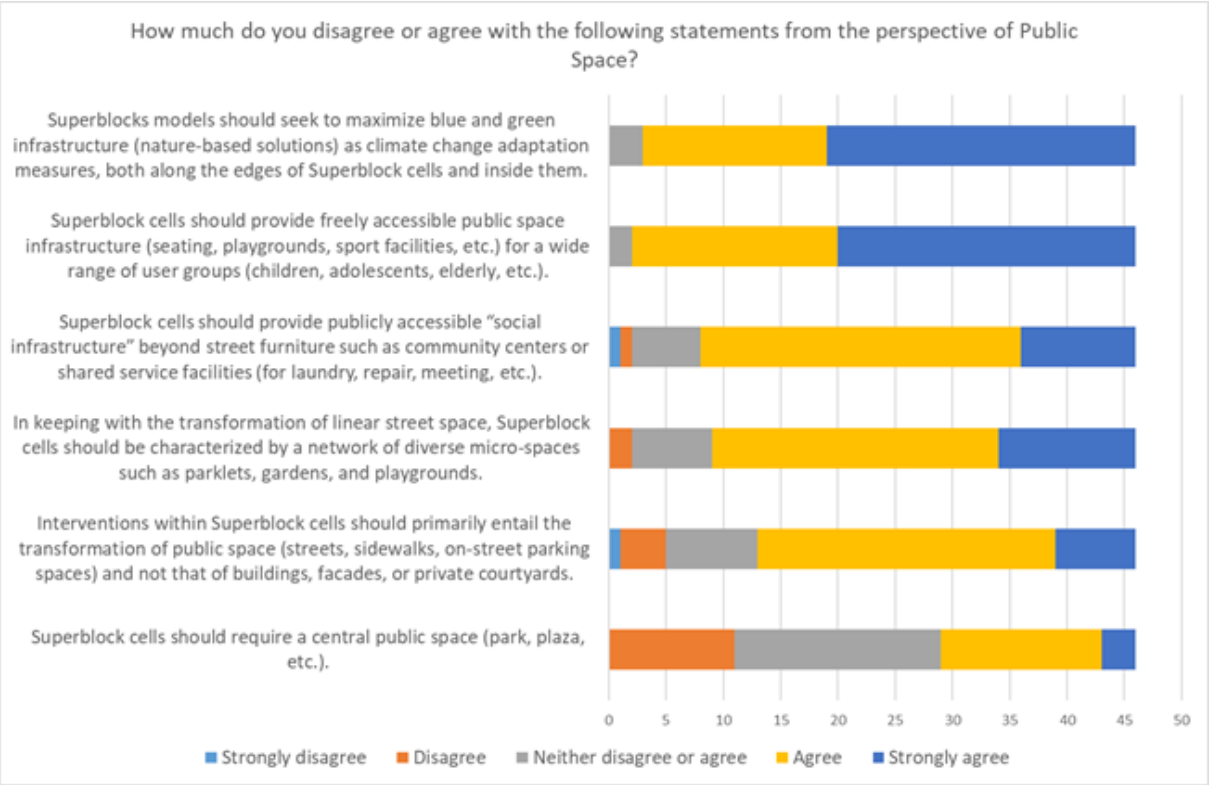

Figure 4: Level of agreement with the statements on Public Space

The experts surveyed believe that the most important **implementation goals** (Figure 5, multiple answers were possible) should be encouraging modal shift towards sustainable modes (70%) and redistribution of public space (63%). Climate crisis-related goals (adaptation and mitigation), considered together, were perceived as important by more than 50% of respondents. Other goals were somehow marked as less important with fostering local business as least important goal.

Figure 5: Most mentioned Implementation Goals for Superblock projects

The most important **barriers for Superblocks implementation** (Figure 6) in European cities proved to be lack of political will (4.6) and current mobility behavior (4.1) – for the first one over 90% of respondents thought that it impedes Superblocks (or similar urban interventions) implementation quite a lot or very much. A lack of knowledge and competence among urban administrations (3.8) was also identified as a potential obstacle, followed by the resistance of local businesses (3.6), assumed traffic increase on adjacent roads (3.5), resistance of local residents (3.4), planning regulations (3.2) and limited municipal budgets (3.2). Fear of gentrification (2.7) and absence of local authority over relevant roads (2.6) were marked as less important – a bit more than half of the experts thought that they provide a barrier at least to some extent.

Experts also provided some useful answers and ideas as an open-ended question. One expert, for example, pointed out that we need to change traditional transport planning practice based on "*predict & provide*" to "*decide & provide*", while the resistance of local residents can be, based on the opinion of the other expert, overcome by introducing cells as easily reversible with more acceptable temporary experiments. Two experts noted that the scope of public involvement should be carefully thought (taking into account very diverse realities), while some decisions (e.g. diverting traffic to distributor roads) need to be left to experts. Another one said that the combination of top-down and bottom-up approach should provide the best results. According to the opinion of another expert, budget should not be a problem (based on Barcelona experience).

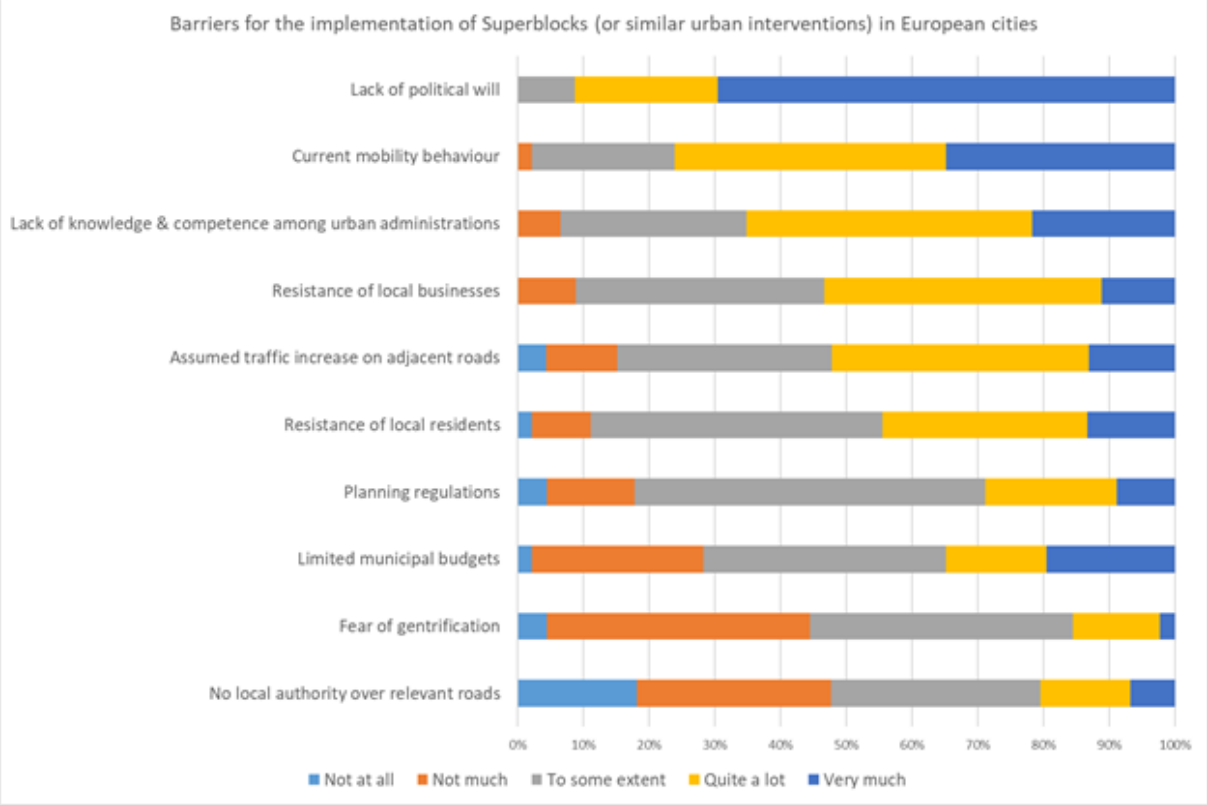

Figure 6: Perceived barriers on Superblock implementation

The scores and comments were carefully reviewed, and the level of consensus was measured by different indicators, such as share of responses within the two top categories (at least 80%), mean (at least 4.0), coefficient of variation (below 50%), and interquartile

range (1 or lower) (von der Gracht 2012). A definition formulation process also included various iterations among some of the “Core Delphi Team” members.

As a result, the following Superblock working definition was designed:

"The Superblock concept was developed to foster systemic transformations of mobility and social behavior and built environments toward social and environmental sustainability. It seeks to maximize freely accessible public space for a wide range of user groups, increase green and blue infrastructure, and prioritize active mobility. This is achieved through the restructuring of traffic grids to reduce through-traffic routes and the development between the intersection of those routes of a network of contiguous, traffic-calmed, pedestrian-priority zones with reduced on-street parking. All Superblocks concepts thus consist of both a traffic grid (though not necessarily orthogonal) and numerous individual neighborhood 'cells'. A Superblock model can be applied in different urban built environments and at various scales; cells should be large enough to encompass multiple interior streets while remaining easily walkable from edge-to-edge. Cells should also provide publicly accessible social infrastructure and a network of diverse public green spaces. Superblocks should be implemented gradually, with high levels of public participation, following the mode of a living laboratory."

1.2 Second survey

The working Superblock definition was offered to experts to be validated in the second round of the e-Delphi process. Like in the first round, the survey was sent to the panel of experts, plus additional experts on the participation process, who joined the panel in the 2nd round to evaluate involvement strategies and participation methods for Superblock implementation (those results are not presented here but in Deliverable D4.1).

The questionnaire consisted of three blocks: demographic and informative questions (gender, professional background, years of professional experience, country of residence, familiarity with the concept, participation in the 1st round), the definition block (Superblock definition, few questions and box for comments) and the involvement strategies block.

The invitation letter with the link to the online questionnaire was sent out from 9 June to 19 July 2022 to the available email addresses of the experts, who were already contacted in the 1st round (plus 23 additional experts on the participation process, who joined the panel in the 2nd round). In order to increase the response rate, all invitations were personalized. Some of them were sent from the official project email address, while some were additionally individualized (from personal email addresses with a more informal invitation). A reminder was also sent a week or two later. For 8 people, the delivery failed (e.g. non-existing e-mail address). On 19 August 2022, the survey was closed.

1.2.1 Second survey results

Among 111 successfully contacted experts, 42 participated in the survey, from whom 36 provided a full response on the definition. The response rate was thus 37.8 %.

The sample of respondents was quite gender balanced: 23 participants were male and 19 were female. Regarding their professional background, most of them come from academia (17), public administration (14), and NGOs (14), followed by private sector (7) and other background (4). 37 experts have at least five years of professional experience, 23 of them

between 15 and 30 years. Most of them confirmed that they are quite familiar with the Superblock concept: 31 know the concept from professional discourse among colleagues or at conferences (82% of all participants), while 23 have heard about it in the popular media. Almost a half of them have also visited actually implemented Superblock projects. They come from 15 countries, mostly from Austria (12) and Spain (7). 22 of them also participated in the first round.

The Superblock working definition were assessed through six criteria. The experts mostly agreed that the provided definition was coherent and useful, although with an average score slightly less than 4.0 (on a 5-point Likert scale, Figure 7). Clearness, comprehensiveness and advancing the field were assessed a bit lower, while 81% of experts agreed that the current definition was too long.

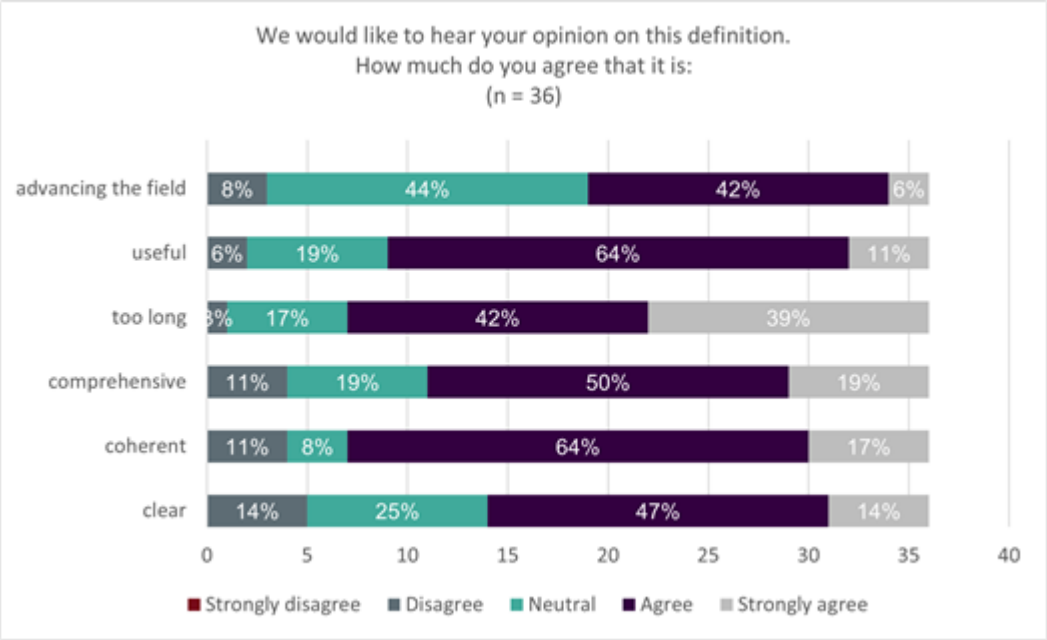

Figure 7: Level of agreement with the Superblock definition

The experts also provided 19 responses on the open-ended question if they would like to add, remove or challenge anything in the definition. Besides criticizing the length, many of them thought the definition is too academic, too detailed and too prescriptive. Some of them offered first-hand solutions which parts should be cut or how should the definition be structured in order to be more focused, useful, clear and emphasizing the “Superblock spirit”. Some of them also suggested including additional aspects or advised to avoid certain terms or expressions. All the gathered opinions were carefully evaluated and discussed among the “Core Delphi Team” members.

From the results, it was clear that the Superblocks definition should be changed and that it especially needs to be shortened. Following numerous discussions inside the “Core Delphi Team”, we firstly agreed that in order to be useful for project purposes and also wider application to help reaching the necessary paradigm shift and systemic change, any definition of the Superblock concept must include:

- that Superblock concept consists of both large-scale traffic reorganization and smaller-scale neighborhood development,

- that Superblocks are intended to promote systemic sustainability transitions and
- that the four central foci of Superblocks are sustainable mobility, climate adaptation, improved urban living environments, and social equity.

Next, the definition should focus on “what” (minimum criteria) and “why” (purpose), because those are the universal aspects of the concept. We decided to not include implementation processes (“how” as well as “who”, “where”, and “when”), despite a high level of experts’ agreement on certain elements, because they can vary widely across different political, economic, and cultural contexts.

We agreed that the definition should also not be longer than 100 words and should be understood for wider audience, not only to experts and academics. Next, although the elements assessing procedure was mostly based on normative level (e.g. what should be necessary ingredients of Superblock), the definition of the Superblocks concept should be descriptive. Again, we paid attention to the sufficient level of consensus in the 1st round of the survey but also took the latest insights into consideration (recent literature and development of the concept, peer group discussions and other project activities). We also designed a shorter, “one-sentence” version of the definition, potentially more useful for communication purposes with planners, public administrators and politicians. In the last step, the definitions were offered to the project consortium members for evaluation through the short online survey. As the definitions are also going to be used for project purposes in concrete activities, we aimed for them to be accepted also on the project level.

Long definition (96 words):

"The Superblocks concept leverages traffic reorganization and the reallocation of public space to support urban sustainability transitions. By systematically reducing the number of motor vehicle through-routes, the Superblocks concept transforms the city into a mosaic of traffic-calmed neighborhoods. Traffic reorganization is applied at scales large enough to promote systemic change, such as that of urban districts or even entire cities. Individual neighborhoods – superblocks – prevent motor-vehicle through-traffic, are walkable in scale, and redesign reclaimed public space to prioritize active mobility, climate adaptation, the improvement of local environmental conditions, and opportunities for diverse and inclusive public social life."

Short definition (46 words):

“The Superblocks concept enables urban sustainability transitions by strategically reducing motor vehicle through-routes – converting the city into a mosaic of human-scale neighborhoods without motor vehicle through-traffic – and redesigning public space within neighborhoods to prioritize active mobility, climate adaptation, local environmental quality, and inclusive public social life.”

1.3 Third Survey

Despite reaching the acceptance of both Superblocks definitions within the consortium, we decided to verify the new version of the definition among the panellists once more. Therefore, the third round of the survey was executed. Another invitation letter was designed and sent to the panellists, together with the survey results, once more in the end of

November 2022 with a reminder in the beginning of December 2022. Due to certain internal organisational issues, this time only 78 experts were contacted, and among them 17 experts responded, the majority being from academia (10). The response rate in the third round was only 21.8%. The long version of the definition was assessed through the same criteria as in previous round of the survey. The new definition was ranked significantly higher across all the aspects – it was described as clearer, more coherent, more comprehensive and more useful (Figure 8). It was still assessed a bit too long (although much better from this perspective than in before) and with similar level of advancing the field. Only few comments were given, but majority of them were related to certain details and were not taken into account.

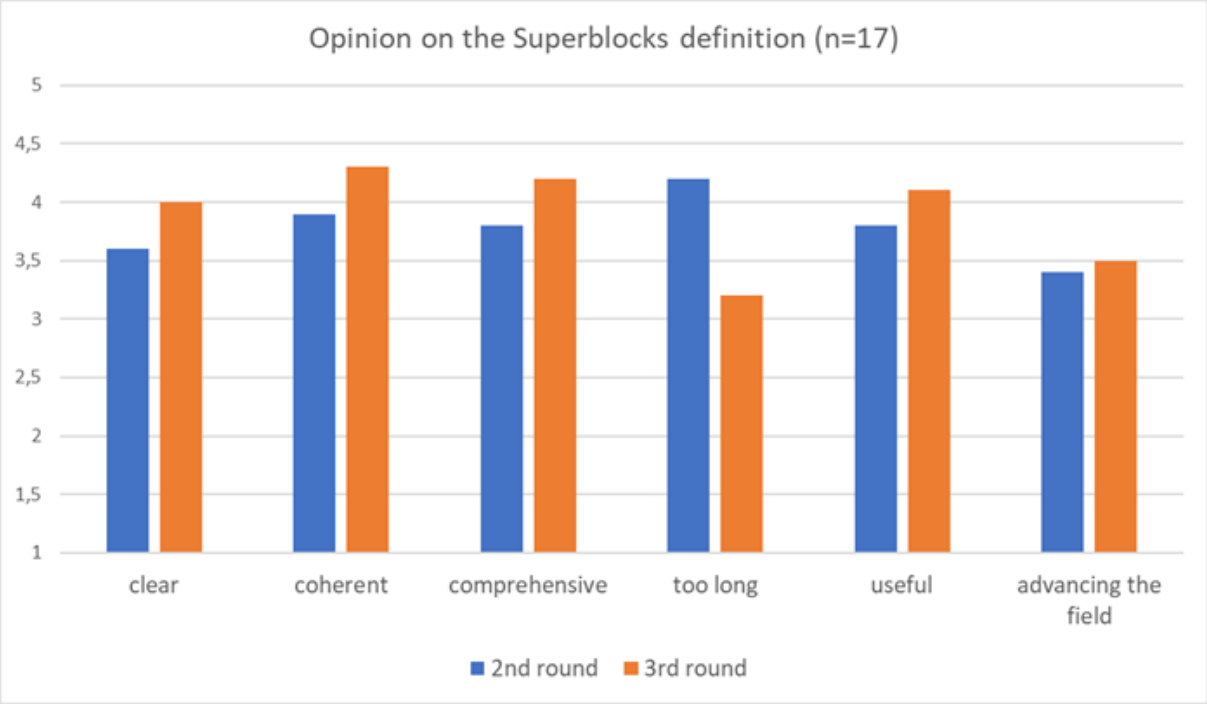

Figure 8: Grading of Superblock definition in the 2nd and 3rd round of the Delphi survey

The definitions of the Superblocks concept, designed after the second round of the survey, were therefore the final ones. Both definitions will be perceived as dynamic and could be slightly changed in the course of the project, if there will be a need to do so (e.g. after getting a feedback at project events if something important is missing or something is being misinterpreted).

1.4 Discussion on the Superblock definition at the International Superblock Meeting in Barcelona

One of the tasks for the participants of the International Superblock Meeting was to discuss some of the “contested” statements from the e-Delphi process. During the first round of the e-Delphi survey, there were higher levels of disagreement about some Superblock elements, especially regarding the urban morphology.

Following the presentation of the Superblocks concept definition developed within TuneOurBlock, there was a discussion about the appropriate size of a superblock. A concern was raised that if a superblock is too big, the inner traffic can concentrate and become through traffic. A big superblock also means risk of losing proximity and social cohesion and leads to the question, how far are people willing to travel by non-motorized transport modes. In Barcelona, the urban planners realized that there is no need to be fixed around the “3x3 size”, what is more important is the neighbourhood and community belonging. From a social services perspective, a superblock can take care of 40.000 people, combining mobility and social perspective. On other hand, the question of size very much depends on the density. It also relates to the question of allowing public transport and important services (e.g. ambulances) to go inside the superblock.

The second round of the discussion evolved around the question if a superblock needs to have the central public space. Participants mostly agreed that having a focal point within a superblock where people can gather is very important. It is beneficial that it is in the centre, but this should not be a requirement; the location also depends on the current urban fabric and the historical development. It also does not need to be a plaza or square. Also, an individual street can fulfil the function of a central public space. What is more important is that people have a possibility to gather and that walking distances within the superblock are not too big. It was also pointed out that in the areas of single-family houses, it is difficult to create a liveable public space as there is no identifiable common space; somewhere it can only be at the edges.

2 How to measure a superblock?

Along with the wish to implement Superblocks or similar traffic calming measures comes the need for quantification – for measuring the effects of an implementation, for describing the status quo and setting targets prior to the implementation, or for finding suitable areas and prioritizing the allocation of funds and resources in the first place.

The indicators used by cities and academia can be clustered in different categories:

- Concerning the **topics** that are touched by the indicators into *traffic related*, *safety*, *buildings*, *environmental*, *social* and/or *economic*.
- Concerning the **type** of indicators into *input indicators*, which quantify the measures taken (e.g. number of planted trees), *output indicators*, which quantify the effect of the measures taken (e.g. amount of degrees the perceived outdoor temperature is lowered), and *target indicators*, which set the goal for a measure (e.g. reducing x % of all heat islands in the city).
- Concerning the **function** of indicators used into *necessity indicators* which indicate the need for change (e.g. noise levels), *feasibility indicators* which try to assess the boundary conditions for implementing measures (e.g. the accessibility to public transport stops), and *informative indicators* which are neither of those (e.g. usage of credit cards in the area).
- Concerning the **scale** of measures and/or effects into *local indicators* (e.g. the accidents at an intersection), *neighbourhood indicators* (e.g. car ownership in a superblock), and *city-wide indicators* (e.g. modal split on a city level).
- Concerning the **perspective** into *objective indicators* (e.g. car ownership) and *subjective indicators* (e.g. perceived safety).
- Concerning the **availability** of indicators into publicly available indicators, non-publicly available indicators and non-available indicators (which must be surveyed first).
- Concerning the **directness** of effects into *direct effects* (e.g. reduction of through traffic), *indirect effects* (e.g. increased number of pedestrians), and *rebound effects* (e.g. increased car speeds because of less cars).
- Concerning the **timeframe** of effects into *short-term indicators* (e.g. increased number of pedestrians) and *long-term indicators* (e.g. increased number of shops)
- Concerning the **data acquisition** into *counts*, *measurements*, *surveys* and *calculations*.

An extensive of indicators used can be found in the Appendix.

Cities have adopted a variety of methods to use indicators in their practice. We will describe different approaches as they show the potential and challenges of the use of indicators.

2.1 Simplifying indicators – Diagnostic dossiers (Barcelona)

The city of Barcelona used a comprehensive set of indicators to evaluate the status quo in proposed Superblock areas in relation to minimal and optimal objectives. At first, 42 indicators, aggregated in 18 objectives, 7 thematic areas and 4 axes were proposed (Figure 9) (Ajuntament de Barcelona, 2014). In one of the first “diagnostic dossiers” in 2014 (Ajuntament de Barcelona and Agència d'Ecologia Urbana de Barcelona (BNC Ecologia),

2014), 35 indicators in 6 thematic areas (land use, public space and habitability, mobility and services, urban complexity, green spaces and biodiversity, urban metabolism) belonging to 3 axes were evaluated, each indicator being graded on a scale from 0 to 10, with an overall result in percent per thematic area, per axis, and in total. However, in the urban metabolism area 6 of 10 indicators couldn't be used as no information was available at least on the Superblock level.

Until 2016, the process was streamlined. By eliminating the thematic areas of urban metabolism and urban complexity and combining the areas of land use and public space and habitability, the thematic areas were reduced to 3 and the indicators to 17 (Ajuntament de Barcelona and Agència d'Ecologia Urbana de Barcelona (BNC Ecologia), 2016). Each indicator now is graded on a scale from 0 to 10, but there is no overall score anymore.

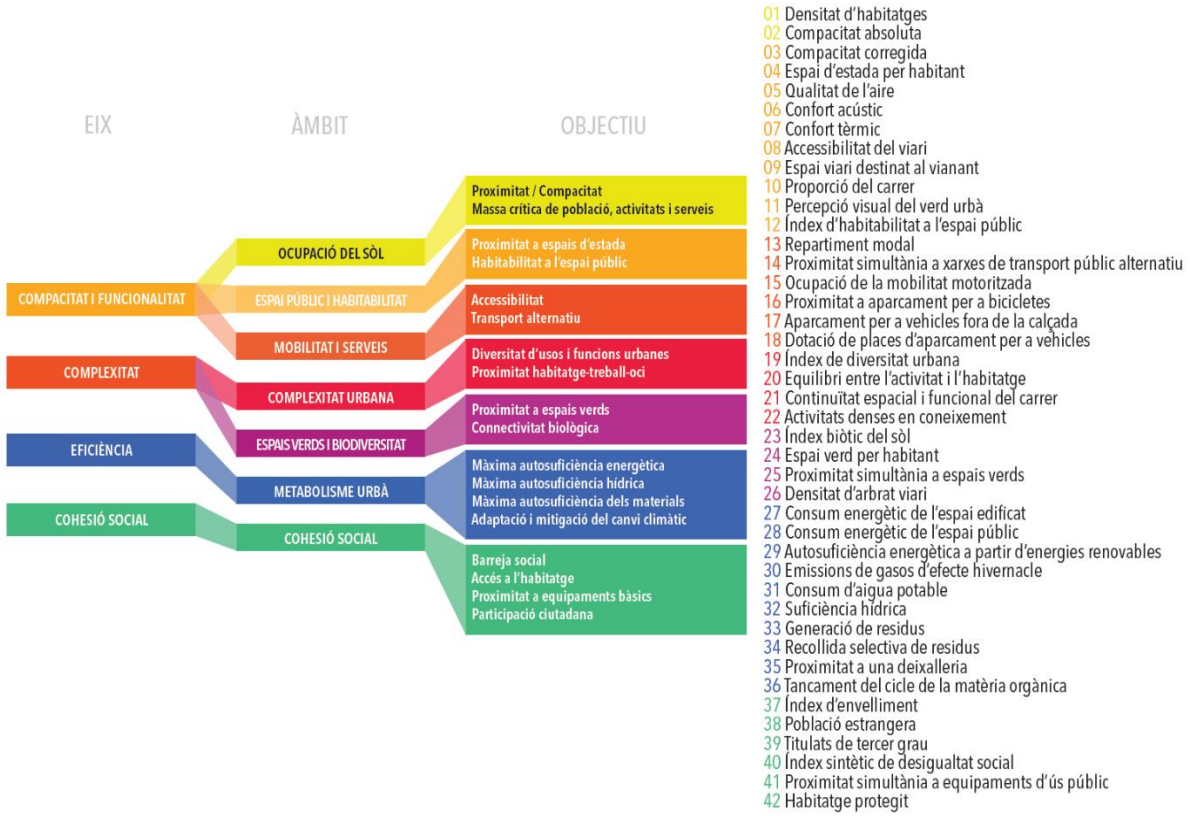

Figure 9: Indicators, objectives, thematic areas and axes first proposed for the evaluation of Barcelona's superblocks; Source: Ajuntament de Barcelona (2014).

2.2 Using indicators for identifying areas in need of change

Berlin's Senate Department for Mobility, Transport, Climate Protection and the Environment is using the Environmental Justice Atlas as a tool for deriving political recommendations. It assesses the situation of the population according to five core indicators: noise, air and thermal pollution as stressors, green space supply as a resource, and the social situation in the neighborhoods as it is relevant to health. In the results map (Figure 10), the five factors are overlaid and the number of mentions in the worst category are summed up for each neighborhood. The need for change is highest in those areas where four or even five of the indicators are in the worst category.

In the SUPERBE project, Frey et al. (2020) used a similar approach, intersecting maps of the access to public transport and the population density as suitability indicators, and the access to public green, trees in public space, and the share of areas for pedestrians compared to the share of space for cars as necessity indicators, in order to prioritize potential Superblock “candidates” (Figure 11).

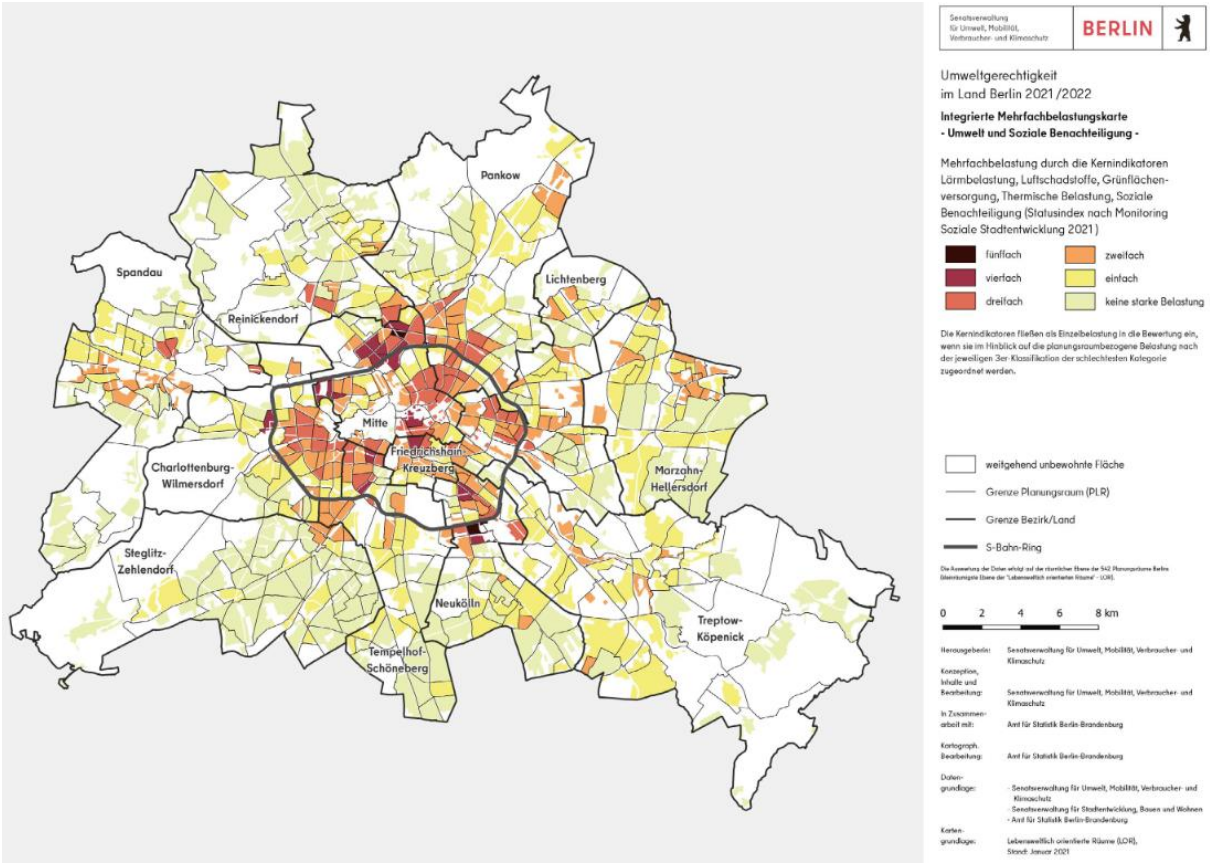

Figure 10: Integrated multiple stress map – environment and social disadvantage; Source: (Senatsverwaltung für Umwelt, Mobilität, Verbraucher- und Klimaschutz, 2022).

Figure 11: Suitability (access to public transport, population density) and necessity (access to public green, trees in public space, share of areas for pedestrians compared to the share of space for cars) indicators for prioritizing Superblock “candidates”, Source: Frey et al. (2020).

2.3 Assessing Superblock implementations with qualitative indicators

Changing Cities (2023) have recently published their guidelines for the implementation of Superblocks (RAKi 23 – Richtlinien für die Anlage von Kiezblocks), in order to be able to assess the different qualities of Superblocks. They are proposing three standards with qualitative, functional specifications:

- For the Minimum Standard, the Superblock must be divided into different areas where car through traffic is prevented by modal filters or road design, the routes for active mobility must be identified and optimized, and residents must be informed. These measures can be implemented within 12 weeks.
- For the Basic Standard, 25 percent of the curbs in the Superblock must be repurposed for blue-green infrastructure, infrastructure for pedestrians and cyclists, for traffic calming or for quality of stay, parking management must prioritize parking spots for disabled persons, for micro-mobility or car-sharing, and the residents are to be involved in the planning process of the Superblock. These measures, implemented additionally to those of the minimum standard, can be implemented within 18 to 24 months after reaching the minimum standard.
- For the Gold Standard, the roads on the edges of the area must be traffic calmed and improved for pedestrians, cyclists, public transport, and staying, long-term parking must be prohibited within the Superblock, and the urban development must be actively supported by promoting local businesses, by scientific monitoring and mitigation of socio-spatial developments (gentrification) and by measuring and analysing the traffic impacts.

2.4 Indicators used by the cities participating in the International Superblock Meeting

In the second part of the ISM workshop, the participants were asked which indicators were used in their respective cities during the implementation of public space transformation and for what purpose. Altogether, the participants reported 67 indicators across different categories (see ***Table 1***). Most of them were meant to monitor and evaluate the progress of urban transformation attempts; some are more general and some already very precise and “ready to use”. The majority is related to social dimension of public space, focusing on social interaction, and modal shift, followed by climate adaptation and mitigation. Some of them were reported by multiple participants.

At the beginning of the discussion, it was emphasized by the experts from Barcelona that collaboration between city authorities and researchers is essential to measure and understand the benefits of Superblocks, for example in the field of health. “Ante-post” measurements in various fields can be especially useful to show the progress and the success of implementation. Contrary to climate change and sustainability narratives, which are at times too abstract for the entire population, health intervention narrative, combined with improving well-being and quality of life proved much more efficient to get public approval and provided useful talking points to communicate with the city administration. In addition, a need for measures and indicators on the metropolitan level was also highlighted as cities are functionally linked to suburban and rural areas in their vicinity.

During the discussion, it became clear that some indicators cannot be applied in every city due to legal restrictions (e.g. using cameras for counting of pedestrians). Some places have more developed data gathering procedure (e.g. accurate and up-to-date data on each building). Most participants agreed that along the “objective” indicators, “subjective” indicators are also essential and should be included in the monitoring procedure. Some of them even stated that

such subjective indicators are best suited to show how the public space transformation project performs.

Table 1: Indicators used in the implementation of superblock-like concepts according to workshop participants

Traffic Safety	Noise & Air Pollution	Modal Shift	Climate Adaptation & Mitigation	Public Space	Local Businesses	Health	Other
no. of accidents (deaths, severely injured)	noise level/ no. of people living over the noise pollution threshold (3x)	modal split (2x)	local greening: tree canopy cover (m2), green planting (m2)	no. of "slow movers" (children, elderly, people with strollers)	local businesses	no. of heat strokes	before-after pictures (2x)
perceived safety	NO2 and PM10 immissions	no. of through traffic	% of new permeable space	vulnerable people in public space	local businesses (sales) types	temperature (heat islands)	no. of active initiatives
no. of crashes	PM2,5 level	mobility diary (change of habits)	no. of planted trees	no. of added street furniture	shops vitality	extension of life expectancy	liveability monitor
road safety prediction model		pedestrian flows	amount / m2 of unsealed surface	“seatability” (places where to sit)			waste
traffic speed		cycling countering	green monitor	pedestrian frequency			(emotional) appreciation
		walking monitor	no. of trees	duration of stay			housing prices
		traffic counts	crown volume of trees	intensity of social life on public spaces			no. of residents left or want to live in the area
		average trip length (km per day)	% of new opened soil	mixed use of public space			building permits
		car possession (vehicles per 1000 inhabitants)	green areas	no. of persons walking along the street in a day			
		modal change		no. of interactions			
		no. of reallocated parking spaces		no. of persons staying in the street in a day			
		no. of parking permits		no. of activities			
		kerbside reallocations		gender & age mix			
		no. of people who gave up on cars		width of the sidewalks			
		increase/decrease of cars in streets		regained space (m2)			
				public life observation/ survey			
				different urban uses			
				public places usage			

3 Transitioning to Sustainable Urban Mobility

Academic literature suggests that societal transformations toward sustainability require the systemic transition of numerous socio-technical regimes. **Socio-technical regimes are paradigmatic configurations of processes, institutions, and behaviours in relation to particular technologies.** For example, urban mobility in cities around the world is characterized by the socio-technical regime of automobility, in which the motor vehicle serves as the default mobility technology and the logic of motor vehicle use dominates traffic organization and the allocation of space in streets. Other mobility systems are permissible only to the extent that they do not fundamentally challenge the hegemonic role of motor vehicles. This may be changing, however, as efforts to make urban mobility systems more sustainable produce policies, plans, and practices that challenge the central logic of automobility. However, also EVs are part of the automobility regime.

3.1 Dynamics of socio-technical transitions

Socio-technical regimes are not monolithic structures but rather a patchwork of subaltern regimes that cohere to form a bundle of tightly-coupled institutional and behavioural norms. They are considered dynamically stable because **they actively resist destabilizing forces emerging from two different directions: the landscape level or exogenous context (conceptually located "above" the regime at a “larger scale”), and the niche level ("below" the regime at a smaller, embedded scale), where the components of nascent "challenger" regimes emerge.** Pressure from the landscape level stemming from concerns of climate change, the quality of urban living environments, social equity, and the need to reduce energy and material consumption threatens to delegitimize the automobility regime. This opens the regime up to critical debate and provides windows of opportunity for alternative modes, practices, and planning approaches to urban mobility to assert themselves. This, in turn, can further destabilize the existing regime and provide both direction and momentum for transition to an entirely new socio-technical regime. The multi-level perspective has been developed to conceptualize the hierarchical structure of socio-technical systems (Figure 12) as well as their dynamics of change (Figure 13).

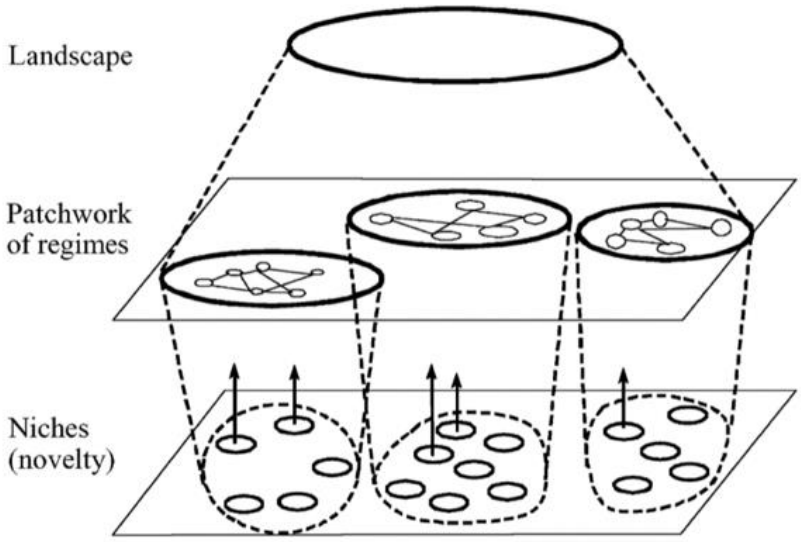

Figure 12: Multi-level perspective consisting of the current regimes, the exogenous context (“landscape”) above and the niche level below; Source: Geels (2002).

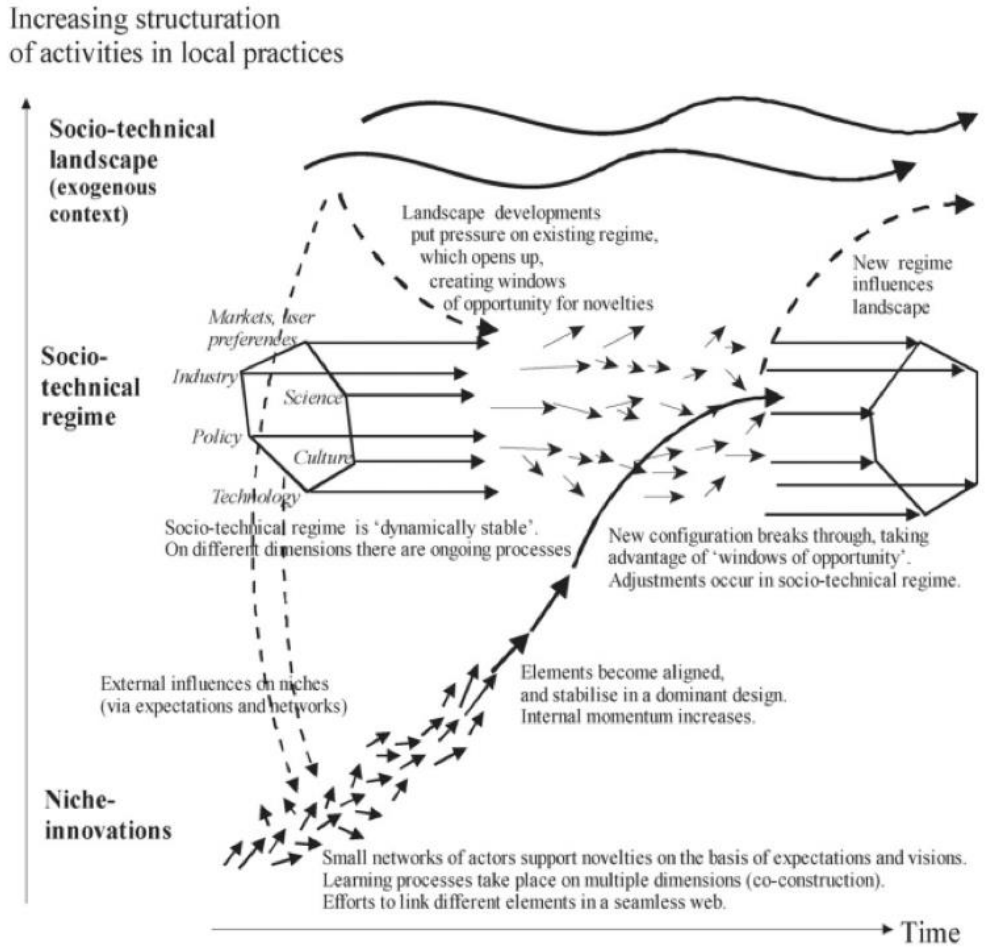

Fig.2 Multi-level perspective on transitions (Geels and Schot, 2007)

Figure 13: Dynamics in the multi-level perspective on transitions, Source: Geels and Schot (2007).

3.2 The role of Superblocks in regime replacement

It is precisely the socio-technical regime of automobility that the Superblock concept was developed to contest (Rueda, 2019). Consisting of two interrelated elements, grids and cells, the Superblock concept re-imagines cities as a patchwork of traffic-calmed neighborhoods (cells) outlined by multi-modal circulation routes (grids). By calling for the de-prioritization of motor vehicle traffic in favor of walking, cycling, and public transport, and the reappropriation of street space to address a variety of environmental and social needs, **Superblocks provide a conceptual frame for regime replacement**. That is, an urban mobility system in which Superblocks were standard practice would likely be characterized by a socio-technical regime different than that of automobility and more closely aligned with both functional and normative aspects of sustainability.

Superblocks can also serve as a "container" for a wide range of niche level interventions by delimiting zones of transition. Even after implementation, streets inside Superblock cells can remain spaces of experimentation and adaptation because they are not dominated by the logic of a single socio-technical regime. Modifications to traffic organization and the physical design of streets and adjacent public spaces that are normally made piecemeal become interconnected elements in a unified effort to model new regimes of

sustainable urban mobility and foster changes in both behavior and values. This means that **implementation of Superblocks should be considered at two levels: (1) the implementation of Superblocks as a physical intervention / transformation of public space; and (2) the implementation of the Superblock concept as a perceptible human-scale centered regime that shall be considered as an alternative regime tackling the recent automobile-centered one.**

The need for systemic change toward sustainability in virtually every sector of human activity continues to intensify. Superblocks appear to be a high-leverage tool for triggering socio-technical transitions in urban mobility away from current, unsustainable regimes based on automobility. Relatively few superblocks concepts have been put into practice, however, and none have reached the intended scale and scope of the concept. Implementation pathways and the real-world impact of superblocks remain, therefore, poorly understood.

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No	Indicator	Description	Value / How is it calculated? (If information is available)	Cluster	Used in which Superblock/project								feasibility vs. necessity	measure vs. effect	subjective vs. objective	Cluster 2	KPI for ToB	survey methodology
					Poblenou	Sant Antoni	Horta	Hostafrancs	Superilla BCN	SUPERBE	CoCy	Supergrätzl						
1	Superblock area		[Total area of the Superblock]							x			feasibility	neither	objective			
2	Living space per inhabitant	The aim is guaranteeing a minimum reserve of recreational spaces per inhabitant. The coverage of recreational areas in cities is of great importance as it directly affects the quality of life of their citizens and the environmental health.	[Surface area of spaces of stay/Population]		x								necessity	effect	objective	social		
3	Road space for pedestrians	Percentage of road space dedicated to pedestrians in relation to the total amount of road space. Once the calculated the percentage of road space for pedestrians in each section, the calculation is made for the whole area of the the entire study area.	[Stretches of road (linear metres) with a road distribution equal to or greater than 60% / Total length of road (linear metres) 60%]		x								necessity	effect	objective	mobility		
4	Sidewalks			Habitability of public space / Environment		x	x	x	x				informative	measure		mobility		
5	Sidewalk widths		[Length of sidewalks > 2,0 m / total length of sidewalks]							x			necessity	measure	objective	mobility		
6	Paving			Habitability of public space / Environment		x	x	x	x				informative	measure		mobility		
7	Furniture		Public furniture /m2	Habitability of public space / Environment		x	x	x	x				informative	measure	objective	mobility		
8	Public seating		[Number of benches / 1.000 inhabitants]							x			necessity	measure	objective	mobility		
9	Attractiveness of public space		[Duration of stay of pedestrians in the public space]								x		informative	effect	objective	social	x	survey
10	Children in public space		[Number of children dwelling in public space]								x		informative	effect		social	x	survey
11	Amount of bicycle parking	Number of bicycle parking spaces per inhabitant.	[No. of bicycle parking spaces / No. of inhabitants]								x		informative	measure		mobility		
12	Proximity to bicycle parking	Percentage of population with coverage of one or more bicycle parking spaces within a distance of less than 100 metres.	[Population living <100m from a bicycle parking station / total population] x 100		x								informative	effect		mobility		
13	Accessibility to public transport		[Area within 250 m of a PT stop / total area]*100							x			feasibility	measure		mobility	x	GIS
14	Simultaneous Proximity to Alternative Transport Networks	Proximity to alternative means of transport is a basic criterion for reducing private motorised traffic. For the calculation of the indicator, the coverage considered are bus stops (300 metres, less than 5 minutes on foot), fixed infrastructure transport stations (metro and tram, 500 metres away, since these are means of transport with a large number of users and with a great connectivity with other lines in the other lines in the most important public transport hubs), and on the cycle lane network (300 metres).	[Population with simultaneous coverage to the 3 alternative transport networks considered/Total population]*100		x								feasibility	effect		mobility		
15	Parking		Parking spaces / m2	Mobility		x	x	x	x	x		x	informative	measure		mobility		
16	Parking for vehicles outside the street	Percentage of parking spaces for vehicles located outside the road and available for residents.	[Number of parking spaces outside the road/Total number of parking spaces inside and outside the road]*100		x								feasibility	measure		mobility		
17	Provision of parking spaces for vehicles	Percentage of parking spaces demanded by resident users (with registered vehicle), located outside the road, which are covered by the existing offer. located outside the road, which are covered by the existing offer.	[Offer of off-street parking spaces/ Theoretical demand for parking spaces for residents]*100		x								feasibility	measure		mobility		
18	Occupancy rate of parking spaces		[Average number of parked cars / number of (on-street/off-street) parking spaces]								x		informative	effect		mobility		
19	Space occupied by motorised mobility	The predominance of motorised mobility in our cities is a determining factor in the quality of public space, especially in terms of air pollution, noise and visual intrusion into the environment. As this occupation tends towards an inverse hierarchy, urban quality could improve, as it will urban quality could improve, since, among other things, the type of activities in public spaces could become more diverse. public space will be able to diversify.	[Road surface destined to motorised mobility/Total road surface]*100		x								necessity	measure		mobility	x	GIS

30	Road space distribution ratio	Percentage of road space dedicated to pedestrians in relation to the road space dedicated to vehicles.	[Area of road space dedicated to pedestrians / area of road space dedicated to cars (driving & parking)]						x			necessity	measure		mobility		
20	Speed regimes		[Length of streets with 30 OR <30 km/h / total length of streets]							x		informative	measure		mobility		
21	Evolution of the number of people per hour	Evolution of the number of people per hour counted in the superilla during the week	number of people/hour	Characteristics and uses of space		x						informative	effect		mobility		
22	People	Data on the mobility of pedestrians, bicycles, and motor vehicles. They measure it with traffic counters, and want to implement cameras that can count without compromising the privacy of users.		Mobility		x	x	x	x			informative	effect		mobility	x	traffic counts
23	Bicicles	Data on the mobility of pedestrians, bicycles, and motor vehicles. They measure it with traffic counters, and want to implement cameras that can count without compromising the privacy of users.		Mobility		x	x	x	x			informative	effect		mobility	x	traffic counts
24	Public transport	Data on the mobility of pedestrians, bicycles, and motor vehicles. They measure it with traffic counters, and want to implement cameras that can count without compromising the privacy of users.		Mobility		x	x	x	x			informative	effect		mobility	x	traffic counts
25	Private transport	Data on the mobility of pedestrians, bicycles, and motor vehicles. They measure it with traffic counters, and want to implement cameras that can count without compromising the privacy of users.		Mobility		x	x	x	x			informative	effect		mobility	x	traffic counts
26	Transport of goods	Data on the mobility of pedestrians, bicycles, and motor vehicles. They measure it with traffic counters, and want to implement cameras that can count without compromising the privacy of users.		[No. of lorries / day]		x	x	x	x		x	informative	effect		mobility	x	traffic counts
27	Modal Split		[Trips undertaken by inhabitants on each mode of transport / total number of trips]							x		informative	effect		mobility		
28	Road safety		[No. of road accidents / year]							x		necessity	effect		mobility		
29	Accessibility	Degree of accessibility of the streets depending on the width of the sidewalks (right and left) and slope of the section. Road accessibility is measured in terms of its impact on pedestrian mobility. The assessment criterion is based on two basic accessibility requirements for people with reduced mobility.	[Sections of road (linear metres) with sufficient accessibility or higher /Total length of road (linear metres)] x 100		x							informative	effect		mobility		
31	Acoustic comfort	Decibels during the day	[Population with noise levels lower than 65 dB during the daylight hours/ Total population] x 100	Environmental quality	x	x	x	x	x			necessity	effect		health	x	measurement
32	Thermal comfort	Percentage of hours per day between 8am and 10pm in which a street offers adequate thermal comfort conditions for a person. Thermal comfort takes into consideration the following aspects: the climate, the morphology of the street, the materials used in pavements and façades, the presence façades, the presence of vegetation and the metabolic activity of the individual.	[Surface area of public roads with comfort potential in summer of more than 50% / total surface area of public roads] x 100		x	x	x	x	x			necessity	effect		health	x	measurement
33	Air quality	The air quality index indicates the proportion of the population exposed to levels of immission not exceeding the air quality objectives (limit values for the protection of human health, critical level for the protection of vegetation) established in Annex I of the Royal Decree 102/2011, dated January 1, on the improvement of air quality. The two most worrying pollutants in the study area are analysed: nitrogen dioxide (NO_2) and particles smaller than 10 microns (PM_{10}). The estimation of air quality of the air quality carried out considers traffic as the main source of pollution, including the other sources other sources in terms of background air pollution.	[Population exposed to permanent levels of immision according to pollutant/ Total population] x 100	Environmental quality	x	x	x					necessity	effect		health	x	measurement
34	CO_2 emissions	This indicator calculates the emissions of greenhouse gases (GHG), derived from energy consumption (fossil fuels and electricity), per inhabitant. This indicator includes the energy consumption of buildings, public lighting and mobility and subtracts energy production from solar panels (photovoltaic and thermal).	[Annual emissions of CO_2 equivalent/ Population]		x							informative	external				
35	Wellbeing	Percentage of people who think that certain characteristics in the area in question (i.e., car numbers; the presence of urban furniture; the number of people in public spaces; pollution levels; the number of spaces to socialize, stay and take the sun; and safety) have increased or decreased. The information is accounted for considering gender.		Wellbeing and social interaction	x	x	x		x			necessity	effect		health		

36	Walking comfort	Residents' perceptions of walking comfort, for women and men		Characteristics and uses of space			x						necessity	effect	subjective	mobility		
37	Spaces to rest	Residents' perceptions about the effect of superilles in creating spaces to rest		Wellbeing and social interaction	x	x	x		x				necessity	effect	subjective	social		
38	Number and speeds of cars	Residents' perceptions of number of cars and speeds, in the main and basic roads		Characteristics and uses of space			x						necessity	effect	subjective	mobility		
39	Private vehicle accessibility	Residents' perceptions of car accessibility, for women and men		Characteristics and uses of space			x						necessity	effect	subjective	mobility		
40	Acoustic comfort	Residents' perceptions of acoustic comfort		Environmental quality	x	x							necessity	effect	subjective	health	x	survey
41	Air quality	Resident's perceptions of quality of air		Environmental quality	x	x	x						necessity	effect	subjective	health		
42	Thermal comfort	Resident's perceptions of thermal comfort		Environmental quality									necessity	effect	subjective	health	x	survey
43	Road safety	Residents' perceptions of road safety		Characteristics and uses of space	x		x						necessity	effect	subjective	mobility	x	survey
44	Stress levels	Residents' perceptions about the effect of superilles in lowering stress levels		Wellbeing and social interaction	x	x	x		x				necessity	effect	subjective	health		
45	Mental health	Residents' perceptions about the effect of superilles in supporting mental health		Wellbeing and social interaction	x	x	x		x				necessity	effect	subjective	health		
46	Healthy habits	Residents' perceptions about the effect of superilles in fostering healthy habits		Wellbeing and social interaction	x	x	x		x				necessity	effect	subjective	health		
47	Socialisation	Residents' perceptions about the effect of superilles in encouraging socialisation		Wellbeing and social interaction	x	x	x		x				necessity	effect	subjective	social		
48	Safety	Residents' perceptions about the safety in the superilles		Wellbeing and social interaction	x	x	x		x				necessity	effect	subjective	social		
49	Frequency of visits and type of activities carried out	Percentage of frequency of visits and type of activities carried out in the transformed public spaces		Characteristics and uses of space			x						both	effect		social		
50	Type of uses	Type of use of the superilla per hour during the week, for men and women	type of uses/hour	Characteristics and uses of space	x	x							informative	effect		social		
51	Distribution of uses			Habitability of public space / Environment		x	x	x	x				informative	effect		social		
52	Type of users	Social groups who are least and most present in the superilles		Characteristics and uses of space	x	x							informative	effect		social		
53	Everyday infrastructures		Everyday infrastructure / m2	Habitability of public space / Environment		x	x	x	x				informative	measure				
54	Tree vegetation		Trees / m2	Urban Green and Biodiversity		x	x	x	x				necessity	measure		NBS	x	GIS / count
55	Tree coverage		[Area covered by tree tops / total area] * 100							x			necessity	measure		NBS		
56	Street tree density	The density of street trees evaluates the number of trees according to their size in relation to the length of the street. This calculation does not is not taken into account the trees present in parks and gardens. only roadside trees are considered.Depending on the recommended planting pattern a suitable density is established for the trees along the line. Trees are living and changing elements over time. For this reason, account is taken of the measures that may be taken in the future. future. The port is related to the height and the capacity, and is a measure of the maximum development of the species. If we consider these two parameters, it is possible to establish three sizes: small, medium and large.	[(No. of large sized trees *12) + (No. of medium sized trees *8) + (No. small sized trees *6) / Length of street section] *100		x								necessity	measure		NBS		

57	Shrub vegetation		Shrubs / m2	Urban Green and Biodiversity		x	x	x	x				necessity	measure		NBS		
58	Planters		Planters / m2	Urban Green and Biodiversity		x	x	x	x				necessity	measure		NBS		
59	Green patches		Green patches / m2	Urban Green and Biodiversity		x	x	x	x				necessity	measure		NBS		
60	Simultaneous proximity to green spaces	The proximity to green spaces analyses the percentage of the population with simultaneous access to 3 categories of green space according to functional and welfare standards and the distance covered on foot: (1) Green space equal to or greater than 1000 m2, at less than 300 metres. (2) Green space equal to or greater than 3.5 ha, less than 750 metres. (3) Green space equal to or larger than 10 ha, less than 4 km.	(Population with simultaneous coverage of the 3 specified categories of green spaces / Total population) * 100		x								necessity	effect		NBS		
61	Accessibility of public green		[Area within 250 m of an access point to public green / total area] x 100							x			necessity	effect		NBS		
62	Green areas per inhabitant	The green area per inhabitant is defined as the area of parks and gardens and other public spaces with vegetation cover (more than 50% of the surface area) in the urban area in relation to the number of inhabitants	[Surface area of urban green spaces/Population]		x							x	necessity	measure		NBS		
63	Fauna		Fauna / m2	Urban Green and Biodiversity		x	x	x	x				necessity	measure		NBS		
64	Water elements		Water elements / m2	Urban Green and Biodiversity		x	x	x	x				necessity	measure		NBS		
65	Permeable surfaces		Permeable surfaces / m2	Urban Green and Biodiversity		x	x	x	x			x	necessity	measure		NBS	x	GIS
66	Biological index of soil	Soil permeability is calculated by means of the Biological Soil Index (BPI). It indicates the relationship between the functionally significant surface areas for the natural cycle of the silt and the total surface area of a study area. Soil is classified according to its degree of naturalness and permeability: soils with permeable surfaces, soils with semi-permeable surfaces and soils with permeable surfaces. soils with impermeable surfaces.	IBS = [∑ (PERMEABILITY FACTOR * AREA) / TOTAL AREA].* 100		x								necessity	effect		NBS		
67	Visual perception of the urban green	This fraction of space occupied mainly by trees is calculated on the basis of the volume represented by their canopies according to their type of measurement. The indicator is expressed as a percentage of the green volume per street section.	[Volume of the tree canopies / visual volume of the street section] x 100		x								necessity	effect		NBS		
68	Density of dwellings	This indicator describes the number of dwellings that are concentrated in a given area. This indicator shows a first approximation of the urban configuration and the territorial organisation of a given urban area. territorial organisation of a given urban area: degree of compactness - urban dispersion.	[Number of housing units/Unit of land]		x								informative	neither		buildings		
69	Absolute compactness	Absolute Compactness (AC) is the ratio between the built volume over the surface area of the study area. It provides information on the building intensity exerted by any type of construction (residential, tertiary or industrial) on a given urban area (residential, tertiary or industrial).	[Volume of built up area/Unit of surface area]		x								necessity	neither		buildings		
70	Corrected compactness	The corrected compactness relates the built-up volume to the living space (relationship space, leisure and urban green space) of a given urban fabric. This indicator corrects for absolute compactness, as excessive compactness can lead to problems of congestion and urban saturation.	[Volume of built up area/Surface of spaces of stay]		x								necessity	neither		buildings		
71	Population density		[No. of inhabitants / ha]							x			both	neither				
72	Living area type	"Wohngebietstypen" > detached house	["Wohngebietstyp" > ??							x			feasibility	neither				
73	Street proportion	Level of opening between the façades that mark a street or an open space (height h) in relation to the distance (d) between these façades. The proportion of a street or open space expresses the type of section based on its morphological characteristics.	[Street sections (linear metres) with a ratio h /d <2 / Total road length (linear metres)]		x								informative	neither				

74	Balance between activity and housing (uses)	The balance between uses linked to activity and housing determines the percentage of non-residential built-up area in relation to the total built-up area.	[Built surface area (m2 c) of commercial+tertiary+industrial use / Total built surface area (m2 c) x 100]		x								informative	effect				
75	Spatial and functional continuity of the street	The spatial and functional continuity of the street is measured on the basis of the degree of interaction of each section, depending on two variables: (1) Number of activities on the ground floor, and (2) Road space for pedestrians in relation to total road space (pedestrians and vehicles).	[Street sections (linear metres) with high or very high interaction / Total linear metres of street] * 100		x								both	effect				
76	Knowledge-based activities	Percentage of knowledge-based activities in relation to the total number of legal entities present in the study area present in the study area.	[Number of knowledge-based activities / Total number of activities] *100		x								informative	effect				
77	Public lighting	Public lighting is necessary to guarantee the safety and comfort of citizens in public spaces during night-time periods. The consumption of lighting represents one of the greatest economic costs for the administration, which can be reduced in a very significant way by improving its efficiency. Energy efficiency in public lighting public lighting is determined by various factors: - Type of lighting: sodium vapour, mercury vapour, metal halide lamps, LEDs... - Type of luminaire: luminaires are the elements that focus the light on the desired spaces. to the spaces to be illuminated. - Levels of illumination: the levels of illumination must be adapted according to the type of road (pedestrian, road transport, green area...) and the activity being carried out. - Management of lighting: the lighting switch-on and switch-off timetable must coincide with the time of with the sunrise and sunset.	[Annual consumption of public lighting/ Area of public space]	Habitability of public space / Environment	x	x	x	x	x				informative	measure				
78	Energy consumption in buildings	The energy consumption of buildings is necessary to meet the demand for air conditioning (heating and cooling), domestic hot water (DHW) and electrical equipment (lighting, appliances, computers, etc.) in buildings. The use, building type, orientation, passive elements and the number of users of a building are factors that directly influence energy demand and consumption. In order to reduce energy consumption, it is necessary to promote the application of energy efficiency measures (renovation of building envelopes and roofs, acquisition of new consumption equipment, etc.), as well as promoting good practices through education and awareness-raising among the population.	[Energy consumption/Roof surface]		x								informative	external		buildings		
79	Energy self-sufficiency	This indicator only aims to evaluate the capture of solar energy in buildings, a value that will be related to the climatic conditions of the area. in buildings, a value that will be related to the climatic conditions of the municipality, the energy demand of the buildings and the availability of their roofs. the energy demand of the buildings and the availability of their roofs.	[Local energy production/Energy consumption]		x								informative	external		buildings		
80	Proximity to garbage and recycling bins	Proximity to landfill is represented by the percentage of the population with access to garbage and recycling bins or stations in less than 600 meters (<10 minutes walk).	[Population with access to garbage and recycling bins / Total population] *100		x								informative	measure				
81	Simultaneous proximity to public facilities	Simultaneous proximity measures how close the population is at the same time to different types of facilities, each of which meets different daily needs. This indicator also provides information on the degree of urban compactness and the mix of uses in the city. This analysis only considers nearby facilities and excludes city facilities, considering a radius of influence of 600m or 300m (5 or 10 minutes walking respectively) depending on their service capacity. The city facilities do not require proximity on foot and cover other non-daily needs.	[Population with proximity/ Total population]		x								feasibility	effect			x	count
82	Protected housing provision	Total number of protected housing in relation to the total housing. All action on a city's real estate stock, be it transformation, replacement, rehabilitation or, inactivity, has consequences on its social structure. Housing is the first factor of urban segregation. And access to housing is the most basic need that a city must cover to avoid urban segregation.	[nº protected dwellings / Total number of dwellings]		x								informative	neither		buildings		

83	Urban diversity index	The index considers the number of species present in the study area (richness) and the relative number of individuals of each of these species (abundance). Individuals in the city translate into legal entities: economic activities, associations, entities and facilities. In urban systems the values oscillate between 0 and 7, being 7 the fabrics of greater urban complexity.	[H = -∑Pi Log2 Pi] H: Urban Diversity Index. n: Number of different types of activities (richness of species). Pi: Probability of occurrence (relative abundance of each species).		x								necessity	effect		social		
84	Evolution of housing rent prices	To understand the impact of gentrification processes, the evolution of rent prices is tracked both in relation to private housing as well as the rent of shops. Moreover, data is gathered to understand the usage of credit cards in the area. More use of credit cards indicates a greater commercial vitality.		Socio Economic					x				informative	effect		economic		
85	Evolution of commercial rent prices	To understand the impact of gentrification processes, the evolution of rent prices is tracked both in relation to private housing as well as the rent of shops. Moreover, data is gathered to understand the usage of credit cards in the area. More use of credit cards indicates a greater commercial vitality.		Socio Economic					x				informative	effect		economic		
86	Usage of credit cards in the area	To understand the impact of gentrification processes, the evolution of rent prices is tracked both in relation to private housing as well as the rent of shops. Moreover, data is gathered to understand the usage of credit cards in the area. More use of credit cards indicates a greater commercial vitality.		Socio Economic					x				informative	effect		economic		
87	Characteristics of the built environment on a micro-scale that influence walkability and physical activity	The audit was carried out using the MAPS instrument. The characteristics that are audited are categorised in 1. Route: destination and use of the site (housing, shops, restaurants, institutional and public services, parking and public transport stops), characteristics of the urban landscape (presence of stray cats, graffiti or debris), and structural characteristics (presence of traffic signs and signs for pedestrians); 2. Crossings: characteristics in the design of crossings (pedestrian crossings, quality of the edges, regulation of intersections, width of the streets and presence of obstacles); and 3. Segments: height of buildings, proportion between the height of buildings and the width of the street, separation space, cycling infrastructure, trees, the aesthetics and design of buildings, the presence of obstacles and hazards on the sidewalk, or the design of wide one-way and sloping streets.		Characteristics and uses of space			x						informative	neither		compound		
88	Index of habitability of public space	The Index of Habitability of Public Spaces (IHEP) consists of a comprehensive evaluation system for the of new variables that condition the positive perception of the streets by citizens. These variables are classified into: - ergonomic variables, which affect the movement and movement of people in public space. in public space. The following indicators are taken into consideration: Road space for pedestrians, Accessibility, Accessibility to the public transport system. to the pedestrian, Accessibility of the road and Proportion of the street. - Physiological variables, which affect the well-being of people and assess the levels of comfort. levels of comfort. The following indicators are taken into consideration: Air quality, Acoustic comfort and thermal comfort. - Psychological variables, which affect the degree of attraction of people to the street. The following indicators are taken into consideration: Density of activities on the ground floor, Diversity of activities and Visual perception of the urban green.	[IHEP = [∑PV ERGONOMICS+ ∑PV PHYSIOLOGICAL + ∑PV ATRACTION]		x							necessity	effect		compound		