CHARTER FOR THE ECOSYSTEMIC PLANNING OF CITIES

Charter for designing new urban developments and regenerating existing ones

Introduction

The majority of the world's population lives in cities. We are undergoing an exponential increase in the urban population, and by the middle of the century it is expected that over 70% of the planet's inhabitants will live in cities or metropolises. This process, combined with the urban production of industrial society, has created vast simplified urban landscapes, which are both unhealthy and, in many cases, uninhabitable (today, more than 800 million people live in marginal areas, in conditions of basic survival). The scale of how far urban landscapes and quality of life have deteriorated in most cities around the world calls for a thorough regeneration of urban systems on every level, in addition to planning new urban developments based on foundations that are far removed from conventional urban planning proposals[1].

In addition, urban environments are currently the main factor behind the pressure being exerted on the earth's ecosystems, on every level. The extent of the impact is such that the current historical period has been classified as a new geological age, known as the Anthropocene era. The process behind these uncertainties has been described as unsustainable and, today, we can say that life on earth depends on a single species and, above all, on the urban systems created by it[2].

Urban systems will therefore be the focus of our attention. Without regenerating existing cities, this problem cannot be solved, and every day that passes sees uncertainties grow. The suggested solutions must, of course, deal with new urban developments, but it is even more important to find solutions for systems that are already built, and which are currently causing damage.

On many occasions urban planning tools were scarce, while in other cases they were inspired first and foremost by the Athens Charter. Although the Charter aimed to rationalise the compatibility between uses and functions resulting from industrial society, it was unable to predict the serious issues that its proposals would cause, and is clearly incapable of addressing the challenges faced in the early 21st century.

An analysis of the biggest problems facing urban systems today has led both continental and global institutions, with the United Nations at the fore, to meet numerous times since the '70s in search of solutions. The last such meeting, held in Quito in 2016, approved the Urban Agenda. Although the Agenda has good intentions, the results achieved so far are not as expected. Perhaps one of the many reasons for this is the lack of an agreed theoretical framework that intentionally channels the technical, technological, regulatory, economic/financial, organisational/institutional and educational tools required to achieve the framework's objectives, and the theoretical reference points for different environmental, economic and social conditions.

This document is a draft for a **Charter** with an ecological foundation, which should serve as a guide for designing new urban developments, for regenerating existing urban systems, and

[1] The biggest issues facing cities today. (Annex 1)

[2] The biggest problems created by urban systems in the planet's ecosystems. (Annex 2)

that responds to the current challenges related to sustainability in the information and knowledge age.

Ecology, the basis for a theoretical framework

We are in the midst of a change of era (the transition from the industrial age to the digital era), and in the midst of formulating a much-needed new paradigm[3]. During the industrial era, the limits of certain variables, essential for guaranteeing the future, were exceeded. The lasting impact on the earth's ecosystems, and on cities and metropolises, urges us to change the internal logic behind creating cities in terms of existing urban systems, as the rationale behind new urban developments. The scope and scale of the damage and imbalances force us to move the goalposts and come up with standards that encompass all the variables at stake. The only conceptual framework that allows this is **ecology**.

Ecosystems are the subject of the study of ecology[4]. **Cities are urban ecosystems** in which human beings are the main component. Urban ecosystems are the most complex systems created by the human species. When approaching the transformation of urban systems from a holistic perspective, we must create synthetic models that touch on the main components of urban systems.

A more sustainable urban model in the information age[5]

The set of components that make up a city, and the relationships and restrictions between them, result in a system of proportions. These proportions, which are the result of a number of factors and interests, can create a range of different issues. For example, if the resulting city has excessively extensive suburbs, then there will likely be social segregation by income, culture and ethnicity. The inequality between different areas will become a reality. In the suburbs, which usually have an exclusively residential function, the shortage of basic services and facilities will force residents to use cars to access them. If the use of transport tends excessively towards private vehicles, then the occupation of public spaces by cars, combined with traffic congestion and poor air quality, among other things, will result in lower-quality urban spaces and habitability. Energy consumption and greenhouse gas emissions will increase, air quality will worsen and this will have a consequent impact on human health. Similar analysis can be extended to other urban variables. This example highlights the need to integrate a series of variables so that their proportions work in synergy to address current challenges.

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[3] A change of era and a change of paradigm: from an industrial society to the information and knowledge society. (Annex 3)

[4] A system is a series of physical and chemical components that relate to each other, and that can be distinguished by the **restrictions** established between the connected components. When the components in a system include living organisms, the system is known as an ecosystem. Ecosystems are open systems in terms of information, matter and energy, following Margalef's principle on ecology, and they are **scalable** by nature: a room, a building, a neighbourhood or a city are ecosystems because they meet this definition.

[5] Rueda, S. (2002). *Barcelona, a compact and complex Mediterranean city. A more sustainable vision for the future.* http://bcnecologia.net/en/publications/barcelona-compact-and-complex-mediterranean-city-more-sustainable-vision-future

As mentioned above, the city is the most complex system created by the human species. The only way to approach this complexity and reach a system with balanced proportions is via intentional models that seek to address current challenges and uncertainties, while simplifying current situations and allowing a channel for the energy of change. Defining intentional models allows us to set the playing field for applying transdisciplinary perspectives, in which experts can later apply their knowledge with a clear understanding of the limits of the playing field and the rules of the game. Today, from an analysis of the problems shown in many urban systems, and an analysis of the systems that have managed to reduce these problems, an **intentional urban model** has emerged that has a **compact morphology, complex organisation (in terms of mixed uses and biodiversity), metabolic efficiency and social cohesion.**

Compactness and urban functionality are the core concepts that deal with morphology and formal solutions: building density, distribution of land use, and the percentage of green space or roads. It determines the relationship between urban uses and functions. It is also the core concept that defines the system's functionality, and forms the backdrop for mobility and public space.

Urban complexity deals with urban organisation, and the mixture of uses and functions that are implemented or will be implemented in a given area. Urban complexity qualifies the interactions between organisational bodies, or legal persons, in a city: economic activities, associations, facilities and institutions. This component includes the information flow model and knowledge-intensive legal persons, which make up the foundation of smart cities. This core concept also includes biodiversity as an expression of biological complexity that coexists with human beings in an urban ecosystem.

Urban metabolism looks at achieving **efficient flows of materials, water and energy**, which make up the support network for any urban system, in order to maintain proper organisation and avoid pollution. Natural resource management should be as efficient as possible in terms of use, causing minimal disturbances to the supporting ecosystems, and in accordance with the fourth metabolic regime[6]. Due to the intrinsic nature of urban ecosystems, the proposed urban metabolism must transcend them and incorporate them in a broader regional context, where their functions of generation, regeneration and reproduction can be carried out. This regional scale is defined by variable geometries for each one of the metabolic components, and is the key to developing strategies aimed at self-sufficiency with renewable resources.

Social cohesion refers to the coexistence between the people who live in an urban space, and the relationships they establish with each other. Cities cannot fulfil their function as engines of social progress, economic growth and as a space for the development of democracy unless there is a social balance in place, both in intraurban and interurban terms, while protecting cultural diversity and establishing a high-quality urban environment. In a context that is aware of social vulnerability, a mixture of income brackets, cultures, ages and professions has a stabilising effect on the urban system.

[6] A change of era and a change of paradigm: from an industrial society to the information and knowledge society. (Annex 3)

These four key aspects are closely related, and interact in synergy to provide integrated responses to urban realities, both in terms of rehabilitation and regeneration processes, and to support those who plan new urban developments. The model has an impact on and shows itself fully on a number of scales, ranging from an entire metropolis to an area of about 16-20 ha.

A regional model that forms a city network with multiple nuclei: more countryside and more city

A regional model that has proved sustainable for centuries in the middle latitudes is a mosaic made up of farmland, forests and pasture, linked by borders, hedges, ditches, streams, rivers and more, with a compact and complex city in the middle, so that the region is set out as a multiple nuclei city network. The synthesis of the two models –the urban and the regional– would mean creating more city space and more countryside at the same time. Experience shows that these two models can be maintained and developed when the mobility model works to enhance the layout of the nodes or nuclei, making it more difficult for urban dispersion to develop.

The key foundations of Ecosystemic Urbanism[7]

Urban planning as a social practice that involves creating and transforming cities is a tool to deal with current challenges. However, the limitations of current urban planning practices mean a new urban planning method is required, rooted in ecology and with a broader focus, which allows us to increase our ability to plan ahead in the face of the current uncertainties created, above all, by urban systems.

a) Context

In ecological terms, addressing the transformation of a given region means taking the surroundings into account (both the internal environment and the broader support system) from every angle: the environment[8], the economy, society and culture[9]. The chosen solution should not create disruptions in the context, or in the accompanying secondary variables.

The components of context are as broad as reality itself: landscape, heritage, cultural identity, geography, metabolism, biodiversity, etc. The scale of context changes in geometry depending on the characteristics of each variable. Taking atmospheric emissions as an example, pollution can have a significant local impact (sedimentary particles), regional impact (SO2, VOCs, etc.) or even global impact (greenhouse gases). Any action taken in a given region will result in more or less of these pollutants being emitted, which means that the context, in this case, will apply on every scale, all of which must be taken into account.

[7] Rueda, S. *Urbanismo ecológico. Su aplicación en el diseño de un ecobarrio en Figueras*.

[8] Avoiding building on floodplains or on areas at risk of landslides, etc.

[9] Culture is a complex category in itself, defined by UNESCO as the set of distinctive spiritual, material, intellectual and emotional features of society or a social group, that encompasses, not only art and literature, but lifestyles, **ways of living together**, value systems, traditions and beliefs.

On the other hand, it is important to understand the specifics of each urban system, and the factors involved in any changes therein. Intervening in a World Heritage city creates a different context to a city without this status. Recognising cultural diversity as humanity's most important heritage is an essential factor in urban and social life. Much like the environment, it runs the risk of destruction and extinction due to a standardised globalisation with dominant and excluding cultural moulds. It is important to ensure that culture is present in every urban development process, especially in those relating to historic town centres, as a strategic and cross-cutting aspect that should be present in every urban planning and decision-making scenario.

Requirements for designing new urban developments and for regenerating existing ones, within the framework of this document:

- *Current situations relating to landscapes, cultural identities, geography, metabolism and biodiversity, etc., will be taken into account under the terms set out in the* Ecological Urbanism Certification*, and under other terms that are justified in different contextual circumstances*[10].
- *Any buildings or urban complexes that express the historical, architectural and urban heritage of the city should be protected. Their renovation, where applicable, should be adapted to the assertions made in the principles of ecological urbanism, which are established later on.*
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b) City vs. Residential Area

For a number of reasons, and depending on the context, the current trend for constructing cities has led to vast low-density suburbs being built. These areas can be defined as urbanised areas, but not as a "city". The main characteristics that distinguish a city from a residential area are the existence of public spaces, and a range of legal persons. The two features that distinguish a city from a residential area do not coincide with the main process of constructing a city today.

The existence of public spaces is a necessary requirement for a city to become a city. Suburbs have buildings (mostly single-family housing) and the spaces between buildings almost exclusively function to allow vehicles to pass through and reach their respective car parks. These are single-purpose urbanised spaces (used only for mobility) that are part of simplified and monofunctional urban areas (residential, services and industrial areas, etc.), but they are not public spaces that provide the potential uses offered by a multifunctional and complex city.

A public space is a meeting place, a place made to be shared, where a large number of urban interests coincide. Interests that may be opposing, in some cases. In order for a public space to exist, or in other words, in order for it to make sense as a space for daily interactions, and as a space that can be used for all the purposes that make us citizens, **the public space must be occupied by a sufficient number of inhabitants and legal persons**.

[10] *Ecosystemic Urbanism Certification.* Rueda, S.; Cormenzana, B.; Vidal, M., et al (2012). Ed. BCNecología. ECOSYSTEMIC_URBANISM_CERTIFICATION.pdf

The second feature that differentiates a city from a residential area is the number and range of complementary legal persons (in terms of economic activities, associations and institutions). The complex and multifunctional organisation of a city, generated by the range and mixture of uses for that city, is much more complicated than the organisation of a suburb, which has a simplified and monofunctional structure. Compared to the organisation of natural systems, a city with a highly diverse number of uses could be comparable to the diversity of species in a tropical forest, while a suburb could be compared to a desert.

Requirements for designing new urban developments and for regenerating existing ones, within the framework of this document:

- *The aim is to build a city, not a residential area. Every square metre taken from nature for urban development must be justified, and this is not the case when the resulting intervention does not produce a city.*
- *Urban zoning regulations should avoid classifying land for use that does not meet the real needs of an area. Thus, developable land should meet real needs, for a given period of time, whenever they cannot be met by recycling existing urban land, or using vacant spaces on the urban landscape. The extension of urban areas should be a continuation of the already constructed urban fabric, avoiding building in non-contiguous areas.*

c) Principles and objectives of ecological urbanism when regenerating existing urban fabrics, and when planning new developments

The following shows the principles of ecological urbanism, which bring together objectives and strategies for constructing a city. They make up the core concepts of the intentional urban model. The following fifteen principles aim to summarise the key points for urban regeneration and for designing new urban developments. Achieving these premises and objectives would allow for a balanced system to be obtained in order to ensure that current challenges, on both an urban and global scale, are dealt with.

1. COMPACTNESS vs. DISPERSION: Reducing land use by increasing the proximity and critical mass of inhabitants and legal persons.

2. DECOMPRESSION vs. COMPRESSION: Urban equilibrium.

3. ACCESSIBILITY vs. PRIVATE MOBILITY: Alternative transport to cars, guaranteeing that all citizens can access the city.

4. CITIZEN vs. PEDESTRIAN: Uses and rights in the public space.

5. HABITABILITY IN THE PUBLIC SPACE: Controlling environmental variables.

6. COMPLEXITY vs. SIMPLIFICATION: Increasing urban complexity with a greater and wider range of legal persons.

7. HYPERCONNECTIVITY: Information flows in the digital era.

8. GREEN SPACE vs. ASPHALT: Increasing green space and urban biodiversity.

9. SELF-SUFFICIENCY vs. DEPENDENCY: Moving towards energy sufficiency.

10. WATER SELF-SUFFICIENCY WITH NEARBY AND RENEWABLE RESOURCES: Conservation in the water cycle.

11. REDUCE, REUSE, RECYCLE vs. WASTE: Moving towards self-sufficiency in terms of materials.

12. ADAPTING TO AND MITIGATING THE IMPACT OF CLIMATE CHANGE.

13. SOCIAL COHESION vs. SOCIAL EXCLUSION: Moving towards social cohesion between a mix of income brackets, cultures and ages.

14. UNIVERSAL ACCESS TO HOUSING IN MORE SUSTAINABLE BUILDINGS.

15. BALANCED RESOURCES AND DISTRIBUTION OF FACILITIES

The systemic and eco-integrative approach of the proposal means that the principles of ecological urbanism work in unison and in synergy.

d) The interrelation and interdependence of the principles of ecological urbanism

As stated above, a city is built on a system of proportions. The principles presented in this document are intimately interrelated, creating a system of dynamic balances between them. The principles and intentional objectives stated in this document will only be fully reached when there is an equilibrium. As in any complex system, interrelation generates a number of feedback processes that indicate the interdependence of the principles between each other. When a principle shows weakness, this weakness drags the principles it is most closely related to into an imbalance. **The interdependence between principles forms the basis of this Charter's systemic approach.**

Indicators for determining ecosystemic equilibrium levels[11]

The urban model and the principles and objectives proposed make up the intentional framework. Ascertaining the level of compliance with each principle is achieved through the creation of a system of indicators quantifying and objectifying the stated intentions (see Annex 4). For evaluation purposes, the results obtained are compared with the maximum, minimum or forked[12] reference values determining if the system is in equilibrium or not and if we are

[11] The indicators for quantifying ecosystemic urbanism indicators, as well as the calculation methodology of indicators included here can be found in: *Ecosystemic Urbanism Certification.* Rueda, S.; Cormenzana, B.; Vidal, M., et al (2012). Ed. BCNecología: ECOSYSTEMIC_URBANISM_CERTIFICATION.pdf

[12] The evaluation system resembles a blood analysis where the results obtained are compared with the maximum, minimum or forked reference values to determine if the individual is in equilibrium (sick), or not.

moving closer or further away from an adequate system of proportion. The reference values proposed form the system of ecological planning restrictions[13].

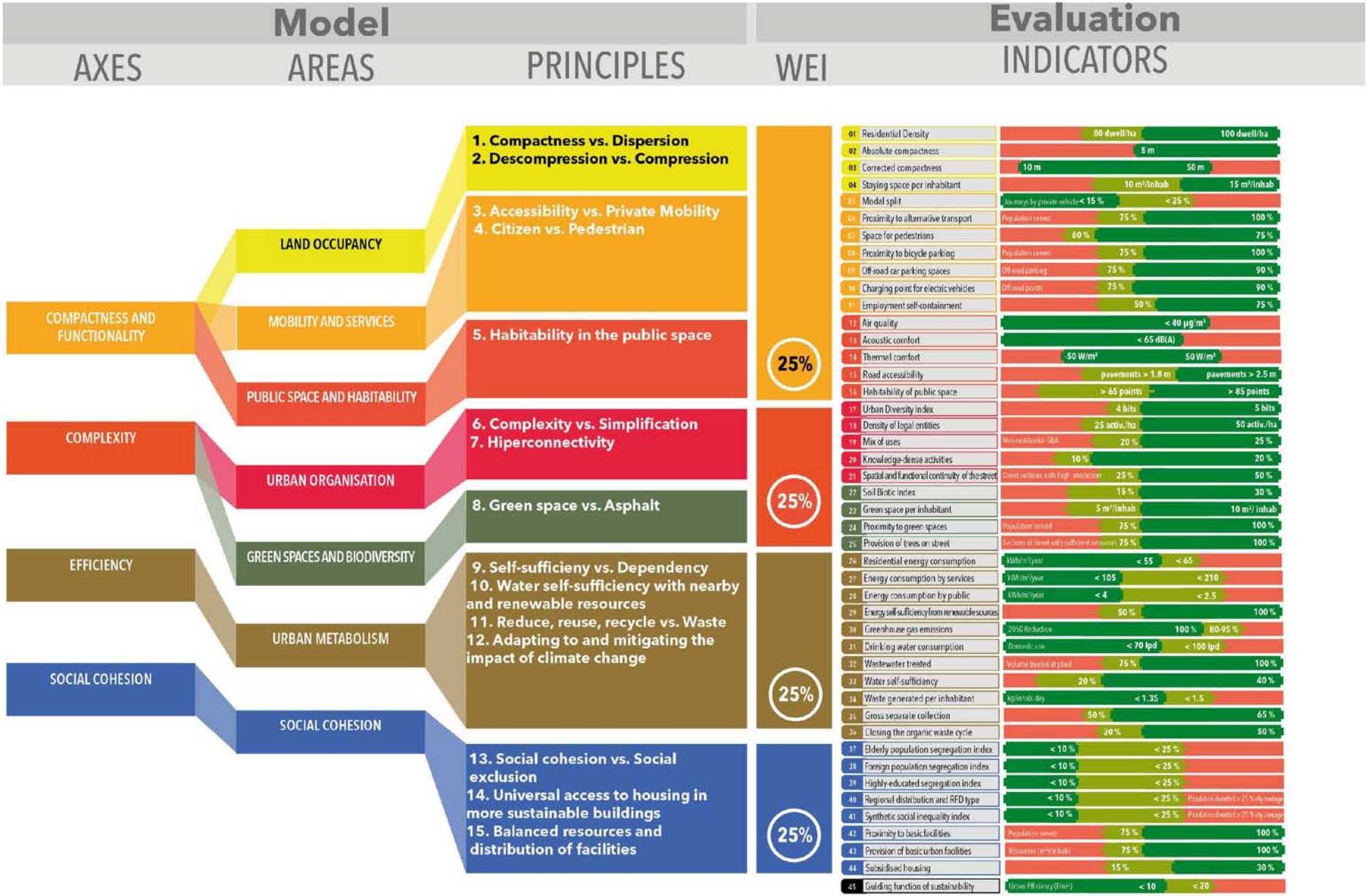
Whether referring to performance proposals for new urban developments or consolidated fabrics, the values obtained for the indicator system variables (restrictors) indicate the level of ecosystemic balance in the analysed area along with the level of required adaptation to the principles and the intentional urban model.

The number of variables in the restrictor system will be slightly different if the analysis is carried out for existing fabrics or new developments. There is more information for existing fabrics for some aspects of the urban reality. Furthermore, the analysis may be carried out on different scales which encompass the entire city or areas with fewer hectors. In fact, the reference values established for the indicators have a surface area of 16-20 ha in the reference area, as this is the minimum urban ecosystem able to integrate the set of proposed principles.

Urban planning usually has a regulatory document governing the standards and conditions that guide the transformation of the area to be urbanised. These standards and conditions come from different, to-scale regulatory frameworks with eminently social and economic variables. In order to face the new challenges, it is necessary to change the focus and base standards without forgetting orthodox urban variables, to meet sustainability criteria in the information age.

In the same way that the planners design a master plan where a specific green area is guaranteed per capita and other conditioning factors, ecological urbanism sets forty four planning standards for the system of proportions to be considered as “fit for purpose”.

[13] The system of restrictions explained here has a similar meaning in that it contains the definition of an ecosystem.


Model
Evaluation
AXES
AREAS
PRINCIPLES
WEI
INDICATORS
COMPACTNESS AND FUNCTIONALITY
COMPLEXITY
EFFICIENCY
SOCIAL COHESION
LAND OCCUPANCY
MOBILITY AND SERVICES
PUBLIC SPACE AND HABITABILITY
URBAN ORGANISATION
GREEN SPACES AND BIODIVERSITY
URBAN METABOLISM
SOCIAL COHESION
1. Compactness vs. Dispersion
2. Descompression vs. Compression
3. Accessibility vs. Private Mobility
4. Citizen vs. Pedestrian
5. Habitability in the public space
6. Complexity vs. Simplification
7. Hiperconnectivity
8. Green space vs. Asphalt
9. Self-sufficieny vs. Dependency
10. Water self-sufficiency with nearby and renewable resources
11. Reduce, reuse, recycle vs. Waste
12. Adapting to and mitigating the impact of climate change
13. Social cohesion vs. Social exclusion
14. Universal access to housing in more sustainable buildings
15. Balanced resources and distribution of facilities
25%
25%
25%
25%
01 Residential Density
02 Absolute compactness
03 Corrected compactness
04 Staying space per inhabitant
05 Modal split
06 Proximity to alternative transport
07 Space for pedestrians
08 Proximity to bicycle parking
09 Off-road car parking spaces
10 Charging point for electric vehicles
11 Employment self-containment
12 Air quality
13 Acoustic comfort
14 Thermal comfort
15 Road accessibility
16 Habitability of public space
17 Urban Diversity Index
18 Density of legal entities
19 Mix of uses
20 Knowledge-dense activities
21 Spatial and functional continuity of the street
22 Soil Biotic Index
23 Green space per inhabitant
24 Proximity to green spaces
25 Provision of trees on street
26 Residential energy consumption
27 Energy consumption by services
28 Energy consumption by public
29 Energy self-sufficiency from renewable sources
30 Greenhouse gas emissions
31 Drinking water consumption
32 Wastewater treated
33 Water self-sufficiency
34 Waste generated per inhabitant
35 Gross separate collection
36 Closing the organic waste cycle
37 Elderly population segregation index
38 Foreign population segregation index
39 Highly-educated segregation index
40 Regional distribution and RFD type
41 Synthetic social inequality index
42 Proximity to basic facilities
43 Provision of basic urban facilities
44 Subsidised housing
45 Guiding function of sustainability
80 dwell/ha
100 dwell/ha
5 m
10 m
50 m
10 m²/inhab
15 m²/inhab
< 15 %
< 25 %
75 %
100 %
60 %
75 %
75 %
100 %
75 %
90 %
75 %
90 %
50 %
75 %
< 40 µg/m³
< 65 dB(A)
-50 W/m²
50 W/m²
pavements > 1.8 m
pavements > 2.5 m
> 65 points
> 85 points
4 bits
5 bits
25 activ./ha
50 activ./ha
20 %
25 %
10 %
20 %
25 %
50 %
15 %
30 %
5 m²/inhab
10 m²/ inhab
75 %
100 %
75 %
100 %
< 55
< 65
< 105
< 210
< 4
< 2.5
50 %
100 %
100 %
80-95 %
< 70 lpd
< 100 lpd
75 %
100 %
20 %
40 %
< 1.35
< 1.5
50 %
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15 %
30 %
< 10
< 20

The minimum urban ecosystem integrating the principles of ecosystemic urbanism

In terms of the scale of ecosystems, this is a question of being aware of what the minimum urban ecosystem is capable of achieving the desired values for the set of indicators (restrictors) ensuring urban equilibrium and the principles established in the urban ecosystem. This minimum ecosystem will become the basic urban planning unit and we will call it the superblock[14].

A superblock is the minimum urban ecosystem of approximately 16-20 ha[15] bordered by a periphery integrating a set of overground transport networks. This expansion of transport networks creates a mosaic of superblocks reaching the entire urban system, whether this is a new urban development or an existing city. Within the superblocks a loop system will create car access to all the façades. However, cars will not be able to cross the superblock and those entering will be mostly removed by the same way they have entered. The maximum speed allowed for vehicles is 10km/h. This speed means the space can be mitigated and shared with citizens' usage and rights, including vulnerable people. Pedestrians and cyclists can cross the superblock and travel in both directions, but cyclists must give right of way to citizens at all times. The streets within the superblocks will become squares developing all citizen uses and rights: entertainment, exchange, culture and democratic expression.

The development of superblocks will be carried out adapting all the areas to the main road network. This road network will include and integrate passing mechanical vehicle networks: overground car and public transport and, where appropriate, bicycles. A network of superblocks will extend over the entire city with a tendency to orthogonality (the most efficient urban system), freeing up most public space today dedicated to mobility and reducing the minimum number of vehicles[16]. Through this, functionality and urban organisation are ensured. Freeing up this space will also allow a green urban network to be established, including urban gardens, articulated through concentration of superblocks creating a complete urban network with connections to peri-urban and rural areas.

In new urban developments, repeating minimum urban ecosystems guarantees that the principles and objectives will be achieved. They will become the functional urban base model of ecological urbanism. In the case of urban regeneration, superblocks with indicator values which are different to the desired values shall be intentionally modified so they are closer to the desired values through urban planning and/or sector planning: mobility, biodiversity, economics, housing, environment, etc.

When superblocks are created in existing fabrics, the project is actually related to urban recycling, and the size of the superblocks is flexible, accommodating the main road network to guarantee system functionality. When new urban developments are implemented, the size of

[14] The superblock: the minimum urban ecosystem integrating the principles of ecosystemic urbanism. (Annex 5).

[15] With these dimensions, the time required to get around a superblock is similar to that of a 100 m long block on foot.

[16] In a city like Barcelona, freeing up 70% of public space can be carried out with a 13% reduction in the number of vehicles. With this reduced percentage of vehicles, the traffic levels will be similar to now. In other words, the speed of the vehicles on the roads around superblocks will be similar to the speed of vehicles on the current road network. This would allow 500 superblocks to be implemented extending the network throughout the entire city.

16-20 ha (between 400 and 500 m long) is adequate because it includes all methods of transport. In addition, this becomes the minimum urban intersection where new urbanism principles integrate and become reality.

A superblock can be created in an ecosystem starting and catalysing the transformation of fabrics requiring regeneration. It acts like a small city incorporating the group (the majority) of urban principles and restrictors, that is, implanting the urban model on a small scale. It may be the framework for regenerating fabrics with an outpouring of isolated towers within a dense but soulless urban fabric[17]. It may be the start of the regeneration of low density fabrics, modifying the rules of the game that created them, increasing density and generating new smaller central areas. The same cell gives a similar response when the intervention area is that of an urban project with several tens of hectares or when the scale of the area, district, city or even metropolis is widened.

Ecosystemic urbanism consists of three levels (layouts)[18]

Currently urban planning has a single layout where urban uses reserved by law are fundamentally established. The current urban layout does not meet, because it cannot, the set of variables which must be regulated for facing the challenges of today and the future. A roof layout and subsoil layout must be added to the surface layout, maintaining the same legal structure with adequate reserves in each layout. The variables related to sustainability in the information age can be included with ease.

The design of the three urban layouts may incorporate, formally, the set of variables involved in facing the challenges indicated.

Organisation, management and governance instruments

The role of cities working with international organisations is irrelevant when compared with that of countries or even regions. If the battle for sustainability is to be won or lost in cities, it seems logical to modify the status of the urban systems and their relevance in decision making at all levels, including on a global scale. Urban "power" must be necessary and enough for facing sustainability challenges in the information age.

In order to advance towards implementing a newer urbanism, a battery of organisation and management instruments must be implemented.

Firstly, it is essential that the "State"[19] acts in some cities without urban planning or adequate organisation for implementing this.

[17] The deficits of these fabrics: diversity of legal persons, biodiversity, etc. may be reduced by substituting uses at height and increasing the green surface through layers or other measures. In other words, using *z* coordinates to get closer to the reference values.
[18] See Annex 6 .
[19] The term "State" involves public institutions, including city councils.

Secondly, planners know that in order to reach defined planning objectives, it is necessary to have adequate organisation. For most cities all over the world it is very probable that the organisation and resources for enacting the principles and objectives of new urbanism will be insufficient.

Thirdly, urban sustainability policies should be promoted through new forms of local governance, facilitating a holistic and integral approximation to urban processes, managing the multi-level dimension of these policies articulated through citizen participation processes.

Urban governing is related to our collective capacity to respond to common problems, creating more complex forms of self-organisation and networks among organisations which replace and/or accompany traditional urban government, new decision spaces and implementation of urban policies. These networks are integrated by different political, social, cultural and economic agencies[20] operating in different urban decision making spheres.

These governing processes are not based on traditional sovereign and territorial exclusivity principles, but are defined as a widespread exercise and power sharing in more horizontal dynamics. In this context, the most significant change explaining the processes of local government is found in new roles and relationships established between actors. Changes in the relationship between government and citizens which may influence local politics; changes in the role of public decision makers; changes in public organisations themselves and new organisational forms (strategic alliances, partnerships, participation experiences), which coexist with traditional management systems.

In relation to urban sustainability, local governance must be a process promoting effective local policies aimed at guaranteeing a prosperous urban economy, environmental sustainability and social inclusion. Appropriate governance would consist of the capacity to get things done in spite of their complexity and the many areas of conflict that the great social change is generating.

The human dimension of ecosystemic urbanism

Ecosystemic urbanism has a human scale scope, and it puts the human beings at the centre of its internal logic; it always pursues a better quality of life and citizen empowerment, both individually and collectively.

The fifteen principles and objectives establish the central position of citizens without placing importance on their individual or social condition. This has become the focus of ecosystemic urbanism.

Firstly, the concept promotes access and enjoyment of the city and its basic services, including housing. It also promotes individual autonomy without using methods of mechanical transport. If this is necessary due to the distance, people should resort to public transport methods or bicycles. We are also seeking coexistence between different parties in terms of income, culture, ethnicity and age etc. The majority of the principles are involved in this.

[20] The development of close cultural policies, created together with citizens, is the only viable route for facing the greater challenges in preserving cultural legacy in the current scenario.

The increased use of public spaces means that citizens' rights and empowerment are expanded. Empowerment is expanded through the development of ecosystemic urbanism instruments: governance, education, training, etc.

This level of autonomy and empowerment is threatened with external control of information flows exercised by companies and institutional bodies of different scales. Ecosystemic urbanism will change different dysfunctions and impacts which may be diluted by the influx of spurious interests influencing lifestyles which are contrary to the ecosystemic equilibriums presented here.

The "firewalls" for neutralising these influxes come from political control and evolved democracy, in part included in the governance instruments for ecosystemic urbanism, regulating information flows to guarantee personal autonomy, free will and avoiding lifestyles contributing to current uncertainties. What is at stake here is crucial and strategic for the planet; the species inhabiting it and new technologies, particularly artificial intelligence, must serve a new respectful urban way of life that respects its components and the systems that support us.

Regulatory Instruments

Many problems within cities are related to the absence of regulations and the organisation to ensure regulations are complied with. The only possibility for developing a new type of urbanism is to create organisational conditions that make it possible to define a new body of law and compliance with this, among other things

Achieving the principles and objectives of a balanced, eco-integrating and more sustainable city requires a radical transformation of the current regulations. In every case, the body of regulations must be modified and adjusted to the proposals included in this Charter.

In addition, current urbanism is focused on the definition and land reserves for every urban use. It designs a two dimensional layout which, with approval, shall become law. In order to incorporate all the variables arising from the whole set of defining principles of ecosystemic urbanism, it is necessary to modify the regulatory frameworks to include the three layout design in law, one for height, another on the surface and another in the subsoil, incorporating the necessary reserves for achieving ecosystemic urbanism objectives and principles. In each location, the territorial scale for enactment of the regulations may be different: state, regional, municipal, and so on. In any case, it is recommended that legal regulations defining the different parts of the new urbanism form a single competency.

Economic-financial instruments

In the majority of countries, populations are eminently urban. Furthermore, 80% of the world GDP is also generated through cities. However, budgets are formed by states and the amounts dedicated to cities are not equivalent to these percentages. In Spain, the state budget given to

cities barely reaches 15% when the urban population is almost 80%. In other countries like Denmark, the state budget given to cities is higher than 60%.

It seems reasonable that, in the interest of facing current challenges and in the knowledge that the battle for sustainability will be won or lost in cities, the budget percentages given to urban systems should be changed. The increase must be equivalent to the combination between the population percentage in cities and the GDP generated in them.

Taxation is, without a doubt, one of the most effective instruments for achieving some of the objectives proposed.

It is known that economic awareness as a regulatory mechanism is significantly superior to environmental awareness. For example, if we attempt to recover used packaging, even the best and most fitting publicity campaign will never achieve the same results as paying one euro per package as part of a deposit, refund and return scheme. Nobody will throw a euro in the rubbish. However, packages containing messages from even the best awareness campaigns will be thrown away due to laziness, convenience or apathy. In this case, economic awareness neutralises unsustainable behaviour.

It is both very effective and educational, to apply finalist tax measures. In other words, charging and allocating what is raised to establish and/or maintain the service. For example, when water sanitation charges are added to bills using an “if you pollute, you pay” principle, this will be effective if the money collected is entirely used for purifying water and restoring riverbeds and bodies of water.

Educational and training instruments

In order to face the challenges of the new paradigm it will be convenient to deploy educational instruments leading to a change in citizen lifestyles and the behaviour of companies and legal persons in general. With the current instruments, the process towards non-sustainability cannot be stopped.

Additionally, the new urbanism will need academic training programmes to be applied and spread all over the world.

Conclusive summary

The fact that quality of life is deteriorating in numerous cities all over the world and urban systems are having an impact on our planet’s ecosystems means that we must change how we currently create cities and the bases underpinning change processes. A new theoretical and instrumental framework must be established for designing new urban developments and above all, the regeneration of existing ones. Urban ecology is a discipline which has a necessary theoretical framework for facing the urban reality holistically and systemically and it is the only discipline which can harmonise urban transformation processes with the laws of nature.

This Charter considers cities to be ecosystems, the most complex ecosystem created by humans. When we face this complexity and equally try to reduce the level of urban deterioration and the level of impact on support systems, we must define an intentional urban model with an impact on the essential features of the urban dynamic which also confronts the sustainability challenges in the information age, which are essential for reducing uncertainties and increasing our capacity for foresight. The only urban model which fulfils all the requirements is morphologically compact, complex in terms of anthropic and biologic organisation, metabolically efficient and socially cohesive. For the implementation of urban models, a new urban instrument is required: ecosystem urbanism. This takes all the variables of the wider context into account within the urban planning process. It proposes producing cities and is against generating suburbs. It establishes a set of principles defining the rules of engagement and the system of restrictions making up the intentional urban model which are a practical guide for production processes within new cities and regeneration of existing ones.

Morphologically, we are looking for urban uses and functions which use as little land as possible. We are supporting regeneration and recycling of existing fabrics and only using new land when absolutely necessary. This compactness must foster the critical mass of the population and legal persons to sufficiently create a city, so there is public space and a mix of uses. The proximity and critical mass allow access on foot to basic services and equipment, in addition to making public transport viable. Density must endeavour to create a city, but must not exceed specified thresholds in order to create an equilibrium city with sufficient spaces for decompression, elevated biodiversity values, public spaces with sufficient insulation spaces and a specified level of energy self-sufficiency, etc.

Urban functionality is defined by the current mobility model based on motorised modes. This model is the largest energy consumer, conditions the use of public spaces (more than 80% of public roads are used for mobility) and creates the worst urban dysfunctions (contamination, noise, etc.) with impacts on health and the environment. Reducing these current dysfunctions and freeing up space predominantly used for public mobility means changing the mobility model to one based on alternative methods of transport, other than cars. The planning instrument to change this mobility model, while guaranteeing system functioning, is the superblock. Superblocks will favour, in this order, movement on foot, public transport and bicycles. Mobility will no longer be a service and will progress towards electric vehicles; the use of electric bikes will be favoured over electric cars.

Freeing up space will be achieved by implanting superblocks throughout the entire city, which allows to reduce current dysfunctions and control variables providing habitability within public spaces. Improvement of air quality, sound reduction, safety, temperature comfort, accessibility etc. will create conditions conducive to a significant increase in the number and diversity of legal persons. Freeing up public space enhances citizen uses and rights to be exercised in the public space. The right to movement, which is currently a dominant and almost unique right, will additionally give way to the right to exchange, leisure, culture and political expression. The opportunity to exercise all these rights in a public space, a “shared house”, makes us citizens. Today, the mobility model restricts these rights and our main goal is to promote walking as a method of transport. Enhancing these uses and rights will turn streets into squares. By implanting superblocks, 70% of public spaces are freed up giving us more of an active role to become citizens, citizens who mainly will travel on foot.

The city is supported by its organisations, which are also known as legal persons. In urban systems, entities which are not organisations are irrelevant. Each legal person has, at least, one

intention justifying it and allowing it to relate to other legal persons. These entities treasure useful information, that is, knowledge. The abundance and diversity of legal persons determine the complexity of the network of relationships. This network is the competitive base between regions and the one that determines, following the Margalef principle, the relative position of each urban system in the national and international order of cities and metropolises.

The current strategy for competition between urban systems based on the consumption of resources is a huge threat to the future of humanity. The only hopeful strategy is based on increasing the number (n) and diversity (H) of legal persons in general and especially of knowledge-dense legal persons, while drastically reducing consumption of natural resources (E). This strategy uses nature to enhance viability of living beings and ecosystems, to increase organised complexity and at the same time reduce the necessary energy for maintaining this complexity. The E/nH ratio that reduces over the time axis indicates the path to follow, and suggests a strategic shift towards competition based on information and knowledge, sustained by services and a less material economy. This is the equation that deals with sustainability challenges in the information age.

Using a strategy based on information and knowledge, urban planning must enhance growth of n and H, promoting new central areas, densification and mixture of suburb uses, activities taking place at a height when there are neighbourhoods made up of tower buildings, corridor streets full of related activities, etc. The increase of n and H increases the number of jobs, employment self-restraint and self-sufficiency, ensuring the existence of basic services for residents.

Knowledge-dense legal persons hoard the majority of useful information, acting as the base for the city knowledge or the “smart city” model. The number and diversity of knowledge-dense legal persons increases as the strategy for increasing information flows and hyperconnectivity grows. This is also done through implementing actions on the necessary sector plans for achieving the principles of ecosystemic urbanism.

We will consider the biophysical matrix as one of the structural elements for urban planning, creating a connected ecological matrix that increases biodiversity and strengthens and re-evaluates peri-urban agriculture and its productivity. The extensive and continuous network of green and blue metropolitan spaces will penetrate the urban system, creating green corridors using the extensions of these areas that have least resistance to the penetration of biodiversity. The green network will be completed by planting vegetation in part of the space freed up by superblocks and in these opportunity spaces: interior block patios, obsolete industry, abandoned spaces, green roofs and walls, etc. Planning on the biophysical matrix must help to close material and water cycles.

Urban ecosystems are open systems in terms of materials, energy and information. They are heterotrophic systems which need resource entry flows and waste exit flows to maintain their organisation. Ecosystemic urbanism seeks to achieve the best efficiency possible for each of the metabolic vectors and the best self-sufficiency with local and renewable resources. It is equally seeking to reduce the minimum amount of impacts on the environment and people. This attempt is combined with the mitigation of and adaptation to climate change, with the aim of foreseeing problems associated with this phenomenon. Again, superblocks play a fundamental role both for mitigation of and adaptation to climate change, as well as to achieve metabolic efficiency targets and closing biogenic cycles.

In urban ecosystems, people are the main component. Numerous factors, among them urbanism, have been responsible for the level of social exclusion and inequality that the majority of cities throughout the world display today. The level of marginalisation and absolute poverty which almost a thousand millions of citizens in the world's cities have to endure is not remotely acceptable. Quality of life and coexistence suffer, even for those who have most, and people often become isolated and scared "to death". The "adequate" mix of people of a different social condition and backgrounds living in proximity, possibly in the same building, has been proven as the best solution for coexistence and individual and collective growth. Urban formulas for mixing incomes, ages, ethnicities, etc. are essential for social cohesion. In this section, it is essential that the State acts where the market does not. Everyone has the right to decent housing and close facilities conducive to urban habitability. Providing primary care services has an adequate territorial framework within superblocks.

The principles of ecosystemic urbanism are articulated integrally and systemically; in order to achieve these principles, superblocks and the definition of three planes with corresponding land reserves are two of the fundamental technical instruments.

The theoretical and technical framework needs regulatory, economic-financial, organisational, governance, educational and training instruments.

The legal framework for each urban reality is different. A lot of current legislation means that the proposals included in this document cannot be included. The challenges we are facing do not leave any margin for hesitation and it is necessary to adapt the regulatory framework to the objectives and principles expressed.

The economic effort of government to implement the Charter's proposals is considerable for some of the principles, for example the acquisition of housing stock in order to achieve social mixes not provided by the market. The budgets that the State raises and then provides to municipalities are, in the majority of cases, very small, even though cities generate 80% of the GDP. It seems reasonable current budget scenario must be changed, particularly in the knowledge that the future depends on how we organise our cities from here on.

For concrete fulfilment of the initiatives necessary for reaching the stated objectives, purpose-driven tax policies have always proven to be very effective.

The position of cities for making decisions on an international scale is insignificant. While the relative position of urban systems does not correspond to their size and importance, it is going to be difficult to reach the goals to reduce current uncertainties and alleviate the current level of urban and social deterioration. In the same way, it is going to be impossible to enact significant change without active participation from citizens and institutions on all scales.

It is fundamental that citizens take ownership of their own existence to change current lifestyles. New lifestyles confront the challenges of sustainability in the information age. The new age must define a new paradigm, away from the principles assumed during the industrial era, which have caused the scenario of current instability. Educational and training efforts must be huge, as much as the change we urgently need.