



BARCELONA

Preliminary Resilience Assessment



Ajuntament
de Barcelona

UN HABITAT
FOR A BETTER URBAN FUTURE



**Ajuntament
de Barcelona**

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1. INTROD



UCTION

1.1 Justification: Why is resilience so important?

The overall trend in the development of civilisation is shifting towards the concentration of populations in urban areas. According to data from the United Nations, over 54% of the world's population currently lives in cities. By 2050, some 6,300 million people – 66% of the total and the equivalent of the world's entire population in 2000 – are expected to live in an urban environment.

That means cities already play a key role in human development and will be increasingly influential in promoting living conditions that guarantee their residents' protection, health, equal opportunities and well-being. Hence the pressing need for a development model that is sustainable over time and environmentally friendly from a global perspective.

It is in this context that we understand the concept of resilience applied to city residents and urban systems. Urban resilience is the capacity of cities to prevent or, where inevitable, minimise the impact of both chronic stresses and exceptional emergency situations or one-off incidents. Such situations may be the result of natural, man-made or technological causes. Resilience provides a series of general principles and guidelines for coping with such shocks and stresses through the sustainable development of cities and urban areas from a holistic perspective.

In the last few years, a number of influential

organisations have strengthened their activity in this area, among them the United Nations, the Rockefeller Foundation, C40 and Local Governments for Sustainability (ICLEI). They identified the need to start urgent work on creating the necessary bases for examining, planning and building cities that guaranteed a sustainable model for a safe and positive community life for their citizens. Resilience strategies have also been developed by the the United Nations Office for Disaster-Risk Reduction (UNISDR) programme – which aims to raise world awareness through risk-reduction strategies – and the UN-Habitat's City Resilience Profiling Programme (CRPP), which is based in and co-led by Barcelona, and is focused on establishing and sharing city profiles and the most effective indicators for developing urban resilience.

More recently, collaboration with the 100 Resilient Cities programme has further strengthened the progress of this movement. Their programme has promoted the creation of resilience offices in the 100 participant cities worldwide, more than 40 of which have already established their Resilience Strategies. These constitute clear examples of the confluence of our approach with the impetus of this comprehensive universal goal.

Resilience is also part of the New Urban Agenda and the Sustainable Development Goals (SDGs)



promoted by the UN and agreed to at the Habitat III United Nations Conference on Housing and Sustainable Urban Development held in Quito in 2016 (SDG 11. Goal 11: 'Sustainable cities and communities').

A resilient city is not just a city that protects itself in order to cope effectively with the impact of critical situations, whether because

it has suffered them in the past or expects to experience them in the future. A resilient city is forward-thinking. It is a city that has taken the initiative to plan and provide for potential risks by establishing preventive initiatives and by intervening to change the parameters that enable us to develop towards our ideal city.

1.2 Background: Resilience in Barcelona

Barcelona has a long history of implementing measures to promote urban resilience, some of which pre-date the use of this specific term. As the city has made progress through several stages, it has gradually strengthened areas where it was vulnerable, adjusted operating procedures and protocols, and addressed critical situations more strongly from a holistic perspective. This has happened as a result of the development of increasingly complex processes and systems with a major inter-dependency factor, each one having an impact on the another if one of them fails. More recently, this has involved the integration and development of processes to protect and support vulnerable groups and individuals.

We have defined three distinct stages in this process of development.

During the first stage, until 2009, individual sectors and departments implemented plans and projects that generated resilience value within the city. However, they solved problems intrinsic to their own area without defining techniques or methodology that would coordinate their solutions with those of other areas and create an integrated and inter-dependent system.

Plans, projects and initiatives aimed at reducing vulnerability and tackling critical situations were implemented in the city, gradually becoming more consistent in their approach. Some of the most important of these are noted below:

- Barcelona has had a sewerage plan since 1997 to minimise critical situations caused

by floods and discharges of rainwater and sewage into the sea during the episodes of torrential rain typical of our climate and as a result of the city's layout. Such critical episodes had been common before the plan was implemented. The problem was solved by the creation of a network of thirteen underground lamination tanks to retain the excess water and subsequently pump it out to two remote-controlled water-treatment plants, managed according to the weather and the network's actual condition. Apart from minimising any damage caused by floods, this ensured an exceptional quality of water along the coast.

- Municipal emergency plans have been established which lay down a protocol to regulate the city's response to specific risk factors, both recurrent and exceptional. Barcelona currently has a Municipal Civil Protection Plan in place, which includes dedicated action plans for heatwaves, strong winds and rough sea conditions, plus as many as twelve Municipal Emergency Action Plans (PAEM) and Specific Municipal Emergency Plans (PEEM) to deal with particular shocks, such as floods, forest fires and failures in electricity, water or gas supplies, among other things.
- Another project was the launch of the Joint Command Room, which has been coordinating every type of reactive intervention by the city police (the Guardia Urbana or GUB), the Catalan regional police (the Mossos d'Esquadra) and the



Fire Brigade since 2005, as well as any occasions when regional police officers have been deployed in the Catalan capital. The Emergency Medical Service has now also joined this initiative. At the time of its creation, it was the only service of its kind in Europe and its interventions guarantee a highly effective response and appropriate targeted action. The service also provides a base for the Liaison and Coordination Centre (CECOR), where the various participants meet up during the activation of any such Municipal Emergency Action Plans.

Despite the real value generated by all these plans and projects, the early part of the past decade saw a series of situations arise, essentially in the area of infrastructure and services, which raised awareness in the city of the need for a change of paradigm to reduce vulnerabilities, ensure swift and effective responses to crisis situations, and strengthen the ability to recover the affected services as

quickly as possible. The most critical situations and their causes during that period are summarised below.

- In January 2005, the collapse of a shunting tunnel under construction to extend metro Line 5 to the El Carmel neighbourhood resulted in the evacuation of 54 buildings, with over a thousand people affected, and the demolition of four buildings. The incident led to a radical change in building methods and in the control and monitoring of tunnels constructed in the city from then on.
- June 2007 saw the collapse of a section of a retaining wall on land surrounding the area of the future underground car park for a building on the old Bayer factory site, at the junction of Calàbria Street and París Street. The collapse led to part of the road and bus lane caving in, bringing down a high-voltage electricity line and a gas pipe. Sparks then ignited the gas, resulting in a fire that lasted for several hours. The incident led to the development of the Municipal Sounding Protocol for controlling



Police officers in the port of Barcelona
Credit: Mossos d'Esquadra

and preventing situations of that type in work carried out in the subsoil, whether public or private.

- There was a severe drought from autumn 2006 to spring 2008, which had a serious effect on Barcelona and its metropolitan area. This opened the way for an intense debate on traditional water-transfer solutions, including those based on regulating demand, and the use of alternative and local resources. Having raised the awareness of city residents, consumption dropped to 104 litres a day per capita, very close to the 100-litre limit recommended by the World Health Organisation (WHO). Supplies were supplemented with emergency measures, such as a water tanker brought over to Barcelona; the activation of the second level of emergency; restrictions in certain uses; and greater exploitation of local resources for public uses. Shortly afterwards, the El Prat desalination plant and the El Ter and El Llobregat river basins' connecting pipes were established and put into service.
- In July 2007, a high-voltage electricity cable fell onto the Collblanc distribution station, causing a short-circuit that affected the entire grid, even causing a fire in the Maragall substation which affected 323,337 users for 56 hours and 42 minutes. The critical nature of the electricity grid, especially in an urban environment, affected several electricity-dependent services, requiring the provisional use of electricity generators to temporarily cover the areas affected. This incident prompted the Catalan regional government to enact new legislation on electrical quality to regulate such situations, and even today high-voltage lines are still being put up through the city centre to interconnect substations which, while not a permanent solution to the situation, reduce the risk of other similar incidents.
- Finally, in October 2007 another crisis situation had a massive effect on access to Barcelona, when a rush to extend the AVE high-speed train line led to serious subsidence on the R2 and R10 local



Fire at the electrical substation at Maragall, 2012
Credit: Elena Carreras

commuter train's southern access lines and in the Llobregat-Anoia FGC railway line tunnel. Replacement bus services and metro interchanges were the temporary solution for the 160,000 people affected by the power cuts, until the local commuter and FGC train services were permanently replaced, after 40 days and four months respectively.

Uncertainty over the extent of real vulnerability of infrastructures, the risk of seeing another critical interruption of this scale in public services and the high probability of cascade effects on the other basic services put the municipal government on the alert over the need for a new paradigm. More specifically, the power cut affected a series of basic services that seriously harmed the living conditions of the citizens affected, while the proposed preventive solutions were neither immediate nor solely dependent on the municipal government. This is where the second stage of the resilience process

in Barcelona began. The focus at the time was on the critical situations that had occurred in the infrastructure and services. The key goal identified was to look at potential remedies from a holistic perspective by working with internal and external participants.

The main steps taken at this stage were as follows:

- A diagnosis of the situation, centred on identifying weak points and interdependencies as well as the essential operational procedures of the city's basic services, was made in 2008 by a team from the Sarrià Institute of Chemistry, which applied the experience of detecting and reducing risks in the industrial sector to urban systems, under a project called Safety in the Provision (3S). Taking part in the process were the city's main service providers and expert teams from the various related municipal areas. Although essential, this work was not enough on its own to add real value to the city's resilience.



Mercat de Santa Caterina
Credit: Ajuntament de Barcelona

- On the basis of the diagnosis and prioritised proposals for risk situations in the various areas, the next phase was to move to a practical stage, which would generate resilience for the city by implementing collaborative projects, involving all the relevant departments, focused on reducing or eliminating, wherever possible, the risks that had been identified. This was coordinated by what is now the Department of Urban Resilience at the Manager's Office for Urban Ecology and the Fire Prevention, Extinction and Rescue Service Department (SPEIS), who set about creating infrastructure committees and urban services (under the Catalan acronym of TISU). These committees were established with eight working groups from the various areas. They created a structured methodology with its own inbuilt continuity as it incorporated a permanent process of reviewing and updating the risks that had been identified.
- In particular, a work platform called the Situation Room was set up under the projects implemented by this committee to enable a comprehensive analysis of how the city was run. The value of this was in significantly improving the ability to detect concentrations of incidents and weak points in individual departments or areas of the city. This made a valuable contribution to the decision-making process.
- The development of TISU committees into Barcelona's existing urban resilience committees brought about a reorganisation of the working groups and a further improved methodology. Several existing groups were recast and others created, such as the People's Assistance group and the Urban Planning group.
- One important element of this resilience work was an increased collaboration with other international bodies and institutions. Attracted by the coherent and pragmatic approach of Barcelona's methodology,



Carrer de Sans
Credit: Vicente Zambrano González

they established a mutually beneficial relationship with the city. The closest relationship was with the UN-Habitat's City Resilience Profiling Programme (CRPP), also based in Barcelona.

Recently, we identified a pressing need to boost and prioritise resilience projects aimed at helping the most vulnerable city groups and residents and at incorporating citizen participation into the projects, which have been enriched and improved through broader collaboration.

We are now at the third stage, which has just started, and we are continuing to implement projects across all areas. Projects rely on the integrated work procedures and systems established during the second stage, and the experience gained during their development. The strategic approach is solid and in line with the main international perspectives and requirements, bringing with it a guarantee of real value for the city.

This strongly cooperative approach underpins the new impetus of the third stage, which brings us closer to meeting our long-term goals for resilience and adapting to climate change.

1859

EPIDEMICS AND
DENSITY-MORTALITY
RATIO

2005

EL CARMEL CRISIS



1999

FLOODS



2007

POWER CUT



1820-1910

OPENING OF THE PRINCESA-
FERRAN AXIS

1859

CERDÀ PLAN. REFORM AND
EXTENSION PROJECT

1893

SUBSOIL SANITATION PROJECT.
GARCIA FÀRIA

INFRASTRUCTURE
AND SERVICE
DIAGNOSTIC



2009

RESILIENCE
COMMITTEES



1999

1ST HOLDING
TANKS



RESILIENCE TIMELINE IN BARCELONA

The progress of resilience in Barcelona

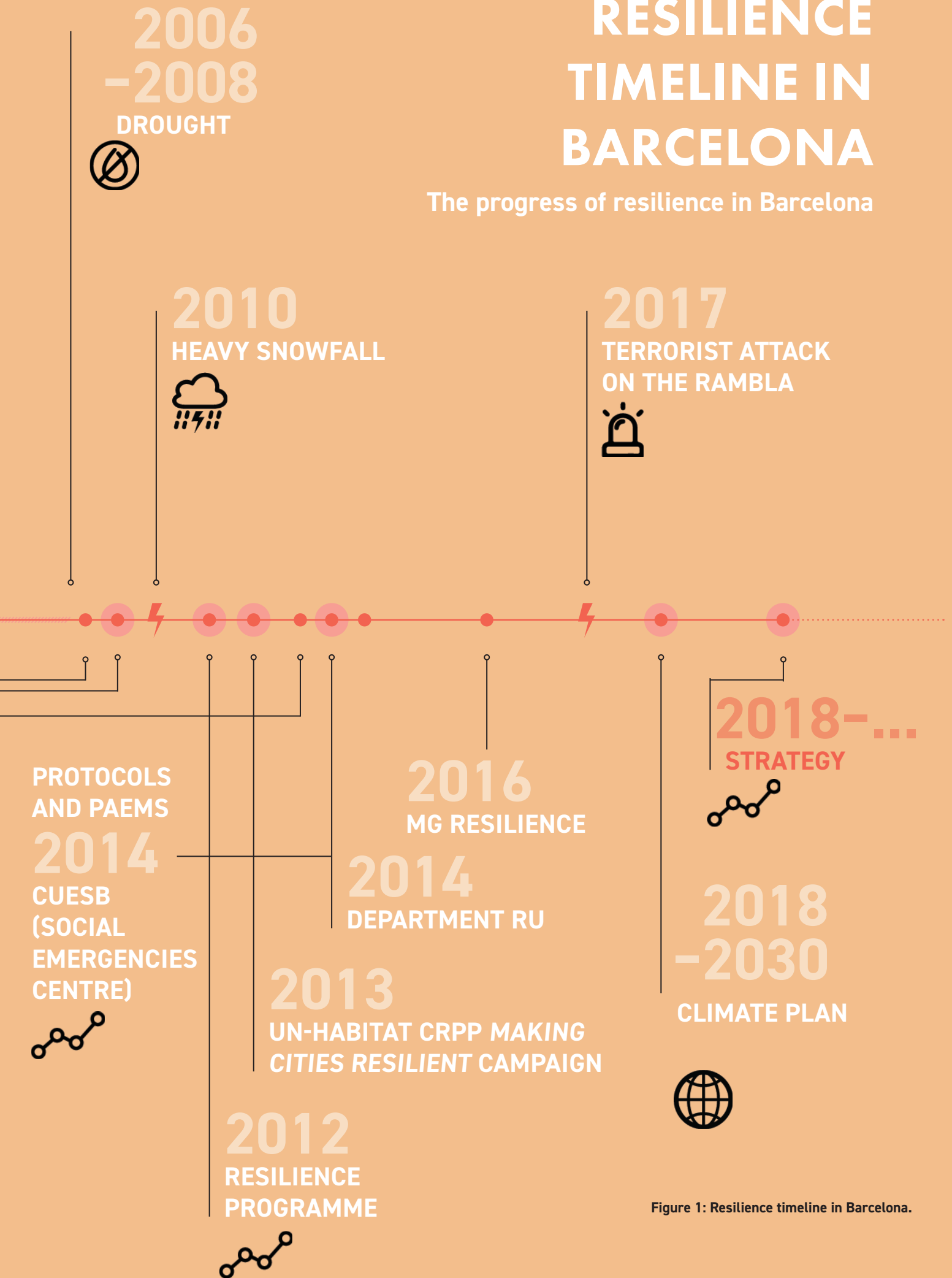


Figure 1: Resilience timeline in Barcelona.

1.3 Process: Institutionalising resilience

Barcelona Department of Urban Resilience

The Department of Urban Resilience was established in February 2014, within the area currently known as Urban Ecology, which comes under the Deputy Mayor's Office for Ecology, Urban Planning and Mobility (see Figure 2, 'The Department of Resilience within the municipal organisational chart').

Urban-resilience government measure

Presented at the Commission for Ecology, Urban Planning and Mobility on 17 February 2016, the urban-resilience government measure was approved with the consensus of all municipal political parties. The government measure incorporates the principles of the Barcelona resilience model and all the initiatives which, governed by their strategic goals, are being

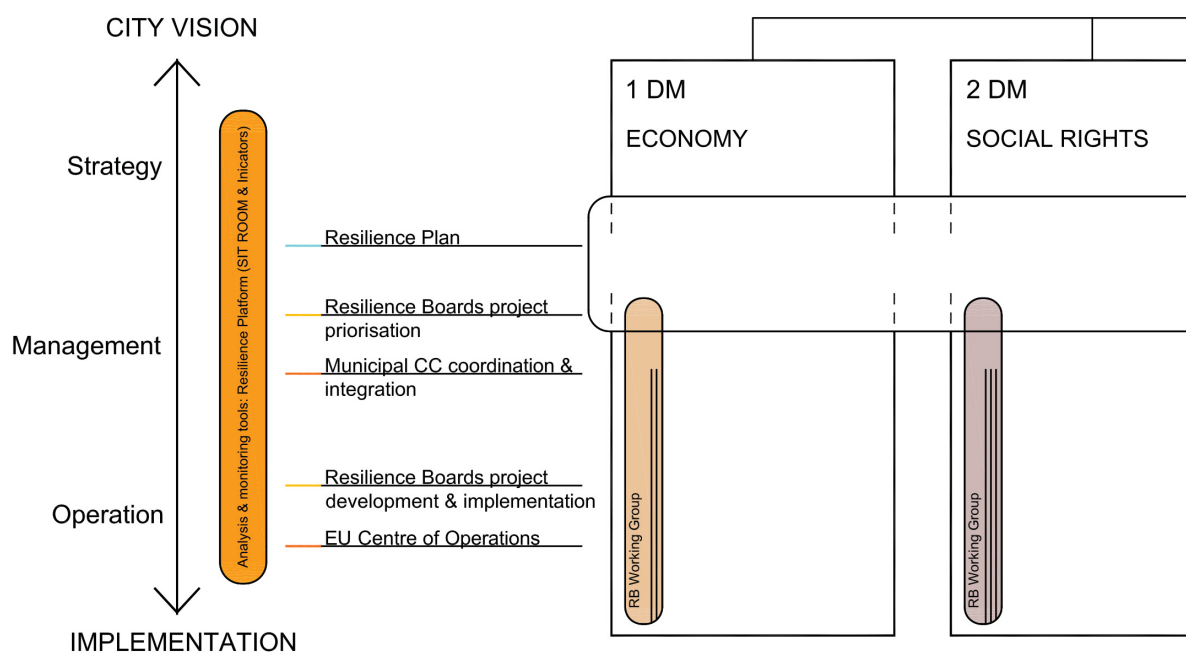


Figure 2. The Department of Resilience within the municipal organisational chart

implemented in this area. See the document here: https://www.slideshare.net/Barcelona_cat/mesura-de-govern-resilencia-urbana

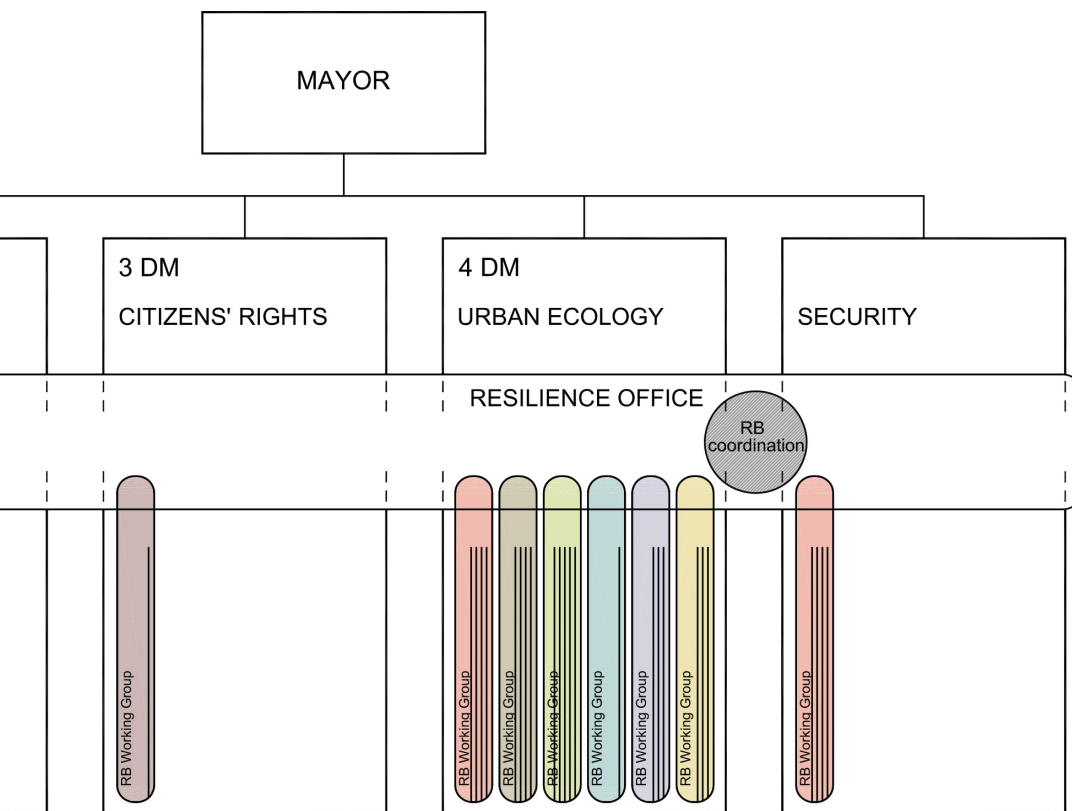
The Area of Ecology, Urban Planning and Mobility is responsible for providing the municipal services linked to public spaces and the services that make life easier for residents living and working in the city. Ecology has become a key factor that has pervaded all development and transformation policies: local urban planning, sustainable mobility, management and maintenance of urban services (water, greenery, waste, energy), and public highways.

The department is made up of three areas. The Deputy Manager's Office for Environment and Urban Services manages the provision of urban services and maintenance of the environment

in accordance with the city's commitments to preserving and improving the quality and sustainability of the environment, fighting against climate change, and enabling an active, healthy and sustainable quality of life for the people.

The remit of the Deputy Manager's Office for Urban Planning is to maintain and develop the harmonious organisation and planning of the city as an entity under constant change and expansion, guaranteeing development in line with the needs of the population and the city.

The Deputy Manager's Office for Mobility and Infrastructures ensures the smooth running of the city and coordinated action in infrastructures and public spaces, as well as maintaining the impetus to develop a sustainable and active mobility.



* RB are coordinated by the Resilience Office and Civil Protection
 1 senior member of each area (Director) is the Working Group Leader
 RB Working Groups are created and/or rearranged according to initiatives

It is through the Area of Urban Ecology that the City Council seeks to ensure the provision of high-quality public spaces and an active and sustainable mobility stimulated and sustained by the residents' involvement and commitment. A series of strategic courses of action have been defined in order to achieve these goals.



Environment and public space

The city is made up of a series of systems under a constant process of evolution and improvement in order to adapt to the population's changing needs. Urban improvement plans oversee the provision of high-quality urban services and the regeneration of urban areas for the benefit of those living and working there. Of note are the Air-Quality Improvement Plan, the Comprehensive Lighting-Renovation Plan, the Noise-Pollution Reduction Plan, the Public-Space Redevelopment Plan, the 'Barcelona dona molt de joc' programme, the Children's Corner Plan and the decision to eliminate aggressive pesticides for the sake of health and the environment.

Urban greenery and biodiversity

Quality of life also means a greener city, where everyone can enjoy contact with the natural world close to home. Urban green spaces bring ecological values that are essential for the city, such as closeness to nature, biodiversity, complexity and connectivity. They also have socio-cultural values by improving health and well-being, and promoting beauty, culture and social interaction. The most important plans and projects include the Greenery and Biodiversity Plan, the Woodland Master Plan, the Green-Infrastructure Impetus Plan, in addition to initiatives for living terrace roofs and green roofs, and for animal well-being.



Urban planning for neighbourhoods

The city has become a large metropolitan area with the same requirements of neighbourhood cohesion and environmental sustainability as any other major European city. It is crucial that development avoids creating rifts between neighbourhoods and ensures that everyone has the same opportunities wherever they live in the city. This will be achieved through the generation of environments including a network of local spaces that will prove indispensable for social involvement to the benefit of the health and well-being of the local people. We have an ongoing commitment to one of the city's most treasured assets, public space, and have implemented a series of plans, including the Empty Land Site Plan, the Superblocks project and the new view of urban planning from a gender perspective. A number of iconic projects have been implemented, such as reclaiming the Model prison, Plaça de les Glòries, St Antoni market and its surroundings, Park Güell, Avenue Meridiana, the Pere IV hub, and the transformation of the Vallcarca and Marina del Prat Vermell neighbourhoods.



Sustainable mobility

Quality of life also means returning the streets to the people. We are working towards a traffic-calmed and well-connected Barcelona that fosters a pedestrian- and cyclist-friendly mobility that is not just sustainable, safe and accessible to everyone but also capable of reaching every corner efficiently and cleanly. We have implemented many notable projects and plans, including the Urban Mobility Plan, the Bicycle Strategy Plan, the new bus network and the Electric Vehicle Master Plan.



Energy and climate change

A resilient city is one that is flexible and open to progress. It looks forward to a positive future because it establishes the conditions and resources essential not just to maintain but to improve its quality of life. The Climate Plan, the Alternative Water Resources Plan, the Energy-Transition Strategy, the Municipal Waste-Prevention Plan, the More Sustainable Barcelona Network, facilities such as La Fàbrica del Sol and the application of regulations such as environmental clauses for public procurement are elements making a positive contribution to improving the city's capacity for tackling the challenges of the future in the uncertain scenario of ongoing climate change.



Citizen compromise

Barcelona is an open and welcoming city and the City Council actively promotes initiatives and opportunities that give a voice to the diversity of the communities living in it, so that the general public, groups, organisations and individuals can all get involved in the city's transformation and development. The Citizen Commitment to Sustainability – More Sustainable Barcelona, the Citizen Council for Sustainability, the Committee Against Air Pollution and the Mobility Pact have all helped to bring about community involvement, participation and collaboration in municipal projects.



International projects

Together with other benchmark cities, enterprises and organisations in the respective activity sectors, the City Council has been launching and taking part in projects relating to ecology, urban planning and mobility. It is also involved with international bodies working to improve cities and their citizens' quality of life, participates in international networks and establishes collaboration agreements for promoting projects with benchmark cities and bodies. It takes part in projects with European (EU) funding – such as EU Cities Adapt, Procura + (Sustainable Public Procurement) – and in international networks such as ICLEI, European Sustainable Cities and Towns Campaign, Local Action for Biodiversity (LAB), World Federation of Rose Societies, World Water Council, Association of Cities and Regions for Recycling and Sustainable Resource Management (ACR+), C40 Cities Climate Leadership Group, Medcité, UN-Habitat and 100 Resilient Cities.



Despite its coming under the Fifth Deputy Mayor's Office, the Department of Urban Resilience works at a cross-cutting level throughout the municipal organisation, and its collaborative work with the Areas of Security and Prevention and Social Rights is especially important.

1.4 Barcelona's resilience model

Our vision

We want to turn Barcelona into a resilient city in every area that affects the lives of its citizens. We will be capable of rising to the challenges of today and tomorrow, and of intervening to discard or extend any boundaries that constrain us from developing the city model we wish to build.

At the very heart of our resilience policies is the goal of facilitating the integration into society of the most vulnerable groups and individuals.

Our vision guarantees the safety and quality of life of both citizens and visitors, using experience as a foundation and proactively developing opportunities and incorporating new elements as a result of that experience.

Mission and goals

1. Contributing to boosting the municipal political leadership based on the culture of resilience, in both the city and metropolitan area and in relation to the other public authorities.
2. Working to improve the capacity of the city to minimise the impact of crisis situations. This is done by reducing the response time to acute circumstances, and improving the recovery time to the city's original state or

equivalent. Each crisis is viewed, as much as possible, as an opportunity to make improvements.

3. Reducing the city's weak points by establishing creative, preventive initiatives that eliminate the original cause of the problem, or minimise the impact of the stress and disturbances it creates, strengthening the city's ability to resist similar events and ensuring that essential services are maintained to provide the fundamental facilities to the population during any untoward event.
4. Providing the city with the appropriate mechanisms for detecting and evaluating in advance the risks that it has to manage.
5. Providing useful information and tools for improving knowledge of the what is happening in the city to support the decision-taking processes on both operational and strategic levels.
6. Integrating the principles of resilience into each of the city's transformation, management and maintenance projects and processes, empowering expert teams to put resilience at the heart of their decision-making, and committing all external participants to acting in the same way.

Ongoing improvement

The urban resilience model rests on three cornerstones that correspond to the three stages making up the ongoing-improvement cycle for creating resilience: managing risks, through the Urban Space's Operational Centre and coordination with the city's other control centres; risk analysis, through the resilience information and analysis management platform, and risk reduction, through resilience committees.

According to this system, the process starts through a coordinated management of emergency incidents and situations made by the various municipal centres.

The second stage concentrates on analysing and managing the information collected and using the conclusions drawn to define the city's problems.

Finally, the projects implemented in the third stage consist of initiatives to eliminate, where possible, any weaknesses discovered in the systems or procedures, or to introduce improvements that reduce the seriousness

of their impact and prevent the same thing happening again. This strengthens the city's capacity to respond in the event of exceptional or emergency situations.

At the same time, work is being carried out on the city's resilience strategy to provide a coherent framework for the individual projects. This involves establishing common work and resource methodologies that conform to the resilience model, and designing the plans for moving forward in the medium and long term.

On a broader scale, several key collaborations have been established with multi-lateral bodies and city networks that are leading benchmark initiatives in this area. Liaisons with these cities and institutions fosters positive exchange of experience, knowledge and good practices. Collaborators include: the UN-Habitat Office of Resilience with its headquarters in Barcelona, through the CRPP; UNISDR, as a member of the Developing Resilient Cities campaign, which recognised the city as a Role Model City for Infrastructures and Urban Services in 2013; the 100 Resilient Cities programme; and the C40.

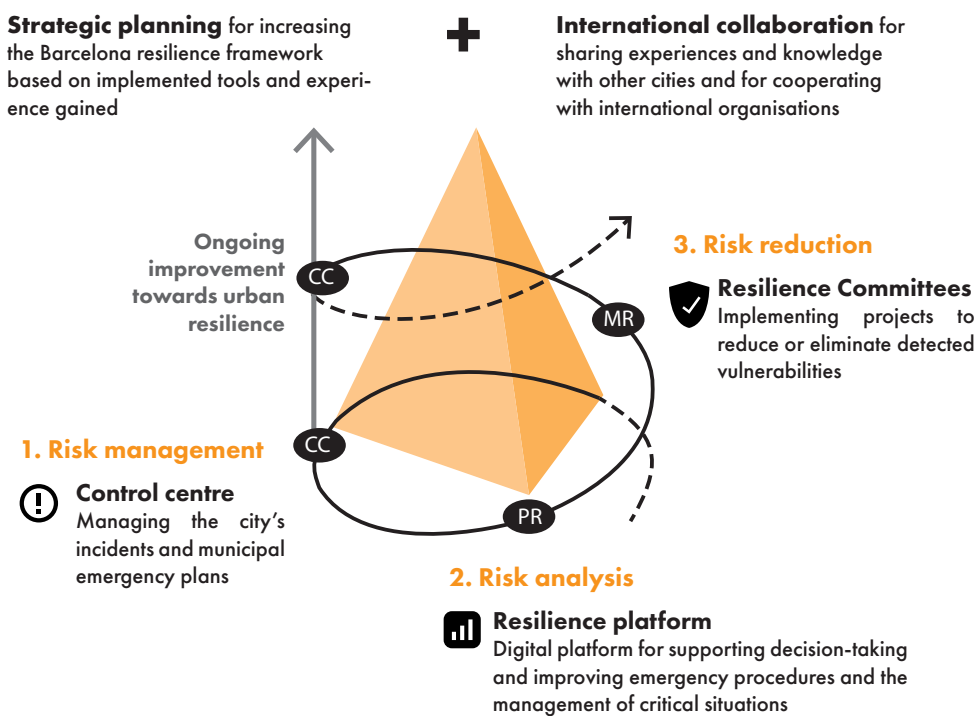


Figure 3.

The urban resilience model as an ongoing-improvement process

Services of the Department of Resilience



1. Resilience committees offer a technical secretariat service for implementing cross-cutting, risk-reduction projects.

Resilience committees have built up a network of contacts over the years with the main internal and external players responsible for planning and operating urban services, for **the purposes of implementing projects that help to reduce or eliminate detected risks**. Notable examples of such projects include the protocols with service-provider companies for communicating critical failures in the supply of water, electricity or gas, and the classification and mapping of the city's sensitive facilities in the event of an emergency.



2. Access to tools and information for improving the efficiency and quality of urban services through the DIVE-Situation Room platform.

The DIVE-Situation Room platform is designed to improve our knowledge of services and our capacity to analyse a situation before taking a decision, whether strategic or operational, which **improves the city's efficiency and supports, through reasoned argument, the decision-taking processes for urban planning, transformation and management**.



3. Possibility of conducting studies or analyses geared to strategic planning.

We at the Department of Resilience are promoting and conducting studies that enable us to evaluate and **take a deep look at the city's problems or concerns, as well as to explore the risks that we predict could affect us in the future, so that we can prepare and adapt the city to mitigate their impact**.

In other words, we need to collate all the available information in order to improve our planning and decision-making. **We we are putting our methodologies and resources at the disposal of the City Council, so it can continue exploring deeply into new areas of interest**.

The Impact Study on Climate Change in Barcelona, conducted in collaboration with Barcelona Regional, the Catalan Meteorological Service and the Public Health Agency, among other bodies, and in collaboration with the UN-Habitat's City Resilience Profiling Programme for developing Barcelona's resilience profile, are good examples.



4. Sharing of knowledge generated by the studies.

We are helping to disseminate and make accessible any new information that municipal experts consider of interest.

The Resilience Atlas aims to bring together and distribute information on various aspects of the different areas of the city which are considered to be of general interest. By publishing different kinds of maps (the results of vulnerability studies or analyses, such as the Impact Study on Climate Change), the aim is to disseminate and help to improve the knowledge we have on our city, to support the decision-making processes and establish an information base for future studies.



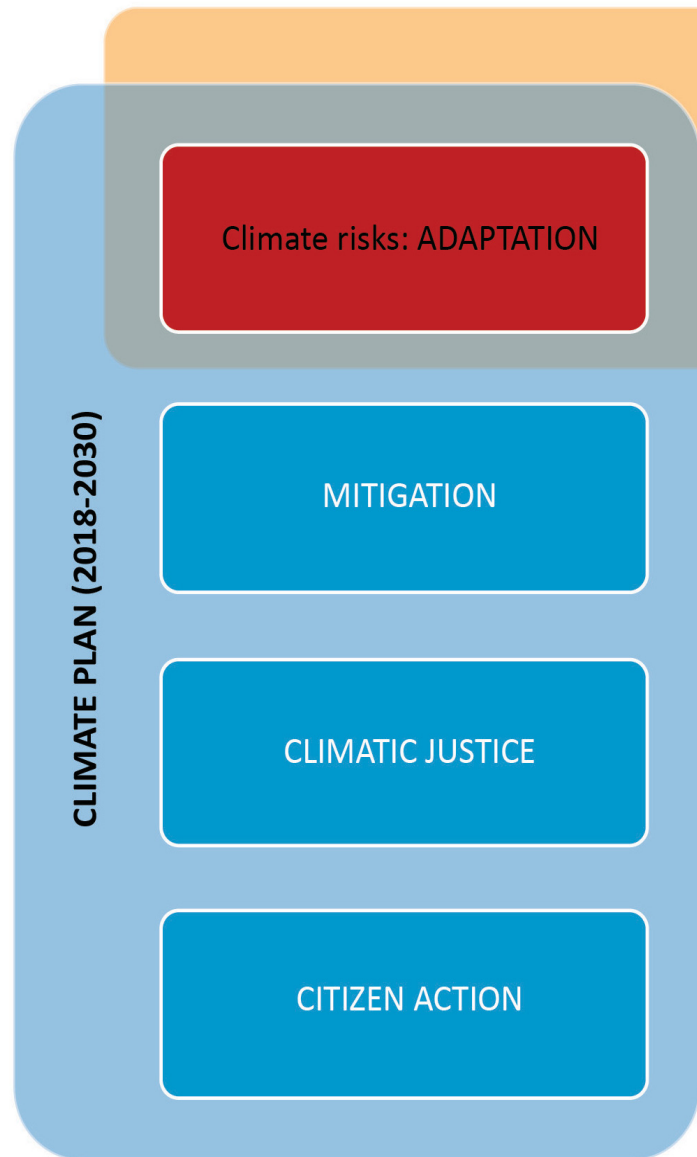
5. Network of contacts with other benchmark cities and institutions for sharing knowledge, good practices and expert advice.

Embracing the need to learn, we at the Department of Resilience have collaborated with other cities that are taking on similar challenges. Together we have invested efforts into finding more effective solutions to common problems. The exchanges made with cities from the 100 Resilient Cities network, through UN-Habitat, and C40 working groups have been used to inspire and share challenges and solutions to urban problems, such as climate change and effective city management.

1.5 Barcelona's resilience strategy

Barcelona's resilience strategy must relate to all the various sectors of involvement, and encompass every initiative and measure promoted by the City Council, integrating them so they complement each other. It can do this because resilience offers a comprehensive and holistic perspective.

A clear example of this is the Climate Plan, which in itself is already an umbrella plan for all the initiatives that the city is fostering on mitigation, adaptation and promotion of social equality in the face of climate-change risks.



RESILIENCE PLAN

Technological risks

Social and economic risks

Figure 4. The resilience strategy and Climate Plan

2. DIAGN



OSIS



2.1 Barcelona now

Barcelona has amassed a considerable volume of information on a broad spectrum of topics to help to define its current social, demographic and environmental situation.

Several studies have also been conducted to analyse its level of vulnerability in the face of various types of acute shock or chronic stress the city either has been experiencing or which

could occur in the future. The most important of these for the Resilience Strategy's development process are summarised below.

The second stage is expected to include a more in-depth examination of any topics we feel have not been researched sufficiently to ensure that we have all the necessary information in our possession.

Socio-economic and environmental indicators

A city between sea and mountain, Barcelona is wedged between the Catalan coastal range, the Mediterranean sea, the river Besòs and Montjuïc mountain.

A compact city, one of the densest in Europe, it has 1.6 million residents in an area of 101.3 km² and with a metropolitan area housing over 3.2 million residents.

Mediterranean city, both for its benign climate and for its location on the Mediterranean sea, with one of the most important ports in Europe and the world in terms of numbers of passengers.

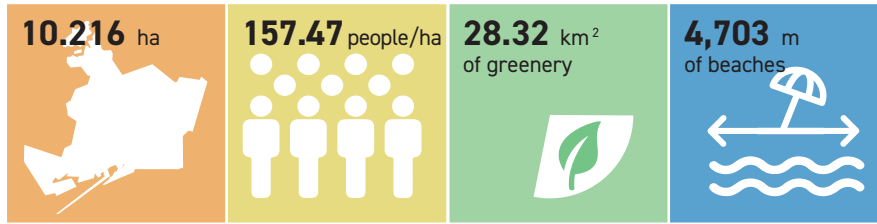
City of services that, within a century, has grown from an industrial base to a tertiary, highly specialised foundation in tourism, and which has doubled its number of visitors in the last decade alone.

City and economic centre with an area of influence that goes beyond the city's metropolitan area, extending to the whole of Catalonia.

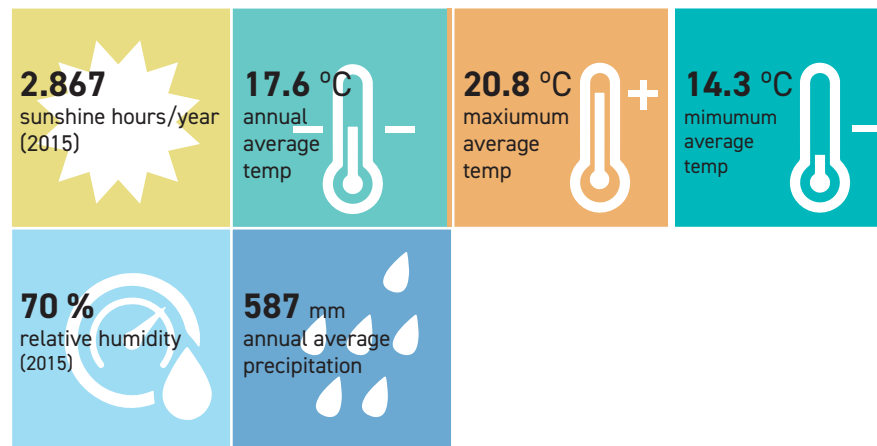
Distribution of wealth

Disposable household income (DHI) measures the income of households for use to spend or to save. Barcelona's annual average per capita DHI is 20,800 euros (datum from 2016). As for districts, Sarrià-St Gervasi has the highest DHI index (182.4 euros) and Nou Barris has the lowest (55 euros). As for the entire city, 16.7% of the population has an income in the highest bands (over 126% of Barcelona's DHI); 47.9% in the middle bands (between 79% and 126% of Barcelona's DHI), and 35.5% in the lowest bands (below 79% of Barcelona's DHI).

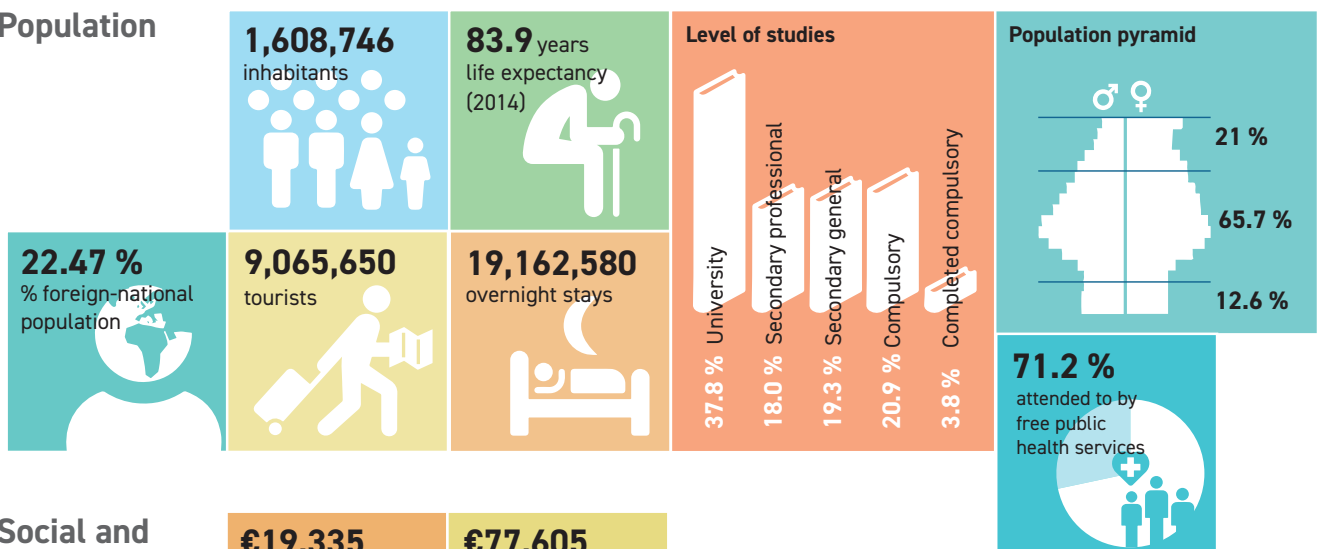
Territory



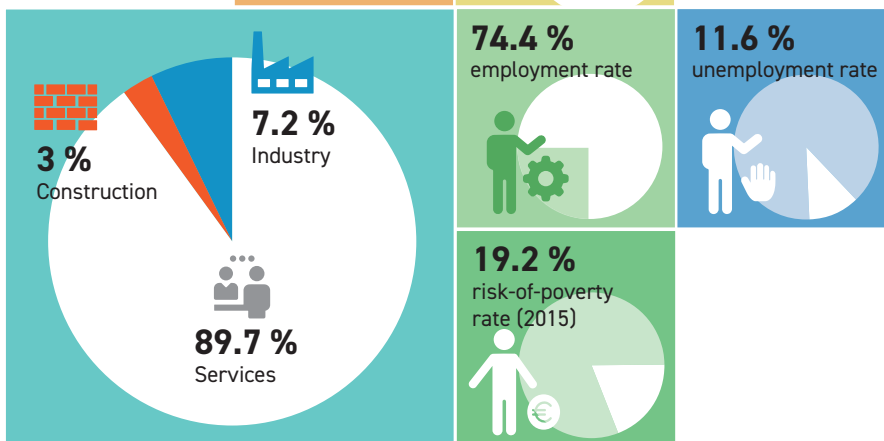
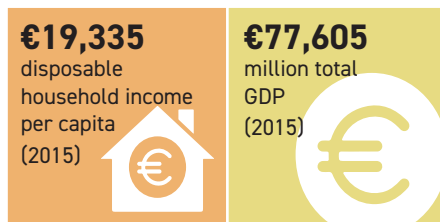
Climate

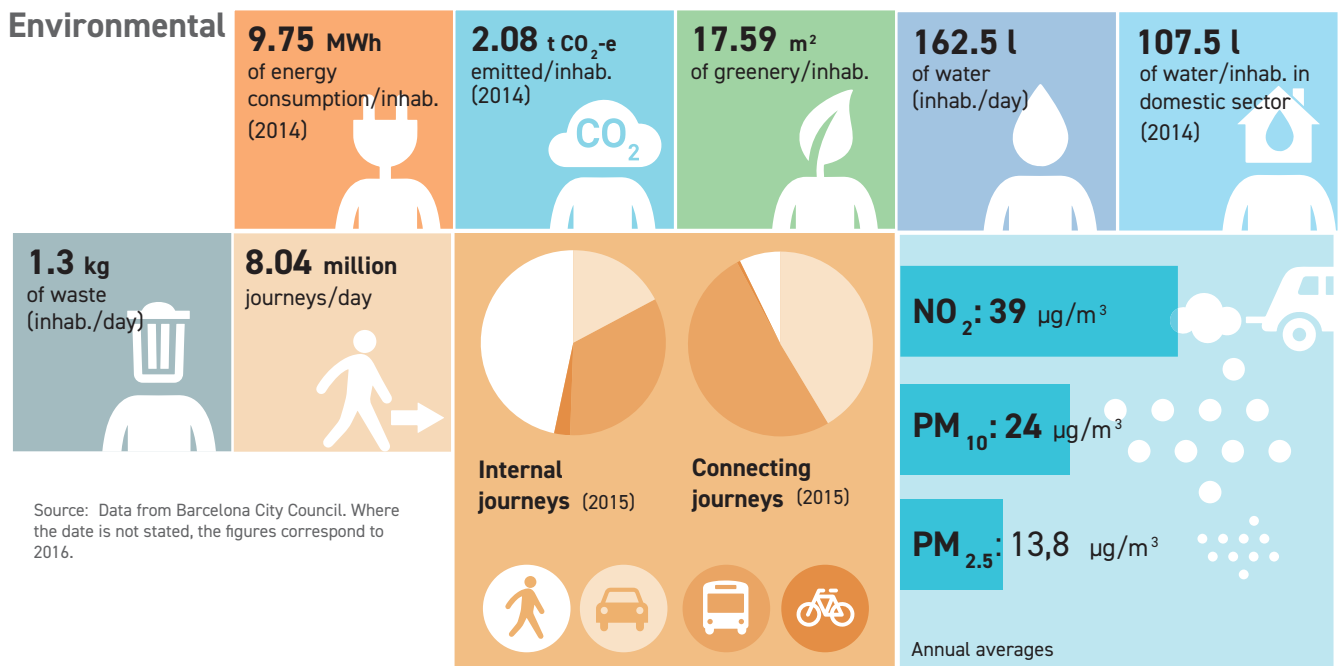


Population



Social and economic indicators





Life expectancy

The average life expectancy in Barcelona, according to data from 2015, is 83.9 years. There is a direct relationship between this figure and health, social and economic levels. A comparison between the districts reveals a difference of 4.3 years between the life expectancy of the district with the lowest value (Ciutat Vella, 81.4 years) and that of the district with the highest value (Les Corts, 85.7 years).

Access to water and energy

Nou Barris and St Andreu are the city's districts with a lower DHI, and it is in these areas that the local people who use the social service centres (SSCs) suffer higher levels of energy poverty (66.2% and 65.1%, respectively). SSC users in the districts with a higher DHI, such as Sarrià-St Gervasi and Les Corts, boast less energy poverty (35.05% and 39.10%, respectively). On the other hand, according to the 2016 Barcelona Health Survey from the Barcelona Public Health Agency (BPHA), the district with the highest energy poverty is Ciutat Vella and the district with the lowest is Les Corts. These two

sources of information suggest that there is a big difference in the income of the residents of various districts in Barcelona, and that this has consequences on access to water and energy.

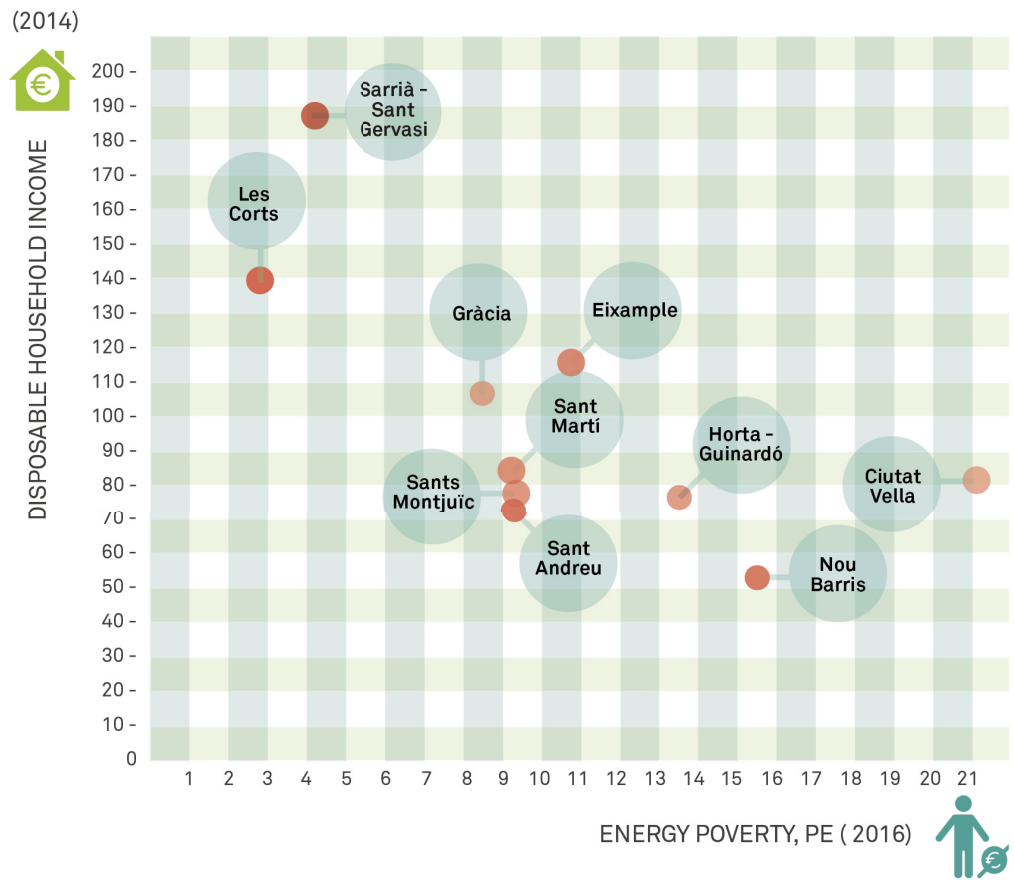
Note too that the trend in distribution of income over the last few years has accentuated the inequality, revealing a polarisation of the population at the extreme ends of the very low and very high income bands.

Poverty

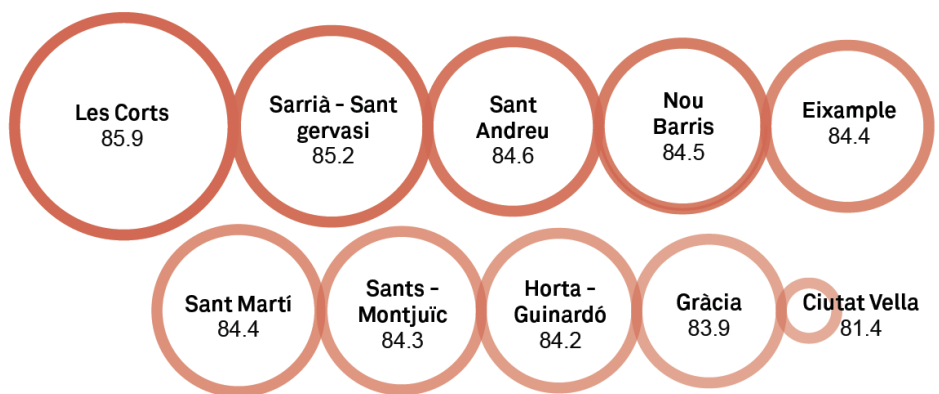
The last few years have seen a series of significant social and economic changes that have transformed patterns of poverty. One of the consequences of the crisis has been an increase in the population falling below the poverty threshold. In Barcelona's case, according to the Health in Barcelona (2016) report prepared by the Public Health Agency, 9% of households live in severe material poverty and 10.6% suffer energy poverty.

Disposable household income, energy poverty and life expectancy by neighbourhood

Source: Barcelona City Council.



LIFE EXPECTANCY (2014)



Homeless population and temporary accommodation

Increases in the **homeless populations** and residential exclusions are an alarming reality all over Europe, and Barcelona is no exception. This increase is having an impact in particular on certain social groups facing specific difficulties when it comes to guaranteeing their right to housing: single-parent families, immigrants, young people, and individuals and groups who, before the crisis, were already finding themselves in a highly vulnerable situation.

According to data from the annual report entitled *Diagnosis 2017. The situation of homelessness in Barcelona. Development and access to housing*, there are over 3,400 homeless people in Barcelona. The Homeless Persons Assistance Network states that 962 sleep directly in the street, 444 in temporary accommodation (such as squats) and 2,006 depend on existing public and private resources for having somewhere to spend the night.

The profiles of Barcelona's homeless are as follows:

- 90% are men and 10% women
- 54% are Spanish
- the average age is 42.7 and the life expectancy is 58
- 58.5% have children
- 44.5% have been homeless for over three years
- 50% of them are looking for work; 60% studied to secondary-education level and 12% to a higher level
- 20% have no health card; 79.2% suffer from physical or mental disorders
- 50% have been victims of a crime or assault

As regards **irregular settlements** in Barcelona (2017 Report on Settlements, Department of Social Intervention in Public Spaces (DSIPS)-Manager's Office for Social Rights), the growing trend over the last few years has resulted in 444 people living in 68 settlements. As for origins, only 4% are of Spanish nationality, whereas the Roma community from the east of Europe and the Galician-Portuguese Roma community represent 43% and 26%, respectively, of the total, followed by groups such as North Africans and individuals from Sub-Saharan Africa, 6% and 7%, respectively, whose numbers have seen a considerable drop over the last few years. The high level of social vulnerability and difficulties in accessing housing that these groups face make it enormously difficult for them to start the process of changing and improving their situation. In the case of Roma groups, there is the additional factor of their nomadic lifestyle, which makes it hard for them to put down roots in an area. Also relevant is the fact that they are establishing themselves in areas where they can make a living through subsistence activities, such as scrap-metal or cardboard collecting. Irregular work tends to result in them occupying sub-standard housing, such as abandoned buildings and other spaces, and even out in public streets, which often involves health and safety risks for the occupiers themselves. By district, St Martí plays host to 60% of the city's temporary settlements, followed by Gràcia (11%) and St Andreu (10%).

Population ageing

As can be seen from the following figures, the the overall population is ageing and the growing number of elderly people is becoming increasingly relevant in the city and a factor to be taken into account over the coming years.

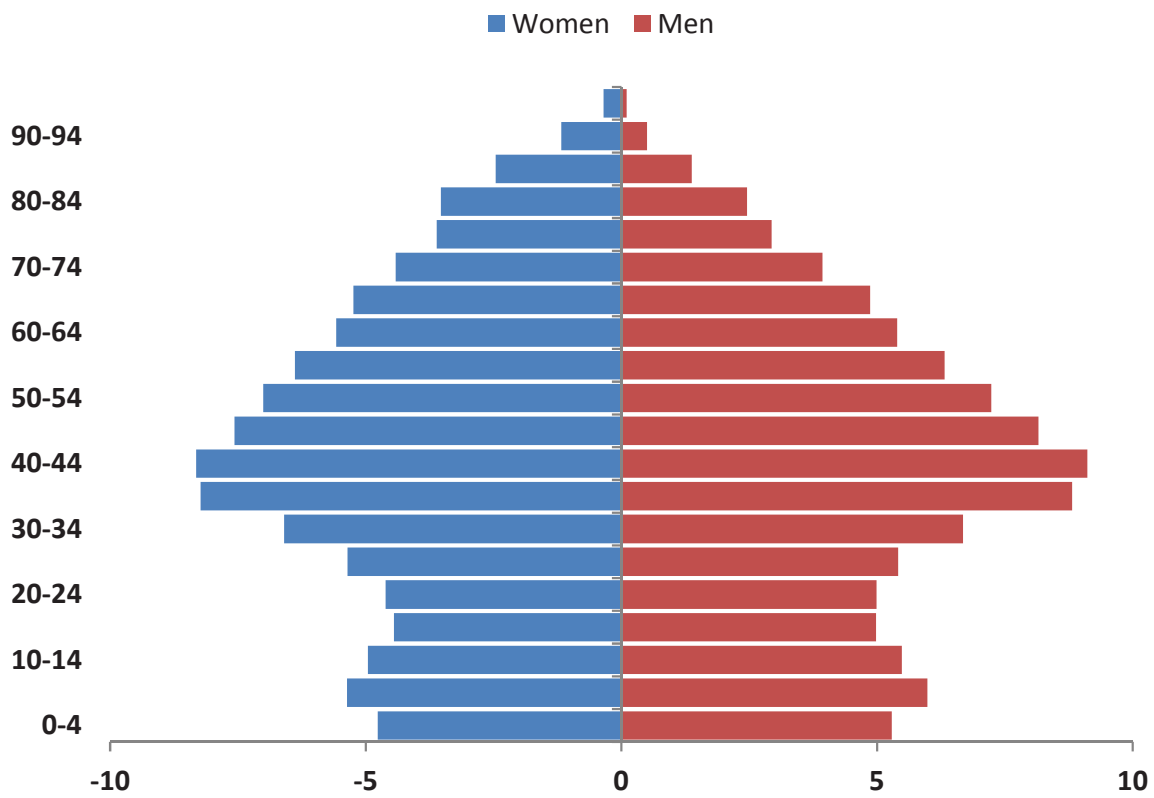


Figure 5. Barcelona's population pyramid (2015). Source: IDESCAT

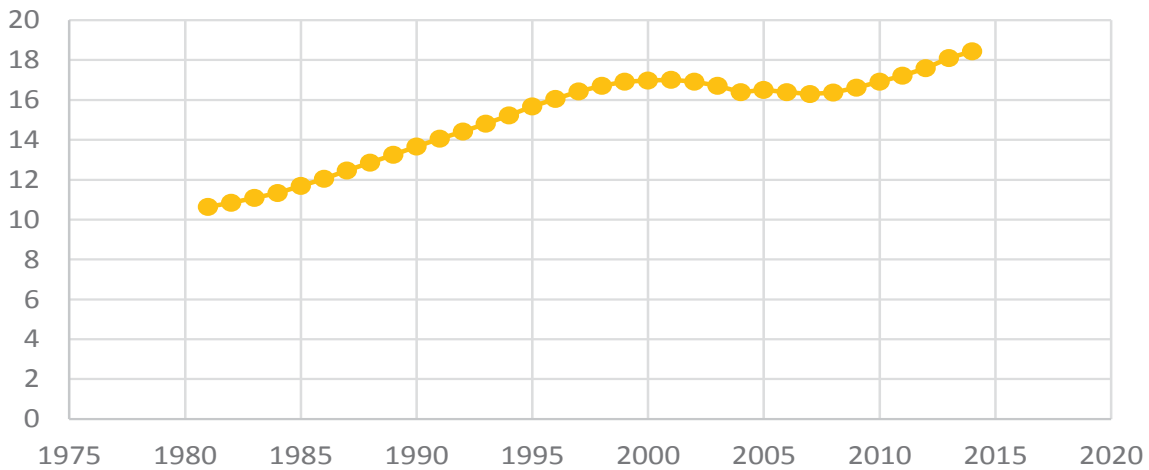


Figure 6. Development of percentage of people > 64 years in Barcelona (2015). Source: Barcelona health in the neighbourhoods presentation. Interventions with elderly people, Barcelona Public Health Agency

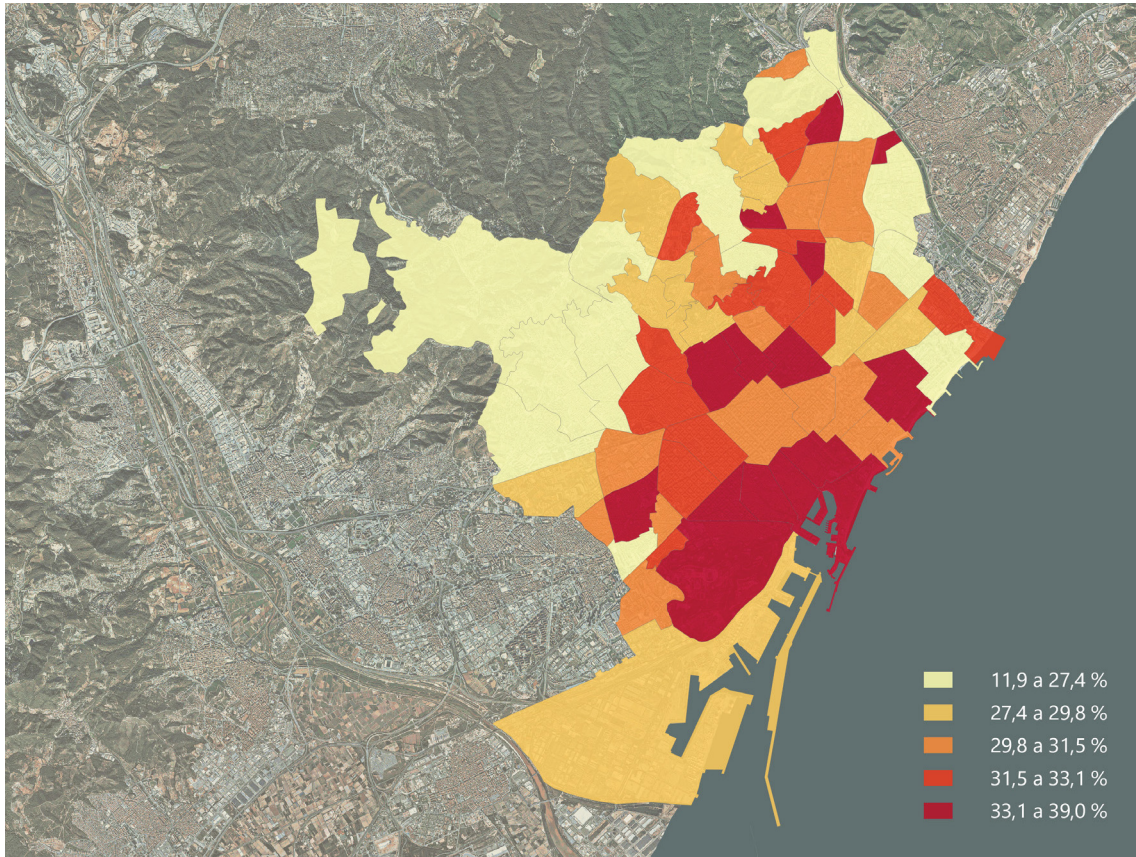


Figure 7. Percentage of people > 74 years living alone. Source: *Barcelona health in the neighbourhoods* presentation. *Interventions with elderly people*, Barcelona Public Health Agency

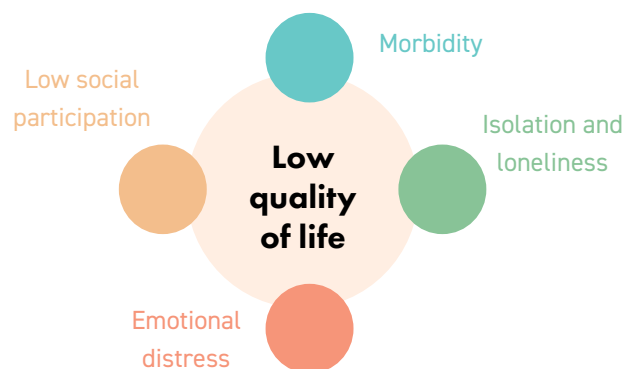


Figure 8. Possible consequences of an increasing percentage of the ageing population living alone. Source: *Barcelona health in the neighbourhoods* presentation. *Interventions with elderly people*, Barcelona Public Health Agency

This is why assistance will have to be given to this group of people, taking other relevant factors into account, such as their state of health, level of independence, the number of people in this age bracket living alone, and so on, as well as aspects relating to living in the city, which may result in this population's social isolation and loss of quality of life.

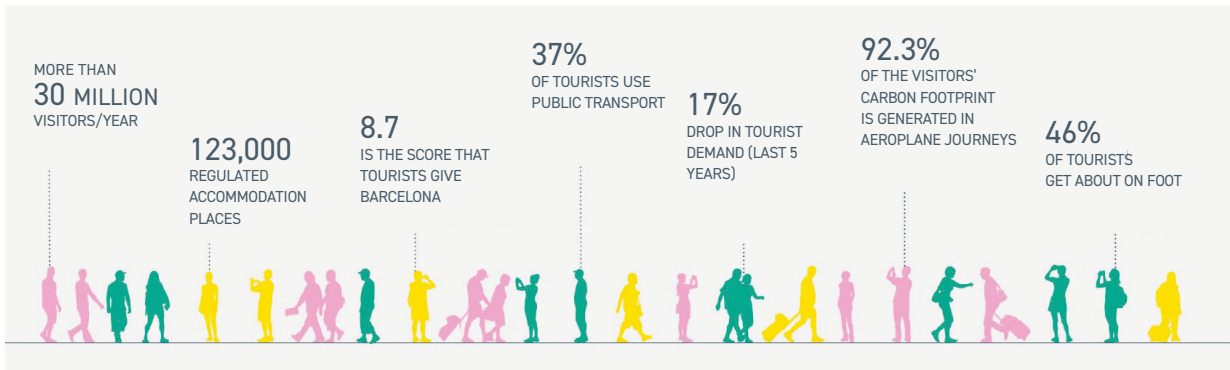


Figure 9. Tourism in Barcelona

Tourism

Tourism is one of Barcelona's most important commercial activities. It is a priority for the municipal government, not just for the contribution it represents to the city's economy, around 12% of its GNP and 14% of its jobs (*Impacto económico del turismo en Barcelona*, University of Girona, 2013), but also for the various effects that it has on the urban dynamic. These factors include localised overcrowding in areas that are highly popular with tourists; changes in residential and commercial dynamics in tourist neighbourhoods; job insecurity in the labour market due to the high dependence on the sector; increasing use of infrastructures and services; and coexistence problems between residents and tourists.

Barcelona has grown as an international tourist destination: 30 million annual visitors,

more than 19 million overnight stays per year, close to 40 million passengers travelling through El Prat airport, 120,000 regulated tourist-accommodation places (*2016 Diagnosis for the 2020 Barcelona Strategic Tourism Plan*). These statistics prove that Barcelona occupies a notable place in Europe's various city classifications (it comes fifth in number of overnight stays, according to the 2016 ECM Benchmarking Report) and forecasts suggest it will continue to do so over the coming years. Barcelona is and will continue to be a tourist city.

Tourist activities in the city have multiplied over the last few years, proving to be a key factor in the city's successive transformations. This has prompted a lively debate among the population over the sustainability of tourist development.

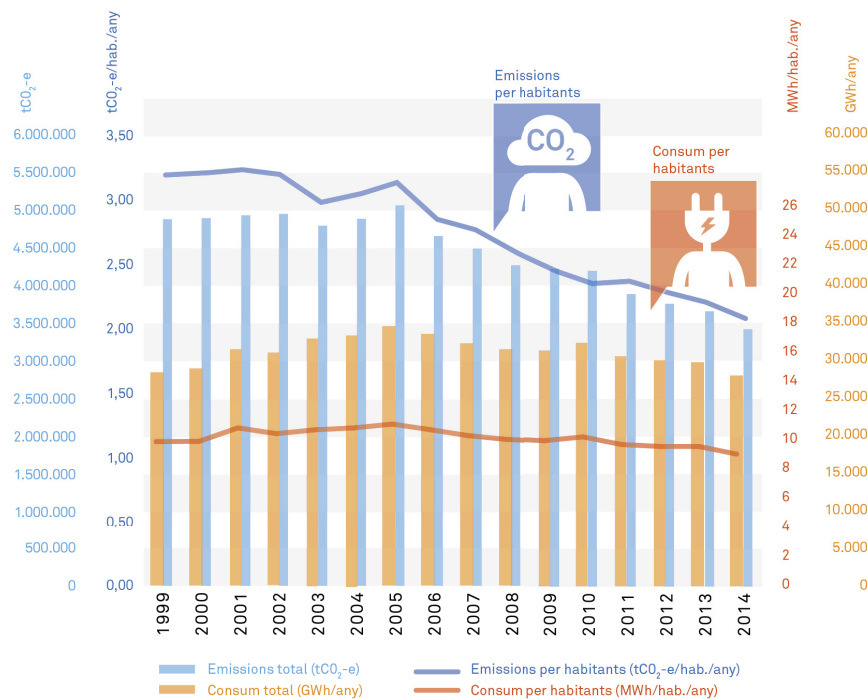


Figure 10. Evolution of Barcelona's energy consumption and GHG emissions.
 Source: 2014 Barcelona Energy Assessment. Barcelona Energy Agency (Barcelona City Council)

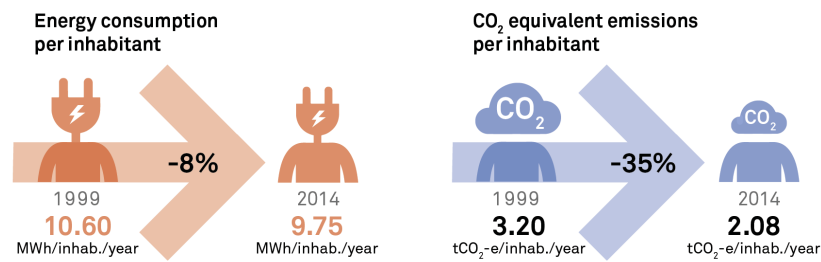


Figure 11. Evolution of Barcelona's energy consumption and GHG emissions.
 Source: 2014 Barcelona Energy Assessment. Barcelona Energy Agency (Barcelona City Council)

Energy model and generation of emissions

Barcelona's energy consumption and GHG emissions dropped by 2% and 31%, respectively, between 1999 and 2014, and markedly from 2005, when they reached their maximum level. The context of the economic crisis and increase in energy prices contributed to a large extent to the implementation of savings initiatives and good practices that had not been provided for until then. This confirms that there is a correlation between energy consumption and the socio-economic context.

Barcelona's energy intensity (which enables the increased GDP to be linked to the increased energy consumption) dropped from 261.64 Wh/euro in 1999 to 215.51 Wh/euro in 2014. This means that

the city was capable of consuming less energy per euro generated.

But what will happen when the economy recovers? According to the latest available data, energy consumption and emission generation rose again between 2015 and 2016. In 2015, energy consumption and emissions were recorded as 15,865 GWh and 3,433,000 tonnes of GHG, respectively, and in 2016, a final energy consumption of 15,633 GWh and 3,443,000 tonnes of GHG, respectively, suggesting an upward trend for the coming years. So a new energy culture must be promoted which disconnects economic growth from energy consumption.

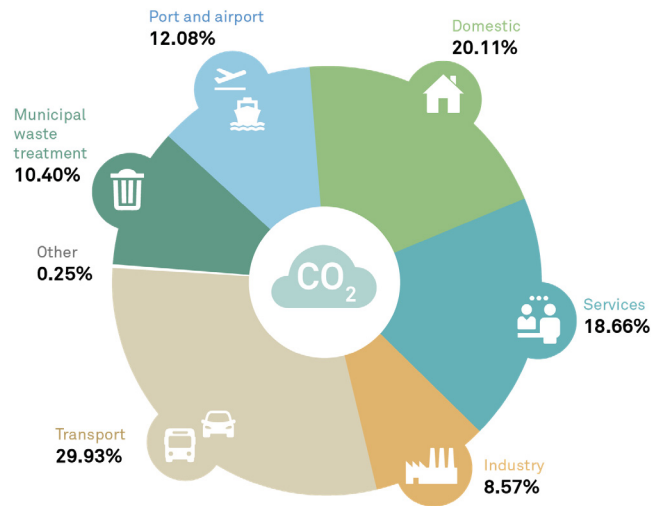


Figure 12. CO₂-e emissions per sector. Source: 2014 Barcelona Energy Assessment. Barcelona Energy Agency (Barcelona City Council).

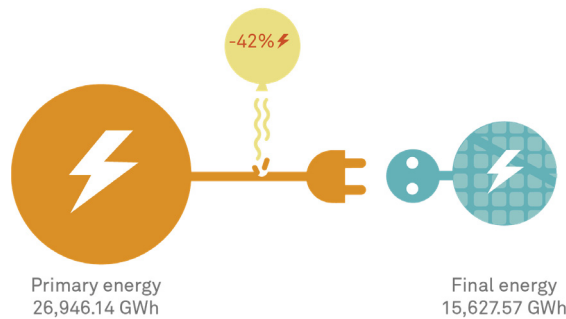


Figure 13. Efficiency of the energy generation and transport system. Source: 2014 Barcelona Energy Assessment. Barcelona Energy Agency (Barcelona City Council).

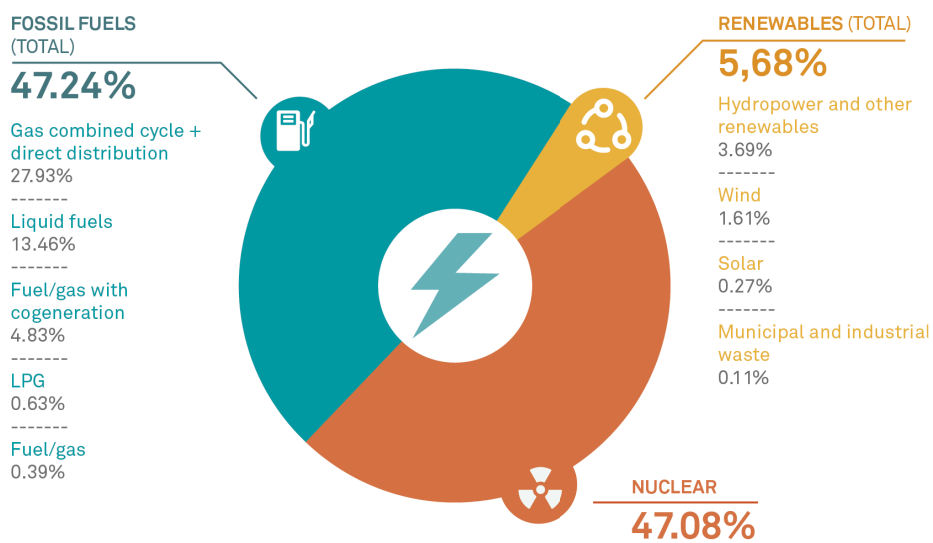


Figure 14. Primary energy source according to Catalan mix. Source: 2014 Barcelona Energy Assessment. Barcelona Energy Agency (Barcelona City Council)

2.2 Barcelona's resilience profile

V1. Preliminary April 2017 profile

The UN-Habitat agenda, under the United Nations programme for the development of human settlements, includes the goal of reducing risks and developing urban resilience. To work towards that goal required a coherent, holistic system of assessment and measurement that could define the capabilities of individual areas of activity. The CRPP developed this multi-risk and multi-participant approach, allowing for an evaluation not just of the capacities within each sector, but also of any overall processes that could potentially be liable to chronic stress or acute shocks.

Barcelona took part in a pilot test to define and then adapt practical aspects of development and urban management, based on the knowledge of the existing capability and how much it could be improved.

The available data was collated, merged and adapted to be output in formats that made it easier to extrapolate the information required. This supported our goal of developing a comprehensive vision to plan for, prevent and effectively manage untoward situations.

V2. June 2018 profile

Following consultations between UN-Habitat and the Department of Urban Resilience (March 2018), the implementation of the CRPT version 2.0 in Barcelona was focused on a series of specific areas of concern for the municipality, and the aim was to avoid duplication by integrating the extensive work previously carried out by the city in the field of resilience.

Four main subjects of interest were therefore chosen:

1. accessibility of the basic services;
2. affordability of the housing;
3. gender equality;
4. poverty.

In each case, the CRPT used its urban-system model to compare, re-organise and diagnose the locally available data and this fed into the long-term development of a Resilience Strategy for the entire city. This strategy is due to be launched in 2019.

This reflects the municipality's awareness that the socio-economic stress experienced by the city over the last decade had intensified, as well as the local authorities' commitment to putting greater effort and resources into tackling social exclusion and vulnerability from the perspective of urban resilience.

CODE	CRPT COMPONENT	ACCESS TO SERVICES	POVERTY and ECONOMIC EXCLUSION	GENDER	HOUSING AFFORDABILITY
1. Built environment 89%					
1.2	Ownership of the land				
1.3	Housing				
3. Basic infrastructure 75%					
3.1.1.1	Access to electric supply				
3.1.1.2	Electric supply service coverage				
3.2.1.1	Access to drinking water				
3.2.1.2	Water-supply grid coverage				
3.2.21	Access to sanitation				
3.2.2.1	Sanitation network coverage				
3.3.1.1	Solid waste collection coverage				
3.3.2	Access to collection service				
4. Mobility 96%					
4.1.1	Diversity of modes of transport				
4.1.2	Urban mobility coverage				
4.1.3	Access to urban mobility system				
6. Social inclusion and protection 30%					
6.2	Minimum social protection level				
6.3	Access to basic social services				
7. Economy 86%					
7.1	Local economic structure				

Table 1. Identification of the CRPT's components relating to the priority areas to be analysed in Barcelona. Source: CRPP, UN-Habitat

Table 1 lists the components of the CRPT that were regarded as essential to ensure a comprehensive consideration of these topics.

The 'built environment' element of the CRPT has been fully implemented in the city and, as previously, serves as a parallel test on the data, comparing it with that collected by UN-Habitat. By acting as a pilot test, the exercise established

the bases for a second analysis stage starting in July 2018.

It is in this context that the following section aims to provide a preliminary examination of the data-collection work carried out by UN-Habitat between March 2018 and June 2018, on each of the above-mentioned issues.

Accessibility of the basic services

Acting in line with the UN-Habitat's CRPP for basic services and infrastructure analysis, the issue of the accessibility of basic services was tackled by collecting quantitative and qualitative information on the guaranteed coverage for each network and the people's capacity to afford each service and access it safely.

Urban mobility, solid waste collection, energy supplies, water supplies and waste water were examined from this perspective, combining spatial, demographic and socio-economic figures. Almost all the data requested by each of these services were available to the public, whether through municipal or metropolitan datasets, depending on the jurisdiction.

An initial review of the data at a general level revealed that the problems of accessibility and affordability in Barcelona particularly affected the lower quintile of the population in housing-related public services. In fact, as already pointed out from the sectoral diagnoses of the city's Climate Plan, energy poverty has rapidly become a subject of concern over the last few years. Local authorities are being pressured into providing financial support for households unable to pay their monthly utility bills to prevent operators from cutting off their energy and/or water supplies. Although network coverage and the population's access are 100%, the latest data show several socio-economic barriers to access that require additional breakdown and research.

By contrast, urban public transport appears to be affordable. Area coverage is almost 100% for all the services analysed, while fares do not exceed the affordability threshold for the lower quintile of the population living within the first metropolitan ring.

Housing affordability

Housing-related data were collected through the CRPT's land and housing department and were compared with general demographic and socio-economic information available from the Municipal Department of Statistics.

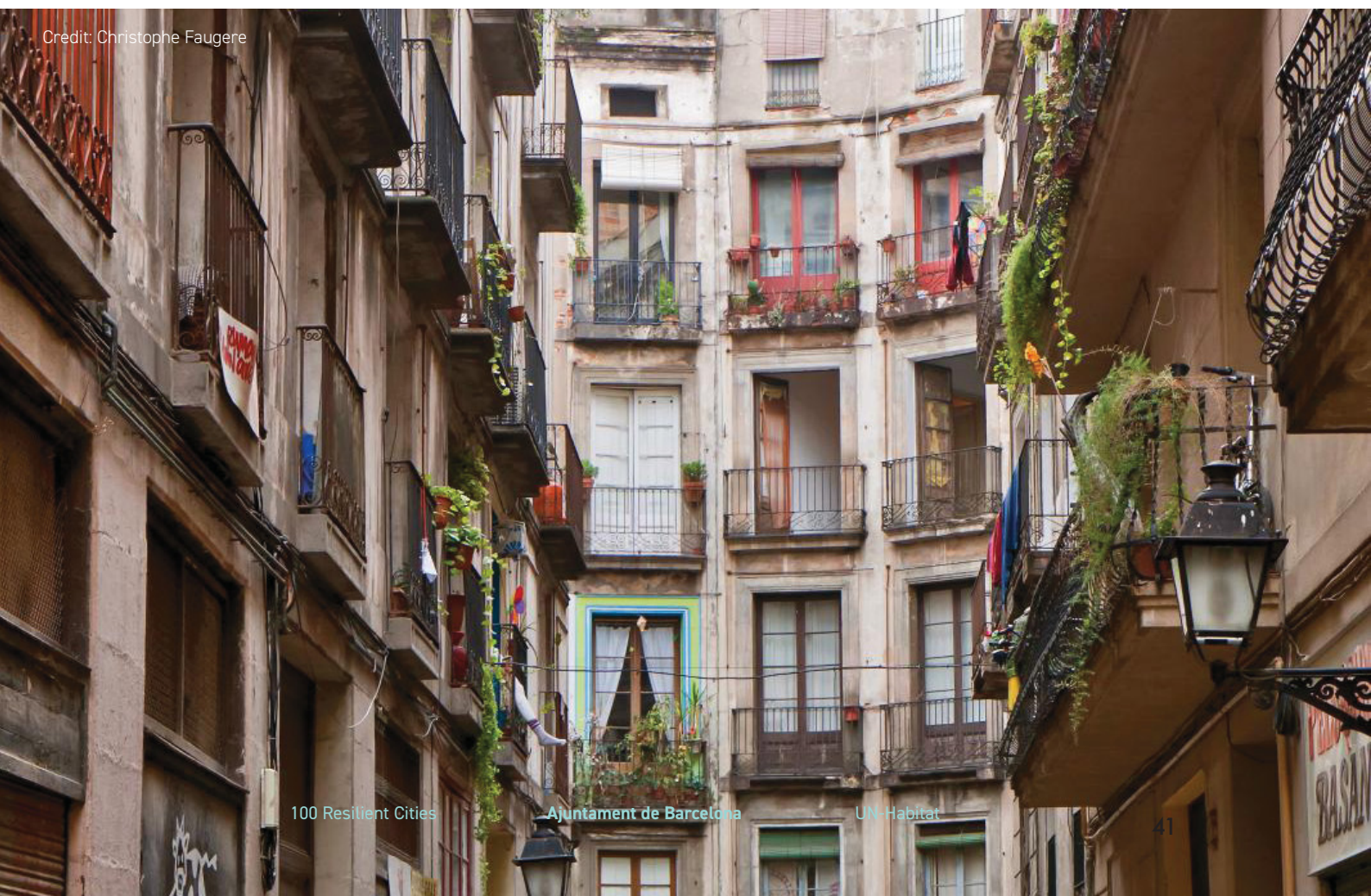
Here not just the data reported in the diagnostics of the Right to Housing Plan for 2016–2025 but also the indicators collected by the Metropolitan Housing Observatory were of vital importance in gathering information on housing and housing problems in the city. However, we need to take account of the fact that this assessment was based largely on a relatively antiquated housing census (National Institute of Statistics, 2011), and that market prices both for owning and for renting are on the increase.

In fact, all the datasets point to the fact that housing-related expenses represent a large proportion of total household expenditure, exceeding the 30% per annum affordability threshold. This was defined by the Municipal Department of Statistics (2016) as the proportion of average expenditure on housing by household in relation to the total average family income per year. A rapid annual increase in property prices was not matched by a similar increase in household incomes. Therefore the proportion of households in which expenditure on housing was defined as affordable remains slim, despite the 2007 commitment to raise it by 15% for 2025.

Although the estimates vary depending on the criteria used for the analysis, the CRPT data show that the number of affordable dwellings in the city is slightly over 20,000 properties (2.7% of the total), of which 10,522 are for social rent, 10,318 receive public subsidies for renting and almost 2,000 private properties are run by the City Council and allocated as social rented properties. In addition, although some of the figures also include properties which were acquired as subsidised dwellings, or ones that still have official protection, and properties under old lease contracts (approximately 30,000 units), such categories are scheduled to be gradually reduced over the coming years and possibly reabsorbed into the mainstream property market, as also recognised under the Right to Housing Plan for 2016–2025.

Given the socio-economic and rapidly changing housing panorama in the city, and the previously mentioned partial dependency on obsolete census data, there is a need to carry out more research on the composition of the housing market. This would benefit from using the latest and most in-depth data, with the goal of continuing to develop new perspectives on housing and residential exclusion.

Credit: Christophe Faugere



Poverty and social exclusion

The issue of poverty relates to every one of the topics analysed throughout the resilience-building process. It is especially important in analysing the point at which economic hardship can prevent certain groups of the population – with special emphasis on the most vulnerable – from satisfying their basic needs.

While the preceding paragraphs provide a few ideas on social exclusion and residential patterns in the city, a comprehensive evaluation of urban poverty through the CRPT's urban system model is based on information from several parts of the section on social inclusion and protection.

Researchers examined access to and coverage of the existing public social services, but refined the data to show how these impacted on various groups: for example, poverty by age group, persons with health-care needs and the unemployed. They also looked at the benefits and means of protection provided by the local authorities. Even though the overall figures on vulnerable groups were generally accessible, thanks to the support provided by the Municipal Social Emergencies Centre (CUESB), important data were introduced that made it easier to subdivide the data to provide more useful information.

At a general level, the data collected show a greater exposure and vulnerability among older people than in younger groups. According to the figures from 2016, 19% of the elderly population are at risk of poverty, compared to 14.7% of children and 18% of the total population (17% in men and 19% in women). This situation was also made worse because although the coverage of

public pensions in Catalonia is 59% (79% in men and 44% in women), 40% of these pensions are actually below the adequate minimum salary level. This therefore represents an additional factor of exposure to poverty.

We concluded that a general evaluation of social exclusion and vulnerability in the city requires additional research to discover the impact and coverage of the various means of protection already established. We would also need to evaluate whether additional disaggregated statistics are available and accessible.

Gender equality

A comprehensive evaluation was carried out using the Gender Equality Enhancer (a UN-Habitat tool for improving gender equality). In this process, a list of indicators and questions was selected from the eight components of the CRPT's urban system, all with a gender perspective. They were applied in order to evaluate the available statistics and provide a snapshot of the state of gender equality in the city.



A preliminary display of these figures in this context requires two types of consideration:

- Information was available for almost every one of the nineteen specific gender questions researched. At a general level, the local government's commitment to improve gender equality and promote the inclusion of women, in particular those in vulnerable situations, reflects well in a series of protection and prevention measures.
- Less encouraging is the trend highlighted on the gender gap in incomes and pensions, registered at 78% and 76.3%, respectively (women's income/ pensions as a percentage of men's income / pensions, 2016). This figure, however, is lower than the national rate for the gender salary gap, which is 86%.
- On the other hand, the process revealed considerably less availability of data disaggregated by sex in almost every one of the CRPT's components analysed; especially with regard to inclusion and social protection.

In other words, even though the basic demographic information was generally accessible for both sexes, it proved challenging to obtain disaggregated figures for age groups and vulnerable groups of the population differentiated by age.

In some cases – for example, basic service coverage – the responses were so close to 100% that it was reasonable to apply the same value to the male and female population, creating an estimate for the disaggregation. In other situations – mainly in inclusion and social protection, though not exclusively so – this interpolation would be inaccurate and therefore specific research would be required on the nature and proportion of the data series.

Availability of data and future steps

The information discussed so far captures the state of progress of the data-gathering process from June 2018 onwards. It illustrates the obstacles encountered during the process and outlines the main conclusions on the basis of a preliminary examination of the information.

The advances were presented by UN-Habitat at a workshop (2–3 July 2018), which brought together representatives from Barcelona City Council, Barcelona Regional and 100RC, with the aim of combining municipal and extra-municipal workflows in a coherent resilience strategy for the city.

CODE	CRPT COMPONENT	ACCESS TO SERVICES	POVERTY and ECONOMIC EXCLUSION	GENDER	HOUSING AFFORDABILITY
1. Built environment 89%					
1.2	Ownership of the land		95%	60%	
1.3	Housing	100%	84%		100%
3. Basic infrastructure 75%					
3.1.1.1	Access to electric supply	0%	0%	0%*	0%
3.1.1.2	Electric supply service coverage	0%	0%	0%*	
3.2.1.1	Access to drinking water	100%	100%	100%*	100%
3.2.1.2	Water-supply grid coverage	100%	100%	100%*	
3.2.21	Access to sanitation	100%	100%	100%*	100%
3.2.2.1	Sanitation network coverage	100%	100%	100%*	
3.3.1.1	Solid waste collection coverage	100%	100%	100%*	
3.3.2	Access to collection service	100%	100%	100%*	
4. Mobility 96%					
4.1.1	Diversity of modes of transport	100%		0%*	
4.1.2	Urban mobility coverage	100%			
4.1.3	Access to urban mobility system	87%	100%	100%*	
6. Social inclusion and protection 30%					
6.2	Minimum social protection level	30%	86%	86%*	
6.3	Access to basic social services	5%		5%	
7. Economy 86%					
7.1	Local economic structure	84%	84%	70%	80%

Table 2. State of completion of the data by component, with regard to cross-cutting types of stress.

Source: CRPP, UN-Habitat



Line L5 on the Metro
Credit: TMB

The workshop concluded with the identification of a series of key areas for further development and research, including, though not limited to, the four types of urban stresses tackled by UN-Habitat, and resulted in a roadmap for developing the second stage of the agreed strategy, put into practice from 2018.

Here the two tables show the completed state of the collected data presented during the workshop, on which basis we will move forward.

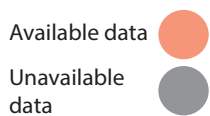
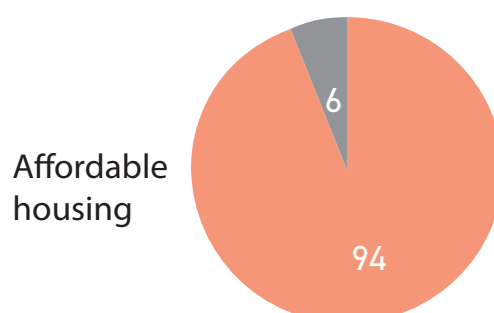
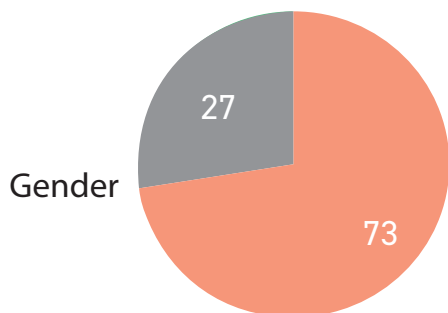
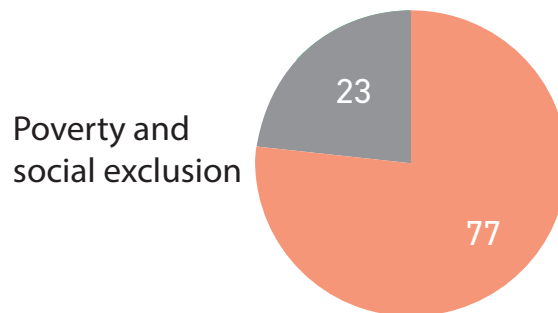
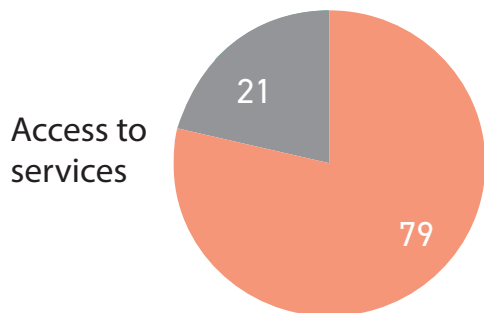


Table 3. Completion state of data availability by sector

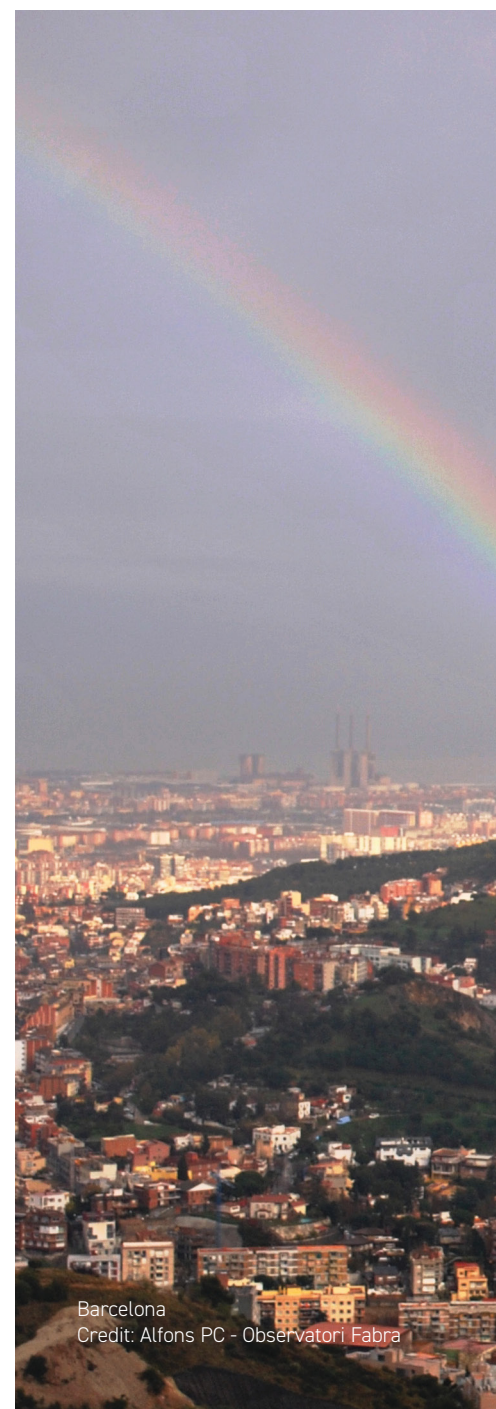
Source: CRPP, UN-Habitat

2.3 Definition of current risks (shocks and stresses)

Barcelona is one of the most densely populated cities in Europe, making it especially vulnerable to a range of stresses and strains. Possible risks that can affect the city have been identified and defined from multiple perspectives and the various international risk-evaluation frameworks integrated by adapting them to Barcelona's own needs and conditions, and basing them on the city's experience of overcoming difficult situations in the past.

Barcelona's participation in the UN-Habitat's CRPP programme and the 100RC programme promoted by the Rockefeller Foundation enables an alignment of two different approaches, though with similarities, and a comparison of the risks identified for Barcelona with the trends described in the Global Risk Report 2018, published by the World Economic Forum.

The main shocks Barcelona is exposed to come from the effects that climate change may bring about in the city. By contrast, most of the stresses the city is exposed to come from social, environmental and economic factors.



Barcelona
Credit: Alfons PC - Observatori Fabra



Shocks



Increased heat

Exposure to high temperatures is not an unknown factor for Barcelona and its residents; nor are its consequences to the health of vulnerable groups such as the elderly and children. Foreseeable increases in temperature linked to climate change will bring about a greater incidence of heatwaves and an increase in urban heat-island effects.



Droughts

One of the features of the Mediterranean climate is the water deficit caused by poor rainfall during the summer period. Barcelona's metropolitan environment has already experienced severe drought conditions that have jeopardised water supplies to its residents. In the future, we expect to see reduced precipitation alongside an increase in consumer demand. The combination of these two factors means we need to find additional water resources.

The effect that climate change can have on the water cycle, as the various forecasts show, is a slight reduction in resources, especially towards the end of the century and, above all, greater variability in the availability of water resources, with increased periods of drought contrasting with possible floods in extreme periods. A slight rise in demand is also expected. This will worsen the deficit in supplies that the city is already experiencing today.

In particular, 12% and 9% reductions are expected in surface- and ground-water resources respectively for 2050. On the other hand, an increase in demand of roughly 4% is expected for various uses in the city. There will be an additional need for drinking-water resources in general for the Barcelona metropolitan area (34 hm³ per year) and the city of Barcelona (an estimated 18 hm³ per year).



Floods

More than 70% of the Barcelona area is impermeable to water which, added to other climatic factors, create an urgent need to prepare the city to cope with extreme flooding.

The general trends observed for climate change indicate that changes in rainfall and a higher sea level will exacerbate the risk of floods. Extreme events are expected to become more frequent, although there will be little variation in their scale. In Barcelona's case, what had previously been associated with 50-year return periods is expected to shorten to 35-year return periods by 2050.

As for changes in rainfall, most of the forecasts agree that there may be an increase in rain intensity and a concentration of extreme episodes. Increased intensities may cause floods in certain areas of the city, as these could raise the level of flowing water and put the city's drainage system to the test.

As for a higher sea level, this may affect the functioning of the sewerage network in extreme situations. In similar situations, a higher sea level would stop drains from working properly, which could lead to excessive rises in the network's water level, causing surface overflows and therefore street floods.

Flood risks will affect some areas of the city more than others. The conclusion is that, at present, for rainfall with a ten-year (T10) return period, the sewerage network functions correctly (despite operating under pressure along certain sections), although in the two future scenarios analysed, overflows are expected.



Forest fires

In Barcelona's case, exposure to forest fires is concentrated mainly along the Collserola mountain range. Dry seasons combined with high atmospheric temperatures are making the Mediterranean region, and Catalonia in particular, highly prone to forest-fire risks, and climate change is expected to aggravate these conditions. The city's strongly dependent relationship on the Collserola mountain range as its green lung, and the possible impact on infrastructure and services that such forest fires could have, highlight the need for protecting and maintaining the city's natural environment.



Terrorist attacks

Barcelona's position as a centre for international tourism and commerce makes it significantly exposed to international terrorism, representing considerable potential danger for the city, particularly in the wake of the summer attacks in 2017. The city suffered a jihadi terrorist attack on 17 August 2017: an attack on pedestrians along the La Rambla left 15 people dead and 126 wounded.



Epidemics

Changes in the climate and environment are attracting totally new tropical diseases, transmitted by insects, to the Barcelona metropolitan region.

Failure in infrastructures

It is essential for basic infrastructures to function properly if a city is to have the capacity to facilitate and provide the necessary conditions for human activity to occur. Investment planning and forecasts must focus on reducing the risk of such failures.



Credit: Ajuntament de Barcelona

Stresses



Effects on the natural environment

Environmental degradation and the appearance of invasive species has led to a loss in biodiversity and a deterioration of ecosystems. At the same time, a lack of green spaces has been contributing to the poor quality of the air and reducing the city's ability to respond to extreme heat phenomena.



Effects on the coast line

The steady rise in the sea level, together with coastal floods caused by sea storms, increases the risk of coastal erosion and has a direct effect on the development of socio-economic activities and tourism in the city.



Provision of basic services

Energy insecurity and access to water and food are vital aspects of daily life which have an impact on the well-being of the population and which may be affected or jeopardised by several factors, such as increased population, crop losses resulting from climate change, droughts, changes in consumption patterns and increased energy prices.



Unsuitable infrastructure

Big cities are constantly exposed to risks arising from the use of basic infrastructures. The need to adapt quickly and efficiently to changes and the transition to a cleaner and more environmentally friendly city model will depend on the modernisation and suitability of its infrastructures.



Economic and political aspects

The economic environment of cities in the globalised and changing world of the 21st century is strongly exposed to markets and changes in macro-economic trends. Catalonia has recently seen the launch of a transition process towards an independent State based on a demand for greater political and tax autonomy from the central Spanish government, triggering a serious constitutional and political crisis. Although it is still too early to identify its social and economic consequences, as well as the city's image to the rest of the world, its local-scale repercussions will have to be analysed. It was hardly surprising, then, that the latest citizen survey from the six-monthly Barcelona Barometer saw the issue of Catalonia's fitting into Spain feature heavily in a significant percentage of responses to the question: 'What do you do consider Barcelona's most serious problem at present?'



Economic inequality

Poverty and unemployment are economic factors that have been made worse by the recent global financial crisis. Job insecurity and drops in salaries have been making it hard for a large number of households to meet their basic needs. Gender and ethnic inequalities are joining the social stresses of an especially diverse population.



Access to housing

As shown by a recent survey of popular opinion, access to housing is one of the main concerns for Barcelona's residents. The city is also becoming less capable of attending to the needs of the most vulnerable groups of people, the numbers of which have grown as a result of the recent economic crisis and the increased levels of migration into the city.



Population dynamics

Barcelona is seeing demographic-level changes and the ageing population, as in most Western societies, is one of its main concerns. The brain-drain of its young talent in search of better employment opportunities in other countries, despite the city being a regional-level economic powerhouse, constitutes another serious dilemma. On the other hand, the arrival of refugees and migrants from other countries has created the need for an extensive deployment of measures for absorbing the large demand for the newcomers' health-care and social resources. Success in the social integration of groups at risk of exclusion and communities disconnected from the system represents a challenge for social cohesion in Barcelona.

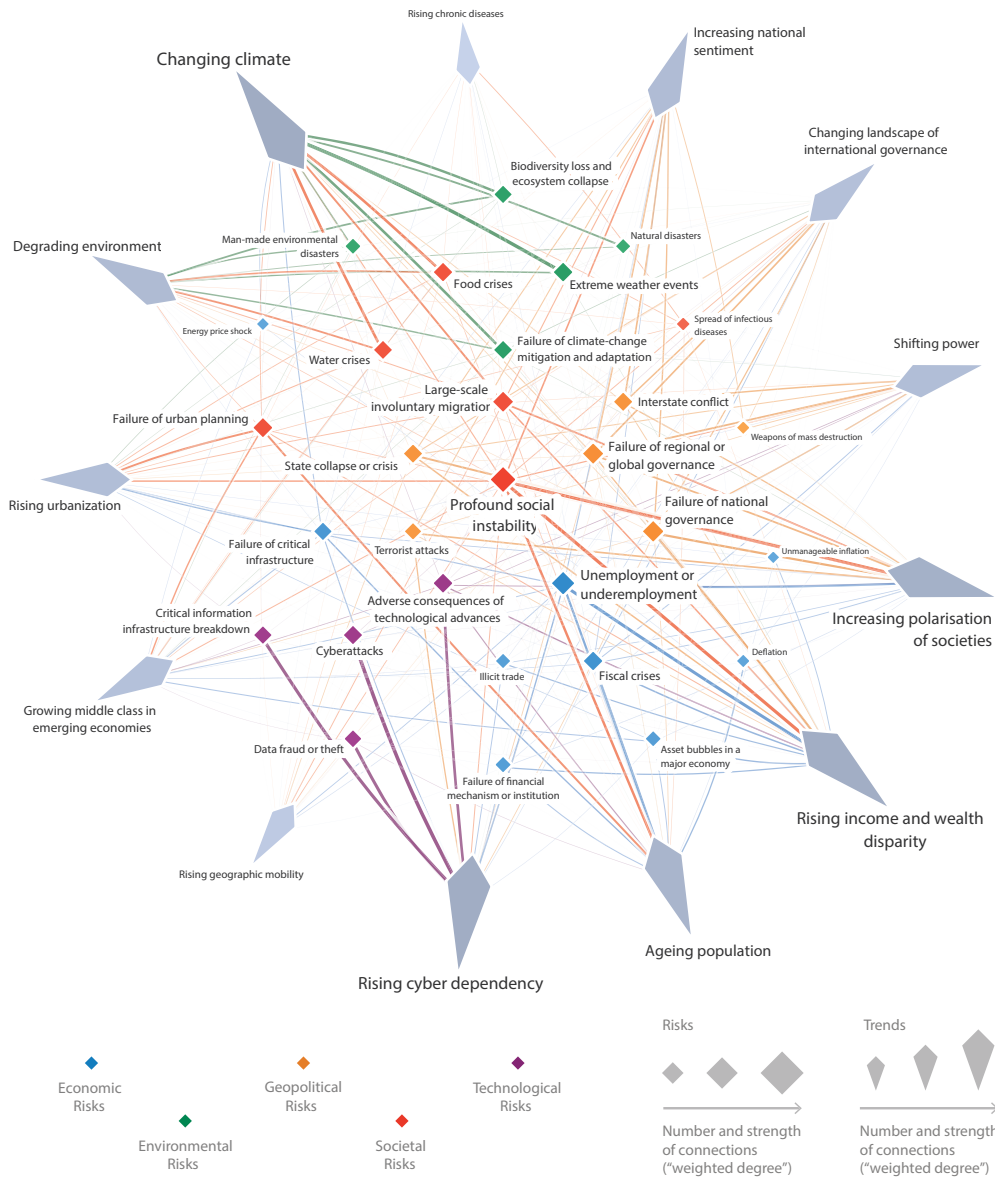


Figure 15. Risks-Trend Interconnections Map 2018.

Source: World Economic Forum Global Risks Perception Survey 2017-2018

In general terms, the respective approaches contributed by the CRPP and 100RC fit in with Barcelona's perspective on the shocks and stresses to which it is exposed and which it will have to deal with in the future if it is to continue offering its residents the conditions they need to live and work in the city. Climate change, socio-economic inequalities, an increased poverty index, and access to housing and services are the main problems that have to be tackled if we are to achieve the transition towards a more resilient city and population.

The figure opposite shows a selection of shocks and stresses for Barcelona based on an alignment of the methodologies proposed by 100RC and CRPT.

As for the risks identified in the Global Risk Report 2018, prepared by the World Economic Forum, the main ones in terms of susceptibility and impact match those affecting or capable of affecting Barcelona in the future. That means the second stage of the Resilience Strategy's definition will consider the possibility of taking an in-depth look through a prospective analysis of potential future risks that may impact the city, and on how to prepare the city for coping with them.

Shocks and stresses according to 100 Resilient Cities terminology	Shocks and stresses selected for Barcelona according to the 100RC and CRPT frameworks	Shocks and stresses according to UN-Habitat terminology
100RC Shocks		CRPT Shocks
Snow storm		
Extreme cold		
Extreme heat	Heat wave/heat island	Heat wave
Drought	Drought	Drought
Rainfall floods	Flash floods and coastal floods	Storm surge
Surge	Extratropical storm	Flash flood
Tsunami		Higher sea level
Hurricane/typhoon/cyclone		Sudden coastal erosion
Severe storm		
Dust/sand storm	Extratropical storm	
Tornado		
Earthquake		Economic crisis
Soil liquefaction		Political crisis
Landslide		
Volcanic activity		Fire
Fire	Forest fire	Forest fire
Accident with hazardous substances		
Cyber attack		
Terrorist attack	Terrorism	Terrorism
Civil unrest		
Financial/economic crisis		
Nuclear accident		
Failure in infrastructures	Collapse of basic infrastr./built infrastr./mobility	
Power cut		
Outbreak of disease	Epidemic/pandemic	
100RC Stresses		CRPT Stresses
Climate change	Environmental degradation	Greenhouse gas emissions
Environmental degradation		Environmental degradation
Invasive species	Loss of biodiversity	Pressure on ecosystems
Loss of biodiversity	Greenhouse gas emission/black carbon	Loss of biodiversity
Low quality of air	Loss of biodiversity	Air pollution
Lack of green spaces		
Subsidence		Noise
Higher sea level/coastal erosion	Higher sea level	
Coastal/tidal floods	Coastal floods	
Energy insecurity	Energy crisis	
Water insecurity	Water crisis	
Food insecurity	Food crisis	
Crime/violence		
Corruption		
Political instability	Political crisis	
Weak regulatory framework		
Municipal funding insecurity		
Lack of investment		
Change in macro-economic trends	Economic crisis	
Undiversified economy		
Poverty	Economic exclusion, poverty, extreme poverty	Unemployment
Unemployment	Unemployment	Speculation
Economic inequality	Social exclusion	Social exclusion
Ethnic inequality	Social exclusion	
Gender inequality		
Structural racism		
Lack of social cohesion		
Drug/alcohol abuse		
Homelessness	Homelessness	Homelessness
Lack of affordable housing	Economic exclusions	Economic exclusions
Precarious housing/slums		
Inadequate educational systems		
Inadequate healthcare systems		
Inadequate sanitation systems		
Inadequate public transport system		
Traffic congestion		
Traffic accidents		
Ageing infrastructures		
Inadequate infrastructure		
Uncontrolled urban development		
Population growth/overpopulation		
Urban deterioration		
Population decline/flight of human capital		
Population ageing	Population ageing	Population ageing
Deprivation of young people's rights		
Displaced population/migration	Migration	Migration
Stock of vacant dwellings		
Single-parent households		
Disability inequalities		
Marginal populations/disconnected communities or individuals	Urban marginality	Social exclusion Urban marginality

Shocks and stresses – selected by 100RC, according to Barcelona City Council's plans
Shocks and stresses – added by Barcelona City Council
Shocks and stresses – selected by CRPT, according to documentary research and conversations with Barcelona City Council
Common shocks and stresses in both methodologies, with several terminologies

Table 4. Shocks and stresses in Barcelona according to 100RC and CRPT

2.4 Analysis of vulnerabilities

2.4.1 Study of climate change impacts on Barcelona

We have presented an analysis of the city of Barcelona in the framework of the Barcelona Climate Plan, and looked at the impact on the city of the effects of climate change. This assessment examined various functional areas that make up the city and that enable Barcelona to offer optimal conditions for living and working.

An analysis of climate forecasts prepared by the Catalan Meteorological Service defines climate change as the factor most likely to infiltrate the weak points in the city's resilience, and affect the city, its services and its residents, both now and in the future. This is centred on two possible scenarios:

1. COMMITMENT SCENARIO (or RCP4.5)



This active scenario anticipates that we would achieve the targets for reducing emissions set out in the 2015 Paris agreement, resulting in greenhouse gas (GHG) concentration rising above the current levels at the end of the century, but minimised from 2030 on, to limit the maximum global temperature rise to 1.5–2°C.

2. PASSIVE SCENARIO (or RCP8.5)



A more passive scenario (or RCP8.5) represents a situation in which the goals marked out in Paris would not be achieved, so that GHG concentrations at the end of the century would be much higher than they are at present. The increase in the global temperature would be well above 2°C.



Climate change will affect Barcelona's residents in the following areas:

- People's health and survival:
 - Heat has a direct effect on mortality, mainly on children and elderly people.
 - Climate change is being accompanied by new disease vectors, such as the tiger mosquito, a transmitter of arbovirus-caused diseases, such as dengue, Chikungunya and Zika fever, among others.
- People's quality of life and safety:
 - Increased discomfort from heat.
 - Need to improve comfort of homes.
 - Need for friendlier public spaces (shade, fountains, cool places).
 - Emergency situations caused by heatwaves, floods, droughts and fires.
- Guaranteed supplies:
 - Scarcity of water due to droughts.
 - High energy demand due to extreme temperatures.
- Cost of living:
 - Increased water and food prices.
 - More poverty.
- Environment:
 - Disappearance of species and habitats.
 - Appearance of plagues and invasive species.
 - Loss of beaches.



The most important challenges that Barcelona will have to face over climate change are discussed on the following pages.

Temperature increases with direct effects on health

Excessive and sustained heat leads to higher mortality and morbidity, especially in the most vulnerable groups: the elderly, babies, people with physical or learning disabilities who have limited mobility and self-care, people with chronic pathologies, who have to take medication that acts on their central nervous system, and those who live in precarious social conditions. The number of deaths resulting from the 2003 heatwave has been estimated at 411 (Borrell), although other studies put the figure higher, at 537 (Tobias) or 665 (Martínez-Navarro, F.).

There have been eight officially recorded heatwaves in the city over the last 34 years. An increase in temperatures will have consequences on health, as besides heatwaves, higher temperatures at night could also have negative effects, given that the night-time resting period is when people recover from the heat they endure throughout the day.

Less availability of water

Barcelona and its metropolitan environment

play host to a very large part of the population engaging in a range of economic activities, all of which require a drinking-water supply that cannot be covered with their own water resources. That is why a large part of the city's water supply currently comes from other river basins' surface resources. The other sources of water in the city are groundwater, the desalination plant and rainwater.

A slight reduction in water resources overall, greater variability in water availability and increased demand for water are all expected. Specifically, the forecasts for 2050 are a 12% reduction in surface resources, a 9% reduction in groundwater resources and a 4% increase in demand. So, there will be an additional need for drinking-water resources in general for the Barcelona metropolitan area (34 hm³ per year) and specifically for the city of Barcelona (an estimated 18 hm³ per year).

Increased number of floods

Flooding risks for want of drainage in Barcelona depends on the profile of the land, the high level of impermeability and the transformation of natural water courses into man-made ones. This effect is increasing due to the features of the Mediterranean climate, where most of its rain comes from a few episodes of high intensity.



Barcelona Beach
Credit: Irene Escobar

The city's high level of impermeability is turning a greater quantity of rainwater into runoff. Barcelona's impermeable surface area grew by over 2,800 ha between 1956 and 2009, with its share of the total municipality area expanding from 45% to 72%. At present, for rainfall with a ten-year (T10) return period, the sewerage network is coping effectively (although it operates under pressure along some sections). The two future scenarios analysed, at the current level of impermeability, predict drainage network overflows at some points, thereby highlighting the system's fragility.

Retreating beaches

Floods caused by a rise in sea level are calculated on the basis of the level of the flooding. This is determined by three parameters: the localised rise of the average sea level, which causes permanent flooding; the tide and changes in pressure and wind, creating potential flooding; and, finally, the wave effect, which causes extreme flooding. Waves currently cause the biggest problems along Barcelona's coastal region when there are extreme storms.

Air quality

Predictions suggest that the effects of climate change could lead to an increase in the annual concentration of the three pollutants analysed. This increase would be larger for PM10 particles, average for NO₂ and much lower for O₃. However, these predictions do not take into account any counterbalancing effect of reductions in private-vehicle traffic or new technologies offering lower emissions.

Forest fires

Climate forecasts suggest that there will be an increased risk of fire in the Mediterranean region in future. In addition to this general trend, there are other factors in the Barcelona environment linked to human activity, the urbanisation process and changes in land uses, which are primarily responsible for the increased fire risk. Because of the rise in temperatures and reduction in precipitation caused by climate change (which will lead to increased water stress and combustibility of vegetation), the risk of fire is rising moderately.

Effects on infrastructure

After beaches, sanitation and mobility networks comes the infrastructure that could be most affected by increased risks of flooding (river, urban, rising sea level or sea storm) or fire.

Energy flows

If we take into account the consumption of all sectors (residential, tertiary, transport and industrial) and on the assumption that there will be no variation in the last two sectors as a result of climate change, forecasts suggest that in a scenario that has the commitment of the inhabitants, a reduction in energy usage at the end of the century would be 6.7% of today's consumption. In a more passive scenario, this reduction could end up representing 7.3% of today's consumption. Despite the global reduction in energy consumption, we expect both a change in citizens' consumption patterns and an increase in demand for electricity mainly due to the need for air-conditioning relating to high-temperature episodes as well as new electric mobility, which would result in a greater need for new methods of distribution.





Biodiversity

Increased temperatures and periods of drought could have an impact on the vegetation of natural areas. The phenology of plants is already currently being affected, and water stress may involve a loss of vitality in vegetation, invasions from better-adapted species and greater vulnerability to pests and diseases.

As for fauna, these changes may affect especially vulnerable groups: fish, amphibians and butterflies. Note that some groups of pests (cockroaches, monk parakeets and rodents) could be seen as beneficiaries of the changing climate conditions, as well as some species of disease-transmitting mosquitoes. In general, all these changes may lead to a simplification of ecosystems and consequently a loss of biodiversity.

Heat-island effect

The highest intensity of the urban heat-island effect in Barcelona is currently occurring during the night-time and winter periods. Urban stations are recording up to 3°C (annual average) more than those from outside the city, with the highs observed showing differences of up to 7°C or 8°C. Climate change will intensify the heat-island effect, as it will increase exposure to high-temperature episodes and heatwaves, which will worsen their effects.

2.5 Action mapping

As part of the work for preparing the Preliminary Resilience Evaluation, we will undertake a review of a number of plans considered key to understanding the actions that the City Council is now taking for building Barcelona's resilience.

We will group those actions in relation to the 12 drivers proposed by the 100RC programme's City Resilience Framework (CRF). It is hoped that, by carrying out this exercise, we will understand how and why these initiatives will strengthen the city's resilience.

The sources considered for this analysis include the following plans, strategies and measures:

- Climate Plan for 2018–2030
- Green-Infrastructure Impetus Plan
- Barcelona Right to Housing Plan for 2016–2025 (executive summary)
- Neighbourhood Plan
- Barcelona Tourism for 2020: a collective strategy for a sustainable tourism
- 'Urban planning from a gender perspective: daily-life urban planning' government measure

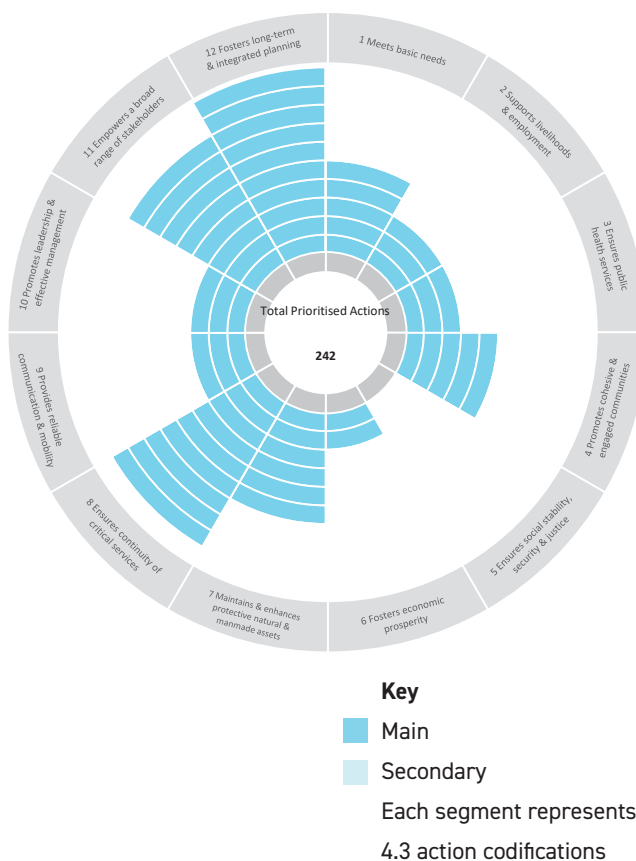
The analysis focused on mapping each of the initiatives contained in these six plans for the CRF's twelve resilience drivers. A total of 790 initiatives were identified.

The preliminary and exploratory character of this method only provides an indication of the current initiatives, but it does not reflect levels of effort, innovation or investment in each of the areas. Even so, it is useful as a qualitative tool that helps to identify areas which are priorities for the city of Barcelona from a resilience perspective.

Climate Plan for 2018–2030 (242 initiatives mapped)

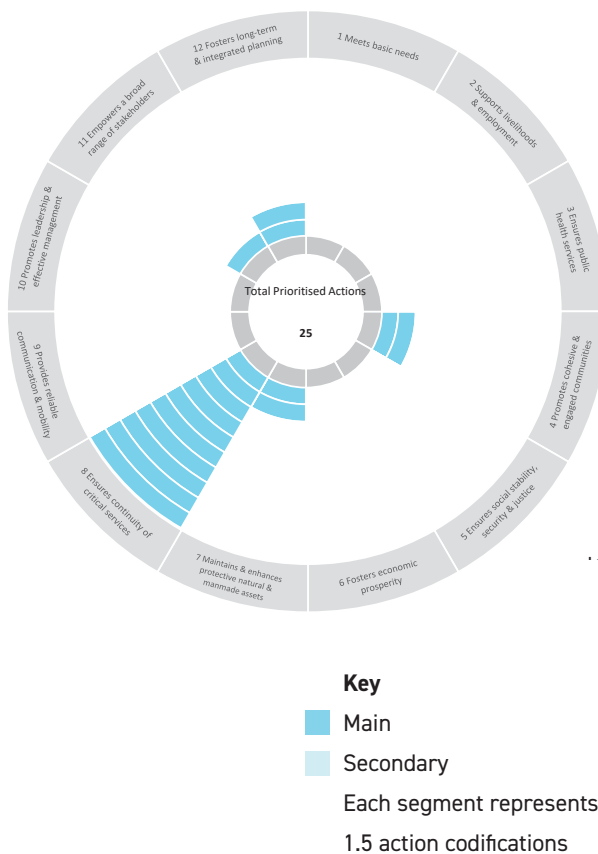
Mapping the Climate Plan's proposals suggests an emphasis on initiatives associated with *integrated planning, empowering participants and ensuring continuity in essential services.*

These initiatives are supported by a notable coverage in the other areas of the CRF, which highlights an integrated approach when it comes to identifying the measures required for mitigating the effects of climate change.



Green-Infrastructure Impetus Plan (25 initiatives mapped)

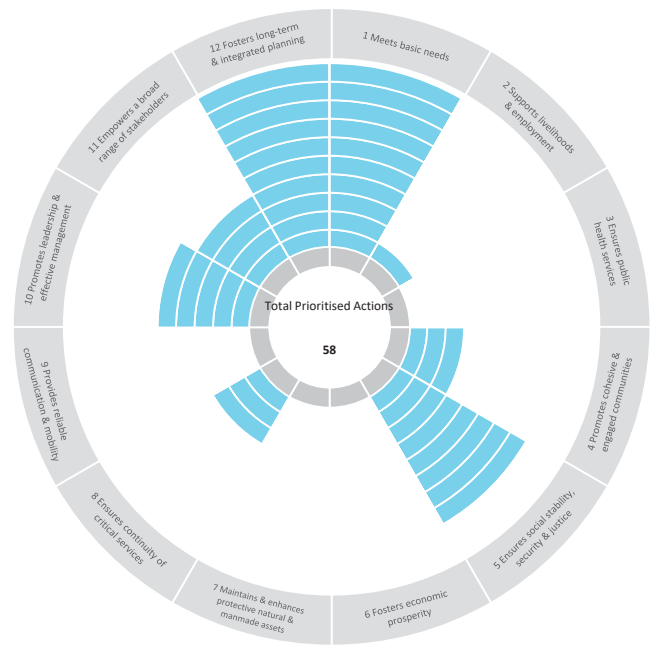
The plan's initiatives focus on guaranteeing *continuity in essential services.* A particular emphasis is recognised in this area on managing ecosystems as a necessary condition for an efficient and sustainable provision of services in the city.



Barcelona Right to Housing Plan for 2016–2025 (58 initiatives mapped)

This plan also shows an initiative focused on multiple key aspects for building a resilient city. It shows, in particular, an intention to *guarantee the basic needs for citizens' lives in the context of integrated planning*.

This approach is supported by an important number of proposals focusing on *compliance with legislation, empowerment of those involved, cohesive communities and an appropriate provision of essential services*.



Key

- Main
 - Secondary
- Each segment represents 1.4 action codifications

Neighbourhood Plan (360 initiatives)

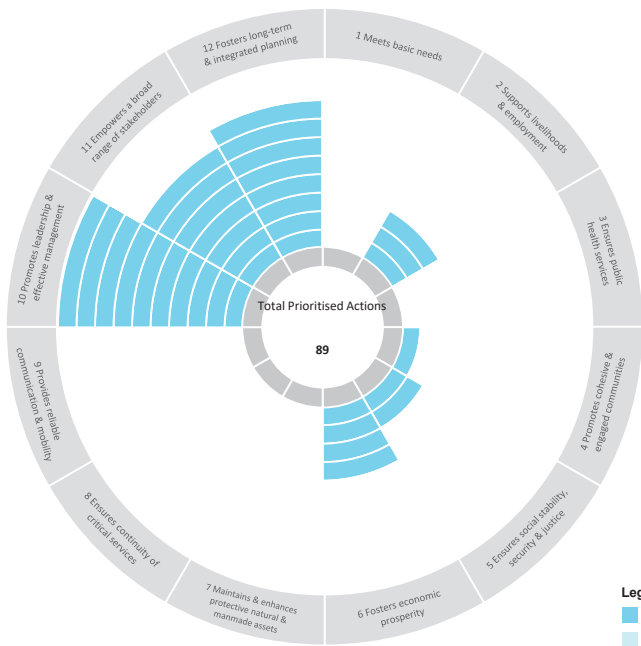
This plan considers an important number of initiatives which, from a resilience perspective, prioritise multiple areas of action for developing communities, including *cohesion of communities and empowerment of local people, alongside a concern for subsistence and employment measures, and integrated planning*.

Other areas of importance under this plan include *fulfilling basic needs, public health and provision of essential services*.



Key

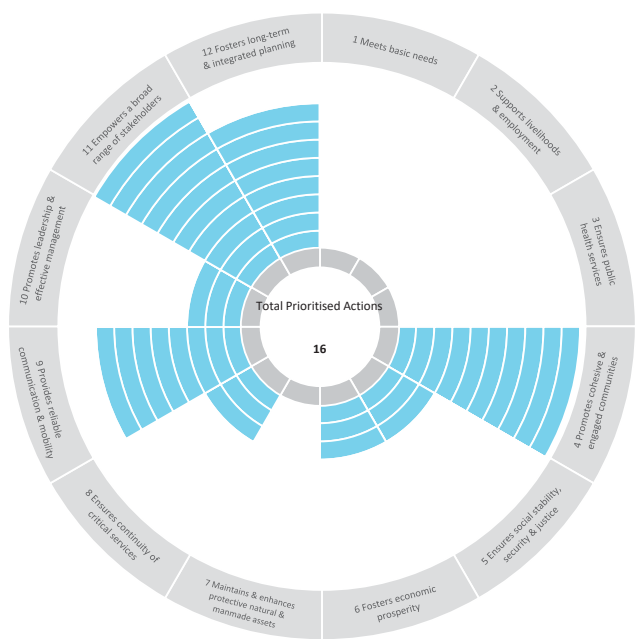
- Main
 - Secondary
- Each segment represents 6.6 action codifications



Key

- Main
- Secondary

Each segment represents 2.5 action codifications



Key

- Main
- Secondary

Each segment represents 0.4 action codifications

Barcelona Tourism for 2020: a collective strategy for a sustainable tourism (89 initiatives)

The initiatives of the Barcelona Tourism Plan for 2020 mostly show the importance of leadership and effective management, integrated planning and empowerment of the people in the city as key areas for managing tourism in the city.

Initiatives associated with economic prosperity, application of legislation, subsistence and employment measures and employment and social cohesion mean this plan is effective in many areas.

'Urban planning from a gender perspective: daily-life urban planning' government measure (16 initiatives)

This government measure includes sixteen specific initiatives for guiding the City Council's urban-planning initiatives. These prioritise measures associated with empowering key participants and cohesion of communities. These measures are supported by an emphasis on integrated planning, communication and effective mobility, application of legislation and economic prosperity.

Results of the plans combined



Key

■ Main

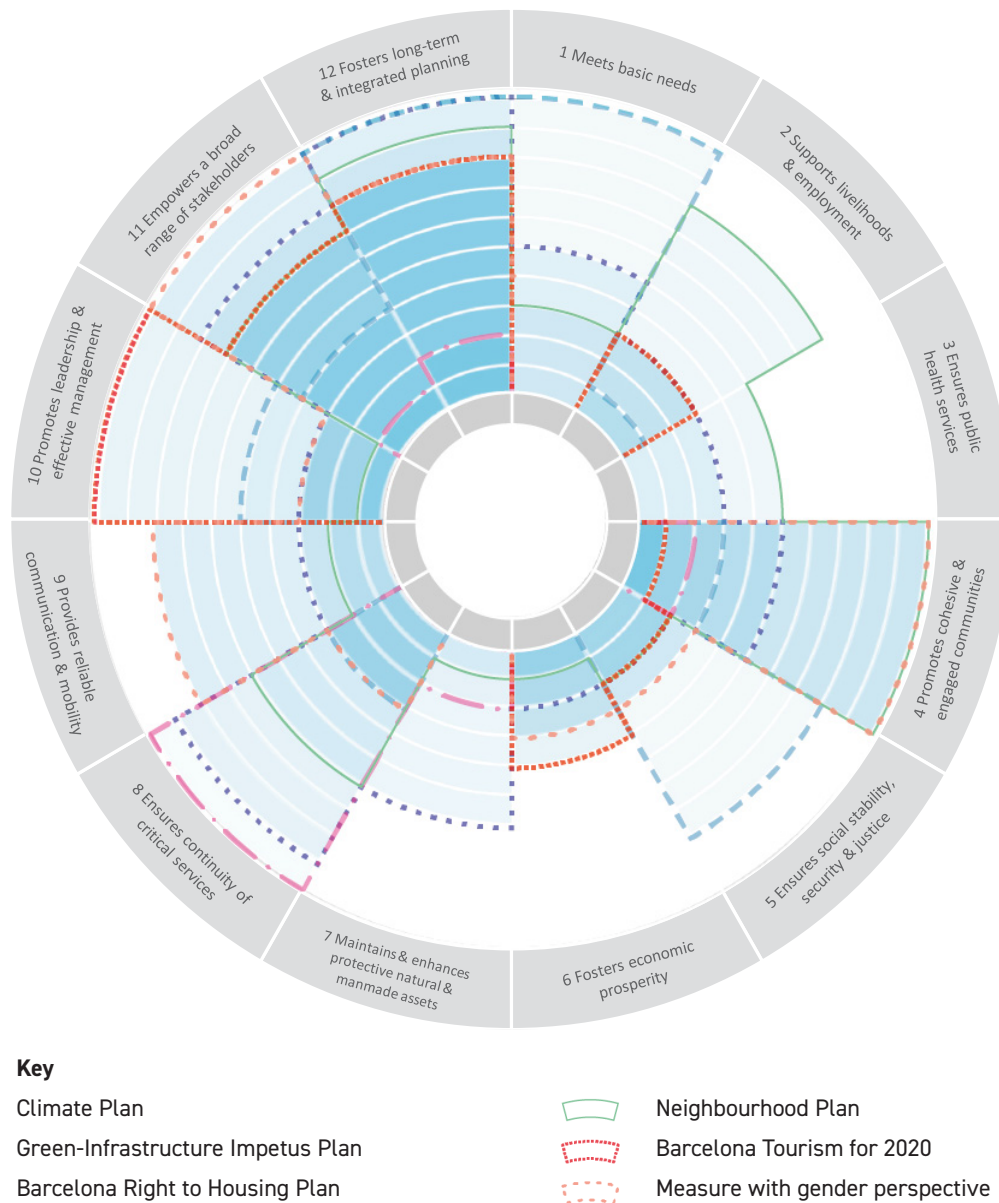
Each segment represents
14.3 action codifications

As a comprehensive result, this preliminary analysis leads to the following conclusions.

On considering all the initiatives as a whole, the greatest number of initiatives from the six plans are accumulated in integrated planning, empowerment of those involved, continuity in essential services, and cohesive and committed communities. So, from the perspective of

resilience, we can discover a virtuous cycle that considers communities and their needs, strategic action in planning and tangible action in urban space through a sound management of infrastructure and ecosystems.

Results of the plans overlapped



The areas focusing on people's well-being (basic needs, subsistence and employment measures, and public health) are presented as areas of action consistently present in every plan. This suggests that taking into account every individual and the quality of life in the city for all residents is a constant in the City Council's actions.

On the basis of the analysis made by the 100RC programme, the importance of maintaining progress on several priority areas suggests a commendable integrated and multi-sectoral approach to building the city in which individual plans complement and support each other.

3.

INTERNATIONAL

AND CITY

PERCEPTION

AL TIZEN TION



3.1 Tools for incorporating the main concerns of municipal professionals and city residents: sectoral interviews and perception surveys

Statistics, indicators and data help us to better understand Barcelona's current state of resilience. However as a complement to this, a series of interviews with people involved in the city's planning, management and transformation process has been proposed, to obtain information on their concerns and to identify current and emerging problems. It would also cover their views on projects, studies and initiatives being carried out, planned or considered for implementation in order to strengthen Barcelona's resilience and capacity to take on future challenges.

Identifying and involving internal players responsible for the main issues that affect the state of the city's resilience proves key to gathering valuable information at the diagnosis stage and will also prove important in the subsequent implementation of measures.

At the same time, Barcelona has considerable information at its disposal, thanks to a large number of regular surveys, on how the population views these changes and initiatives. The following studies are considered the most important in taking the citizens' opinions into account:

- Studies on global perception and general aspects of the city, the City Council and the services that residents are offered:
 - Six-monthly Barcelona Barometer, 2011–2017 development
 - Six-monthly Barometer, first quarter of 2018
 - 2017 Municipal Services Survey
 - 2017 Urban Ecology Survey



Asturias Street
Credit: Ajuntament de Barcelona,
Vicente Zambrano González

- Specific studies:
 - 2016 Perception of Tourism Survey
 - 2017 Victimization Survey
 - 2017 Social Services Evaluation Survey
 - 2017 Citizen Participation and Associations Survey
 - 2015 Barcelona Health Survey.
 - 2014 Children and Families Barometer

The information obtained in interviews held during the second stage and the citizen-perception surveys will be evaluated through the perception tool provided by 100RC. This analysis, under the perspective proposed by the CRI, allows perceptions to be linked and interconnections made between several aspects that influence the city's capacity for building resilience. The tools provide points of reference to define strengths and weaknesses in the initiatives and plans; identify and catalogue the most important aspects; and record consensus or discord between those involved.

3.2 Mapping of perceptions from the survey of the six-monthly Barcelona Barometer for 2018

Citizens' opinions are an essential element in understanding a city's resilience. Their concerns indicate factors that governments need to pay attention to, as well as aspects that have to be strengthened because they have not been given sufficient priority. Numerous exercises will be carried out during the development of the Barcelona Resilience Strategy in order to understand factors which, from the perspective of the various people involved, either strengthen or undermine the city's resilience.

The work group initially explored a number of studies on global perception and general aspects of the city, the City Council and the services that residents are offered. Notable among these was the survey from the six-monthly Barcelona Barometer, which includes citizens' perceptions over the city's challenges. These perceptions had been gathered by the council over the last eight years.

The data analysed relate to the question: 'What do you consider to be Barcelona's most serious problem at present?'. The responses define important challenges and priorities for the city – in other words, resilience factors perceived as priorities by citizens. The results were mapped on the Resilience Framework in order to enable further exploration from a resilience perspective.

Challenges associated with cohesive and committed communities make up the largest quantity of responses, at 20% of the total. These include *problems associated with immigration, overcrowding, negative social values, lack of education, civic behaviour and Catalonia's fitting into Spain*, which, from the perspective of resilience, are normally associated with the need to consider identity and local culture as a determinant area for a city's resilience.

These are followed, in second and third place respectively, by basic needs and support for subsistence and employment measures. The large number of responses associated with *access to housing* (12.3%) is understood, from a resilience perspective, as a wake-up call for the considerable housing needs in the city and the existing pressures on that market. For their part, labour and employment issues such as *strikes, work conditions and social problems: poverty and inequality* collected a total of 10.7% of the responses from participants in the survey.

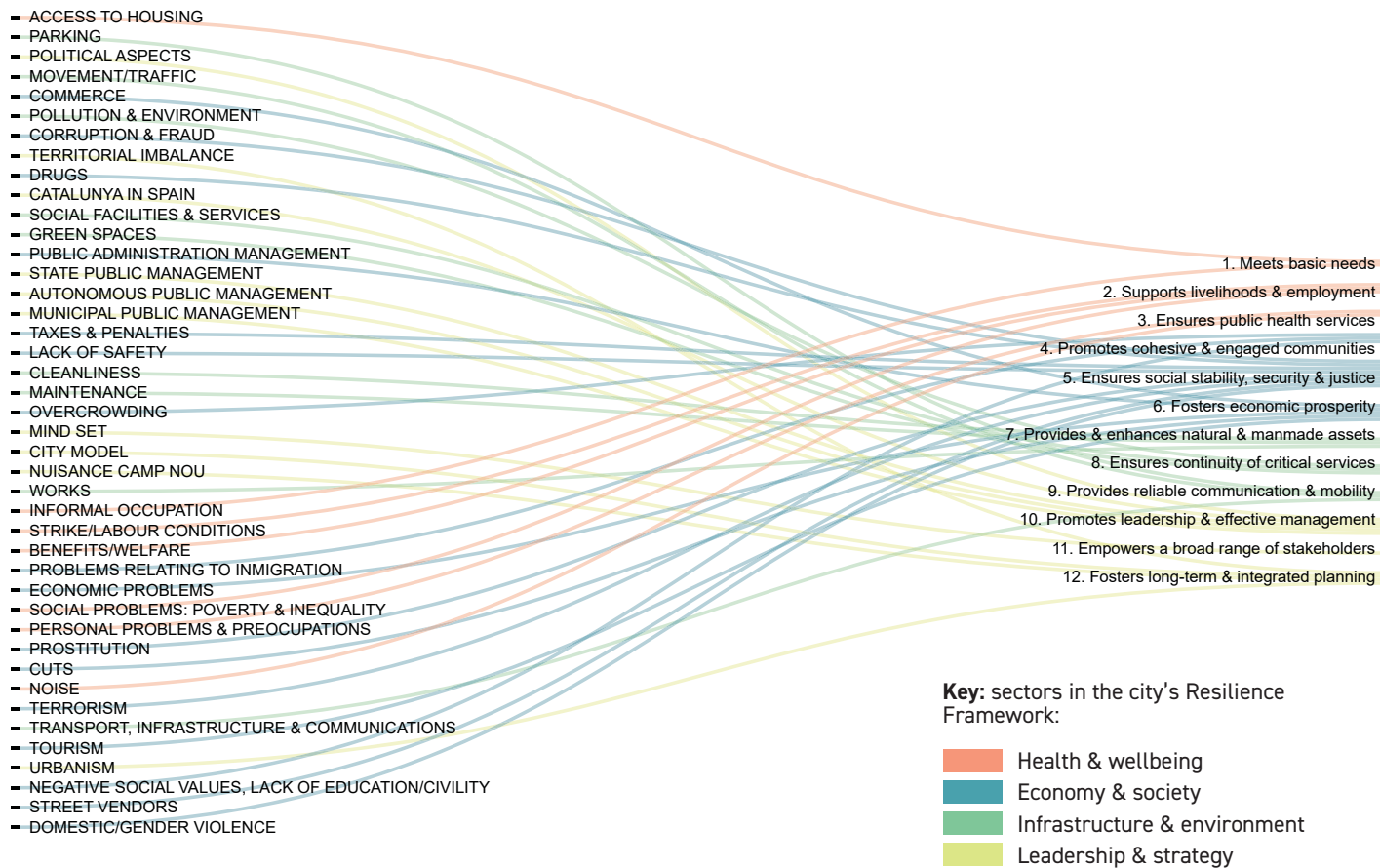


Figure 16. Correspondence between subjects mentioned in the survey and the twelve subjects of the City Resilience Framework



Figure 17. Mapping the results of the six-monthly Barcelona Barometer, June 2018

What do you consider to be Barcelona's most serious problem at present?

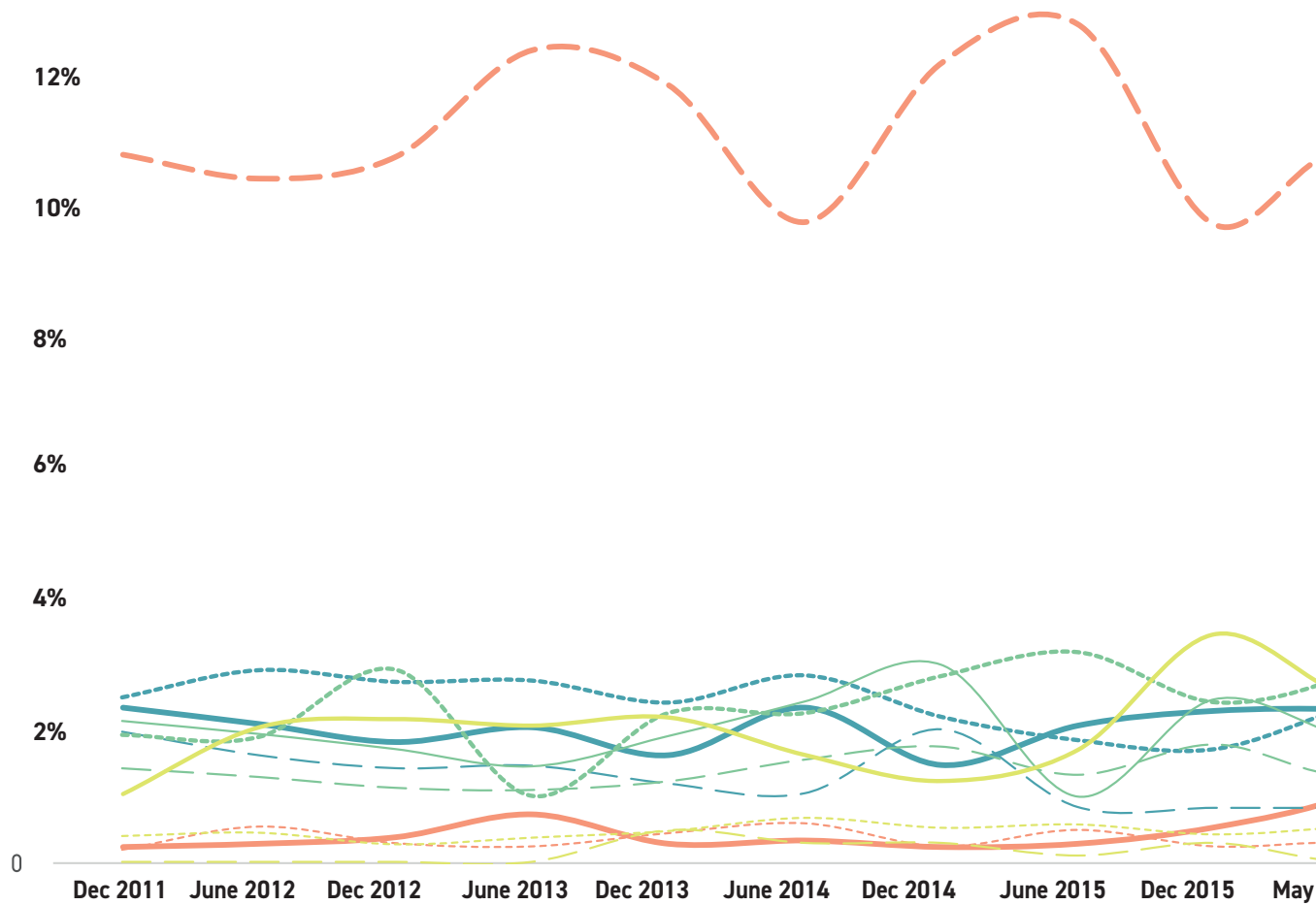
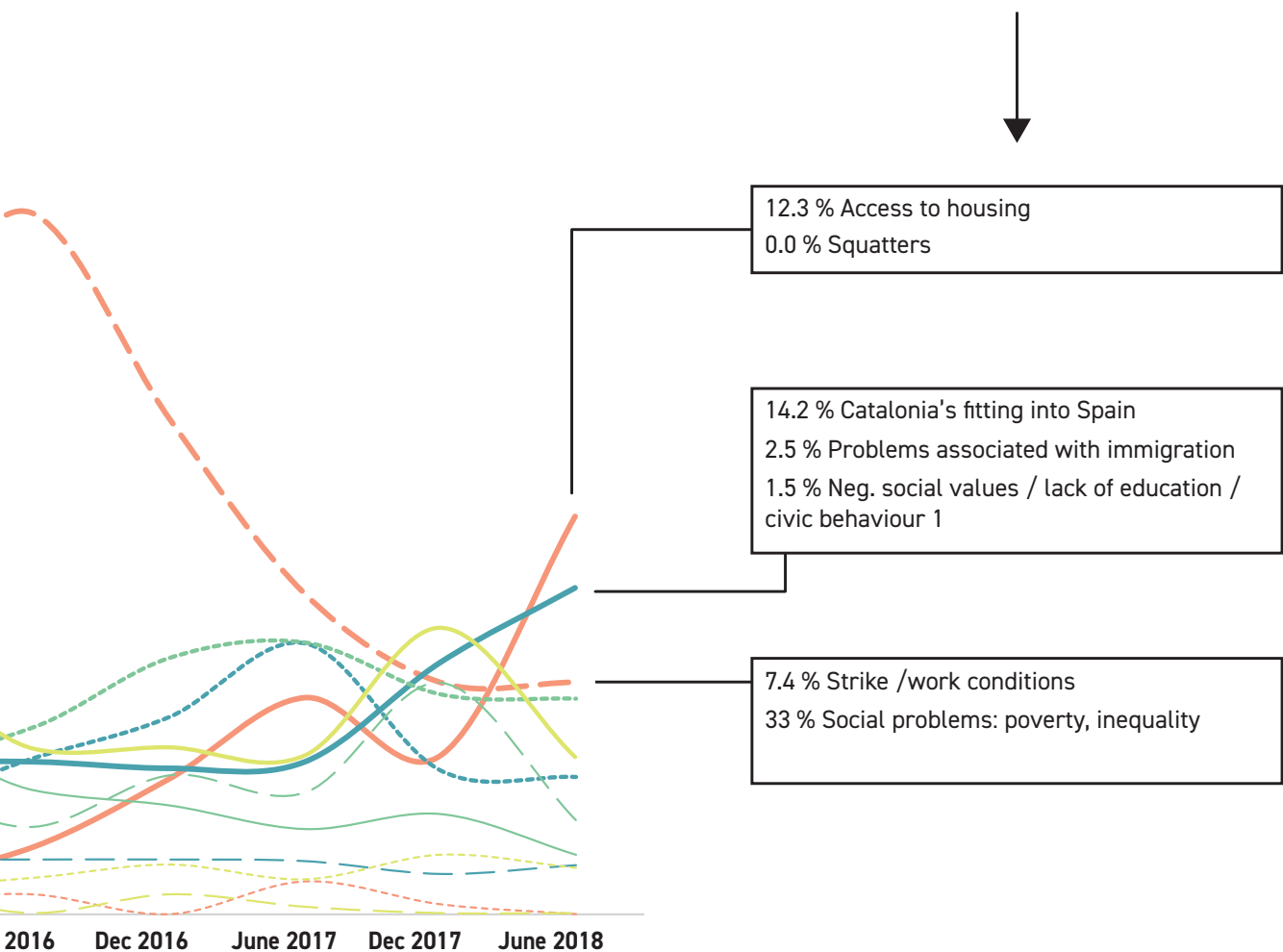


Figure 18. Development of the 2011–2018 results, question ‘What do you consider to be Barcelona’s most serious problem at present?’

Other thematic groups accumulating a large number of responses include economic prosperity (mainly *tourism*), at 10.5% of responses; reliable communication and mobility (which include *traffic and transport, infrastructures and communications*) at 10%, and leadership and effective management (which include *municipal political management and political aspects*), which collected 9.7% of preferences.

These results show the importance of the integrated and multi-sectoral nature of a large number of plans. These plans include the

Climate Plan, the Right to Housing Plan, the Neighbourhood Plan and the ‘Urban planning from a gender perspective’ government measure, which explore clear and imperative work issues (such as climate change, housing and gender perspective). **The significance of these plans lies in the fact that** they not only create solutions for the specific problem under consideration, they also **recognise the need to support and improve many other urban functions (social cohesion, access to basic needs, employment access) in order to achieve a comprehensive impact.**



Nevertheless, the increased **importance in issues of identity and basic needs in citizens' priorities suggest that the Council must continue to prioritise its efforts in these areas.** A systematic approach that maximises the integration of work models and tools is a next step where a resilience lens focused on people and their needs can provide a valuable contribution.

Key

- Meets basic needs
- - Supports livelihoods & employment
- - - Ensures public health services
- Promotes cohesive & engaged communities
- - Ensures social stability, security & justice
- . - . Fosters economic prosperity
- Provides and & enhances natural & manmade assets
- - Ensures continuity of critical services
- . - . Provides reliable communication & mobility
- Promotes leadership and effective management
- - Empowers a broad range of stakeholders
- . - . Fosters long-term & integrated planning



4.

DISCOVER AREAS

RY



Discovery areas

4.1 Stages of life

Exploring the needs of citizens, in particular those of our women, young people and elderly, to understand how a safe and accessible city can be created, with quality of life at every stage.

4.2 Living conditions

Rethinking urban-renovation processes and how these can positively contribute to the citizens' housing and service needs, so Barcelona can be a place where everyone finds the living conditions they need.

4.3 Public spaces

Understanding the social and environmental determinants that enable improvements to be made to the quality of our public spaces, by minimising noise and air pollution, maximising their role in social integration and preparing them to tackle the effects of climate change and other risks that the city has to take on.

4.4 Social and economic prosperity

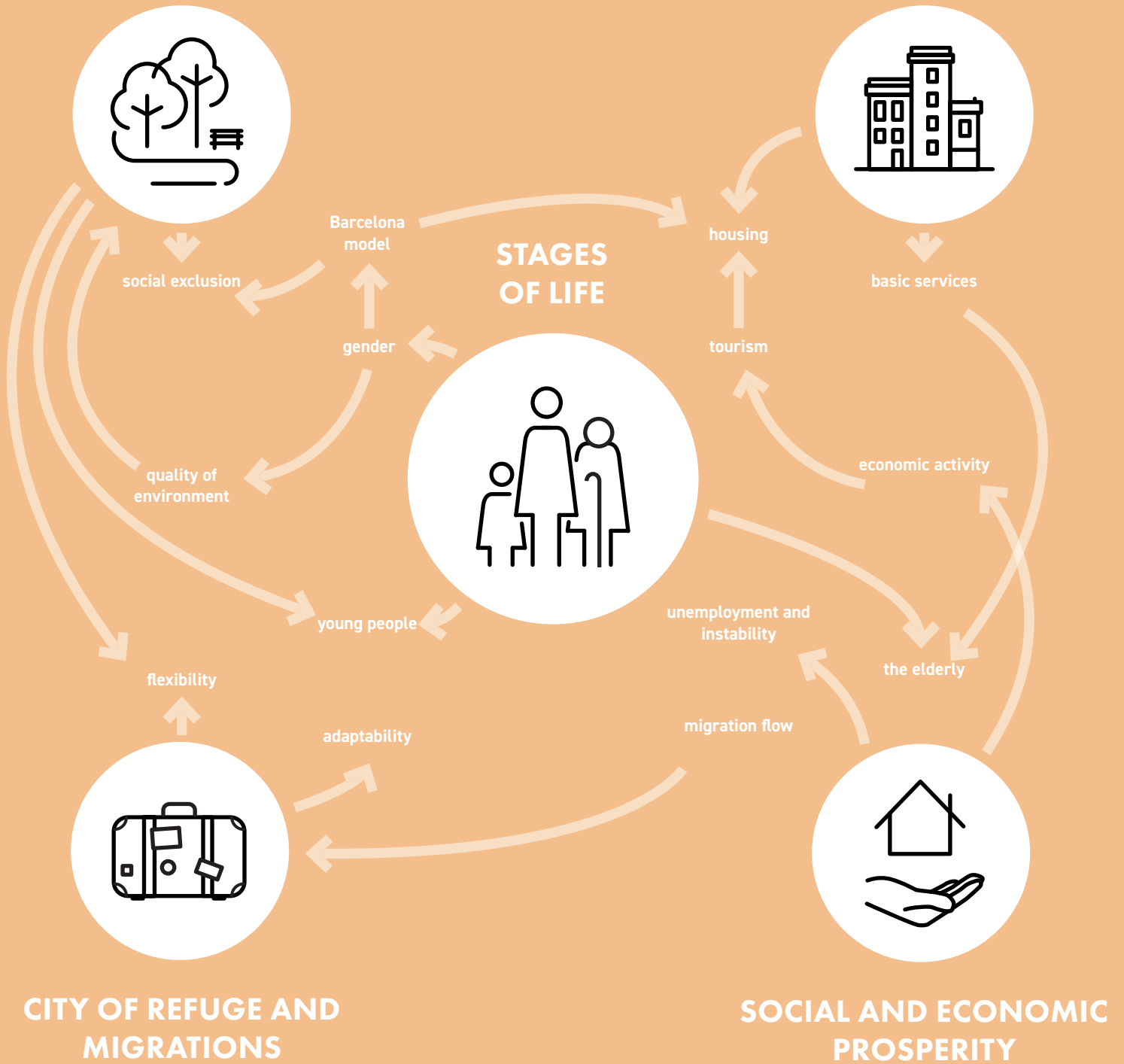
Investigate possible actions that help to diversify the city's local economy and promote prosperity among citizens, taking into consideration the potential shock and socio-economic stress scenarios which the city needs to be prepared for.

4.5 City of refuge and migrations

Studying possibilities for creating an emergency infrastructure system that is capable of meeting fluctuating and unforeseen needs. Inclusiveness, adaptability and flexibility issues will be explored.

PUBLIC SPACES

LIVING CONDITIONS



4.1 Stages of life



Formulating the challenge

Barcelona is a city that needs to ensure the quality of life and well-being of the people who live in it by building a safe environment and guaranteeing the coverage of its citizens' basic needs through quality and inclusive services and environments. We hope that the resilience lens will enable a detailed exploration of citizens' needs, irrespective of their stage of life, their gender and origins or any other feature that may determine them.

Resilience issues

To be able to identify the extent to which the city represents a friendly place and where the basic needs of all its citizens are met, we explored the lives of several citizens in order to gain a deeper understanding of how the city is guaranteeing the provision of services promoting their well-being and how an environment is being cultivated where citizens can develop to their full potential.

We pay special attention to key aspects for promoting and consolidating an inclusive urban-planning model, which incorporates the gender perspective and transforms the features that make it hostile to vulnerable age brackets.

Similarly, and in relation to discovery areas 3 and 5, there will be an exploration of the capacity of public space and urban design for use as a tool in the fight against social exclusion.

Goal for this discovery area

To explore the needs of citizens – in particular those of our women, young people and the elderly – in order to understand how a safe and accessible city can be created, with quality of life at every stage in people's lives.



Discovery questions

- What are the main risks and problems that a Barcelona resident has to face in the various stages of their life?
- To what extent do gender, origins and other innate factors determine the obstacles and difficulties in people's development? What does the city need to do in that regard?
- Which of the physical and social needs of the population, in particular those of children, young people and senior citizens, are not being addressed?
- What factors determine the risks of exclusion and social isolation, particularly in any groups that the city may be neglecting?

4.2 Living conditions



Formulating the challenge

Barcelona needs to be a city for the people. The success of tourism and urban renovation over the last few decades has brought about a process of gentrification that needs to be controlled and properly managed to prevent residents from being forced to move out of their neighbourhoods.

Resilience issues

Barcelona has become an attractive city to live in, as well as captivating a large number of the temporary population that visit it every year. This fact, along with the physical limitations to its growth, has unleashed growing pressure on its public spaces, basic services and housing market. The city has also undergone urban-transformation processes that are notable for their high quality housing, and improvements in access to essential services, which have resulted in a rise in value of these up-coming neighbourhoods.

All that has led to an increase in housing costs – rent and purchase prices alike – triggering aggressive gentrification processes and steadily pushing out the resident population to other areas. This has altered the traditional shape of neighbourhoods, especially those most exposed, and led to changes not just to their social fabric but also to their level of activity and usage.

Goal for this discovery area

To rethink urban-renovation processes and see how these can positively contribute to the citizens' housing and service needs, so Barcelona can be a place where everyone finds their ideal living conditions.



Discovery questions

- What specific gender and age-group needs for housing and living conditions do we have to consider? What type of solution, whether existing or new, would be the most appropriate to fulfil your needs?
- How can a looking at the issues from a resilience point of view contribute to implementing existing housing plans?
- Which regeneration models enable gentrification to be minimised?
- What policies and interventions enable a better management of tourist sites while promoting neighbourhoods and a robust local economy?

4.3 Public spaces



Formulating the challenge

Barcelona is internationally recognised for its public-space model. However, new environmental and social phenomena – such as climate change, noise pollution and social segregation – require new solutions for building a more integrated and fairer city for everyone.

Resilience issues

Barcelona has launched a series of urban-transformation processes since the end of the 1980s, with its Olympic transformation putting considerable emphasis on improving the quality of public spaces and promoting a varied and compact city model that has made it a world benchmark. This successful model requires a periodic revision to ensure that it is meeting the new needs and challenges, whether environmental or social, that the city is facing.

Reducing pollution, improving environmental quality and coping with the effects of climate change constitute the main challenges on an environmental level. There is also a need for exploring and maximising the capacity of public spaces and urban designs as tools for fighting against social exclusion.

Goal for this discovery area

To understand the social and environmental determinants that enable improvements to be made to the quality of our public spaces, by minimising noise and air pollution, maximising their role of social integration and preparing them for tackling the effects of climate change and other types of risk that the city has to take on.



Discovery questions

- How can we guarantee that public spaces are prepared for taking on the challenges and risks the city is or will be exposed to?
- How can we maximise investments in new or improved public spaces and infrastructures in order to guarantee the best provision of services and an increase in the city's resilience?
- How can we integrate and prioritise the implementation of the multiple plans aimed at improving public spaces?
- How can we ensure that our public spaces meet the needs of the neighbourhoods they are located in?

4.4 Social and economic prosperity



Formulating the challenge

Barcelona is a city with an important historical and social heritage. This has led it to develop a tourist market of world-wide attraction, though this has given the city, in the medium-term, a great dependence on tourism as a main economic sector. Together with the context of the global economic crisis experienced since 2007, this has resulted in difficulties for producing diverse and attractive sources of work for city residents.

Resilience issues

Tourism is one of Barcelona's main sources of income and it has developed an important economic sector around this activity. As we have seen in discovery area 2, tourism has unwanted side-effects, such as increasing housing prices and exerting pressure on public spaces. Similarly, to ensure a healthy and prosperous economy offering quality job opportunities for its citizens and with a capacity for retaining local talent, the city considers it important to diversify its activities and boost other strategic economic sectors.

Boasting an important industrial past that makes up part of its architectural heritage, the city is noted historically for its entrepreneurial nature and for being the region's economic powerhouse. The view is that it needs to choose once again to strengthen its commercial leadership and reclaim part of its potential, lost as a consequence of the recent economic crisis.

Unemployment levels (which reached over 20% of the working population) and, above all, job insecurity make up some of the other main socio-economic challenges that the city needs to address. Other possible shocks and stresses must likewise be taken into account – such as the current political crisis – and their impact on the economy, as does the potential contribution that a more diversified economy can make.

Goal for this discovery area

To investigate possible actions that help to diversify the city's local economy and promote prosperity among citizens, taking into consideration the potential shocks and socio-economic stress scenarios which the city needs to be prepared for.



La Boqueria market

Credit: Thomas Mueller - <http://www.tmxm.de>

Discovery questions

- How can we promote a more diverse economy?
- What cases of economic diversification can be examples for Barcelona? How can a more resilient economy be built for everyone?
- What are the potential shock and stress scenarios which our local economy needs to be prepared for?

4.5 City of refuge and migration



Formulating the challenge

People are arriving in Barcelona on a daily basis as part of the migratory flow and influx of refugees across the Mediterranean sea; this has been ongoing since 2015. It is estimated that around 4,400 people came to Barcelona in 2017 and the forecast for 2018 is that this will rise to 8,000 people once the figures are collated. This is possible based on the use of the emergency infrastructure the city relies on, which is currently operating at maximum capacity. In this context, it is useful to explore the type of infrastructure and services that are necessary for coping with future local and external emergencies in a fast and flexible way, given the varying intensity of these migrations and the different reasons they occur.

Resilience issues

The city, given its considerable social support network, has positioned itself as a welcoming city before the humanitarian crisis arising from the massive migrations taking place on a global level and with special intensity in Europe.

Barcelona has an extensive range of social services aimed at attending to the needs of the most vulnerable groups, and has concentrated its efforts on increasing the budgets intended for these areas, which have seen a dramatic rise in the number of users as a consequence of the economic crisis. Even so, these services are reaching saturation levels or have even exceeded their capacity. The current migratory crisis is adding pressure to these services and putting at risk its capacity to cover the demand.

Given that these emergencies are unpredictable and will probably keep on changing in the future, we need to reconsider our planning, design and management of emergency and reception infrastructures and services.

Goal for this discovery area

To study possibilities for creating an emergency and reception infrastructure system that is capable of meeting fluctuating and unforeseen needs. We explore inclusiveness, adaptability and flexibility issues.



Open Arms rescue boat
Credit: Proactiva Open Arms

Discovery questions

- What urban infrastructures and solutions can contribute towards effectively responding to emergencies inside and outside our city?
- What examples of response from other cities can be applied to Barcelona?
- What future local and external emergencies must the city be prepared for so it can respond rapidly and flexibly?

Moving forward

After analysing the results of our research in phase 1, this Preliminary Resilience Assessment allowed us to identify five lines of work that initially we believe relevant and key to build resilience in Barcelona.

These discovery areas will help us structure the scope of work for phase 2, and assign tasks to working groups, collaborators and consultants. Through a more in-depth study of these discovery areas, we will be well positioned to identify the actions and strategic initiatives that the City of Barcelona will continue to develop in the Resilience Strategy.



Credit: Irene Escobar





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