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FINAL THESIS

ACCESSING BUENOS AIRES

Proposing a method to ensure activity participation through public transport policies in the Metropolitan Area of Buenos Aires

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Introduction

Research background

In the last decades, transport planning has evolved towards a broader definition of mobility. Traditional approaches were focused primarily on efficiency concerns related to the provision of infrastructures and services to answer to an existent demand for movement. The main element of study was the movement itself, intended as the possibility to displace from an origin to a destination, without taking into account the motivations that were behind the choice, or the necessity, to move. Nowadays, new theoretical and operative perspectives, able to complement the established practices, are emerging (Kaufmann, 2002; Urry, 2000; Ascher, 2004; Lévy, 2004; Orfeuil, 2004; Bourdin, 2005; Cresswell, 2006). Mobility and social needs are being considered as complementary matters.

"Mobility, conceived as a necessity and as a right, reflects the possibility of access to basic services for the development of social life, for active participation in the economic activities and for the socialization of people. Increasingly, the possibilities of mobility qualify people and places and are systematically incorporated in concept such as the right to the city (…)" (Blanco et al. 2014).

In this sense, it is possible to assume that the role of mobility has a key role in the social participation. However, the possibility to move is strictly dependent on socio economic aspects. Belonging to the most disadvantaged portions of the population may limit the freedom of choice and access to activities that represent valued opportunities such as jobs, schools, hospitals and all the other spheres that can contribute to the quality of life of an individual.

The idea of choosing Buenos Aires and its Metropolitan region as our field of study comes from the curiosity to analyze a region where social dynamics different from the ones present in the European context could be found. The region, which population is almost 13 million of inhabitant and that has grown between 2001 and 2010 by 11% (INDEC), features a stronger degree of social inequality.

Furthermore, the demographic growth was accompanied by a continuous extension of the urban fabric with more fragmented forms. *"(In Buenos Aires) the current dilemma of urbanism and transport is not a compact "or" diffused city. It is a compact "and" diffused city. Both coexist in the same metropolitan territory"* (Gutierrez, 2012).

The historical development of the urban structure of Buenos Aires was directly related to the presence and improvement of the transportation networks. Nowadays, the dispersed growth challenges this tradition exacerbating the social segregation of the territory. Because of this, it may be interesting to evaluate if there is a connection between the quality of the public transport system, the policies that have been proposed by the authorities and the social inclusion (or exclusion) of the inhabitants.

Buenos Aires Metropolitan region becomes, thus, an ideal field of experimentation to understand if mobility and social inclusion are as complementary as conceived by the recent theoretical framework.

Research aims and structure

The aim of the research is to analyse the relation between quality and supply of public transport and the level of social exclusion of an individual in terms of accessibility to valued opportunities. In order to reach this goal, an operative method of analysis has been developed to understand which are the most vulnerable areas of the whole Metropolitan Region of Buenos Aires. In this way, the method generates a criterion of priority of intervention, thus, identifies the weakest areas where a set of specific policies related to this matter is proposed. According to the referred theoretical background, these policies should, by upgrading the quality of the public transport, improve activity participation for the more disadvantaged people. In order to reach the proposed aim, the thesis:

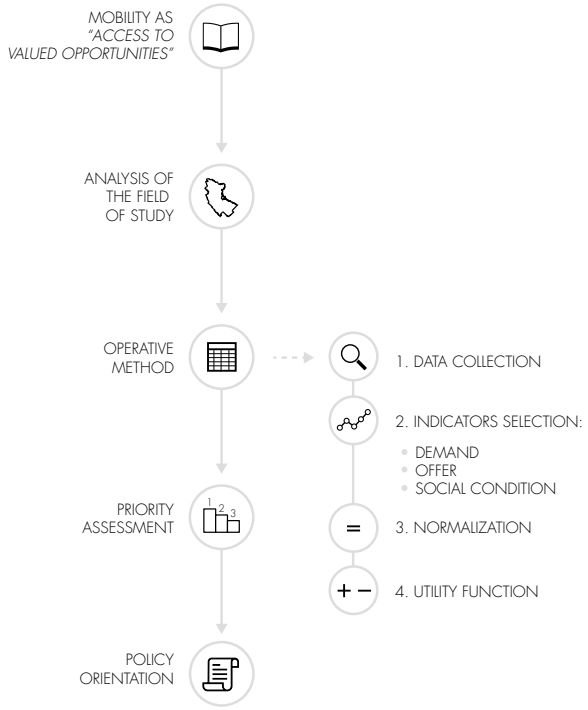
1. **analyses** the current **territorial organization and mobility practices** of the Metropolitan Region of Buenos Aires, offering a general framework of its urban structure, its relationship with the infrastructural scheme, its socio-economic profile and a description of the mobility trends. This is made in order to understand the main dynamics of the study area and to be able to make informed proposals.

2. **describes** the **main policies** proposed by the strategic plans of the city and of the metropolitan region. Furthermore, the main **ongoing transport projects** have been identified to understand which are the priorities in the public policy agenda with regards to mobility issues and the organization of the transport network. The aim is to understand the type of approach followed by the plans regarding

the topic of mobility and accessibility.

3.**proposes** an **operative and experimental method** as a tool to identify, at a neighbourhood scale, the areas where low quality of the public transportation system, low access to valued opportunities (defined as access to jobs, schools, hospitals, etc.), low demand for movement and low socio-economic condition coexist. Furthermore, the method is used to **orient** more effective **policies** in the some of the most disadvantaged localities of the region.

4. **defines** which would be the **relevance of the analytical tool** in the sphere of transport planning, the potential users to whom may be directed and the evaluative and interpretative value it may have.



The thesis is divided in two main parts. The first one, characterized by a descriptive profile, aims to describe the territorial organization and mobility practices of the Metropolitan Region of Buenos Aires as well as the main urban and mobility policies proposed in the strategic plans (points 1 and 2). The second one, instead, introduces the analytical approach applied to the whole Metropolitan Region through an operative profile (points 3 and 4).

Research method

The method, by the combination of five indicators related to mobility and social aspects, creates a synthetic index to assess a priority of intervention based on the social value of public transport. The starting point implies the collection of data necessary to build the indicators. This process was particularly challenging considering the general scarce availability and quality of the open data specially when related to the chosen scale of analysis (neighbourhood). To analyse the mobility trends the Gravitation and Mobility indexes (describing the attractiveness level and the density of displacements of a specific location) are used to describe the real demand for movement. The Potential Mobility index (describing the average speed of the public transport) and Job Accessibility index (describing the number of jobs reachable in 60 minutes time by public transport) are used

to describe the potential offer and quality of the public transport network. Finally, the Unsatisfied Basic Needs index is used to describe the socio-economic profile of the several areas of study. The five indicators were chosen because they are interdependent when proposing a policy on transport aimed to enhance activity participation. In fact, an amelioration of the transport system may increase the potentialities expressed by the indexes of offer and, by consequence, generating a change in the real demand for transport. This process can be at the base of a final improvement of the social condition of the inhabitants. All the indicators were normalized and managed to be combined by applying a utility function. The result is represented by a general map where each locality of study can be easily identified according to its level of priority of intervention. Finally, by analysing only the most disadvantaged areas, a more specific set of policy guidelines is proposed considering their real demand trends and the possibility, through an improvement of the transport supply, to increase the level of activity participation of the inhabitants as a pre-condition for their social inclusion.

Relevance of the research

The method at the core of this research is characterized by scientific, social and political value. Regarding the first aspect, the scientific reliability is confirmed by the reference to a well-established literature (see Chapter 3) that validates the initial theoretical assumptions. The theories that are considered to orient the research conceptualize mobility as a basic necessity that is cause and effect of the participation of people in society. In a policy making field the method, even with an experimental character, could be used in an *interpretative* phase to understand the negative dynamics affecting the local scale without losing the metropolitan perspective: the possibility to consider the two scales at the same time may be relevant because mobility issues are often not constrained to the administrative limits. Moreover, the tool may be used with a *propositive* meaning.

According to a *prioritarian* perspective, public policies should be oriented with a priority criteria in order to guarantee benefit to the more disadvantage ones considering that, *"benefits matter more the more worse-off the person to whom the benefit accrue"* (Martens, 2017, Casal, 2007). Because of this, the areas that the method considers as most vulnerable become the place where specific policies related to the improvement of public transport are justified by concerns of social equity and fairness. This confirms the social value of the research. Finally, the method may be also useful in an evaluation process, because it may help to understand what can be the social impact of ongoing or proposed transport policies. It may be assessed that this method represents a first step towards the

construction of more informed public policies, even if it will require a further refinement to be effectively applied and its precision increases when better open data are available.

In conclusion, the aspiration of this research is to propose to policy makers a different point of view when approaching a territory of this complexity and aims to stress the concept that every decision related to the mobility sphere has a strong impact on the activity participation of people.

Knowing the Metropolitan Area of Buenos Aires

Current territorial organization and mobility practices

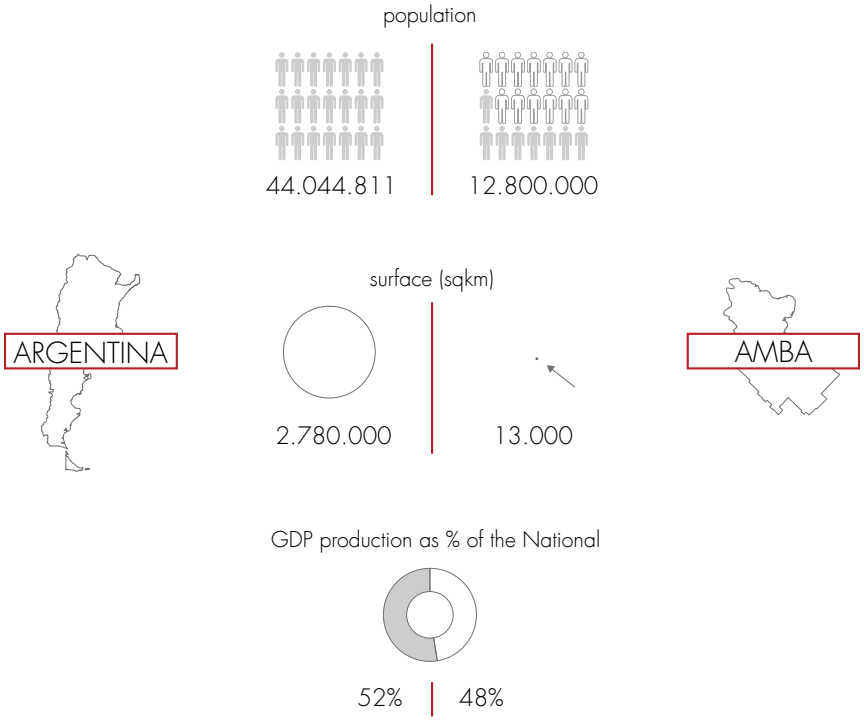
Several definitions for the same area

In this Chapter the administrative status of the Metropolitan Region of Buenos Aires is described. Before deepening on this topic, a general political overview of the country is presented to understand the national context in which the study area is framed.

The Republic of Argentina is a federal nation with an estimated population of 44.044.811 inhabitants (INDEC, 2017) located in the southern part of South America. It is divided into 23 federal entities called *Provincias* and the *Ciudad Autonoma de Buenos Aires* (CABA) which is the capital special autonomous district. Each Province is considered by the national constitution as autonomous, which means that it can hold all the powers that chooses not to delegate to the federal government. The provincial governor (*Gobernador de la Provincia)*, is directly elected by the people, as well as the *Jefe de Gobierno* which is at the same time the governor and the mayor of the CABA. There is a secondary administrative level which is under the provincial one and it is composed by a large number of municipalities called *Departamentos* or *Partidos*. Each of them is often formed by several cities, towns and villages called *Localidades* and it is governed by an *Intendente*.

Buenos Aires is the capital and largest city of Argentina. When speaking about Buenos Aires it must be taken into consideration that there are two different administrative bodies that share the same name: one is the Province of Buenos Aires (PBA), while the other one is the Autonomous City of Buenos Aires (CABA). The PBA is the largest one in Argentina, with a surface of 307,571 sqkm and a population of 15,625,083 inhabitants (national census 2010) and, by far, the most populated one in the country. The urban fabric of the city of Buenos Aires has extended beyond its administrative limits creating a wide agglomeration which involves several municipalities of the PBA.

Because of the inexistence of a pubic body which regulates this agglomeration, several



Relation between Argentina and its metropolitan region (INDEC data)

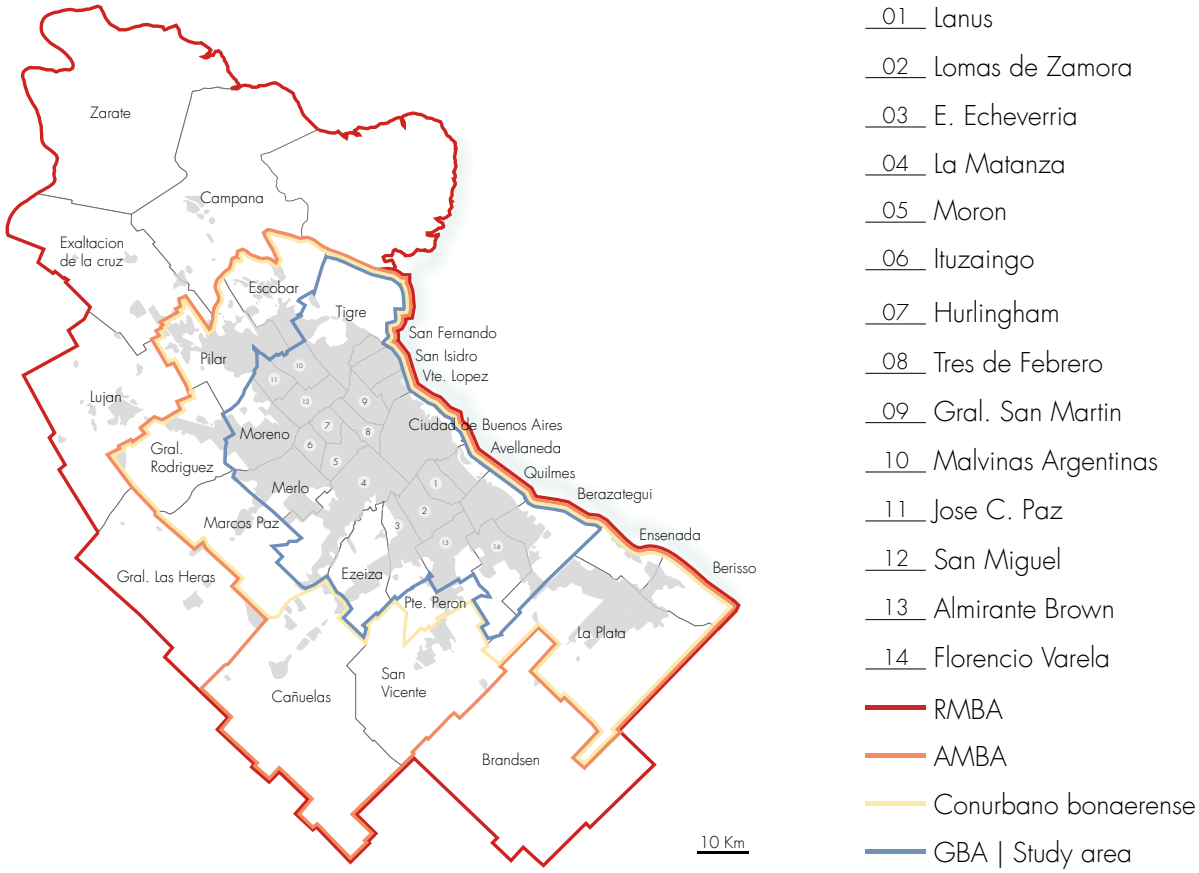
definitions can be found throughout the scope of public plans and other legal documents,, these are:

Region Metropolitana de Buenos Aires (RMBA), 40 municipalities + the CABA. This definition is recognized by the Provincial Government of Buenos Aires and taken into consideration in the *Lineamientos Estrategicos Para la RMBA*, the last strategic plan presented for the region. The RMBA municipalities are chosen because of the following shared characteristic: production, commerce, urbanized habitats, mobility and environmental issues.

Area Metropolitana de Buenos Aires (AMBA), 35 municipalities + the CABA. This division is used by the National Institute of Statistics and Census (INDEC).

Aglomerado Gran Buenos Aires (AGBA), composed by the CABA and 30 surrounding municipalities of the PBA that have a strong relation with the core city.

Conurbano bonaerense, following the law N°13473 of 2006 with 32 municipalities + the CABA. *"In order to proceed to the administrative decentralization, granting and financing of programs and/or plans, of international and/or national and/or inter-provincial organizations, and/or interregional and/or provincial and/*



Different administrative boundaries

or inter-municipal organizations, be these social, health, production, promotion of cooperative activity, employment, education, environmental sanitation, security, housing, urban regularization, urban and interurban social infrastructure, road, water and energy networks for regional development, in the provincial area, will be understood that integrate the territorial area of the Buenos Aires the suburban municipalities of ... (LIST) "

Gran Buenos Aires (GBA), 24 municipalities + the CABA. This is the main definition used by the National Institute of Statistics and Census (INDEC).

The limits of the **study area** of this research follow this last definition because it includes the municipalities which are an integral part of the continuous urban tissue. A secondary reason is that the availability of data referred to these portion of the territory is wider than for the rest of the region.

A city of corridors: historical growth of the urban fabric

The urban configuration that currently presents the Metropolitan Area of Buenos Aires was conformed since the establishment of the City of Buenos Aires in 1580. The Territorial Model 2020-2060 says that, at the end of the 19th century, the urban form

of perpendicular streets and squared blocks was expanded through the circulation axes, forming peripheral neighbourhoods that were then gathered together and consolidated the urban fabric of the city.

As the central area planned avenues to improve circulation, the centre became the main area of the inhabitants and of the city itself. Very close to it, but still detached, were also born numerous settlements of rural origin related to the activity of the city.

By 1860 the traditional urban scheme was quickly transformed. The central area was consolidated and the neighbourhoods were acquiring different functions and hierarchies. The population of bigger resources was abandoning its traditional location in the southern part of the city to build their new residences in the north, in the neighbourhoods of Retiro, Recoleta and Palermo. This was due to the poor health conditions of the southern area (cholera epidemic of 1869 and yellow fever of 1871) and the trends of the time, which favoured individual houses. The centre started to be defined by commercial and banking sectors.

It is during this decade that some growths on the new axes of the railroad begin to appear in the Metropolitan Area. Towards 1857, the railroad of the West arrived until Flores (located in the city), and in 1860, until Moreno (located in the province). Towards the north, the railroad arrived to Belgrano (city) in 1862, and to San Fernando (province), in 1863. In the same year, the South railroad opened its services, which by 1872 reached Quilmes (province). During this time, it was formed the spatial configuration of the terminal stations that were located in the periphery of the urban plot of that time. Retiro to the North, Miserere to the West, and Constitucion to the South, linked the city with the nearest rural periphery and, essentially, the interior of the country. Beyond these transformations, in 1870, Buenos Aires still presented a small urban plant that maintained its traditional organization, reason why most of the daily activities of the population was made by foot. In 1869, the first drainage of the running water network was created, with a very limited extent.

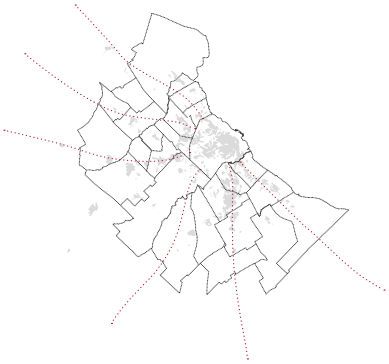
Between 1870 and 1880 population growth and the diversification of economic activities drove the expansion of the city with the consolidation of new peripheral neighbourhoods. The trip from the centre to the neighbourhoods began to be quotidian for much of the population. Nevertheless, despite its expansion, Buenos Aires continued revolving around the traditional centre. The tram network was increased to cover the increasing need for mobility, gradually integrating the whole city. In 1880 Buenos Aires became the Federal Capital of the country and in 1888 its territory was precisely defined. The federalization of the city encouraged several

urban projects aimed at meeting the growing demands of sanitary services, sewers, electric lighting and mobility. In 1912 the construction of subway line A and new railway terminals began.

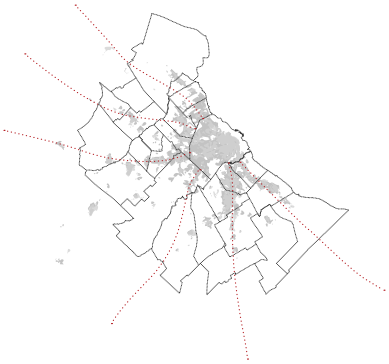
The changes in means of transport were historically key players in the dynamics of the expansion. In the first three decades of the twentieth century the horse-drawn tram is replaced by the electric one. In 1913 the underground was inaugurated, the first one in Latin America. The transport network was gradually expanded, extending its main lines to the outlying neighbourhoods of the city such as Belgrano, Flores and Liniers, and improving the urban and suburban rail services. All these events promoted a radial growth in the form of great tentacles that came out from the centre of the city also generating the growth of a great number of small towns in the border of it. From 1905 the use of the car began to be incorporated together with the construction of roads suitable for them. Urban growth was driven by the main public transport networks, first by the railroad and then by the public bus. The population of the city continued to grow.

Whereas in 1904 only 26% of the population of the Capital City resided more than 5 km from the centre, only ten years later, in 1914, 46% were in this situation. The pattern of occupation in the city, was different between one place and another, due mainly to cultural habits, and different quality of transport offer. Benefited by very good transport services and by highlands, the North corridor continued the movement initiated by the wealthy class in 1860 and was receiving the population of greater resources. The South corridor was linked to the workers' sectors, in relation to the growing industrial location. At the same time the West axis was losing momentum in this period. In 1914 the group formed by the Capital City and the 19 municipalities represented little more than two million inhabitants, 78% of which lived inside the City. In 1935, two decades later, this proportion had declined to 69%. In the middle of 1920 the public buses began to have a greater presence.

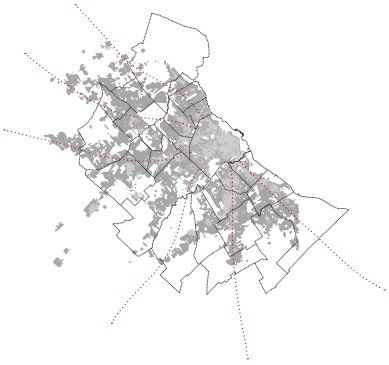
From the 1930s, there was a profound social transformation, associated with the participation of the population in the labour market, especially linked to industries. In this context, the population of the Metropolitan Area grew at an accelerated pace, well above the country average, which boosted the concentration of the population in Buenos Aires, from 25.2% of the country in 1935 to 35.4% in 1970. In this period, migration from the interior of the country to the metropolis became the main responsible for the accelerated growth, which allowed the consolidation of the first metropolitan crown. In 1947, the City of Buenos Aires stopped its population growth (with 3 million inhabitants) unlike the Metropolitan Area, which continued



Urban fabric 1910



Urban fabric 1947



Urban fabric 1972

Urban fabric 2001

Crowns of the Metropolitan Area

to grow.

In the early 1950s, railroads and natural resources were nationalized, and the internal consumption expanded. All this situation gave rise to new territorial reconfigurations of the Metropolitan Area.

Since 1940, in the traditional corridors, the growth was continuous. The North axis is consolidated extending from the districts of Retiro and Recoleta to Tigre. As today, the neighbourhoods on this corridor were well served by public transportation, and connected by fast-track car traffic with abundant landscape resources. They also focused on the best level of infrastructure and housing equipment. In the southern neighbourhoods, in general, there is a lower density and socioeconomic level. Between these extremes, diverse gradations are reproduced along the City. The social mix recognizes a historical density and a decreasing socioeconomic level from the centre to the periphery, as well as from the nods to the gaps between them.

In 1970 only a little more than a third of the population of the Metropolitan Area of Buenos Aires lived in the City. Industrial development played a very important role in the concentration and growth of the metropolitan area. In 1970, large public projects were carried out, such as the built up of highways. In this period the growth of

poverty increased sharply.

In the Metropolitan Area, the mechanisms that had driven the expansion (the economic price of lots) showed signs of exhaustion, and population growth was demonstrated through the occupation of vacant lots, the densification of the space already built through the subdivision of plots, housing overcrowding, and the growth of precarious settlements and *villas miserias*. A process of de-concentration of the population began in the Metropolitan Area of Buenos Aires, as a result of a decrease in the annual growth rate, which reversed the so far high growth trend. In any case, the population in the Gran Buenos Aires continued to increase and in 2001 exceeded 12 million inhabitants. In terms of territorial expansion, the Metropolitan Area reached the third crown. As an additional information, the population in *villa miserias* doubled between 1991 and 2001. In the outer periphery of the City, another phenomenon facilitated by highways was consolidated: gated communities oriented to high class sectors.

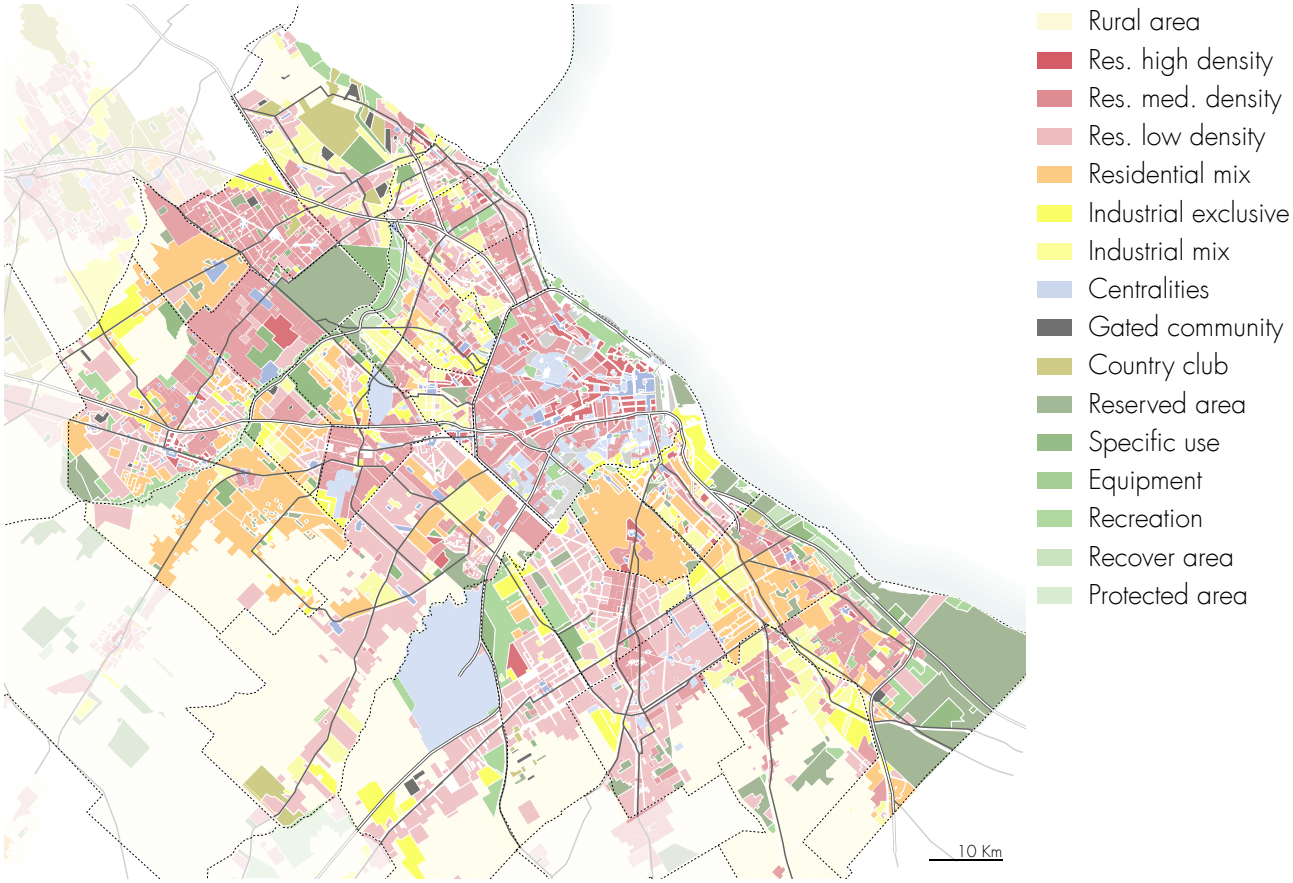
Nowadays, it is in the central area of the Autonomous City of Buenos Aires that most metropolitan, national and even global financial and administrative activities are located.

By analysing the description of the Territorial Model 2010-2060 produced by the CABA, it is possible to understand how the region that was born concentrically concentrated and continuous, was gradually transformed into a fragmented and discontinuous scheme due to the lack of planning and regulation of its growth, mainly, along the axes of public and private transport. It is possible to stand that this growth was also influenced by the different political actions and the consequences that these actions entailed in the appropriation of the land of the different areas of the metropolitan region.

Nowadays, large sectors of medium and high income classes are located in the City of Buenos Aires, while middle and low income sectors predominate in the peri urban area, with the exception of the north axis and some new gated communities spread throughout the territory.

A fragmented region: land use patterns

The current distribution of land use in the Metropolitan Area of Buenos Aires reflects the urbanization process which began its expansion in the late 1800s. The areas with highest residential densities can be found inside the city of Buenos Aires distributed specially along the centre and north part of it. The south of it, because of its evolution and geographic characteristics its more relegated to a high mix of industries and medium density residential areas. In the borders of the City, next to the main arteries there is concentration

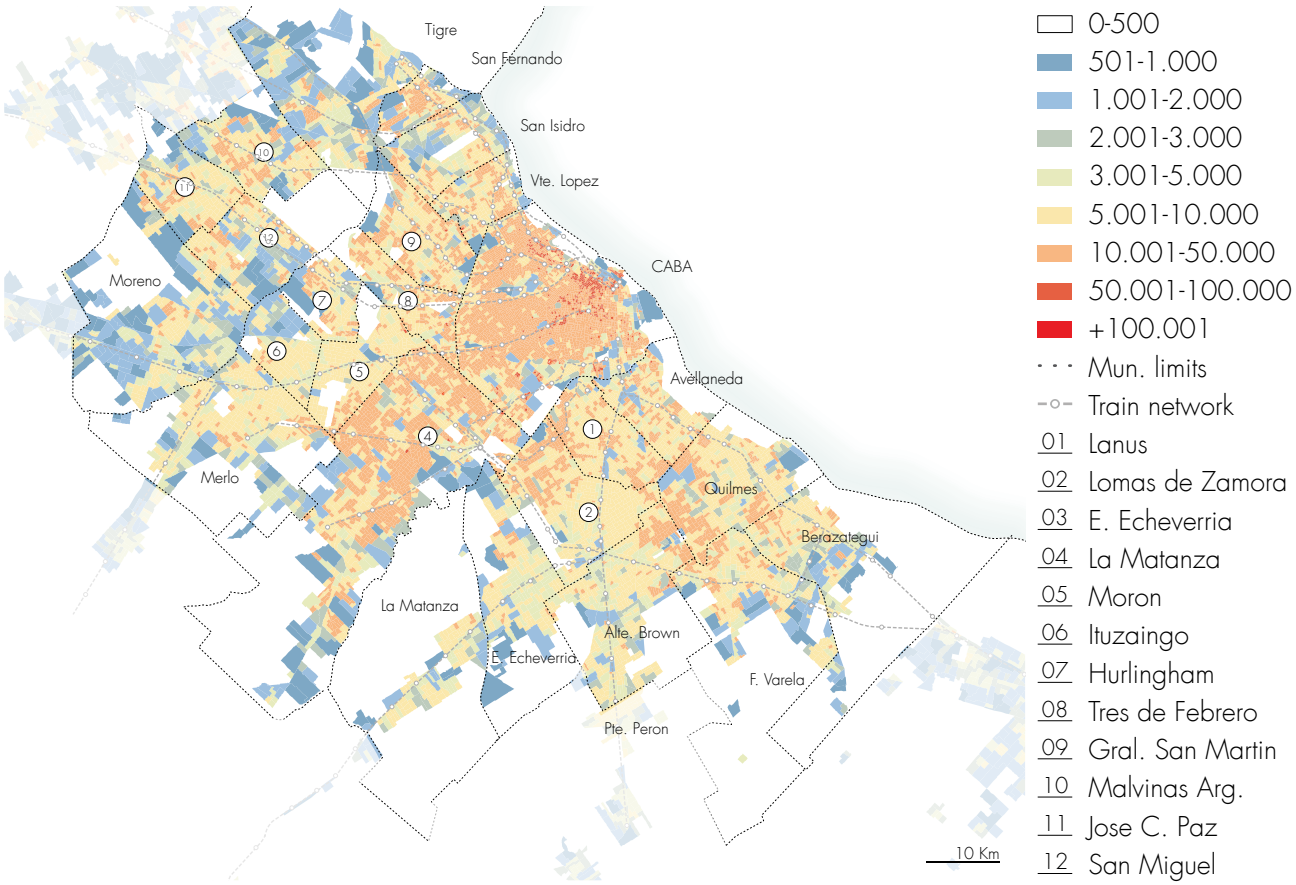


Land use patterns in the study area

of industrial areas as well as some green spaces or areas designated to other kind of uses.

The rest of the peri-urban area is characterized as a transition zone between the urban use and the rural area, where there are spread sectors with different types of allowed construction, from high density to medium density and some farmhouses and open fields. Generally, with the exception of the northern area and some gated communities, the areas of the second and third crown are occupied by inhabitants of low purchasing power and, in some extreme cases, do not count on cloacal services and water of network, among others. It is also common to find a lack of paved roads as moving away from the city.

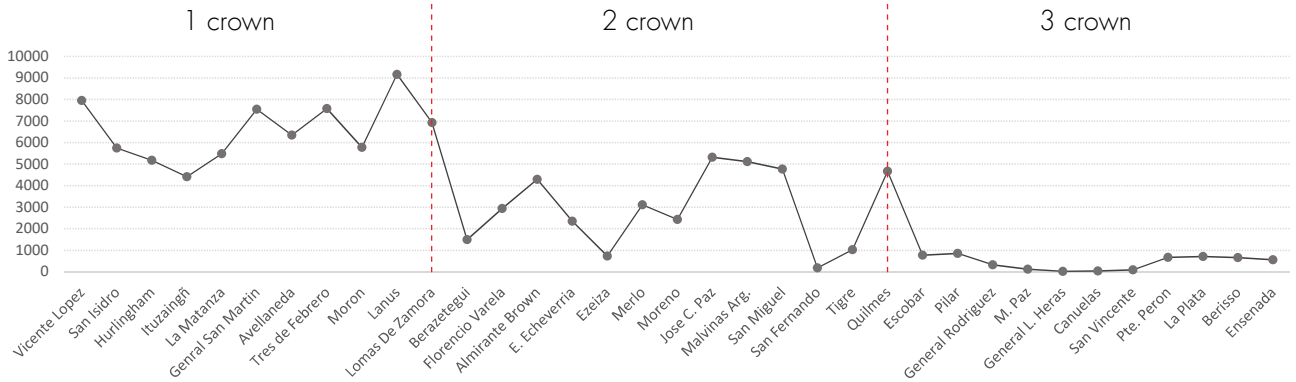
The residential areas, even though they can be found at different distances from the urban area, are usually associated with the infrastructural corridors. This because they are the concentration of the fast and easy access roads as well as of the rail system. In a vast context of this characteristics, the access to a fast mean of transport may be crucial to develop the daily activities. Some exceptions can be found in the Southern rails which are mainly dedicated to industrial uses. Although in some cases the residential areas are second homes frequented mostly at weekends, most of them are permanent residences. It is important to underline that there's no general map of



Population density (inhab./km²) in the study area at census track scale

land use of the Metropolitan Area. In order to analyse the hole area, it was necessary to consider a map, made by the Province of Buenos Aires, which had gathered the different land uses planned by each municipality.

The different land use patterns observable in the Metropolitan Region of Buenos Aires lets the reader assume how the built environment is highly different and heterogeneous at the same time, diffuse and compact, which has an impact on the territorial levels of population density. The AMBA presents an average value of 3,342.39 inhab/sqkm according to the 2010 INDEC national census. The compact and dense CABA presents a value of 14,000 inhab/km², that is, as expectable, the highest that can be encountered in the



Distribution of population density in the municipalities of three urban crowns

whole metropolitan area.

The density value starts to decrease while moving from the Federal Capital to the outskirts. The municipalities of the first crown have an average density of 6,555.7 inhab/sqm, with the highest values in the municipalities directly neighboring the CABA (Lanus, Vicente Lopez and General San Martin). Usually, the neighborhoods of the first crown that are located close to the boundary with the City of Buenos Aires present the higher values of density, creating an urban continuum that is only interrupted by the presence of the General Paz Avenue. Other densified places in the first crowns municipalities are located in correspondance with areas of historical development that are also usually close to the main local railway stations.

In the second crown the size of the municipalities increases widely and the urbanized settlements become less dense and more dispersed, with few concentrated area, mainly located along the main infrastructures (road and rails) also as a response to the land use. In this wide area the density drops to 2,954.5 inhab/km^2. The municipalities that maintain a *"first crown"* level of density are the highly populated cities of Malvinas Argentinas and Jose C. Paz, on the north, and Quilmes and Almirante Brown on the south. Finally, the lowest density values are encountered in the further urban area that is composed by the vast and low populated rural communities of the third crown. In this area the average density is 436,9 inhab/km^2 and the settlements are mostly concentrated around the main centers or dispersed in the countryside due to the rural activities. This areas, because of the vastity of the territory, the notable distance to the CABA and its lower number of inhabitants, depend mainly on interurban bus lines to move and, in a secondary level, on low frequency train lines. Because of this, as described in following chapters, the third crown tends to be a territory where projects on public transportation are not proposed, probably because the main strategies to develop a strong and frequent public transportation network are directed to the most populated areas.

In order to have a more concrete idea of the real configuration of the territory each of the land use definitions will be presented:

Rural Area

Areas destined to sites of uses related to extensive agricultural production, forestry, mining and others.

Residential medium

Areas for exclusive residential use of medium density with individual and collective dwellings

Residential High Density

Area destined to residential use with a high degree of densification and consolidation, in which compatible uses are accepted with the dwelling

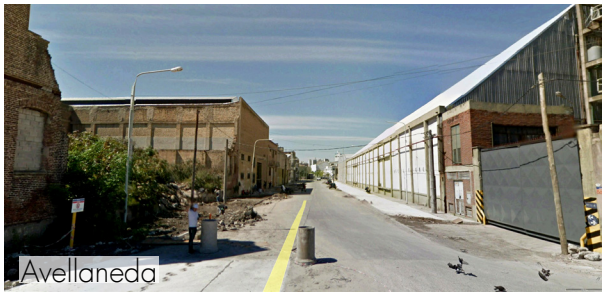
Residential low

Areas for exclusive residential use with individual and collective houses of medium density and low limited height.

Residential mix

In this zone, there can be only industrial establishments defined as 1st Category, as well as residential uses.

Industrial exclusive



In these areas any industrial establishment (1st, 2nd or 3rd category) may be installed regardless of its Level of Environmental Complexity (N.C.A.*).

Centralities

They are the areas destined to the location of the administrative, commercial, financial and institutional equipment, at local level, with adequate accessibility.

Industrial Mix

In this zone only industrial establishments defined as 1st and 2nd category can be established.

**The industries can be classified into three categories. These categories depend on the resulted value from the Level of Environmental Complexity (N.C.A. in Spanish). This value considers effluent and waste, category, risk, size and location. The first category it's up to 15, the second between 15 and 25, and the third above 25.*

Gated community

Reserved Area

Specific interest oriented to the common good. These areas give rise to the conformation of natural environments where different species of native flora and fauna can be maintained in perpetuity or increase its diversity.

Country Club

Specific Use

Areas for transport uses (terrestrial, maritime or fluvial and aerial), of the communications, the production or transmission of energy, the defence, the security and other specific uses.

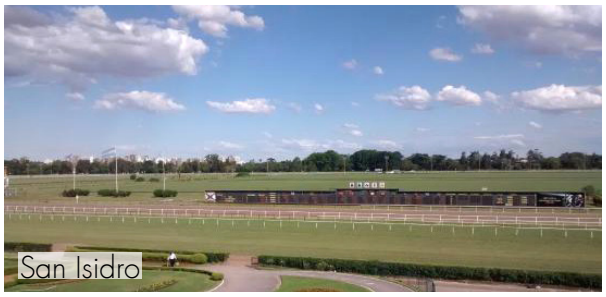
Equipment

They are areas where are located activities that serve the city in general and that by their characteristics admit the restricted coexistence with the residential use.

Recover area

The one that, in its current state, is not suitable for urban uses, but is recoverable through suitable works or actions.

Recreation



The one mainly destined to the leisure activity idle or active, with the equipment adapted to these uses. It can be located in any of the areas.

Protected area

This district encompasses areas that, due to their historical, architectural, symbolic and environmental values, have a high heritage significance, being deserving of a protection treatment of their differential characteristics.

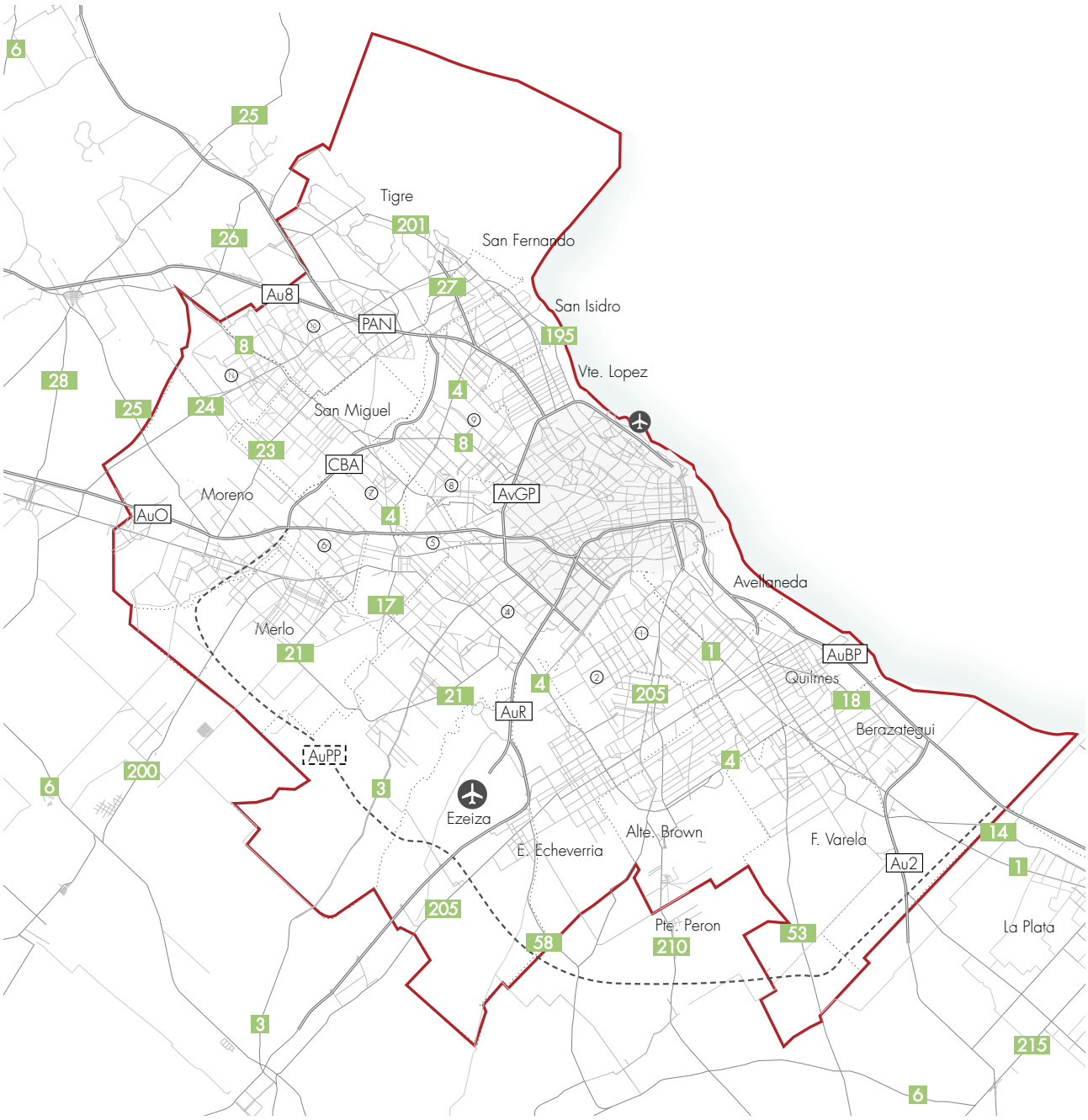
Describing the complexity of the mobility system: Infrastructure, service and management

As highlighted in the previous sections, the development of the urban fabric is strongly related to the growth of the infrastructural network. Because of this relation, and according to the scope of this research, a deeper description on the mobility system is

presented.

The general structure of the mobility network of the AMBA is dominated by six main radial corridors formed by the compresence of railways and highways that converge in the CABA and four concentric roads (General. Paz Avenue, route N4 known as Camino de Cintura, Camino del Buen Ayre, and route N6) which are partially under construction.
The Avenue General Paz is the first concentric axis built during the first half of the XX century. At the time, it represented a sort of a buffer between the urbanized areas and a mainly rural territory. By the 60s the urban expansion transformed the avenue into an urban express way with 6/8 lanes. The highway physically demarks the administrative boundary of the CABA (except for the southern side) and it is today, by far, the most congested highway in the country. Route N4 (Camino de cintura), was initially conceived to delineate the urban expansion as a major tangent corridor and runs completely into the expanded urban realm of the AMBA. It is a 70km road which is mainly composed by two carriageways with two drive lanes each but it becomes also a standard urban street (with two lanes in a single carriageway) when crossing denser urban areas, especially in its southern part. The Camino del Buen Ayre, opened in 1982 being the first completed branch of an under-construction highway that is expected to surround the urbanized area of the AMBA (second crown), allowing the connection between all the radial highways crossing the territory. The decision to extend the Camino del Buen Ayre, was taken in the 90s by the government where the new branch of the concentric axis would be called Autopista Presidente Peron. A long projectual phase was hold between 1995 and 2011, when works finally started. Even though the completion of the 94km highway was expected for 2019, due to economic and organizational problems, such as the necessity to expropriate lands and environmental issues, the highway is still in its initial steps. Finally the route N6 is the most external concentric axis. It is a 180km long corridor built during the 60s to finally delimit the expansion of the AMBA. It is manly composed by two carriageways with two lanes each. After its completion, many productive sites where located along it, generating a consistent commercial traffic that convince authorities from the province to impose a toll that still stands today.

Concerning the public transport infrastructure, most of the rapid transit lines serve directly the city: all the rails that cross the metropolitan region are headed to their terminus in the CABA and the subway system is totally included inside the city boundaries. The six subway lines that compose the underground network are also designed in a radial way, connecting the city center, where they converge, to different cardinal points on the outskirts of the city, with the exception of two transversal connections. There are also eight



Road network

Highways
Planned highway
General streets
6 Prov. and nat. routes
Mun. limits
Study area
Airport

01 Lanus
02 L. de Zamora
03 E. Echeverria
04 La Matanza
05 Moron
06 Ituzaingo
07 Hurlingham
08 T. de Febrero
09 G.S. Martin
10 M.Argentinas
11 Jose C. Paz

bus rapid transit lanes and one pre-metro (an overground light rail).

In order to better understand the characteristic of the infrastructure and the specificities of the service of the public transport system, each mean of transport will be described individually.

The urban train network is structured on eight lines with a total of 832.9km and 273 stations with 41 of them located inside the city. The system is radially distributed in relation to the city and covers the northern area with three lines (Mitre, Belgrano Norte and Tren de la Costa), the northwest with two lines (Urquiza y San Martin, the southwest with two lines (Sarmiento and Belgrano Sur), and, finally, the south with one line (Roca), which also covers a small part of the southwest. Even though it has a big extension, it still doesn't beat the use of the bus to get to the city or to move between municipalities of the Metropolitan region. According to the official timetables, the daily frequencies inside the city and in the first crown are pretty high, with very good performances on the main coastal corridor (Mitre – Roca). This performance change when reaching the second crown, where the offer tends to decrease to less than 150 daily trips. In 2015, according to the data of the CNRT (National Commission of Transport Regulation), the total number of passengers was 330.347.361 making the train the second most used mean of transport for AMBA to CABA displacements (19%), a figure that is very low if compared with the one related to the use of public bus (52%). Regarding the management side, the service has known different changes during the last decades. During the 90s, all the lines were given in concession to several business companies, a process that ultimately brought to a decrease in the use and quality of the service, a situation that got particularly critical with the national crisis of 2001 (Barbero, 2012). The process of deterioration of the infrastructure and the poor management are at the base of the reform of 2014 when six of the lines returned to be controlled by the state. Together with this change, new investments have been directed in the improvement of the infrastructure and of the service. The two lines that are still privately managed are the Urquiza line which belongs to the same private company of the subway and pre-metro (Metrovias S.A.), and the line Belgrano Norte which is in the hands of Ferrovias S.A.C.

The system of public bus has more than 360 lines and some of them have more than eight different branches on a same route. The total number of lines can be divided into three categories. The ones of national jurisdiction (numbered from 1 to 199) are those which at least in one part of the route pass through both, the city and the province. The ones of provincial jurisdiction (numbered from 200 to 499) connect at least two municipalities from the province and the ones of communal

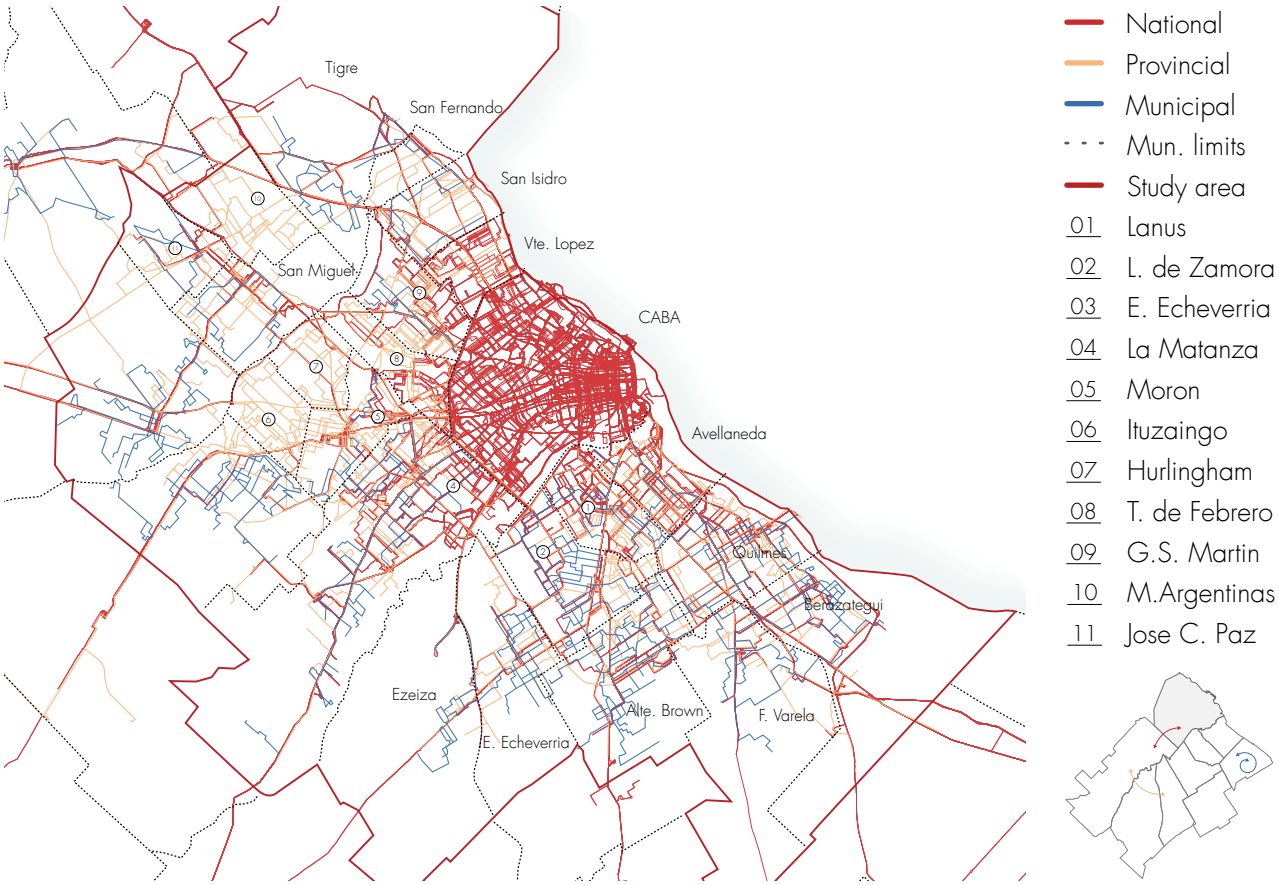
Train network

- Tren de la Costa
- Mitre
- Belgrano Norte
- Urquiza
- San Martin
- Sarmiento
- Belgrano Sur
- Roca
- Mun. limits
- Study area

01 Lanus	04 La Matanza	07 Hurlingham	10 M.Argentinas
02 L. de Zamora	05 Moron	08 T. de Febrero	11 Jose C. Paz
03 E. Echeverria	06 Ituzaingo	09 G.S. Martin	12 San Miguel

Trains per day:

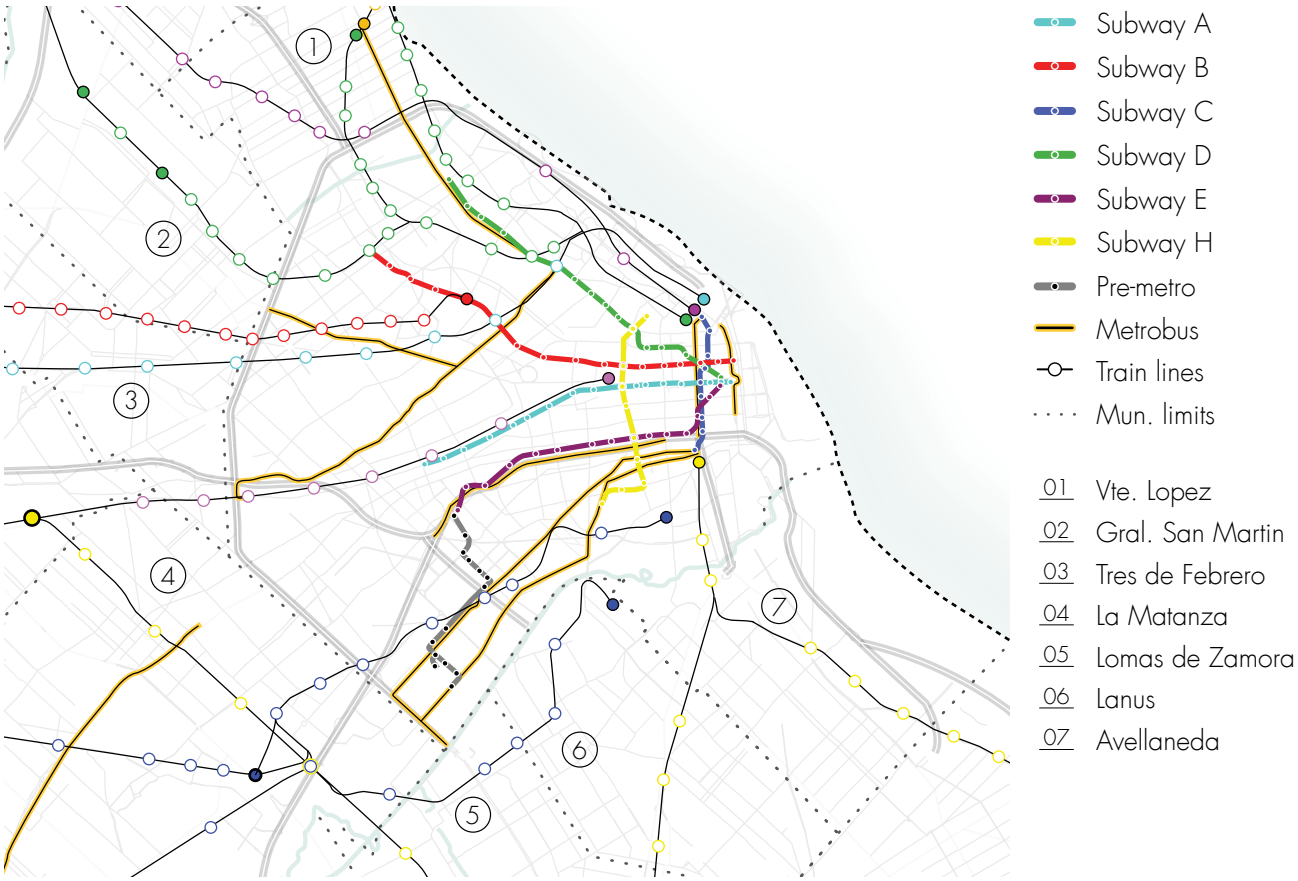
- 0 - 49
- 50 - 99
- 100 - 149
- 150 - 219
- 220 - 499
- + 500



Public bus network

jurisdiction (numbered from 500 onwards) circulate exclusively inside each municipality. According to the law N 24,449, the operative units should not be more than 10 years old. Since October 2013, units that are acquired zero kilometres by companies with national jurisdiction, must have an air conditioning system. On October 2014, the Province of Buenos Aires adhered to these regulations, adding also the mandatory use of accessible units for people with reduced mobility. With respect to the public buses of national jurisdiction "the exploitation of public services is carried out by permits granted by the CNRT, which must be awarded through the public contest of proposals, or by special authorizations" (Act 300/10 of the General Auditory of the Nation). The service operates 24 hours a day. Although from 22:00 hours onwards the frequency is reduced to the criterion of the provider of each line, the company has the obligation to provide a service, at most, every 30 minutes.

Since 2011, the city of Buenos Aires has incorporated the system of **Bus Rapit Transit (*Metrobus*)** along several main corridors. Even though most of them can be found inside the city, extensions are proposed towards the metropolitan area. Nowadays, the total length of the dedicated lanes is 73km and affects 101 bus lines (official data from 2017, Gobierno de la Ciudad). It is necessary to consider that, even do the travel



Subway, Premetro and Metrobus lines

time has been reduced in the places where it was implemented (CEPAL 2012), it may also affect the circulation of the private cars by increasing the already existing congestion.

With respect to the **CABA subway network**, the six lines (A, B, C, D, E, H) have a total length of 53.7km with 86 stations and the pre-metro has a total length of 7.4km with 18 stations. The most used lines are B and D, with 83 and 80.2 million passengers, followed by A (56.3 million), C (45.6 million), E (17.4 million) and H (17.4 million). The Pre-metro light rail carries about 1 million passengers. In 2016 the total number of passengers ascended to 304.057.514 which showed a variation of 11.41% with respect to 2015 (official data from 2016, Gobierno de la Ciudad). The first subway of Buenos Aires, and the whole South hemisphere, was inaugurated in 1913, and even though it positioned the city as a new leader regarding mobility issues, during the 50s its growth rate started to slow down. Not only the subway system is the only one in the whole country but also, other cities like Sao Pablo or Santiago de Chile, which inaugurated their subways in the 70s, already exceed 90km of length in the total network.

Even though the subway system belongs to the City of Buenos Aires, due to a concession contract signed during the 90, it is currently operated by Metrovías S.A..

The concessionary has the possibility to increase the ticket fare to improve the service or because of the inflation but, they don't have the responsibility of lines extension. This is in hands of "Underground of Buenos Aires Society of the State" (*Subterráneos de Buenos Aires Sociedad del Estado*), which is the company of the City of Buenos Aires that oversees the administration of the network, its development, expansion and control of the operation of the service.

With respect to the vehicles for hire, there are three different kind of services: charter, taxi and remis.

The **charter or pullman** is a private service contracted for direct trips with reduced stops at the origin and destination. It is used for direct journeys between the periphery and the central area of the CABA for trips with fixed routes and schedules of 30 km and average travel time of 40 minutes. The service is provided on all axes of the RMBA, from 10 to 100 km from the central area. (Gutierrez, 2012)

There is a gradual differentiation of the profile of service: there is a charter of superior quality or expensive and another one of inferior quality or economic. Those of superior quality have higher prices than the public transport, passengers of socioeconomic level medium to high, vans in good to very good state, predominantly legal operators and a personalized service (telephone reservation, prepayment, discounted packages, drop-in drop-off points on demand, deal with the company, offices downtown but distant from the train stations). Low-cost charters have similar prices to public transport, medium to low socio-economic passengers, good to regular vans, predominantly illegal operators, and non-personalized service (waiting at stops, close to the train stations, payment on board and by trip, deal with the driver) (Gutiérrez, 2005)

The charter adapts the service according to the socioeconomic peculiarities of the north, west and south axes. The low-quality ones are concentrated in the south-west corridors (towards La Matanza) and south-east (towards Florencio Varela). There are also transversal trips, which surround the CABA towards the north or northwest of the AMBA, reaching places such as Pilar, which attract workers for industry and construction (new residential, commercial developments, etc.). For distances greater than 50 kms, there are only expensive charters in all corridors (Gutiérrez, 2005).

On the other hand, the **taxi** is a service that responds to a personalized demand. Although it used to be considered a safe, efficient and economical option for users, currently, due to various cases of insecurity and the increase of its fare, it is no longer a viable option for all types of users. Inside the CABA there is also the option of "radio taxi" service. Although

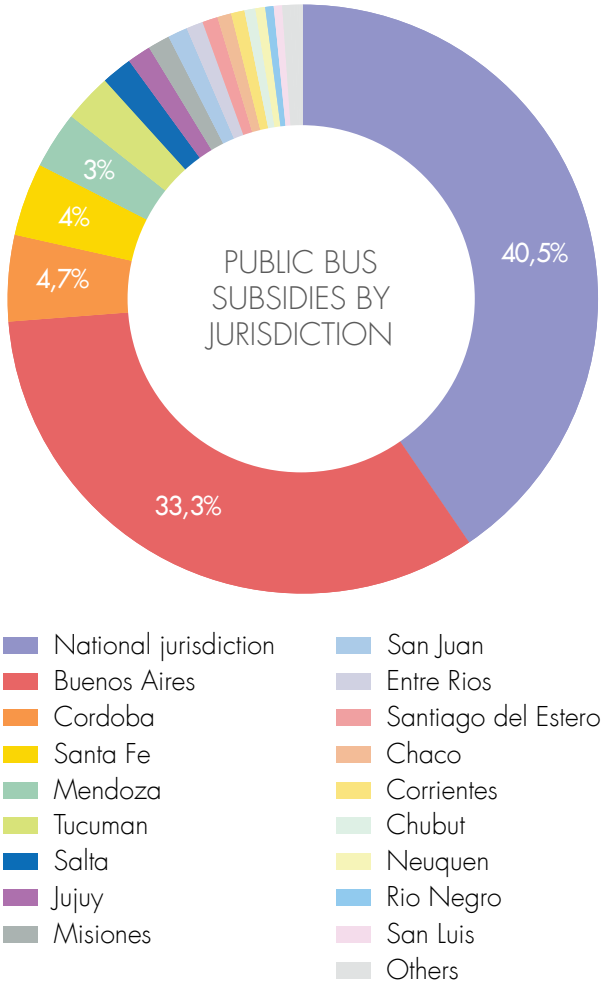
it is considered in the ENMODO (2010) survey, the available data is very few. Unlike other means of transportation, taxis are not subsidized by the government.

The ***remis*** also acts as a rental car but without a taximeter, where the rate corresponds to the kilometres of travel to be made. As in the charter, the authorized *remis* vehicles are around 50% and the rest operates in an irregular way. Different profile services are also distinguished according to price and quality. There are high quality or expensive, with prices above public transport (up to 10 times the price per km), legal vehicles in good condition, with door-to-door service and by telephone request, similar to the taxi. And there are lower quality or economic, with fixed price, equal to the subsidized public transport (or up to 25% lower), old vehicles and/or in poor condition, in a situation of illegality, and with services on fixed routes. This profile is exclusive of the periphery, which correlates with its deficit of public transport. The *remiserías* are concentrated in central areas, in the CABA or in the main localities of the periphery around the train stations or hypermarkets. It can't be found in low density areas. *"The remis is a discretionary service that operates according to economic, urban, social and personal barriers. Travels for strangers towards "dangerous" districts are hardly accepted. These barriers operate especially in the periphery, where the greater contrasts accentuate the selectivity. The bad condition of the streets and/or its lack of denomination and numbering makes it difficult to provide the service, as well as the exclusivity of the service for companies (of industrial parks, for example) and closed urbanizations"* (Gutierrez, 2012).

Finally, it is important to underline that a big part of the mobility system receives economic subsidies from the national government. The arguments which justify the subsidies to the public transport are usually connected to the economic efficiency and distributed equity. (Castro and Szenkman, 2012).

Since 2011, the subsidies to the transport system have been growing unmeasurably. Several studies show not only the inequity of its distribution but also its ineffectiveness. A report made by the Argentine Association of Budget and Public Financial Administration (ASAP) stands that during 2014 the national subsidies to the public transport represented 1.4% of the national GDP. Regarding the public transport dependent on the National State, 66.1% of the subsidies are directed to the public buses, 23% for the train system and 10.3% for the national flight company Aerolineas Argentinas. Of all these subsidies, half of them are distributed in the AMBA, while 22% are for the rest of the province of Buenos Aires. What is left is distributed between other important provinces as Cordoba, Santa Fe or Mendoza, and the remaining 10.6% is distributed all along the country. With regards

to the public bus exclusively, 40.5% of the subsidies are directed to the national ones, thus,bus lines that circulate through the City of Buenos Aires exclusively, or touch the CABA at some point of its route.



Source: Updated to 10/2016. Newspaper La Nacion. Gas oil is not included because it is not discriminated by jurisdiction.
Data based on: Secretariat of Transport

The regulation of the subsidies system is very low and that is why the system is prone to fail (Szenkman, 2012). In this context, some possible negative impacts could be, for example, a high concentration of subsidies in only one sector; no equity in the geographical distribution; possible filtration of the subsidies to people that do not need them and an increase in the number of subsidies without any improvement of the service that is being offered.

A region of inequities: analysing the socio-economic profile of the population

In this section, a discourse on the social structure of the inhabitants of the Metropolitan Region of Buenos Aires is described. Social condition is a topic of relevance for a research which is aimed to understand how the characteristics of the mobility system may have an influence on the social participation of individuals. This is particularly true for those who, in relation to their low socio-economic status, are potentially more dependent on the public transport offer.

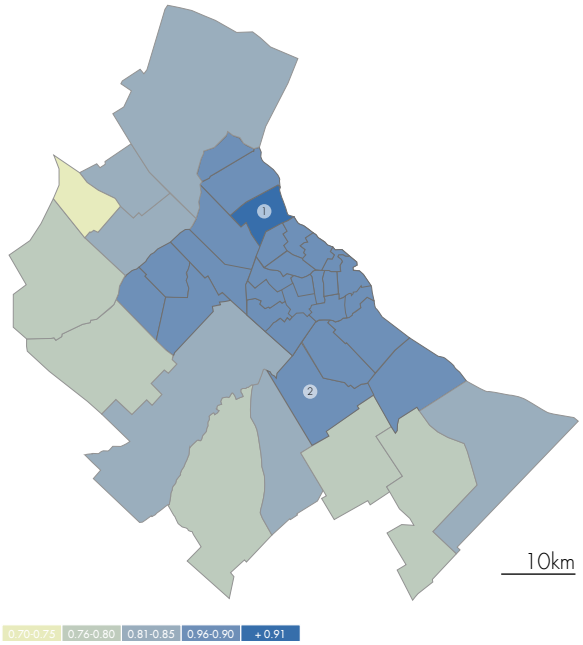
The urban region of Buenos Aires features different kinds of social conditions that can be explored using the available census data, mainly provided by the INDEC (Institute of Statistics and Census of the Republic of Argentina). There are two main indexes, used by official sources, that are used to describe the metropolitan socio-economic patterns.

The first is the Human Development Index (HDI), which is provided at a municipal level. The study on this index has been carried out, during the years 2004/2005, by the United Nations Development Program (UNDP) in

cooperation with the Banco de la Provincia de Buenos Aires Foundation based on the official data from the 2001 census. The report on Human Development in the Province of Buenos Aires (IDHPBA) goes more in depth than the usually scopes (related to national and regional scale) and analysis the municipalities that composes the AMBA, offering a general but useful frame to understand, at a great scale, the socio-economic disparities that characterizes the urban area.

According to the UNDP, the HDI is an index composed by data related to three main domains: education, wealth and health. The first domain is based on the level of education of the population, the second on the per capita GDP and the third on the life expectancy. Each of the three dimensions is expressed on a synthetic value comprised between 0 and 1 that represents the ideal development. According to the HDI value, every municipality ranks in four possible categories referred to the quartile in which they are located. The first quartile (0.8 - 1.0) encompasses municipalities with very high human development, while the high human development index municipalities (0.50 - 0.79) are in the second. There are two other quartiles that are medium and low development that are not featured in the AMBA. The result of the 2004/2005 enquiry is synthetized in Figure x.

The map shows that in the AMBA the level of HDI at municipal level are between 0.75

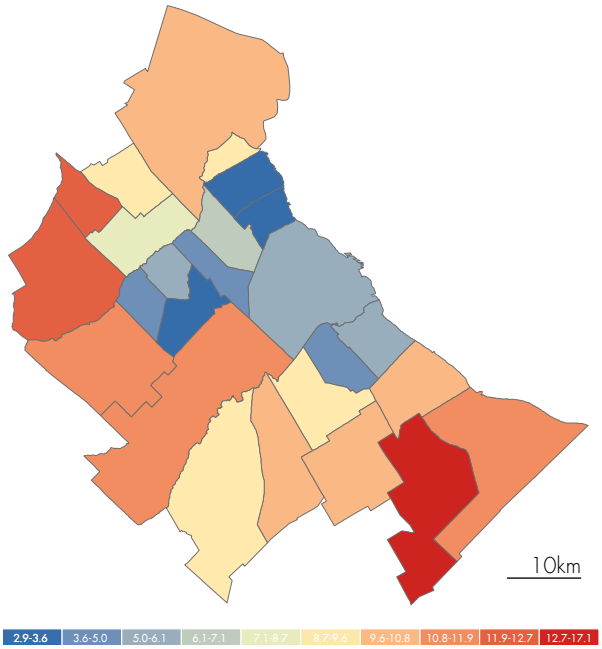


01 Vicente Lopez 02 Florencio Varela

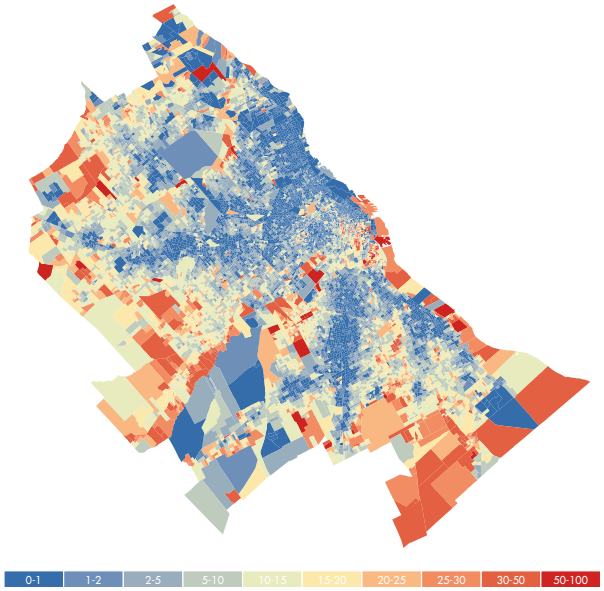
Human Development Index at Municipal scale

(Florencio Varela) and 0,907 (Vicente Lopez), meaning that in the AMBA there is a gap between municipalities that can be represented by the difference in socio economical aspects existing between, for example, countries such as Bosnia and Herzegovina and Sweden. It is also worth noting how the socio economical level expressed by the HDI tends to be higher in the municipalities located in the first crown, with notable peaks on the northern side of the CABA, where the most affluent municipality, Vicente Lopez, is located.

A second available indicator, which is the most descriptive and that is extensively used in the operative part of this research is the Indice de Necesidades Basicas Insatisfechas (Unsatisfied Basic Needs Index). It is a social and housing deprivation indicator that was calculated in the 2010 Indec census by



Unsatisfied Basic Needs Index at Municipal scale



Unsatisfied Basic Needs Index at census track level

considering households that feature at least one of the following conditions of socio-economic deprivation:

1)Household living in a precarious building or/and with rent affordability problems
2)Lack of sanitation
3)Residential overcrowding
4)Lack of access to the educational system
5)The presence of a single low educated employed in a household with four or more inhabitants

The result is an index that expresses the percentage of households, at a census track or municipality scale, that feature a problematic situation. The geographical results, at both scales, are represented in Figure x. At the municipal level, the map presents common features with the one of the Human Development Index. The first crown municipalities have a generally lower percentage of households that are facing social or housing deprivation. As expected, the less problematic areas appear to be the ones located on the north of the CABA, with Vicente Lopez still being the most affluent municipality with only 2,9% of the total households living in poor conditions. On the other side, the second crown municipalities present higher percentages of the figure, touching the 17,10% of Florencio Varela, that is confirmed as the most disadvantaged city in the AMBA. More specific trends can be observed applying the indicator at the census track. Each municipality, in fact, has a more complex socio-economic structure that should be analysed at a smaller scale. At this scale the value of the index ranges between 0 and 100%, meaning that several localities have

a totally problematic structural and social condition. There is an evident concentration of well-off areas in the northern side of the CABA and in the northern municipalities located along the coast. Another interesting feature is the location of many of the most affluent areas outside the boundary of the CABA, in the first crown municipalities. The predominance of wealthy areas tends to be maintained when moving towards the periphery of the Metropolitan Area along the main infrastructural corridors, such as the railways and the motorways.

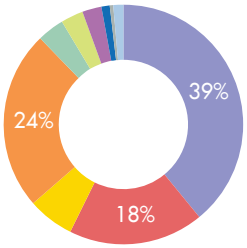
Moving around: mobility patterns and accessibility assessment

The AMBA is a wide urban area where every day around 20 millions of trips are made, generating a network of relationships that is synthetically analised in this section of the thesis. The aim of this description is to understand the demand for movement that is, indeed, an important aspect to be considered when understanding the ways and reasons why people move and that can contribute to the orientation of specific transport planning policies.

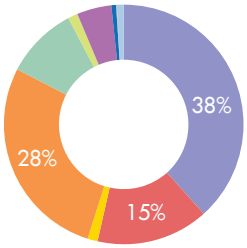
The most important feature of the field of study with respect to its influence on the mobility trends, is the urban configuration of the AMBA and the location of its main polar attractors. In this sense, the CABA can be intuitively pointed as the most important magnet of the urban region, where most of the trips made by the inhabitant all around the metropolitan area are directed. This is due to the great concentration of activity in the city and, conversely, to the strong residential vocation that characterizes many other municipalities that surround it. Most of the data available and presented in this research, with reference to the mobility trends, have been obtained from the analysis of two main enquiries: INTRUPUBA, 2007 and ENMODO, 2010. ITRUPUBA Enquiry on public urban transport of Buenos Aires (Investigaciòn de Transporte Urbano Publico de Buenos Aires) was realized by the National Secretary of transport (Secretarìa de Transporte de la Naciòn) between 2006 and 2007 and it is the first massive collection of data related to the use of the different public transportation modes. The scope of the enquire embraces 27 municipalities of the metropolitan region and the CABA. Generally, it can be observed that the selection of the municipalities can be related to the extension of the urban realm. The enquiry analyses modal share, time of travel, purposes, number of interchanges and a socioeconomic profile of the users. The main results obtained by the enquiry show that the most used mean of transport is, by far, the bus that is used for the 75% of the trips in the region. This is due to its diffusion, especially in the several areas in which no rails or subways are present. Another interesting result is the fact that most of the trips (43%) are originated

Trips for working reasons

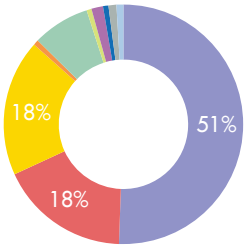
all directions



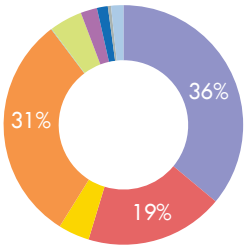
inner CABA



AMBA to CABA

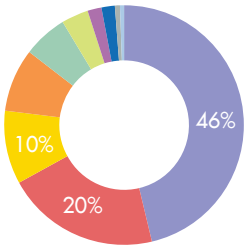


inner AMBA

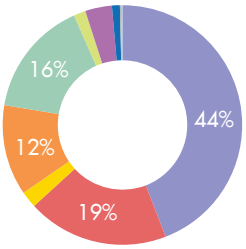


Trips for all reasons

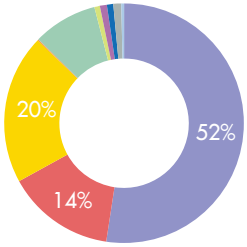
all directions



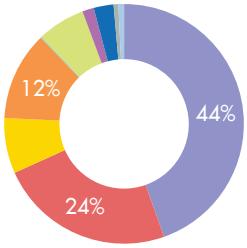
inner CABA



AMBA to CABA



inner AMBA



Bus
Car
Train
Walking
Subway
Cycling
Taxi | Remis
Moto
Charter
Others

and destinated in the province (so to say, not entering in the CABA) and only 22% of them is between the province and the CABA. The rest of the trips (35%) is totally comprised into the CABA. Most of the trips are hold between 07.00 and 10.00 in the morning and 17.00 and 19.00 in the evening. They are mainly for working reasons (67%). Finally, an interesting socio demographic perspective is given: by dividing the population in 7 categories of socio economic level (considering income, job and education) it emerges that people pertaining to the highest (6-7) and lowest levels (1-2) are the lower users of the public transportation system. The main users are from the levels 4 (lower medium) and 5 (medium standard).

The second enquiry, called ENMODO, (household mobility enquiry or Encuesta de Movilidad Domiciliaria), is the main source of the data related to mobility that has been used to complete the operative part of this research. It is the most updated enquiry about mobility patterns in the urban region of Buenos Aires. It was made by Secretarìa de Transporte de la Naciòn between 2009 and 2010. It was conducted on 22.500 surveys made at household level. The aim is to provide a full overview of the mobility trends, by including also private means (car, motorcycles, bicycles, walking etc.) that were not considered by INTRUPUBA. As for the previous enquiry, ENMODO considers not just the modal share of the several means of transportation, but also the time of travel, interchanges and socio demographic features of the travelers. The completeness of the data set is not homogeneous, because it is frequent that, for the most peripheric municipalities, only few information is available.

The results of the enquiry highlight, in accordance with the trends already observed by INTRUPUBA, that public bus is by far the most used mean of transport when considering all the displacements at the regional level. This is probably due to the extension of the network which reaches also the most peripherical spots of the territory. The use of car, displacements by walking and the use of train are also relevant but with a magnitude that is not comparable to the one of the public bus. Among the general regional trends, for the scope of this research it is interesting to observe that there are three main sets of relations. The first is related to the inner CABA displacements. The carried-out analysis shows that the role of the subway is quite secondary and that most of the trips inside the city are still made by bus. This is peculiar, because this is the only part of the metropolitan region where an underground rapid transit system is present. The weakness that can be at the base of its low use is related to the radial structure of the network: all the lines, except for line C and the new line H, are running along the main axis that connects radially the city center with the outskirts of the CABA. This configuration generates a strong use of the subway to reach

Fig. 4:
Daily trips between municipalities

the city center while it diminishes considerably for concentric displacements between more peripheral neighborhoods.

Something similar seems to happen regarding the use of train, that is low, even if the CABA is served by 41 stations along the main suburban lines that departs from the terminus located all around the city core. The scarce use of the train can be imputed to two factors. The first is related to the radial structure of the rail system, which can't support effectively concentric movements. This is the same issue that characterizes the subway network: all the major rail lines are departing from the city center and proceed radially towards the province. Concentric internal connection can be made only by using the subway (when close to the city center) or by using bus. The second reason is related to the congested and poorly designed interchange spots that make trans board between different means of transport complex and uncomfortable.

The second set of relations that is relevant to be considered are the displacements between the municipalities of the province and the CABA. They represent the 40% of the total daily trips and are mainly made using the bus and, in a lower extent, the train. The peculiar urban structure of the region seems to help this type of displacements, because the infrastructure that define the main radial corridors theoretically allow to move quickly

from the outskirts of the region to the city center and vice versa. In particular, the means that may be more reliable for these kinds of suburban displacements is the train as it is demonstrated by the fact that it is highly used in comparison with other sets of relations.
Finally, the trips that are made between municipalities of the province without entering into the CABA, are briefly described in their trends. Every day around 12 million of trips are made in the peri urban region. 3 million are made between municipalities and 9 million are inner-municipal trips. The trend that can be observed is peculiar, because the number of trips made by walking is particularly high, in direct competition with the one of the bus. This can be explained by the fact that inner trips are considered and they are likely to be made on smaller distances, using private means such as bikes or motos. Moreover, even if the bus network is extended, its quality is inhomogeneous and a trip by bus may be not preferable in localities that are poorly served by the network.

In conclusion, it can be said that the metropolitan region is strongly dependent on its bus network and that the mass rapid transit lines are able to answer only to a limited demand. Even if their number is pretty relevant, the displacements along the corridors are just a percentage of a higher amount of more diffused and differently oriented movements that create a chaotic net of metropolitan relations. While moving between places that are close or well connected to the radial infrastructural system may be easier, the same can't be said for movements that follow different paths. This different degree of accessibility is at the same time one of the causes and one of the effects of the strong issue of social segregation that affects the Metropolitan Region of Buenos Aires.

Plans for the future

Official strategies and transport projects

Introduction

In this section, it is described the way in which decisions related to mobility and land use are taken in Argentina. The aim is to understand which is the distribution of decisional competencies across the several administrative levels and which is the legal framework that supports it. This description is necessary to introduce the authorities that are involved in policy making related to land use, transport provision and management. Moreover, it is useful to legally frame the most important strategic planning tools that are deeply analysed at the end of the chapter.

There are two relevant strategic spatial plans, one produced by the Province of Buenos Aires and one from the CABA, in which are expressed the main guidelines for the future development of the Metropolitan Region of Buenos Aires. The plans, that are characterized by a strategic perspective, have no direct legal impact on the land property configuration but represent a framework that should be addressed in order to orient more specific planning actions towards a "sustainable" territorial development.

A deeper look on these plans is necessary in order to understand how authorities assess weaknesses and strengths of the mobility system and which are the main policies that are proposed to deal with the main problems that emerge from the official analysis.

At the end of this chapter a brief overview on the main ongoing projects related to the improvement of the public transportation system is presented to understand which are the main strategies that have been concretely developed.

Legal framework: transport and land use planning in Argentina

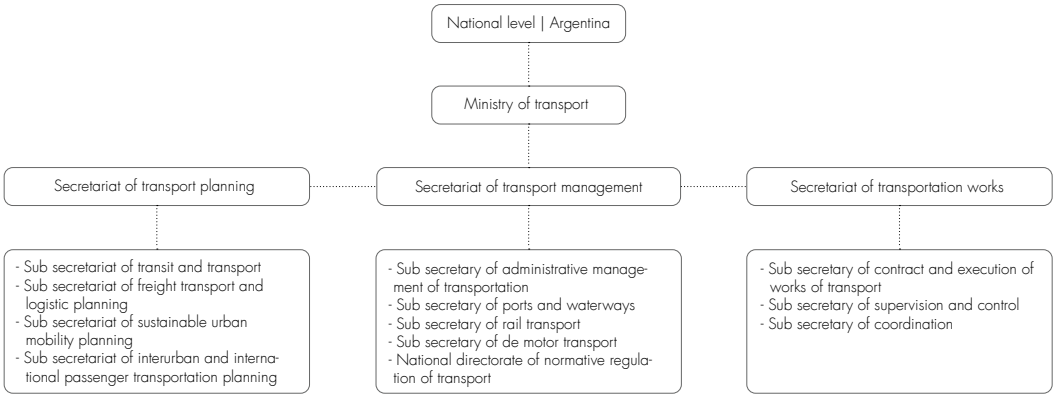
At the top of the legal framework is the National Constitution which represents the supreme law throughout the whole national territory. In turn, according to the art.123 of the national constitution, each province dictates its own constitution and its own provincial laws,

with their respective regulatory decrees. As previously stated, each province is considered autonomous, which means that it can hold all the powers that it chooses not to delegate to the federal government. The provinces are divided politically into municipalities that have functional autonomy. The municipalities dictate applicable ordinances within their territory.

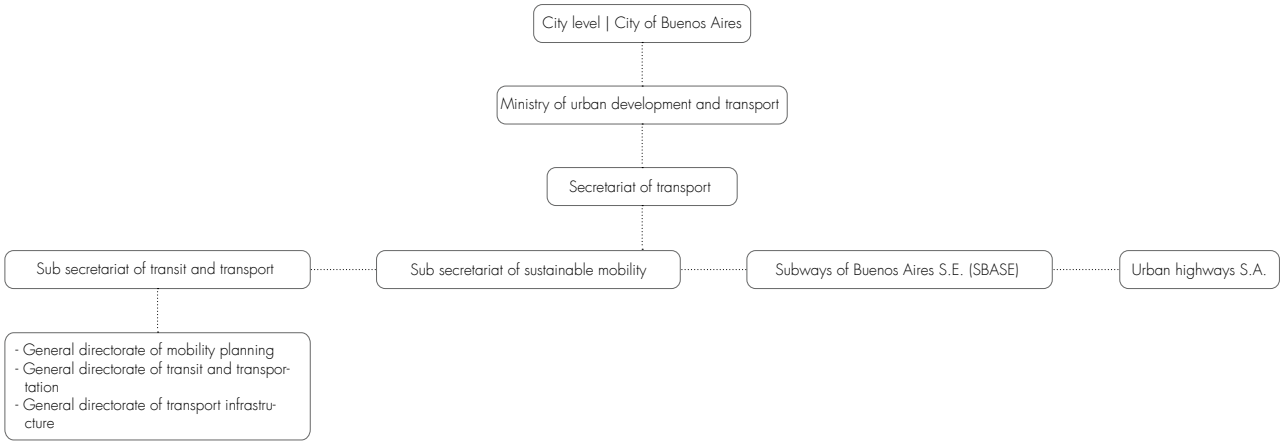
When talking about urban planning, in each of the institutional levels can be found a planning department. At the national level, there are different departments which influence the urban planning in different matters. The Ministry of the Interior, Public Works and Housing intends to "work to improve the way in which all Argentines live through long-term works and policies that promote human and productive development".
The Ministry has a Sub secretariat of Territorial Planning of Public Inversion which was founded in 2004 with "the purpose of implementing the National Policy for Development and Territorial Planning, whose objective is to build an integrated, balanced, sustainable and socially just country through the consolidation of territorial planning as State policy".

The Province of Buenos Aires, instead, has a Sub secretariat of Land, Urbanism and Housing. Which, in their words, has the mission of "be the governing body in matters of land, urban and housing policy, developing strategic actions that promote social use of the land, coverage of basic urban services, habitat improvement, land regularization and social deed. Through sustainable urban development that guarantees balance and equity in the growth of cities". They also entitled some of the actions to be followed in order to achieve these objectives such as "Formulate, plan, program, implement, and control new policy instruments for the reconstruction and/ or urban upgrading of informal sectors at provincial, regional and local levels" or *"exercise the authority to apply the legislation in matters of territorial infrastructure and housing, developing proposals for modification, extension or interpretation depending on the needs of consolidating an effective regulatory framework to lead the process of urbanization of the Province of Buenos Aires".*

Inside this department it can be found the Department of Urban planning and of Urban and Territorial Infrastructure. They share their objectives and explain their action mode as *"plan, design and propose provincial, regional and local policies, strategies and plans for the development of urban and territorial infrastructure, understanding as such the installed capacity in energy, transport, road and rail networks, drinking water and sewers, waste, telecommunications, housing and urban and regional equipment, contributing to the definition of a territorial model of the Province based on the principles of integration, balance and sustainability".*


National level | Argentina
Ministry of transport
Secretariat of transport planning
Secretariat of transport management
Secretariat of transportation works
- Sub secretariat of transit and transport
- Sub secretariat of freight transport and logistic planning
- Sub secretariat of sustainable urban mobility planning
- Sub secretariat of interurban and international passenger transportation planning
- Sub secretary of administrative management of transportation
- Sub secretary of ports and waterways
- Sub secretary of rail transport
- Sub secretary of de motor transport
- National directorate of normative regulation of transport
- Sub secretary of contract and execution of works of transport
- Sub secretary of supervision and control
- Sub secretary of coordination


Province level | Buenos Aires
Ministry of infrastructure and public services
Sub secretariat of transport
Sub secretariat of land, urbanism and housing
Sub secretariat of planning and management control
- Provincial directorate of transit and transport planning
- Provincial directorate of transport inspection
- Provincial directorate of motor transport


City level | City of Buenos Aires
Ministry of urban development and transport
Secretariat of transport
Sub secretariat of transit and transport
Sub secretariat of sustainable mobility
Subways of Buenos Aires S.E. (SBASE)
Urban highways S.A.
- General directorate of mobility planning
- General directorate of transit and transportation
- General directorate of transport infrastructure

Apart from these general departments, each municipality has its own planning department in order to handle the local scale.

Another important point is to "plan, program, project and propose the processes of the urban management necessary to the development of the urban and territorial infrastructure, coordinating actions with the organisms of the province of Buenos Aires with competence in the matter" as well as "advise, plan, promote, carry out and validate particularized projects in the area of urban infrastructure development and provide technical and urban support, especially with regard to housing for social programs". Finally, it also mentions the possible co-working with the other institutional levels by "coordinate common criteria and actions with national and provincial bodies in matters of their competence".
The Planning Development and Transport Department of the City of Buenos Aires *"designs the policies and implements the programs and projects destined to the urban planning and to the execution and control of public works of the City of Buenos Aires"*.
What is more, it has a Sub secretariat of Urban Planning which *"design and implement policies to transform the urban quality of the City. It elaborates urbanistic norms of patrimonial protection"*.

The organization with respect to the mobility system is, as happens for land use, organized in three levels: national, provincial and municipal. Each of them divide their approach by departments of transport planning, management and, in some cases, supervision.

The decisional framework features a general issue of fragmentation, due to the lack of communication between the different administrative levels. During the last two decades, there have been some attempts to improve the collaboration between the parties. In 1998, the Congress sanctioned the law N° 25.031 creating thus the entity for the regulation of the transport in the Metropolitan Area (ECOTAM, spanish acronym). This was due to the lack of coordination between the national, provincial and municipal jurisdictions that was affecting directly the AMBA's transportation system.
This law presented some difficulty in its operation since, being a law of adhesion, once the national State establishes the terms for the operation of the entity, then invites the other jurisdictions involved to adhere. (Poder ciudadano. 2007) This leads the parties to adhere, but without active participation.
In the year 2012 an agreement was signed between the nation, the CABA and the province of Buenos Aires creating the Metropolitan Transport Agency. The ATM (spanish acronym) functions as a tool, it does not seek to create a new bureaucracy or limit the executive power of the parties. Its objective is to facilitate the creation of agreements between the parties, as well as to

order the complexity of articulation between the levels of nation, province and city. (actas del primer congreso argentino de transporte, buenos aires 2015).

In 2016 there was a relaunch of the Metropolitan Transport Agency since, although it was formed in 2012 and although a five-year transport plan and a statute were signed, in addition to the progress in the development of the Metrobus La Matanza and Los Viaductos Belgrano Sur, San Martín and Mitre, the organism was never institutionalized. It currently functions as an advisory body to plan the mobility of the territory with a representative of each jurisdiction. No plan or intervention proposed by the AMT can be found as of 2017.

The strategic spatial plan for the metropolitan region

The first plan that is analysed is the "Strategic Guidelines for the Metropolitan Region of Buenos Aires" of 2007. It was first published by the Province of Buenos Aires at the end of the governorate of Felipe Solà, exponent of the Justicialist Party which, at the time, was also the party represented by the presidency of the nation. In 2015, a new governor from the opposite party was elected and this change may have influence on the principles of the plan or may lead to the production of a new strategic one. As of today (2017) the 2007 plan is still in force. The plan aims to give a set of guidelines in form of scenarios that may orient a sustainable development and invert specific negative trends that have characterized, according to the document, the growth of the urban fabric in the last decades. The plan orients, in a final operative section, specific programs that are considered to be relevant to accomplish the proposed objectives.

The structure of the plan is based on four main parts, three to be considered analytical and the last one more operative.

The first part concerns the historical development of the city and its urban region, followed by a territorial analysis and diagnostic of the metropolis as it is today.

The second part is devoted to the main problematic issues ("cuestión") that can be found in the territory. Each of these issues present a specific challenge ("desafío") and for each of them two options of treatment are studied ("dilemas"). The main tackled issues embrace a wide set of dynamics. They are related to the future of the port, energy provision, configuration of the road system, configuration of industrial spaces, reorganizations of urban centralities, expansion of sewage system, changes in growth patterns, water bodies management, solid waste treatment, metropolitan system of green areas and reorganization of peri-urban

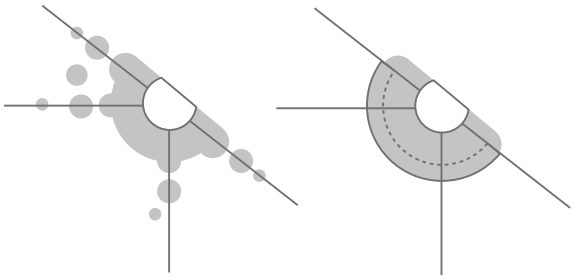
areas.

Furthermore, the third part of the plan concerns the definition of several strategies by categorizing the previous underlined issues into three main topics (environment, production and growth). The plan intention is to guide political actions towards possible futures that may vary depending on the chosen option ("dilemas"). Commonly one of the options is the "business as usual" while the other one is more challenging and asks for an integrated development. According to different possible combinations of options, the plan foresees five scenarios with different magnitude of impact.

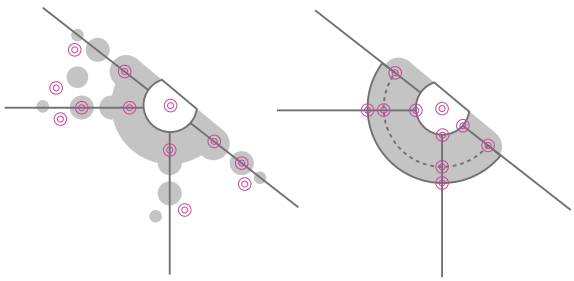
Finally, the fourth part, presents the possible interventions and territorial programs that may be followed to achieve the chosen scenario. They are mostly operative programs in form of site projects. The part ends with an economic analysis followed by a proposal to better distribute the responsibilities of all the involved public bodies.

Regarding the topic of mobility, which is at the core of this thesis, the plan proposes a set of challenges for the future.

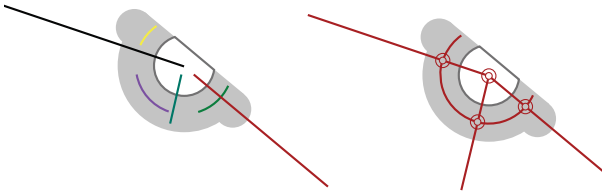
The first challenge ("desafio") is to define the future organization of the road network at a metropolitan scale. The two options ("dilemas") consist of extending the already existing radial axis or to promoting the development of concentric axis. The model tends to favour the second option because the first one represents the followed one in the last decades and it is considered as the origin of many problems that till today affect the region. The development which occurred in the most peripheral areas of the territory, was oriented to the urban sprawl and urban fragmentation with many gated communities build all around the area. This phenomenon has jeopardized the balanced accessibility in the metropolitan territory.



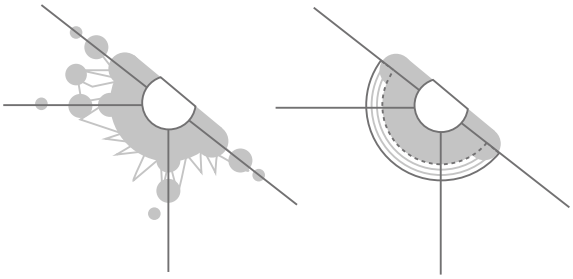
The second challenge proposed by the plan is to integrate old centralities (commercial areas around the transportation interchange nodes) and new ones (malls, offices, universities etc. built along highways). The two options of this challenge consist of leaving the development to the free logic of the market and local regulations or applying active policies to revitalize old centralities and guarantee access to the new ones.
The model tends to favour the second option because it may have wider impacts able to affect all the social strata, enhance the connections between old and new centralities and favour a denser and less segregated growth.



The third challenge is to create an integrated system of transport and to increase the territorial accessibility. In this sense, the plan proposes two possible directions where the first is to improve the system by maintaining the actual management structure, while, the second one is aimed to institutionalize the ECOTAM (coordinated entity of transport, introduced with the law 25031/98 and never effectively entered into force), create an intermodal ticket and physically restructure the whole system. The model tends to favour the second option because the centralized control allows an easier restructuration of the system and thus, the introduction of an integrated ticket and other innovations which will increase the use, the revenues and the social benefits of the public transport. It must be said that this policy was proposed when most of the management of the service of the main rapid transit lines was in private hands, a condition that today has changed (see chapter 2)



The fourth challenge is to consolidate the peri-urban border as an area of environmental rebalance. The two options ("dilemas") consist of considering the territory as a residual area where the activity segregated by the rest of the city can be located or, assuming the territory as an area than can contribute to the environmental rebalance of the whole city. The model tends to favour the second option because it is connected to the previous preferences of the plan which entitles that the new concentric model shapes the future areas of growth avoiding the urban sprawl and structuring better connections. In addition, the plan contemplates the development of specific policies for the area located between the planned highway that represents the extension of the Camino del Buen Ayre and Route N6.



In the third part of the plan, it is worth analysing the fourth and fifth scenarios where the topic of mobility is introduced. In both, the reorganization of the transport system is seen as an intervention that, in combination with many others, may have a mayor effect on a social development. The starting point would be the creation of a common authority

and the introduction of an intermodal ticket. This is related to the proposal of a new taxation system in correlation with the level of accessibility of the properties as it happens, according to the plan, in other world cities. This would be the main source of funds to be invested in the development of the transport system which follow these actions:

-Adequate existing and propose new concentric and radial axis for the road network
-Invest in the train network
-Reorganize the bus network
-Develop along already urbanized areas in connection with the transport system following the principle of train/subway for long distance, public bus for medium ones and bicycle for the local.

The plan awares of the impact of this potential change, especially the extensions of the rail network, because it may absorb other fringe of the urban fabric that are today detached from its continuum bringing a bigger problem of urban sprawl. The development, thus, must follow the matrix created by the interception between radial and concentric axis.

To conclude, in the final operative part of the plan, the most concrete policy proposed regarding mobility is the extension of the Camino de Buen Ayre to generate a new concentric ring road together with the routes 4 and 6. These axes are today the main concentric ones but their configuration doesn't allow a fast flow of movement because they cross several villages. The new highway will represent the final and most external part of the new matrix of development, based on concentric and radial axis, proposed by the plan. The points of intersection between the new concentric highway and the radial ones, are considered as the main new nodes for urban development where new centralities and interchanges between different means of transports should be designed. They will absorb most of the growing provisions for the whole metropolitan region.

The strategic spatial plan for the city

The second plan that is analysed is the Territorial Model 2010-2060 produced by the CABA. It is a strategic and policy-orientation plan that aims to evaluate the actual urban quality of the city and orient criteria of intervention for a sustainable and desirable future based on its present weaknesses and needs.

The plan is structured in seven chapters which can be divided into three groups. The first group represents the introductory part where the laws and administrative decisional structure regarding the actual city are described as well as the evolution of this system until nowadays. These two chapters are followed by other two (the actual city and the thought city) which analyse the current situation of the city and the different plans that where proposed

during history to get to its actual configuration. The final part concludes with three different chapters describing different possible cities where the first one is the expected, then the desired and, finally, the sustainable city.
The goal of the plan is to analyse, by applying a scientific approach, the current urban quality using several indicators that express the actual gradient of sustainability, in a range between 0 (insufficient) and 1 (optimal). Different topics are studied (environment, housing, urban structure and centralities, transportation, economy and productivity, and urban heritage) and possible solutions towards a desirable city are proposed. The plan represents a sort of intentional strategic framework upon which following future sectorial plans should be structured.

In the following lines, the most interesting sections of the plan with respect to the topic of mobility are described in a deeper way.

The second chapter considers the theme of actual city ("la ciudad actual"). It proposes a territorial investigation of the city in order to achieve a general diagnosis of the present situation. It starts with an analysis of the city at national and metropolitan level followed by a closer approach to basic characteristics such us the morphologic configuration, urban blocks and division of parcels, land use and service infrastructures. The theme of transport and mobility is also mentioned by considering the public transport and its spatial distribution, pointing the attention on the structure based on radial and concentric axis. Finally, it describes the public spaces and the real estate market followed by a social analysis of the population regarding its education and its social status.Specifically, regarding the transport and mobility system, it also recognizes the importance of the exchange nodes in the transport network as they connect the different means of transport. At the same time, there is an important characteristic of the transport system which is the lack of physical and managerial coordination and the absence of a common fare system. All those issues are due to the jurisdictional fragmentation that exists between the administration and operation of each subsystem.

The third chapter treats the "tendential city", thus, the current processes and modifications regarding the metropolitan area and topics related to its complexity such as structure and centralities, transport and mobility, habitat and housing, public spaces, production and employment, and urban heritage. In this case, the topics of metropolitan area and transportation will be tackled. Regarding the former, the demographic indexes show, for the last ten years, an increase in population even bigger than the one inside the city. This growth is mainly concentrated in the third crown of the metropolitan area, while the municipalities situated in the border of the city limits show a lower growth. The plan also mentions a critical situation regarding

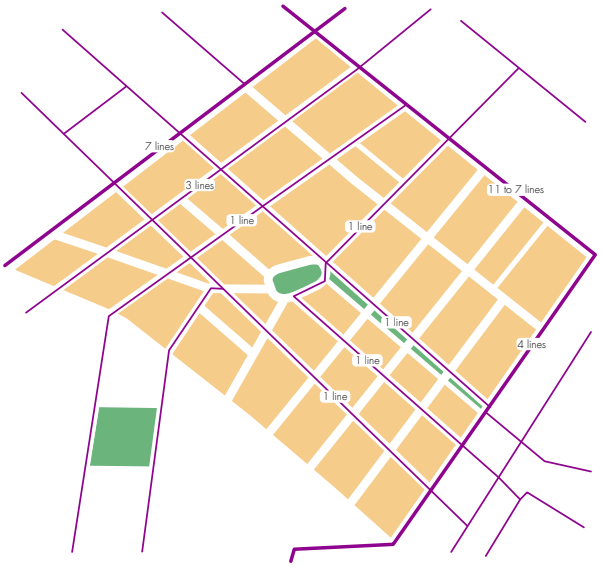
the expansion of the urban fabric which is often followed by a delayed expansion of the network of public services. Of course, this kind of growing leads to unplanned and uncoordinated urbanization processes. There is a special focus regarding the route N6 and its possible upgrading to establish it as the physical limit of the urban expansion. Furthermore, it also mentions a necessity to incorporate new mechanisms of metropolitan coordination for land use and transport planning. This is the only section of the plan in which a more specific focus on metropolitan dynamics is extensively proposed.

The fourth chapter considers the theme of the desired city (ciudad deseada). It is the expression of the sustainability values that the administration wants to establish for the CABA. While recognizing the necessity of promoting a larger-scale view on the territory (so to say including also the AMBA), the plan still maintains its scope only inside the administrative boundaries of the CABA. In the plan's desired city, a strong role is played by the concept of the compact city desired, with its concentration of functions, human relations and environmental potentials, as the best possible outcome for the future of the city. This is openly in contrast with the ongoing shaping of the contemporary city, which is physically and socially fragmented. To obtain this goal, great attention is directed to the actual structure of the existing centralities, intended as places with living services, presence of public transportation networks and commercial activities. The intention of the plan is to follow the present distribution of the centralities and potentiate them. New densification trajectories will follow different radial branches starting from the centre of the city along already existing high density structural transportation axis. Medium density areas, with new activities, are been foreseen at the margins of the high-density corridors and finally, new concentric densification rays are designed to complete the structural grid. This attempt can be compared with the spatial grid of concentric and radial axis that is proposed in the plan produced by the province, even if at a smaller scale. This attempt represents a kind of partial decentralization of functions that is intended to happen also for the transportation and green networks, involving in particular the southern areas which are considered as the weakest in terms of habitability.

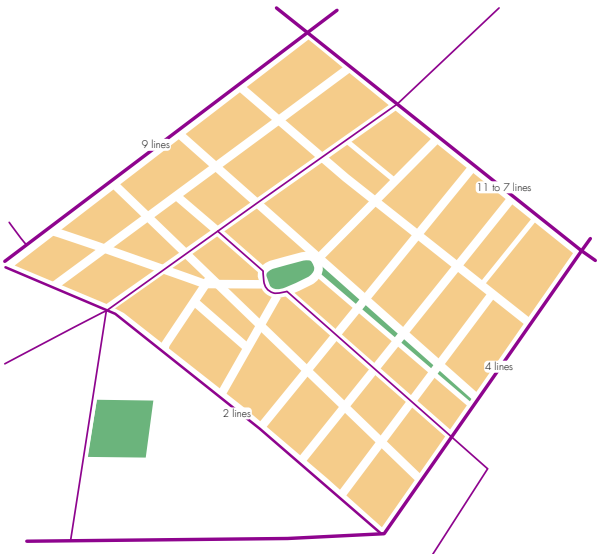
With respect to the road network the plan proposes a hierarchization of its components, defining the major roads as a strong framework for massive public transportation lines and through car traffic. The major axis will become the borders of the so called basic sustainability units (unidades de sustenibilidad basica) where the accessibility to services, green, housing, commercial areas and transportation lines can be achieved by walking or cycling. In this frame, the local inner roads will be designed to prioritize pedestrian movements, allowing just local car transit. According to

the plan, this transformation is strongly linked with a decrease of car use, achieved with the rationalization of the road network and by prioritizing the public transportation lines on the main axis. The public transportation system will be also hierarchized, leaving to the networks of trains and subways the role of long distance connectors while promoting the use of public bus primarily for small/ local connections. The multimodality will be guaranteed by the already existing frame of interchange nodes and the new ones that are planned.

The last section of the plan is related to the sustainable city (ciudad sustentable). This section presents the results of the scientific approach on the city. The chapter explains the construction of the synthetic indicator which gave the actual rating of sustainability of the CABA. It is obtained by averaging the several indicators specifically calculated for all the issues tackled in the plan (environment, housing, urban structure and centralities, transportation, economy and productivity, urban heritage). The average value for the whole CABA is 0,68 (this in 2010 when the plan was published), meaning that the starting point, according to the plan, is quite satisfactory. Fields of study that presents indexes below the average are urban structure and centralities (0,60) and quality of public spaces (0,61). At the same time, the quality of the transportation system seems to be quite satisfactory (0,72). The index is calculated by combining three main indicators related to car ownership, distance from a public transportation node and distance from the primary road network. In this sense, the way to assess accessibility to the public transportation network is only related to physical proximity and doesn't take into consideration the quality of displacements.



"Unidad de sustenabilidad básica" of high density: current transport and mobility



"Unidad de sustenabilidad básica" of high density: future transport and mobility

This type of scientific approach may be considered by planners as necessary because it is obtained by quantitative data: when those starting data are modified, different outcomes in terms of sustainability are achieved. This is the final goal of the plan: giving a framework of evaluation of the future development while proposing strategies, such as the implementation of the basic sustainable unity, that are intended as relevant to maximize the sustainability index.

Under development and future projects

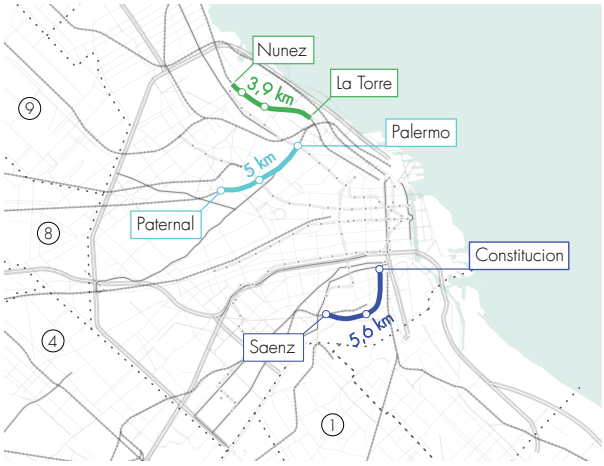
This section features a description of the main ongoing projects and proposals for the capital city and the Metropolian Area with regards to the mobility system. The projects have been divided taking into consideration the territory of application as well as their level of completion.

To begin with, inside the Capital City there are several interventions currently under development.

First of all, the project known as "Paseo del Bajo" situated in the city centre. The objective of the project is to connect the highway Buenos Aires-La Plata with the Illia motorway. The project will be carried out by the Ministry of Urban Development and Transportation of the City, through Urban Highways S.A. The Paseo will have more than 6 kilometres of extension connecting the south with the north part of the City. This road will have four lanes (two for each direction), where only heavy traffic such as trucks and buses will circulate. The cargo transport will have a direct exit to the port and the buses one direct to the Retiro Station. Private cars will continue to use the current roads but, theoretically, with a lower level of congestion. The work has a total cost of US$ 650 million, of which US$ 400 million are from a CAF (development corporation) loan, and US$ 250 million provided by the City. It is expected to be completed by the first half of 2019.

Secondly, there are several viaducts being constructed in the rail lines of the Train San Martin and Train Mitre. Even though being developed inside the City of Buenos Aires, it is presumed to have an impact also on the passengers arriving from the rest of the Metropolitan Area. The project of San Martin train line will lift the train along 5 km, from Palermo station to La Paternal station. Eleven barriers will be removed and nine safe crossings will be opened. The Project is supposed to have an impact on almost 680.000 citizens. It is a project impulse by the Ministry of Transportation of the Nation together with the Government of the City of Buenos Aires and will be carried out by the Ministry of Urban Development and Transport of Buenos Aires through Autopistas Urbanas S.A. In the case of the Mitre railway, the proposal is to raise the trace, as well as to eliminate eight barriers

and contribute to the connectivity and security of the neighbourhoods of Belgrano, Núñez and Palermo.



With respect to the Metropolitan Area, several projects expected to be finished by 2017 are still under development.

Firstly, the Ministry of Transport of the Nation has projected several works in the main access to the City which main objective is to alleviate vehicular flow in the Panamericana and the Acceso Oeste. The works consist of extension of lanes, rehabilitation of damaged areas, paving and construction and improvements in the bridges that cross the highways. In the case of Acceso Norte, there will be nine works. A third lane will be built at Tigre, lighting will be carried out and drainage and paving will be built on Av. Constituyentes, between Ramal Campana and Pilar. A third lane will be built on the Ramal Pilar and the area of the collector roads will be paved. In addition, improvements will be made on fourteen bridges. In the case of Acceso Oeste, the fourth lane will be constructed in each of the directions on the Camino del Buen Ayre, for a length of three kilometres, at the zone of José María Paz. In addition, two bridges will be widened and drains will be adapted. Also on the Camino del Buen Ayre, but at the height of Provincial Route 23, a fourth lane will be built for six kilometres. It will also include signs, drainage and improvements to the highway defences.

Secondly, another project under development that can be found in the Metropolitan Area is the extension of the bus rapid transit to the peri-urban area. Some parts have already been inaugurated, even though the whole dedicated lane path hasn't been finished yet. The first one was the one in the North of the city, and over the last months, parts of the corridors in the municipality of La Matanza and Tres de Febrero.

Thirdly, several province route roads are

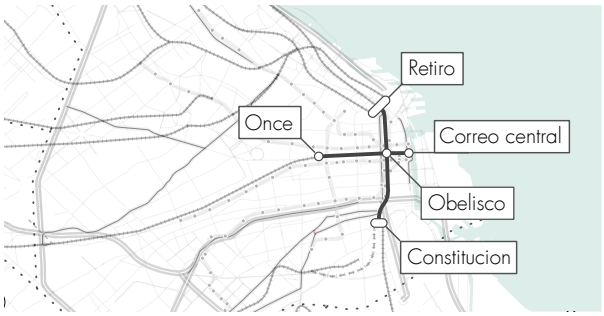
being extended or improved. Regarding the Camino del Buen Ayre, The Ministry of Transport of the Nation, through National Roads (Vialidad Nacional), is carrying out a work to extend the Camino del Buen Ayre road from Acceso Oeste to AU 2. It is a total extension of 83 km of new path that will join 12 municipalities among themselves and with the access to Buenos Aires and La Plata. The highway will have two lanes per direction, overpasses and distributors. The provincial route N4 will be re-pavedt along 18 km in the Municipalities of Morón, Quilmes, Hurligham, Tres de Febrero and Gral. San Martín. In addition, it is contemplated the improvement of the illumination and signalling. The works, which began on April, will require a total investment of $ 352 million. (peso arg). In addition, several transfer centres are being upgraded in order to improve the interchange between the different means of transport and increase the security and the urban quality. Improvements have been made in the station of Retiro, Constitucion, Chacarita, Once, Pacifico and Flores, all located inside the City of Buenos Aires.

Regarding future developments, the Government of the Capital City is studying the feasibility of creating a new subway line both in terms of land ownership and surface, where the government would have to expropriate the buildings that would be needed to build the new stations. An environmental impact study will also be carried out. The new F line would connect Constitucion with Plaza Italia passing through the city centre.

What is more, on September 2017, through the government gazette, it has been announced an official document for US$ 2 billion with a view to incorporating 1,500 electric wagons to the rail system. That number exceeds the 1346 units that circulate in the metropolitan area at the moment. Another US$ 800 million will go to the provision of spare parts and the provision of maintenance service for 10 years. The new wagons will be directed to the tracks of Mitre, Roca, Sarmiento and San Martín lines.

Furthermore, there is one project that even though it hasn't been developed yet, it still being considered as part of the main agenda. The main concept of this project known as RER (Network of Regionals Express) is to connect all the rail network which arrives to the city centre. By making an extension of the railway of 16km, the hole system of trains would be connected in the city centre allowing to decrease the number of interchanges needed to move around the city or crossing through it. The project has already been approved

and, in May 2017, the bidding process was lunched in order to start the first works at the Station of Consitucion. It is expected to be finished by 2023 with a budget of U$S 14.000 million.



Finally, on June this year, the Secretary of Transport of the Nation presented the National Transport Plan with prospects to 2019 and 2027. The main objective of the plan is to improve the efficiency of both passenger and cargo transportation. Among other things, routes will be built and trains and ports improved. US$ 6000 million will be invested in the recovery of the railway system that is today in a state of deterioration. The plan aims to improve 3,000 kilometres of roads and to buy more than 100 locomotives and 300 wagons. As for the public transport, it is among the main objectives to improve the Metrobus network. The improvement of the units is also in the agenda such as the incorporation of automatic braking in all trains, which will demand U$S 260 million.

Summing up, most of the investments that are being done are concentrated in the mobility system that can be found inside the CABA or towards it. The projects are also directed to the improvement or extension of road networks, presumably, to reduce the high level of congestion and ease the traffic. It is notable how, regarding the most used mean of transport, the public bus, only projects related to the Bus Rapid Transit system can be found.

Towards a new perspective

A literature-oriented critical review on the plans for the future

Different approaches, common weaknesses

The analysis carried out on the plans for the future of the Metropolitan Area of Buenos Aires done in the previous chapter highlights how the topic of mobility is present but tackled in different ways. This is expectable in a so wide and populated area which is constantly growing in terms of number of inhabitants and urbanized surface. Because of this phenomenon, an increasing pressure on the mobility network is in place and this is the reason why official plans and projects primarily propose to deal with congestion. This becomes evident when considering the nature of the ongoing projects. Most of them are aimed to physically improve the transportation hubs and the main radial connections. A reasonable attempt, considering that more than 25% daily trips are made along the five main corridors that connect the CABA to the rest of the region (Szenkman, 2015).

What is more, all the projects that have been described in the previous chapter seem to be highly influenced in their scope by the administrative structure of the region. For example, the portions of the urban railway lines that are being tunnelled are all concentrated in the CABA territory even if areas with similar physical characteristics can be found also in other municipalities. In addition, only one Metrobus corridor out of nine connects directly the northern side of the Federal Capital to the AMBA. The fragmented way in which mobility policies are managed reflects, as highlighted in the LERMBA, the lack of a metropolitan body able to orient political decisions with a complete vision of the whole region. Furthermore, even if the body has already been created, it is not yet in operation. This lack leads to *"an inertia in the way the situation is diagnosed (...) and a fragmented treatment of transport services and the dimensions of analysis"* (Gutierrez, 2012).

The differences regarding the dimensions of analysis is particularly relevant. Both plans feature a diagnostic section where the main issues related to the urban sphere (such as mobility, land use etc.) are analysed using

data (LERMBA) and indicators (MTCABA). The plan for the city shows a more scientific-oriented approach able to describe, in a quantitative way, aspects strictly related to urban quality among which transport and mobility is considered as one of the seven main topic. This represents an interesting way to assess problems and to propose strategies to tackle them, even with a scope that is totally constrained to the boundaries of the Capital city. Moreover, the evaluative side of the plan seems to be more powerful than the propositive one, considering that only few operative strategies are suggested.

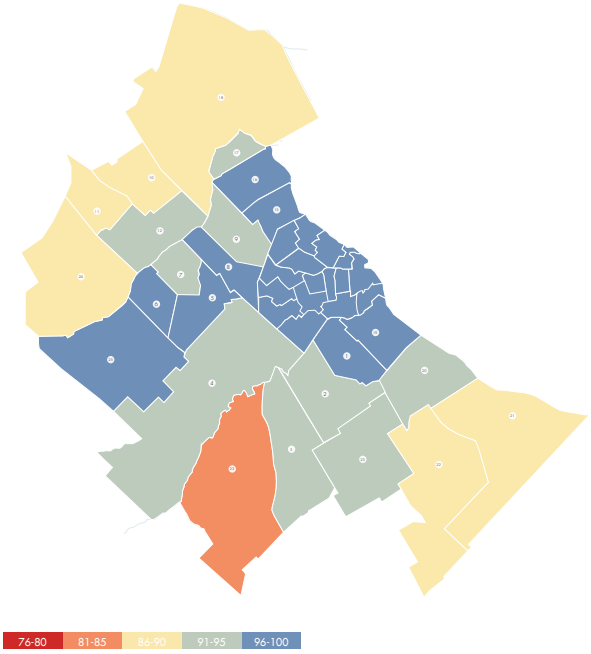
In the plan for the province, instead, a different approach seems to be followed. The problems are identified by analysing existing dynamics that are detected interpreting geo-referenced data and statistics of the territory. In order to strategically tackle the negative trends, it proposes different scenarios where several set of policies are suggested in order to get to the desired outcome. This approach tries to handle different topics to create a set of integrated strategies. The first issue related to the plan is merely technical and is referred to its readability and chaotic organization. A second one, relevant for this analysis, is that it considers eight topics of intervention (areas to be urbanized, industrial areas to be recovered, etc.) among which issues related to mobility are not present. Instead, this topic is treated in a subsequent operative phase as a secondary component which, in combination with others, may lead to achieve the desired outcomes. In this way, there is a lack of a general overview of the main weaknesses related to the quality of the transport system. The main strategy with respect to mobility is the proposal of the creation of a Metropolitan Transport Agency which role implies to evaluate and propose policies to complement the ones proposed in the plan.

This strategic plan is different from the MTCABA because while the objective of the latter is to propose an evaluative tool to orient future policies, the former proposes a less scientific oriented approach devoting more attention to the specific strategies that should be implemented.

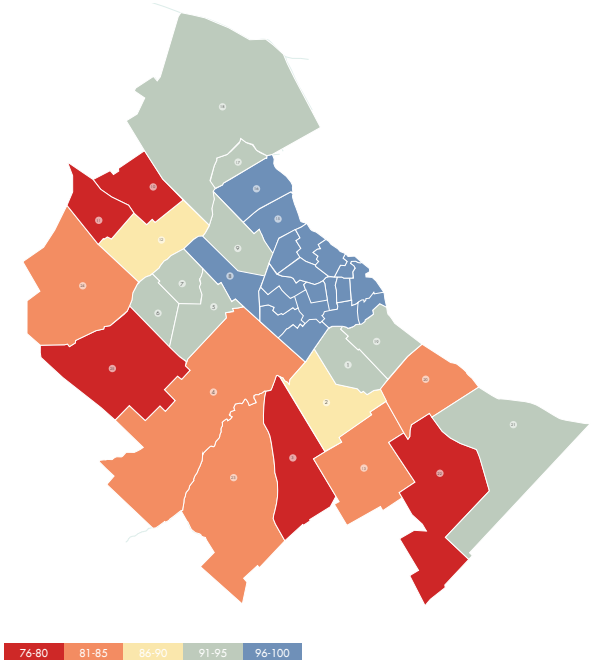
The difference in terms of scientific reliability between the two plans may be due to the fact that the scope and objectives they have are different which is a further evidence of the lack of cooperation between the two entities with respect to planning. This aspect has a clear negative impact on metropolitan topics such as mobility.

Based on the goals of the research, at the core of the analysis lies the weak way in which accessibility, especially to the public transportation network, is assessed.

The first one is the actual accessibility to the public transportation network. This information is present and available on the



Accessibility index of PT at Municipal scale



Connection by paved roads at Municipal scale

INDEC portal, but only at a municipal level. The data is obtained by considering if, for a single household, there is or not the presence of a stop or station to catch public transport in a radius of 300 meters. The data has a relative value, because it reflects an average calculated on all the households living in the whole municipal territory.

The same issues of validity characterize another index, that is the percentage of the total municipal houses connected by paved roads to the main network. This is another valid way to assess the economic development of a municipality and the possibility a person has to move in a reliable way, having a street that is reliable during different kinds of weather and that guarantees a minor time to displace.

This index, in combination with the potential accessibility at the municipal level, could be way more relevant and useful if available at the local census track level, because it would allow to define in a more precise way what are, inside each municipality, the most fragile areas in terms of accessibility.

If we accept the definition for movement as a right people have, a closer look to single neighbourhood dynamics seems to be necessary. This research and analysis approach would be useful for many reasons. First, it will give a deeper idea of which are the most vulnerable areas in the metropolitan region, in terms of social needs and weaknesses. Data highlight a strong economic disparity between different municipalities and different neighborhoods, with figures that are sometimes dramatical. Secondly, it will help planners and authorities to consider which are the areas that mostly lack necessary infrastructure to move and

to be part of the society. In this sense the presence of public transport and reliable road infrastructures (plus other basic ones that have to be also guaranteed, such as the sewage system, just to give an example) will help those disadvantaged areas to become more active part of the urban realm and will improve the quality of life of the inhabitants.

While both plans measure accessibility only as the physical proximity to the network, to the hubs or according to the ownership of a private car, the aim of this research is to approach this topic in a different and more encompassing way.

When transport meets society: a theoretical background

The definition that is embraced is the one that considers accessibility as *"the extent to which land use and transport systems enable (groups of) individuals to reach activities or destinations by means of (combination of) transport mode(s)"* (Geurs, Van Wee, 2004) where a *"person's accessibility increases as a person builds up experiences in using transportation system to access activities distributed over space"* (Martens, 2017). This means that, for an individual, the availability of a reliable way to move stands, together with other values, at the base of its potential inclusion in the society. This is clear when referring to activities that can be made by travelling such as working, studying or accessing to healthcare which can be considered, according to a Rawlsian perspective, as primary social goods (Rawls, 1971, Van Wee and Geurs, 2011, Martens, 2017).

Among the several ways to move, this thesis focuses particularly on the role of the public transport in a metropolitan context, considering that it has a primary role for the least advantage part of the population which usually is more dependent on it. As Bocarejo stated in 2012 *"…in many developing countries as well as in some cities of industrialised areas, there is an obvious problem with respect to accessibility to transport, and therefore to opportunities"*. In this research, opportunities are related to the concept of social activity participation, defined as the possibility of an individual to access to certain kind of every day activities which may have an impact on his or her quality of life. Such activities, according to Golob and McNally., 1996, mat be aggregated in three categories: work, maintenance (shopping, medical care, household maintenance, religion, etc.) and discretionary (culture, civic, amusements, hobbies, etc.).

In an urban context like the one of Buenos Aires, where a strong social segregation exists, it is necessary to understand if a low access to opportunities is related not only to the social status of the inhabitants but also to the quality of the offer of public transport. Moreover, it is also necessary to understand if

the implementation of public transport policies generates a consequent impact on the social active participation of individuals. In the following chapter the method that will be presented attempts to answer to both questions becoming a tool to propose and evaluate policies related to the public transport sphere.

According to different authors, accessibility can be interpreted and measured in different ways. On one side, it can be defined as an indicator able to express, in a quantitative way, the number of opportunities that can be accessed by an individual in a given time. Number of jobs, schools, hospitals, and other basic services are all considered as valued opportunities to be reach. On the other side, another aspect that can be taken into consideration is the quality of the offer of the mobility system. Martens, 2017, proposes a method to measure accessibility by the combination of these two aspects because it claims that *"low accessibility levels may well be the result of poorly functioning transportation systems, a low density of desirable destinations, or both"*. For this reason, he defines a framework where an accessibility indicator is related to a potential mobility index that expresses the service's quality. This method is deepened in the next chapter. At the same time, *"A broad definition of accessibility refers, not only to physical access to goods and services, but also to the transport system itself in terms of its availability (including routing and scheduling), affordability, reliability and safety, as well as access to timetable information, etc."* (Geurs, Van Wee, 2015).

This last way of measurement tends to be more comprehensive, thus including accessibility to opportunities and quality of service as two of the several components it features. Measuring accessibility, especially in its broader sense, is a key topic as *"numerous authors have emphasized the importance of mobility measures for assessing the social equity and distribution inclusion impacts of transport services"* (Lucas, 2015).

According to Geurs and Van Wee, 2004, there are four main components of accessibility to be measured when evaluating a transport system:

1. The individual component reflects the needs (depending on age, income, educational level, household characteristics etc.), abilities (depending on people's physical condition, availability of travel modes etc.) and opportunities (depending on people's income, travel budget, educational level, etc.) of individuals (...)

2. The land-use component reflects the land-use system, consisting of (a) the amount, quality and spatial distribution of opportunities supplied at each destination (jobs, shops, health, social and recreational facilities, etc.), (b) the demand for these opportunities at origin

locations (e.g. where inhabitants live), (c) the confrontation of supply and demand for opportunities which may result in competition for activities with restricted capacity such as jobs, school vacancies and hospital beds

3. The transportation component describes the transport system, expressed as the disutility experienced by an individual when covering the distance between an origin and a destination; included are the amount of time (travel, waiting, parking), costs (fixed and variable) and comfort-related variables (such as reliability, level of comfort, accident risk, etc.) (…)

4. The temporal component reflects the temporal constraints, i.e. the availability of opportunities at different times of the day, and the time available for individuals to participate in certain activities (e.g. work, recreation). (…)

5. In addition, Lucas (2012) has suggested in the evaluation of transport-related social exclusion it is also important to consider a fifth cognitive component, which includes people ability to interact with the transport system. (…)

Therefore, evaluating becomes central when assessing the social value of public transportation systems within a policy making process. This is the reason why the method that will be proposed in the following chapters follows this direction by featuring some key topics that emerge from the previous five components. First of all, the individual component stresses the necessity to consider the socio–economic profile of an individual when assessing accessibility to opportunities. Secondly, the land use component highlights the role of the physical urban structure in generating patterns of mobility to reach opportunities. Thirdly, the transportation component measures the quality of the movement as experienced by the individual. These three aspects are highly relevant especially considering their absence in the analysis proposed in the official plans of Buenos Aires.

When using a method to evaluate a transport system which goal is to orient policy decisions, there is an ethical background that must be taken into consideration during the whole process. Lucas, Van Wee and Maat in 2015 stated that *"It is widely accepted within the literature that no policy decisions are entirely value-free and so it is important to be explicit about the value system that is in place when policy interventions are being developed and evaluated. The use of ethical principles to support the values that are being promoted through public policies is not new but it is an issue that still concerns many transport professionals".*

Since this research focuses on the role of public transport in dealing with social exclusion, three main ethical theories relevant for this topic have been considered: egalitarianism,

sufficientarism and prioritarianism.

Egalitarianism is related to the works of John Rawls and its Theory of Justice (1971). It assumes that, in a policy making process, the benefits resulting from the application of a policy should be distributed across the population in form of primary social goods (such as income, wealth, civil rights…). Rawls also argues that *"we should strive for 'the greatest benefit of the least advantaged members of society"* in order to compensate the unbalanced distribution of natural goods. Even if there is a debate concerning the role of transportation as a primary good, the key aspect of egalitarian principles lies on providing an equal level of public transportation quality and access to opportunities for all. Egalitarian theories are thus *"useful for encouraging a focus on the relative level of accessibility between different social groups, particularly those who are at risk of social exclusion"* (Van Wee, 2011).

Sufficientarianism, instead, assumes that *"there is a threshold and that the persons below the threshold have absolute priority over persons above the threshold"* (Martens, 2017). This kind of distribution takes into consideration, as recipients of benefits, only the individuals that are below the threshold, assuming that, in the transportation sphere, the ones above have already sufficient levels of accessibility in its broader sense. The main criticism of this approach is how to validate the chosen threshold levels and the possible impacts of the distribution of benefits on the status of the well off.

Prioritarianism, finally, assumes that *"benefits matter more the more worse-off the person to whom the benefit accrue. Proponents of prioritarianism argue that the moral value of a benefit, or the disvalue of a burden, diminishes as its recipient becomes better off"* (Martens, 2017, Casal, 2007). This concept can be applied to transport planning because it classifies the population according to a combined set of indicators expressing the level of social inclusion and the quality of its mobility. By doing this, it is possible to apply a higher benefit to the more disadvantage ones thus to intervene with a priority criteria.

Among the different ethical perspectives presented before, prioritarianism is the one that is taken as a reference for the analytical part of this research. Starting from the assumption that accessibility to opportunity using a reliable public transport system is a key value, especially for the least advantaged part of the population, prioritarianism offers the framework to understand who is more in need, without the risk to exclude other sectors of the population. The result of this approach is the definition of a priority of intervention criteria able to orient future policies. This is, as far as known by the authors of this thesis, an attempt that has not been previously proposed for the metropolitan region of Buenos Aires and may

be considered innovative with respect to the Latin American context: *"Although the concept of social equity seems to be ubiquitous in most mobility plans of major Latin American cities, when evaluating transport projects for financing and prioritization there are no specific or solid indicators to measure how they can contribute to promoting better access to opportunities, particularly for the most vulnerable segments of the population."* (Bocarejo, Oviedo, 2012).

Accessing Buenos Aires

A method to ensure activity participation through public transport policies in the Metropolitan Area of Buenos Aires

Scope of the research

In order to promote policies able to ensure a *"basic accessibility"* defined as *"the ability to reach valued opportunities"* (Lucas, 2012) and because basic accessibility is influenced by transport system, our thesis analyses if people have enough access to a basic set of relevant urban activities, assuming this as the primary aim of transport planning.

This approach intends to discover which is, in the Metropolitan Region of Buenos Aires, the correlation between the quality of the public transport system, the level of social exclusion and the reachable job opportunities. In addition, it seeks to create a new image of the territory where the different performances of the area can be immediately identified to orient and evaluate transport policies by considering a priority of intervention.

Traditionally, interventions in relation to the sphere of public transport were oriented by considering only the real demand for movement. This means that interventions were oriented to places that featured a certain level of vitality (expressing high levels of congestion) while the areas that were less mobile and thus, less capable of reaching valued opportunities, were not considered.

This weakness is at the based of new approaches (see Martens, 2017) which are more interested in understanding the role of the offer of transport in relation to the possible increase of activity participation. For this reason, they focus on potential accessibility as more indicative of the level of social inclusion of an individual rather than on the real demand. Even if this approach seems to follow a linear path, by focusing only on the potential offer, it risks to exclude real mobility trends that may be relevant in a policy making process. Both of this approaches, based on demand or potential offer, are relevant for a research on measuring accessibility to real opportunities but may not be effective if applied singularly.

For this reason, based on Geurs and Van Wee, 2004, the attempt of this research is to

consider simultaneously demand and potential offer in relation to the socio-economic profile of the population. This last topic has been added because by using indicators only related to mobility, it is not possible to understand which are the effects that an improvement of the transportation system may have for the different social groups characterized by different mobility profiles. For example, social groups from the lower levels, different from the ones from the higher levels, may be more dependent on public transport for reaching their daily activities.

In order to describe the real demand for movement, the indexes of Gravitation and Mobility have been used to describe attractiveness and density of displacement. Furthermore, Potential mobility index and Job accessibility index reflect the potential quality and availability of the offer (in this case referred to public transport). Finally, the level of social deprivation is tackled by the index of unsatisfied basic needs.

When combined, they constitute a single measure of quality able to synthetically represent which is the role public transport plays in ensuring the access to valued opportunities. Considering the field of study, it is important to point out that this method can be use, when possible, with data of different nature. Meaning that, in presence of updated and complete informations, other spheres of accessibility (to education, health, etc.) could be analysed, providing a more complete picture of the opportunities for social participation of the inhabitants of the Metropolitan Region of Buenos Aires.

The research process is based on the following steps:

All the phases of the method will be explained in the following pages. Before starting with the description of the method it is necessary to declare that, because of the experimental nature of this attempt, there is the possibility of having a higher margin of error at the scale of analysis that is proposed. Anyway, considering that this research aims to represent an exercise of analysis that focuses on a new possible way to know and describe the territory of the Metropolitan Region of Buenos

Aires, it can still be considered as a valid and, probably, innovative attempt that may require further explorations.

In the following paragraphs the most critical aspects related to each step of the method are tackled in order to clarify the choices made by the authors.

Data research and organization

This section describes the process of research and selection of the available data necessary to measure accessibility to opportunities in its broader sense. To do so, data and indicators referred to different spheres such as mobility offer and demand, and socio economic trends are necessary. In addition, data should preferably be geo-referenced in order to be usefully applied in a planning research such as this one.

Working on an extra-european field of study represents, for the authors of this thesis, a novelty. Indeed, most of the projects made during the master course in Urban Planning and Policy Design where set in italian and lombard contexts. Especially the latter is characterized by a good availability of databases, often managed by public authorities, that feature large amounts of geo-referenced open data. Databases are generally easily accessible by the public and are usually operable using GIS softwares. In Argentina, however, the availability and easiness of use of open geo-referenced data related to mobility, land use and socio economic trends is generally smaller. This may be due to several issues:

A first one is related to data availability. Most of the information related to land use is generally hard to be found. For instance, many municipalities, which are asked by the law to produce building regulations and zoning maps, don't publish them online. Data related to mobility is difficult to be found too. Regarding the public transportation systems, which dynamics are crucial for this research, only few information concerning timetables, line paths, stops, stations and number of users is available.

A second issue is related to data accessibility. Different public authorities produce and publicize open data through their web portals, like in Italy. In the argentinian context there is a multitude of bodies involved in data production that seem to organize their

work independently one from the other. This fragmentation generates great difficulties to everyone seeking information at any scale of analysis.

A third issue is related to the inhomogeneous quality of the databases. For instance, the database of the CABA tends to be way more complete in the variety and number of data available than the one managed by the Province of Buenos Aires. This problem is at the base of issues of interoperability that could compromise the possibility to analyse topics that interest at the same time different territorial fields.

A huge part of the time necessary to make the analytical section of this research was spent trying to tackle the difficulties inducted by the issues described before. In conclusion, a better organization and coordination in the production of open data could facilitate any evaluation process, useful to better understand the complex dynamics of the Metropolitan Region of Buenos Aires.

The data used to build the indicators to assess the social value of mobility in the field of study has been obtained from official sources. A first aspect to be considered is related to the geographical and administrative scale to which the data is referred. There are five main territorial dimensions of statistical study in Argentina, but most of the data is available only for some of them:

-National level

-Provincial level

-Municipalidad/Partido (Municipality): They are only present in the Province of Buenos Aires and not in the CABA.

-Localidad (Locality): They represent the internal subdivisions of a single municipality. In the area of analysis there are 187 *localidades* distributed in 25 *partidos.* The documents produced by the National Institute of Statistics (INDEC) do not consider this subdivision. Instead, on the municipal websites and in the ENMODO mobility enquiry of 2010 they are featured, even with some differences within the administrative limits they use.

-Comuna - Barrio - Distrito Escolar (District -Neighbourhood - Scholar district): They are the diverse ways in which the CABA is officially subdivided. There are15 *Comunas* that are composed by 48 *Barrios.* For statistical purposes the territory was also divided into 21 *Distritos Escolares* which configuration is different from the previous ones. Currently, a process of reorganization is imposing the *Comuna* level as the main one for statistical analysis in the CABA. In the ENMODO 2010 enquiry a similar comparison between different administrative levels can be found: the *distrito escolar* (CABA) is considered at the same level of the *municipalidad* (Bs. As. Province); the *barrio* (CABA) is used in relation with the localidad (Bs.As. province)

-Radio censual (Census track): minimum statistical unit of INDEC official census.

In this research, all the analysis were related to the *localidad/barrio* scale because it is the minimum scale at which information about mobility is available thanks to the results of the ENMODO enquiry of 2010. Moreover, it has been considered as a more appropriate scale of study than the municipal one (which is the most used in the official analysis) because it better describes the different characteristics of this diverse territory. According to the aim of this research, a local approach can be useful to orient public policies in a more precise and effective way. However, even if the use of the local scale has been chosen for its precision with respect to the municipal one, it can be still considered as a generalization, because many inner dynamics may be ignored. The question related to the risk of over simplification that could arise can be answered by considering the vast dimensions of the field of study. Furthermore, a more specific analysis will require data that as of today is not available.

All the data that has been collected to be processed in the analysis can be divided into two main groups, according to the topic they are referred to, the socio-economic profile and the mobility patterns.

Regarding the socio economic aspect, the used data is the following:

-Population: Obtained by the INDEC National Census, 2010

-Number of workers: This data is not available and has been calculated using the INDEC National Census data on population between the ages of 15 and 64 at the *radio censual* scale and then multiplying it for the INDEC 2010 employement rate. The choice of the 15-64 range is based on the fact that INDEC define it as the group of the "theoretically" active population, although the retirement age in Argentina is 60 for women and 65 for men.

-NBI (Unsatisfied Basic Needs, INDEC 2010 census): This is a compound indicator of social and housing deprivation which has been already described at PAGE.

-Work places: This data is unavailable, and was constructed using the ENMODO 2010 mobility enquiry, taking into account the statistically weighted number of workers reaching a specific location for working reasons. This data includes also all the workers that don't leave their *localidad* of origin.

All the previous data is, if available, related to the *municipalidad* and *radio censual* scales. For this reason they have been processed in order to obtain a socio-economic profile at *localidad* level as required for this analysis.

Regarding the topic of mobility patterns the used data has been obtained from the results of the 2010 ENMODO enquiry. They are referred to:

-Outgoing trips

-Incoming trips

-Travel time
-Reason of travel
-Mean of transport

All of this data is available at *municipalidad/ distrito escolar* and *localidad/barrio* levels. To be operated it requires a certain familiarity with advanced statistical softwares.

It is necessary to declare that the data featured in the mobility enquiry ENMODO 2010 has a different degree of statistical validity according to the different scales of analysis. It tends to be higher when used to describe metropolitan dynamics while it decreases when referring to smaller scales, such as the one featured in this research. The authors, aware of this issue, decided to maintain this scope of analysis, even if it may enlarge the possible margin of error. This decision is due to the belief that a more local approach to urban transport planning is necessary in order to avoid, as far as possible, generalizations that could lead to a less informed policy making process.

Finally, it is important to underline that the localities which compose the Municipality of San Martin (Figure A) may present unreliable results due to the different ways in which its internal administrative boundaries are defined by the official bodies.

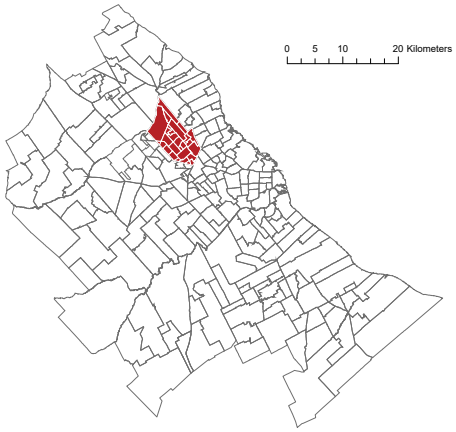


Figure A

Methodology

Based on the collected data, it was possible to develop the five indexes previously mentioned. Considering that each of the indexes is measured using different parameters and, consequently, the final results cannot be directly compared, it was necessary to apply a normalization. The latter is expressed using a scale from 1 to 10. To do so, the Jenks optimization function using the ArcMap software was applied. The function allows to classify data so that variance within the classification groups is minimized and the variance between the different groups is increased. The ESRI dictionary defines it a *"[cartography] A method of statistical data classification that divides data into classes using an algorithm that calculates groupings of data values based on the data distribution. Jenks' optimization seeks to reduce variance within groups and maximize variance between groups".*

By doing this, it was possible to obtain a result from 1 to 10 for each of the localities in relation to each of the indicators, as shown in the table below:

NORMALIZATION					
Locality/Neigh.	Grav	Mob	Pmi	JA	Nbi
Caballito	6	6	2	9	2
San Nicolas	10	8	6	10	7
Berazategui	4	5	6	7	6
Jose C. Paz	5	3	7	3	7
San Justo	6	3	4	4	5

These results do not have a positive or negative meaning but, as this method seeks to classify the territory on behalf of its level of advantaged or disadvantaged profile, it was necessary to apply a Utility Function (FDU). By this process it is possible to connote, as a problem or as a resource, the dynamic that each indicators describes. For instance, in the case of the potential mobility index, to a higher value corresponds a better quality of the transport system, thus, the function of utility is positive. On the contrary, in the index of unsatisfied basic needs, a higher value is related to a higher level of social deprivation, thus, the function utility is negative. The result leads to the classification of the locations, for each index, on a scale from 1 to 10 where a lower value defines a worthier performance and, by consequence, a higher level of priority of intervention.

FDU					
	+	+	+	+	-
Locality/Neigh.	Grav	Mob	Pmi	JA	Nbi
Caballito	6	6	2	9	9
San Nicolas	10	8	6	10	4
Berazategui	4	5	6	7	5
Jose C. Paz	5	3	7	3	4
San Justo	6	3	4	4	6

In order to have a clear understanding of the steps taken to reach the final results each of the indicators is going to be described individually.

The purpose of applying, among the demand indicators, the ***gravitation index*** was to have a descriptive image of the whole territory able to highlight the attractivenes of a place for working reasons. This is because gravitation index points out the localities that produce more outgoing trips for working reason than the ones they receive. In order to develop the index it was necessary to use data concerning outgoing and incoming trips for working reason (wr) using any mean of transport and the total number of workers that can be found in each locality *i* or neighbourhood.

$$GI\ (i) = \frac{Incoming\ trips\ for\ wr - Outgoing\ trips\ for\ wr}{Total\ workers}$$

Due to the purpose of this investigation, it was necessary to identify and consider as priority the places that were creating a higher number of working trips, therefore a higher real demand of movement. This is due to the fact that, a place that acts as a generator of working trips (reflected by a low value of the index), reveals a scarcity of jobs opportunities within its own boundaries. According to this concept, a positive function of utility was applied to the index because a place that is more attractive is considered to offer more valued opportunities.

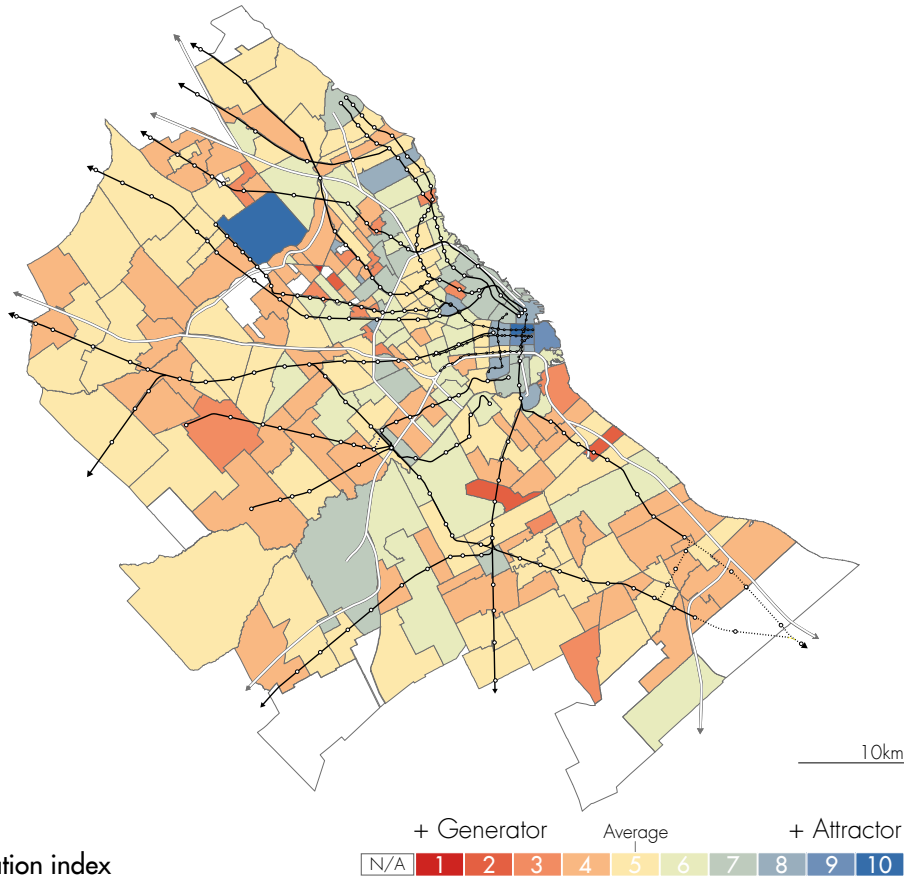


Fig. 1:
Gravitation index

The results of applying this function can be seen in *Figure 1*. It is shown in order to be compared with the same ones made for the rest of the indicators.

The gravitation index can also be used to offer an approximation of the land use profile of each locality, understanding its role with respect to the entire area. The core of the city stands out as one of the main attractors of the territory because it is the central business district of the Metropolitan Area. Furthermore, the attractors can be found mainly inside the city which makes sense, considering that it is the final destination of almost 40% of the trips of the region (ENMODO, 2010). The rest of the attractors primarily respond to industrial or medium scale central areas distributed along the territory. With respect to the generators, the higher levels can be found in places where there is a clear concentration of residential functions and the necessity to travel to get to work may be bigger.

Moving on to the next indicator of real demand, the ***mobility index*** will be tackled. Its importance relies on the fact that it allows to describe the density of displacement and, in doing so, identify the localities or neighbourhoods with respect to the total movements made for working reason. By dividing the data of the total generated trips for working reason of each place (including the internal trips) by the total workers, it is

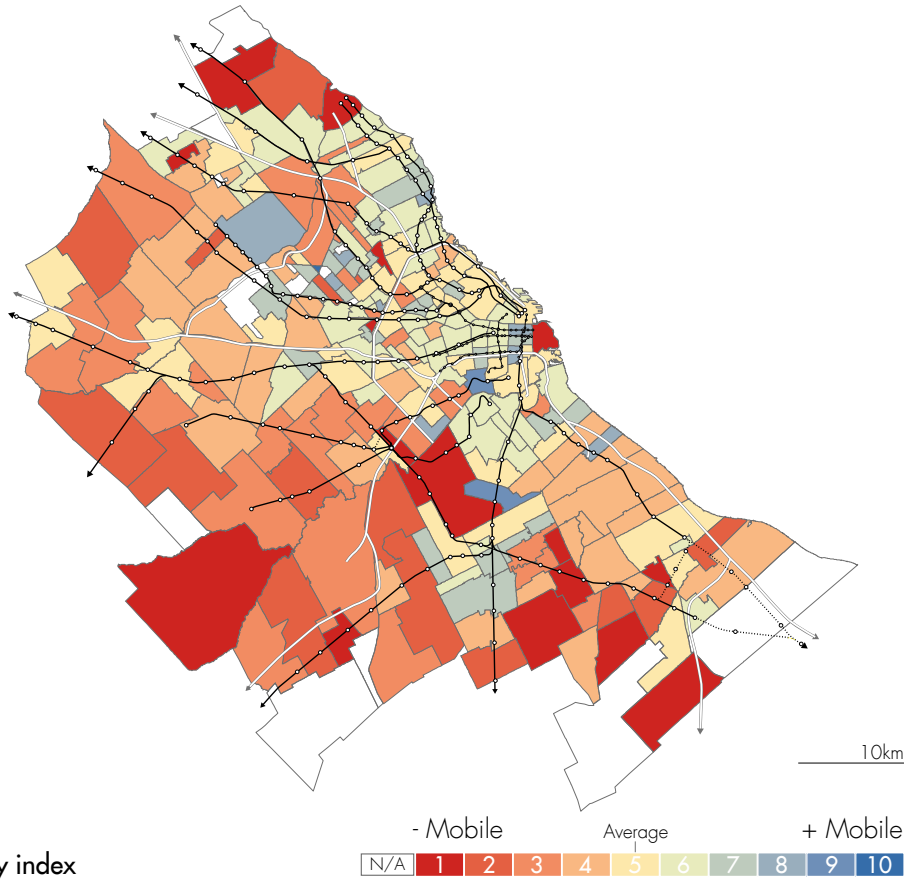


Fig. 2:
Mobility index

possible to know how much the population of a locality or neighbourhood *i* is mobile.

$$MI\ (i) = \frac{Total\ generated\ trips\ for\ wr}{Total\ workers}$$

Like the previous indicator, the mobility index was normalized using the Jenks optimization function in order to distribute the results in a scale from 1 to 10.

The outcomes of this equation are important for the scope of this research because the level of mobility of a place reflects its level of vitality. A low value of the mobility index reflects limits of different nature that may affect the possibility to reach valued opportunities. For instance, this can be related to a very negative social condition where problems of unemployment, strong social exclusion and other factors may constrain the need of movement.

Because of this explanation, a positive function of utility has been applied to the index. In this way, the places with a lower value of mobility are represented by the lower values of the scale, thus, becoming places where to intervene primarily. The territorial profile is reflected in *Figure 2*.

The map shows a clear concentration of mobile places in the capital city while a decrease of them is reflected as we move away from it. Most of the localities with higher levels of movement can be found along the

infrastructural corridors which clearly reflects the higher levels of supply of transport concentrated along them. Places with lower levels of mobility are mainly concentrated in the third crown.

The third indicator used in this analysis, in reference to the potential offer, is the ***potential mobility index*** (PMI) as proposed by Martens 2007, 2017. This is a pure mobility indicator that can be considered as part of the transportation component when measuring accessibility as described by Geurs and Van Wee, 2004. The index is build considering data related to the travel time necessary, from each *localidad/barrio,* to reach, by public transport, a set of relevant destinations located at a defined Euclidean distance from the place of origin. The data that has been used to obtain the index comes from different sources.

The first step to operate them was related to the choices of the relevant destinations from each locality of origin. This was attempted by analysing, using the ENMODO data, the pattern of movement for working reason from each locality. In a second step, the travel time to move from an origin to every relevant destination was calculated, obtaining an average value referred to the trips for working reasons made by using public transport. Finally, the aerial distance between localities was defined using softwares such as Google Maps and Google Earth. This process was applied to each of the 235 units of territorial analysis. The index, thus, characterizes each locality by assessing the quality of its public transportation system where PMI (i) equals the average aerial speed for locality *i, d(i,j…n)* is the Euclidean distance between localitites *i* and *j* and *T(i,j…n)* is the travel time between locality *i* and locality *j*.

$$PMI\ (i) = \frac{1}{n} \cdot \sum_{i=1}^{n} \frac{d\ (i, j \ldots n)}{T\ (i, j \ldots n)}$$

The result is a value that can be considered as a sort of average speed, because it is mathematically obtained by dividing a space component for a temporal one. Because of that, a higher value of the index is related to a better potential performance of the public transportation system.

In a second step, all the results were normalized using the Jenks optimization function with final values ranged from 1 to 10. In this case the FDU has a positive connotation, leading to a final score of the PMI where values closer to 1 are associated to very poor performances of the public transport network while values closer to 10 indicate a very positive condition for the analysed locality.

The map that is obtained (*Figure 3*) shows some interesting features. First of all it is possible to observe a high concentration of localities characterized by low level of PMI

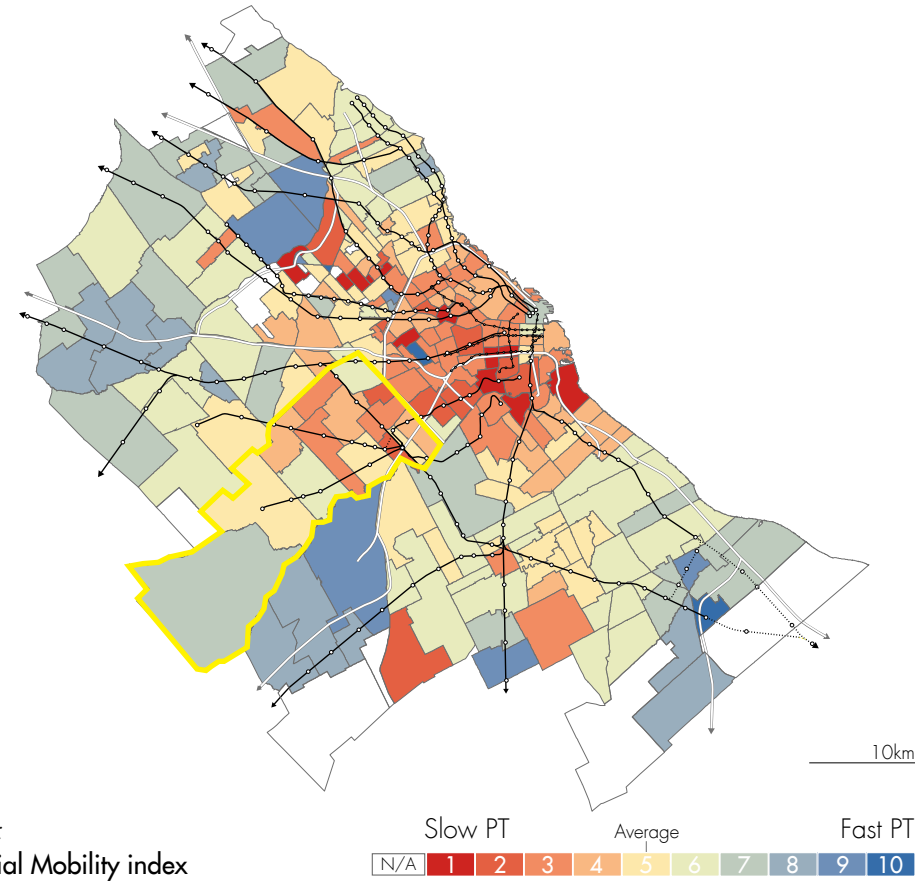


Fig. 3:
Potential Mobility index

in the CABA. This phenomenon is probably due to the combined effect of congestion, which is expected to be high in the central core of the metropolitan region, and to the inhomogeneous spatial distribution of the mass transit systems such as rails and subways which constrains people to rely on the public bus. For instance, the localities of the southern part of the CABA, which are only served by the Belgrano Sur train line, show worst performances than the localities located on the north that are reached by the subway and by more reliable train lines. Belgrano Sur, in fact, is poorly connected to the rest of the public transportation network and all the stations that are located inside the CABA are not close to any subway stop. The scarce reliability of the line seems to affect also the population of the localities located along the rest of the line outside of the CABA, as it happens in the northern side of La Matanza (highlighted with yellow borders) where PMI indexes still assume low values. However it is worth noting that the low performances that characterizes the municipality of La Matanza may be partially answered by the opening of the first section of the Metrobus corridor in 2017. A second interesting aspect that emerges is that the localities that are distributed along the main radial corridors (which coincide with the rail network) are characterized by better performances of PMI, which could be due to the presence of the faster train lines. This positive effect on the PMI

deserves a deeper understanding because, being the rail corridors usually headed to the CABA, the travel times of the trips directed to this destination could be way better than the others.

To enrich the analysis, the PMI of each locality was newly calculated both for the trips directed to the CABA and for all the other trips with other destinations.

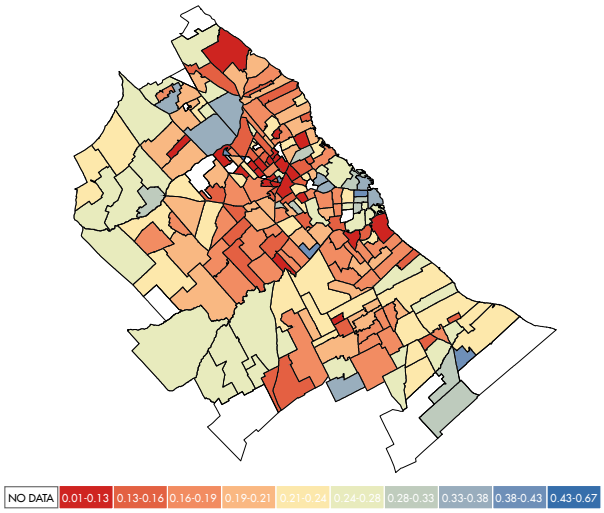


Fig. x:
PMI with extra-caba localities as only destination

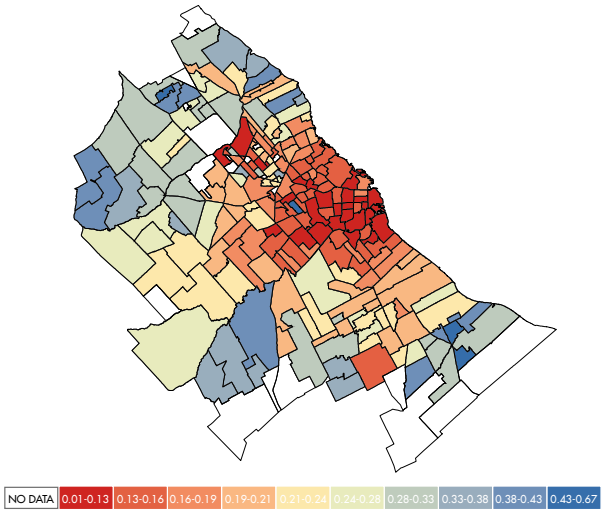


Fig. x:
PMI trips with CABA as destination

The final results highlight the effect of the radio-centric structure of the transport network of the region: without considering the *barrios* of the CABA, the average PMI of the movement headed to the city has a value of 0,22 that decreases to 0,19 when considering only the movement made between extra-CABA *localidades*. Even more significant is the result when considering the CABA *barrios* which PMI have an average value of 0,20 for the trips directed to the external *localidades* and 0,14 when directed to the other neighborhoods of the CABA. In conclusion, the most reliable connections in terms of time-distance ratio appear to be the one made between the Capital city and the rest of the Metropolitan region while the inner movements of the two areas could be considered as less comfortable.

With respect to the second indicator of potential offer, the ***job accessibility index*** (JAI) is an interesting way of measuring the possibility of a person of having an active role of participation within the society. In Martens (2017) words *"the lower the general level of accessibility experienced by a person, the higher the chances that the person will experience a low personal level of accessibility, the higher the chances that the person will not be able to participate in a reasonable set of activities, and the higher the chances of participation poverty, now or in the future. The measurement of accessibility is thus a measurement of the risk of participation*

poverty, i.e. of the chance that a person will experience a lack of activity participation due to problems in accessibility".

To apply this index the research takes into consideration the potential accessibility to workplaces in a given time using public transport. Considering only accessibility to work is due to the scarce available data with regards to other possible fields of analysis. Moreover it is important to underline that workplaces are not defined according to their quality considering that *"people may be interested travelling longer distances than those of the thresholds (average) in order to reach better opportunities"* (Vecchio, 2017). Besides this limitation, the access to job represents a basic valued opportunity that may have a big impact on the quality of life of an individual.

To measure the index, the Hansen (1959) equation was applied. Where A_i equals the accessibility of zone *i* (origin zone), a_j the attractiveness of zone *j* (number of workplaces at the destination zone) and $f(d_{ij})$ the function of the distance (time) between zones *i* and *j*.

$$A_i = \sum_j a_j f\ (d_{ij})$$

Following the path of the research, the attractiveness of a zone *j* responds to the number of workplaces that can be found in that destination and the function of the distance is expressed in travel time (Bocarejo et al., 2014). The choice to consider distance as travel time distance derives from the vast dimension of the field of study where displacements for working reason can be time consuming. The number of workplaces has been calculated within a 60 minutes radius from each location as it represents an appropriate time frame according to the data emerging from the ENMODO enquiry.

The obtained results have been normalized in a scale from 1 to 10. Afterwards, considering that places with higher levels of job accessibility present higher levels of potential active participation, a positive utility function has been applied. The result shows that places with lower values correspond to places with lower levels of participation, thus with priority of intervention.

The *Figure 4* shows a clear lecture of the whole Metropolitan Region with respect to its job offer and the quality of its public transport service. It is easier to reach a potential workplace in 60 minutes when living inside the capital city or along the north and south corridors. This responds not only to the role of the capital city or to the density of its urban fabric but also to the offer of the different means of public transport that are distributed along the territory. *"The metropolis expands, transport networks reduce their coverage, and their differences increase with unequal territorial distribution" (Gutierrez, 2012).*

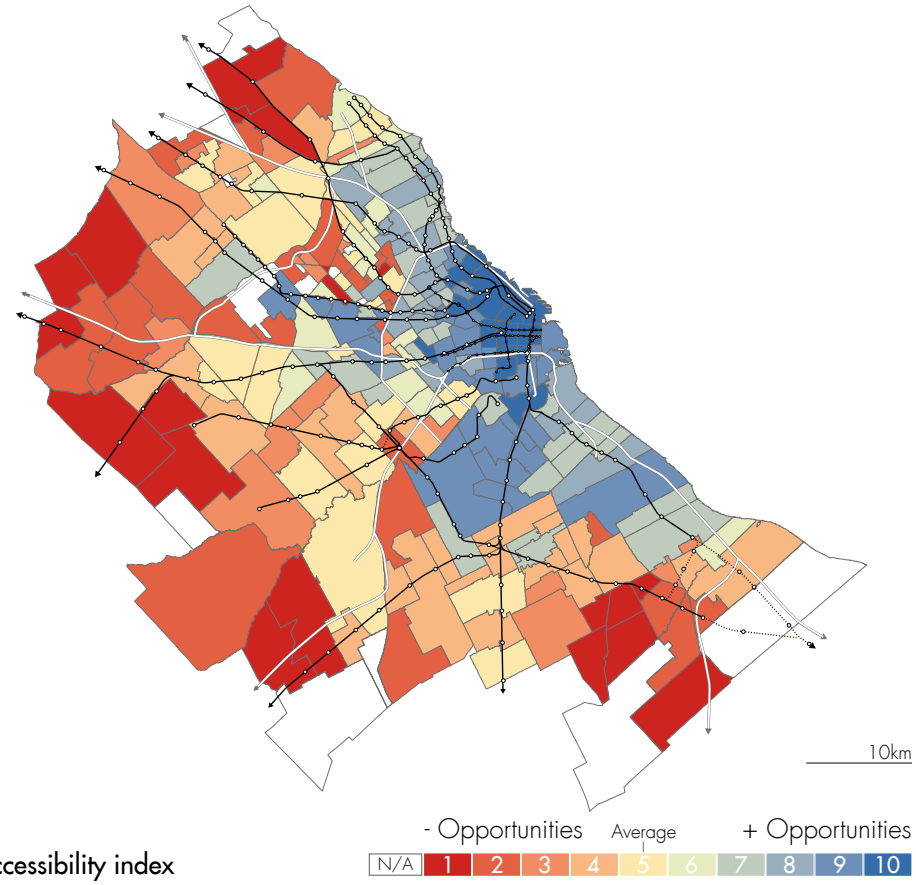


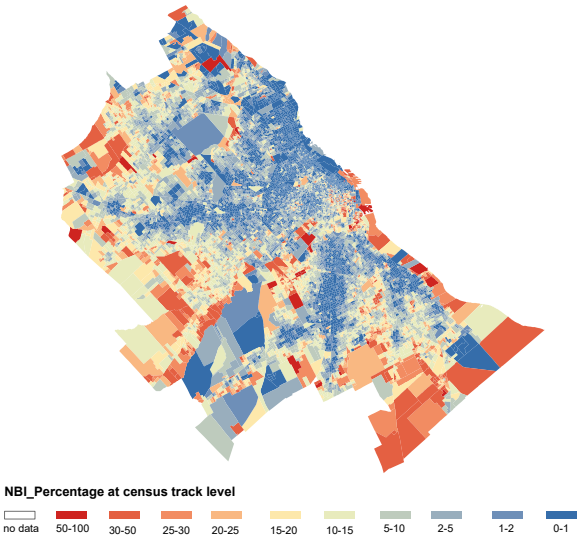
Fig. 4:
Job Accessibility index

While moving away from the core area, the values roughly drop down highlighting a third crown which clearly reflects lower possibilities of reaching job opportunities in a moderate travel time.

The last indicator used to build the present method, in relation to the socio-economic profile, is the ***Unsatisfied Basic Needs index*** (NBI), referred to the individual component as described by Geurs and Van Wee, 2004. This is the only ready-made indicator that has been used in this research because it already features many relevant aspects that are necessary to have a framework of the main social inequities that affect the field of study. A complete description of the composition of this index has been made at PAGE. The NBI index expresses, in form of percentage, the number of houses that features social and/or housing deprivation with respect to the total. Its use is fundamental for an analysis that aims to understand how public transport quality is related to social exclusion. The index, which is available for every census track, was computed in order to be used at the locality scale. This operation, even if necessary for the purposes of this research, implies a generalization related to the fact that the final NBI value for a locality is the average of all the figures of the census tracks that are included in it.

Like the other indicators, the results of the

NBI index were normalized using the Jenks optimization function in order to classify the range of values of the 235 localities into ten classes. Subsequently, the FDU function has been applied. Considering that a higher value of the index reflects a worse condition, the function for the NBI has a negative connotation: higher levels of NBI index in a locality (more problematic) contribute to increase the level of priority thus, moving the final index towards 1.



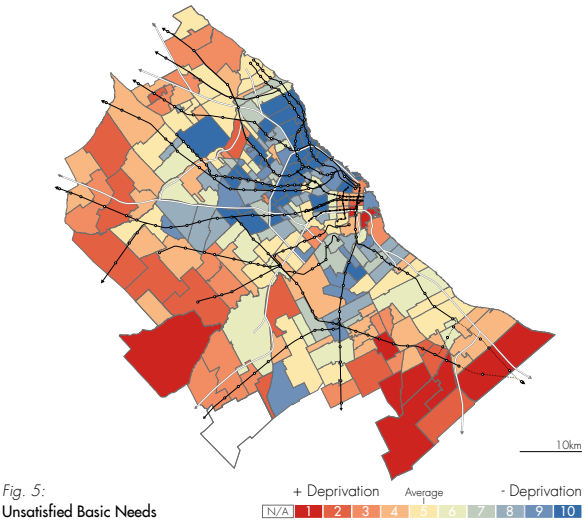


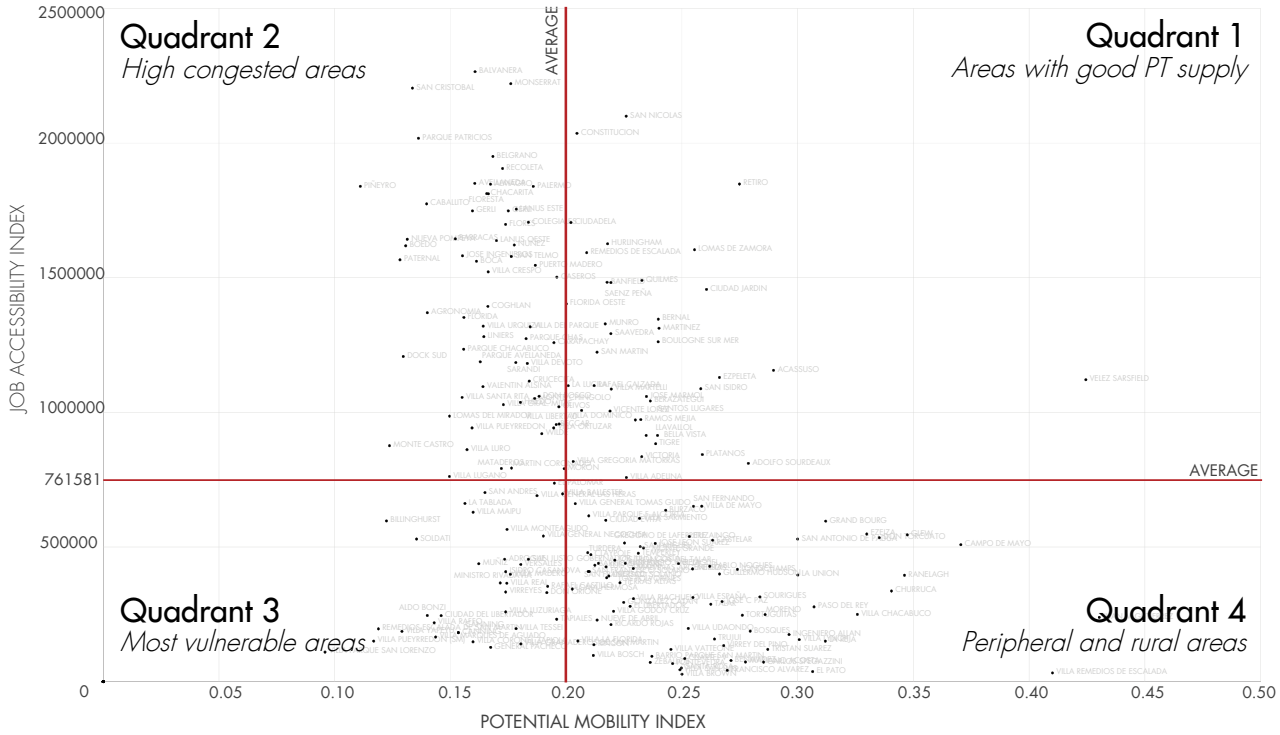
Fig. 5:
Unsatisfied Basic Needs

Figure 5 presents results that, even if simplified with respect to the ones based on the census track analysis, follows similar trends. It can be observed that localities placed in the north of the CABA and along the main infrastructural corridors are generally more well-off. On the contrary, the localities that are placed in the most peripheral crowns and in the southern-central portion of the CABA feature the worst performances of the whole region.

Testing Marten's approach

Based on the goals of our research and on the relevance of the approach experienced on this topic by Karel Martens, it is interesting to propose a in-depth analysis with respect to the indicators related to potential offer (PMI and JAI). Potential Mobility index and Job Accessibility index can be considered highly related when assessing the accessibility to valued opportunities of an individual. According to Martens, 2017, *"the measure of potential mobility is not intended to replace the measurement of accessibility, but rather to complement it (...) to define a framework that can help identify the role of transportation planning in addressing accessibility shortages and promoting a fair transportation system".*

Because of this, by following Martens' approach (2016), the two indexes are compared using a cartesian chart. On the horizontal axis lies the real numeric value



of PMI while, on the vertical, the number of accessible jobs. The result is a chart in which every locality occupies a specific position according to its performances. Recognizing the utility of this approach, it has been applied in the field of study. In order to critically evaluate the results of the chart for each locality is necessary to consider how to assess what can be considered as a positive or negative performance. In this sense a possible way is to define two thresholds that correspond to the average level of PMI and JAI. The effect of this operation is the subdivision of the chart into four quadrants.

Localities that are positioned in quadrant 1 are the ones where the good quality of the transport system allows inhabitants to access to wide range of job opportunities. They are mainly located in the first crown and crossed by the most reliable mass rapid transit lines. Localities of the quadrant 2 have a more problematic condition because the transport system is not able to sustain a high number of potential job opportunities. This may be imputed to congestion, and that is why localities that feature this condition are mainly located in the CABA. The quadrant IV hosts, on the contrary, the localities which feature good public transport performances but low number of opportunities to be reached. This is a condition, connected to land use and population density, that is typical of the places that are located in the

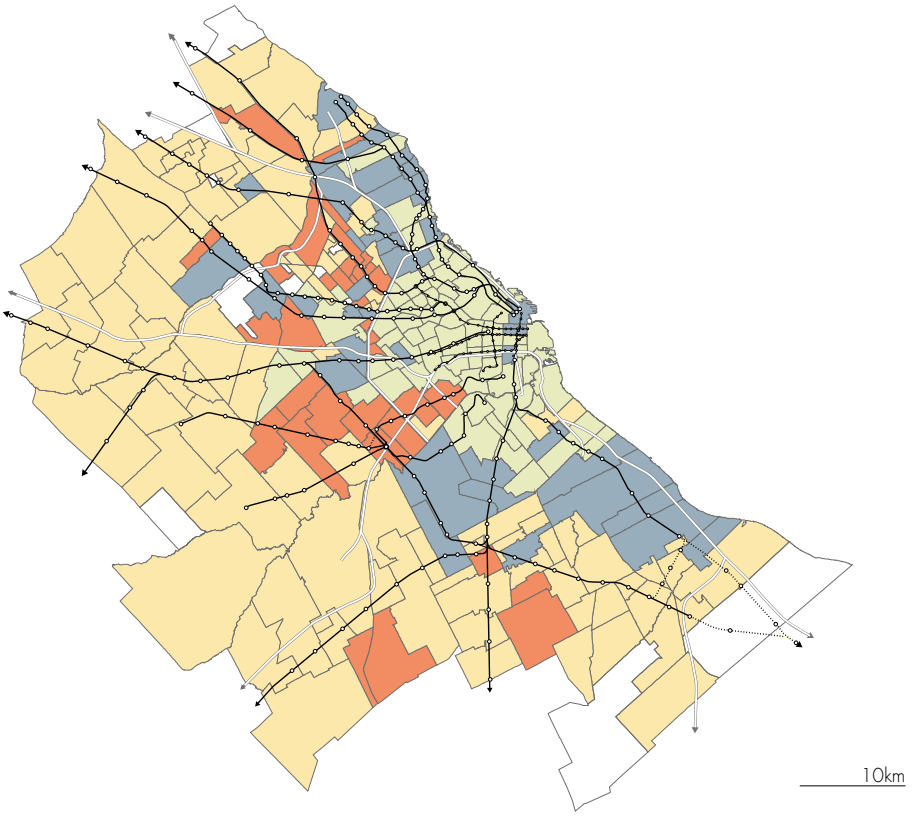


Fig x:
Profile of the localities based on Marten's approach

most peripheral and rural portions of the Metropolitan Region. The high level of PMI of these localities is probably due to the fact that, to calculate it, every direction of trip was considered and, probably, the relation between the province and the CABA increase the general performances. Finally, localities of the quadrant 3 are the most problematic ones because they feature great problems in terms of quality of the mobility system and availability of opportunities. According to Martens, 2017, *"The framework helps first of all to establish the role of transportation planning. That role is confined to the left-hand side of the quadrant system."*

This conclusion is relevant for the scope of this research even if it has been taken, not as the only but, as one of the several ways to assess accessibility to opportunities. In fact, by merging PMI and JAI with other social and mobility indicators, the research intends to constitute a more layered and multi dimensional tool of analysis.

Matching the indicators

Once that all the five indicators, for each locality, have been normalized and a utility function has been applied a possible following step could be the application of a weight to each indicator. The purpose of this operation would be to give to selected

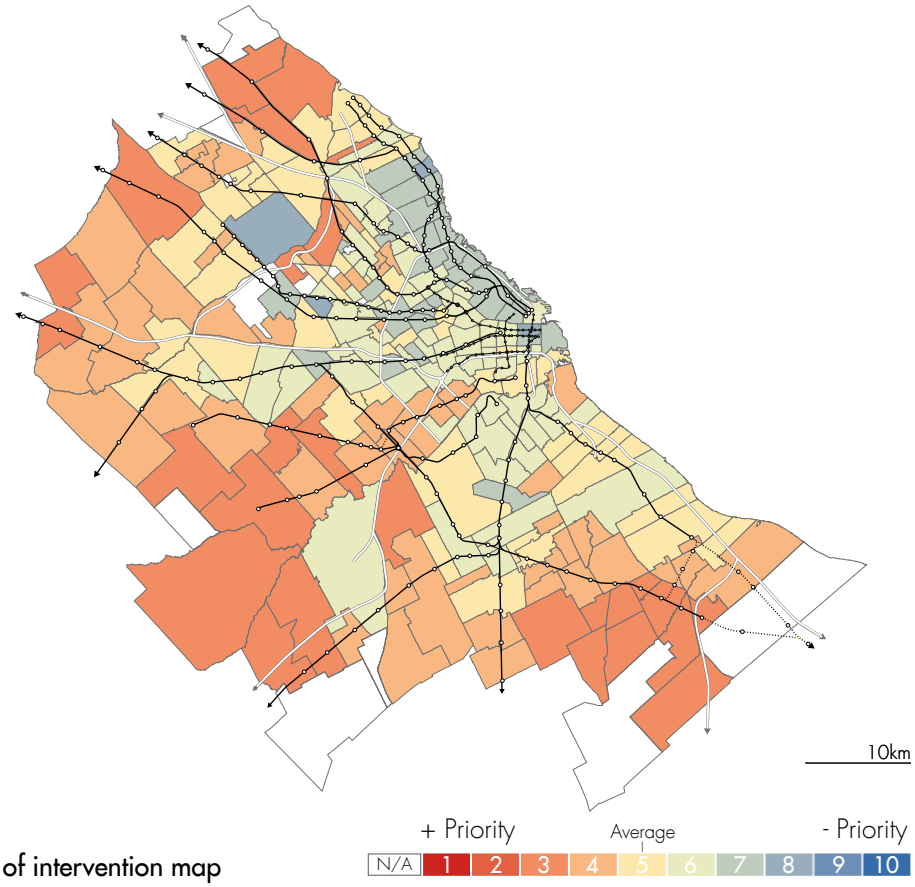


Fig 7:
Priority of intervention map

indicators a higher or lower importance in order to influence the final result according to the specific aim of the research.

After a process of trial and error, the final decision was to apply the same weight to each of the indicators. This can be explained by the fact that the evaluations of demand and potential offer are directly related in a policy making process. An intervention on the improvement of public transport would have an impact on the offer and consequently, on the demand. Consequently, increasing the real access to valued opportunities which may lead to an increase in the social economic level of an individual. All the five components are thus related and equally important. Weighting the indicators differently from each other would orient the evaluation towards an unbalanced result.

At the end of the process, all the five values of every location were averaged in order to obtain a final value that synthetically describes the performance of a place according to its intrinsic social and mobility levels. The method was designed to feature at the lower level of quality (towards 1) the localities characterized by a compresence of problems related to economic difficulties, low accessibility to jobs, low mobility and low quality of it. Those localities, according to a prioritarianism perspective, should have to be considered as the first places to be taken

into consideration when proposing policies related to the sphere of public transport. This is conceived in the belief that an amelioration in the mobility sphere, which aims to empower activity participation, may generate a process of socio economic improvement. This point of view, however, doesn't ignore the localities with better performances (towards 10) but assesses that different policies, related to other spheres, may be applied.

Orienting future policies

The priority map (Figure 7) shows a general image of the Metropolitan Region of Buenos Aires. Before reaching the final step of this method some interesting facts can be described by looking at it.

First of all, when working at this scale, there are no locations which correspond to the highest or lowest categories. The ranges vary between levels of priority 3 and 8, with an average value of 5, which means that almost 30% of the territory is under the average threshold. It is very unlikely that one single location presents a totally positive or totally negative performance for all the five indicators.

Secondly, there are some territorial dynamics that deserve a deeper consideration. The most evident one is the concentration of low-performance localities in the third crown of the region and along the horizontal infrastructural corridor of Belgrano Sur train line (highlighted with the colour blue on the top right Figure). This is due to the fact that the third crown features locations with a different character from the one that are closer to the CABA. They are less dense in terms of population and the land use is highly devoted to residential activities. Moreover, many low socio-economic status areas can be found in this crown. The worse performance can be the result of the quality of the train network service: many lines are usually operated with high frequency until the localities of the

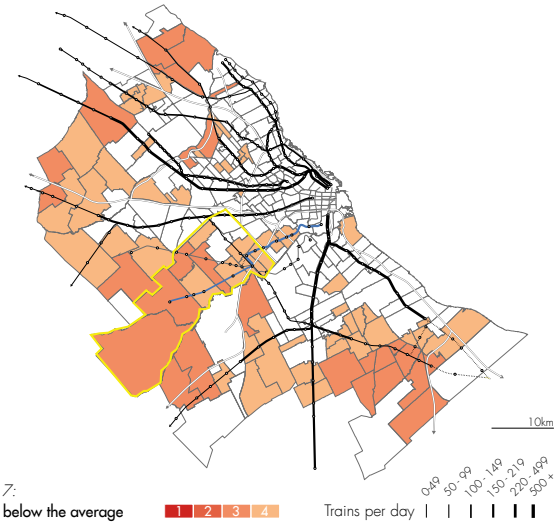


Fig. 7:
Loc. below the average

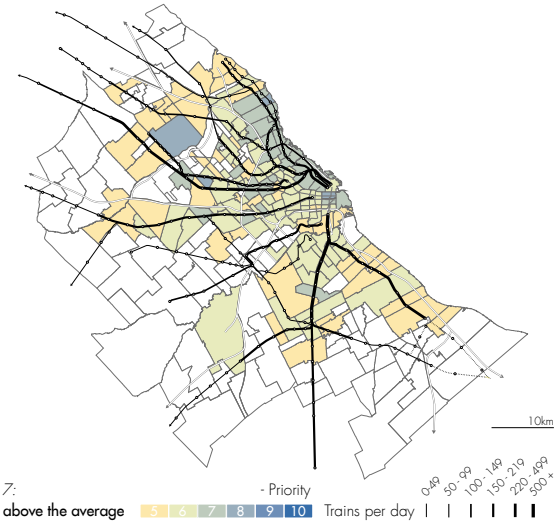


Fig. 7:
Loc. above the average

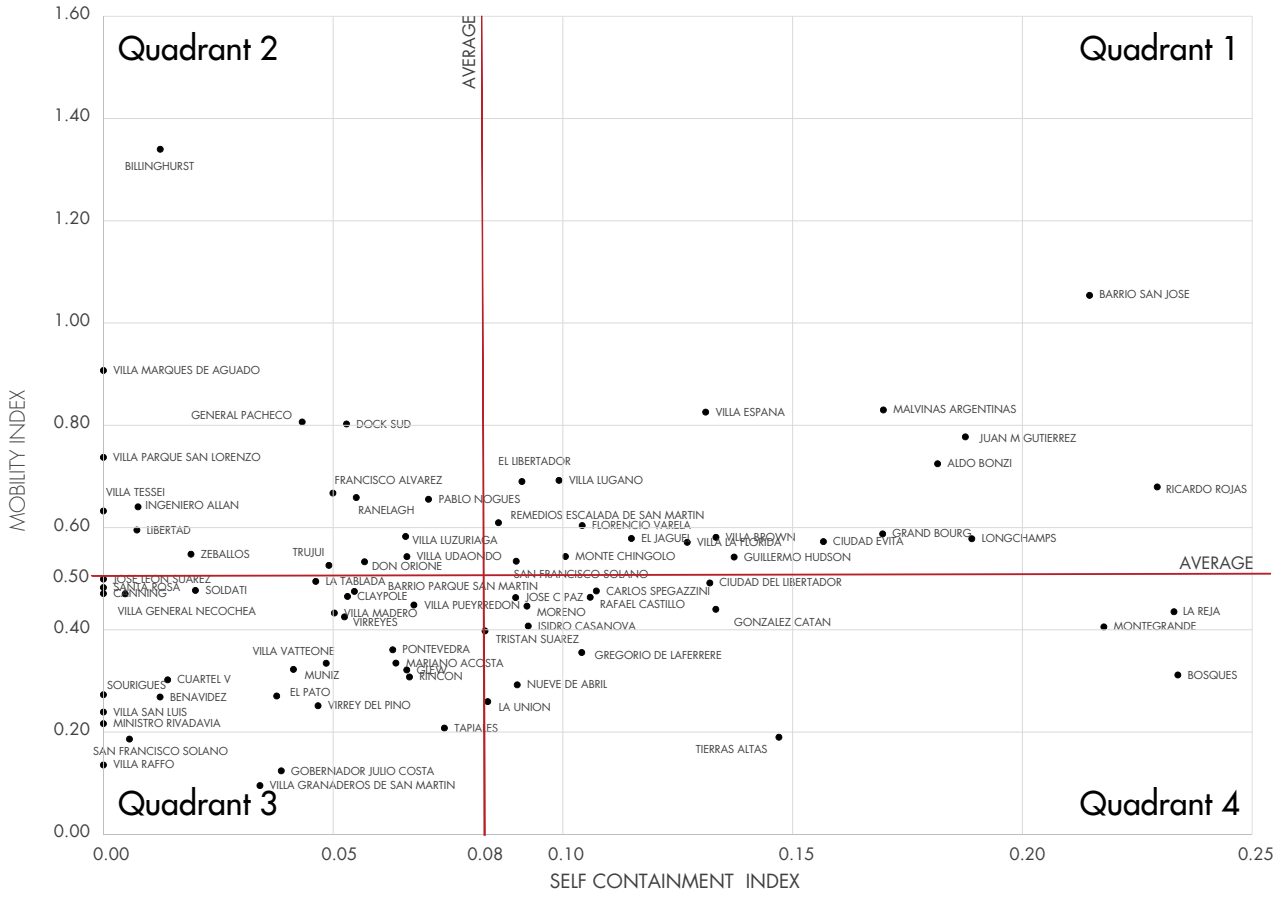
second crown. Beyond this limit, the reliability of the lines tends to decrease consistently constraining the inhabitants that use the public transport to be more dependent on the public bus offer.

The dynamics of the second crown were partially expected because of its territorial characteristics. A more remarkable result is the one regarding the corridor of the Belgrano Sur train line. While the localities placed along the other main infrastructural radial corridor tend to show performances above the average, this corridor doesn't follow this pattern. This is particularly interesting because it is extended from the third crown until the CABA. In particular, the localities pertaining to La Matanza municipality and to the south-west part of the Capital city seems to be affected by similar issues. The fact that many of these localities can be found along the rail line may suggest that the train as a mean of transport, which in other contexts guarantees better levels of accessibility, may not be able to contribute to the improvement of the local social condition by guaranteeing access to valued job opportunities.

The previous considerations presented a general overview of the territory that may be not sufficient to identify which kind of policy may be effective for an specific area. This is due to the fact that places which are characterized by the same final value may not feature the same exact problems. However, what it is certain is that those that can be found under the average, feature a mix of problems that limits the possibility to access to job opportunities for their inhabitants.

This is why this thesis proposes a further step to orient policies on public transport on the less advantaged areas (the ones under the average level). To do so, it may be useful to consider the real demand for movement that is expressed by the local population instead of the potential offer. This is because, while during a process of priority evaluation to consider a potential index is suggested, on a concrete policy field, it may orient future policies in places where they are not needed thus, not responding to a real demand.

As previously mentioned, one of the index which better describes this real demand is the mobility index. This index of vitality describes a location with regards to its generated trips for working reason. It is useful to understand if the population of a single locality is in effect moving. However, it is not able to explain if the generated trips are directed to the locality itself or to outbound destinations. The gravitation index, even if useful during the evaluation process, doesn't take into consideration the internal dynamics because it only explains the role of a locality with respect to the rest of the region. This is why the index of self-containment should be introduced considering the final goal of this process of policy orientation is to suggest interventions in



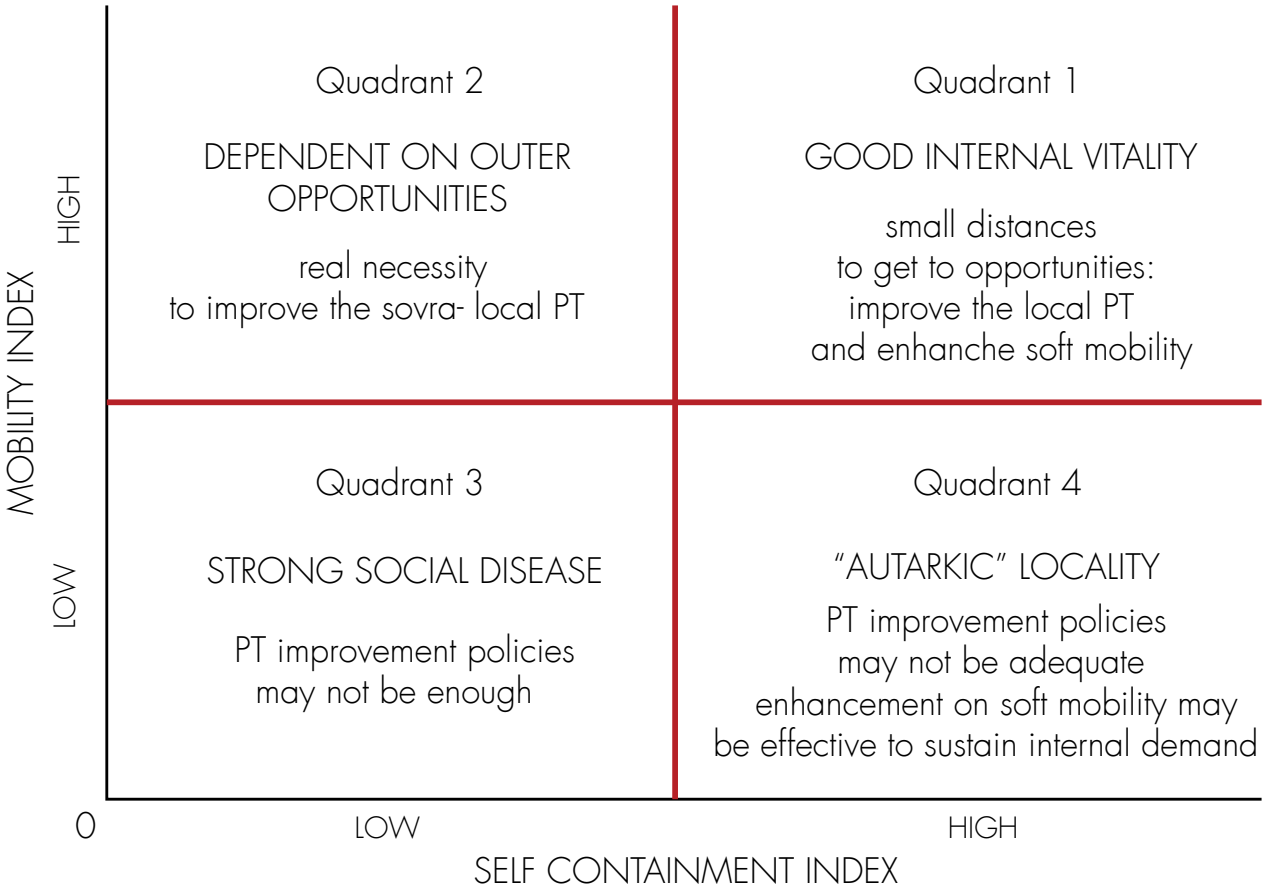
places characterized by internal deficiencies. Indeed, the index measures the internal vitality of a single place *i* which may reflect the presence of opportunities inside the locality.

$$SCI_i = \frac{internal\ trips\ for\ wr}{total\ workers}$$

By combining these two indexes it is possible to obtain a chart that may help to orient future policies on mobility in a more specific way. In the chart, two thresholds have been applied by taking into consideration the average values of each of the indexes. The average has been calculated only considering the values of the most disadvantaged places. Each of the quadrants defines an specific profile that may justify a specific set of policies.

The localities placed in the Quadrant 1 are characterized, among the most disadvantaged ones, by a high level of inner vitality. Meaning that most of the generated trips for working reason are made inside the same itself. In this condition, available opportunities at a short distance, even if few, are present. This profile suggests that an amelioration of the inner public transport system combined with softer interventions that may promote the use of bikes or improve the quality of the pedestrian paths could be significant.

In relation to the Quadrant 2, it is possible to identify places that are mobile but dependent



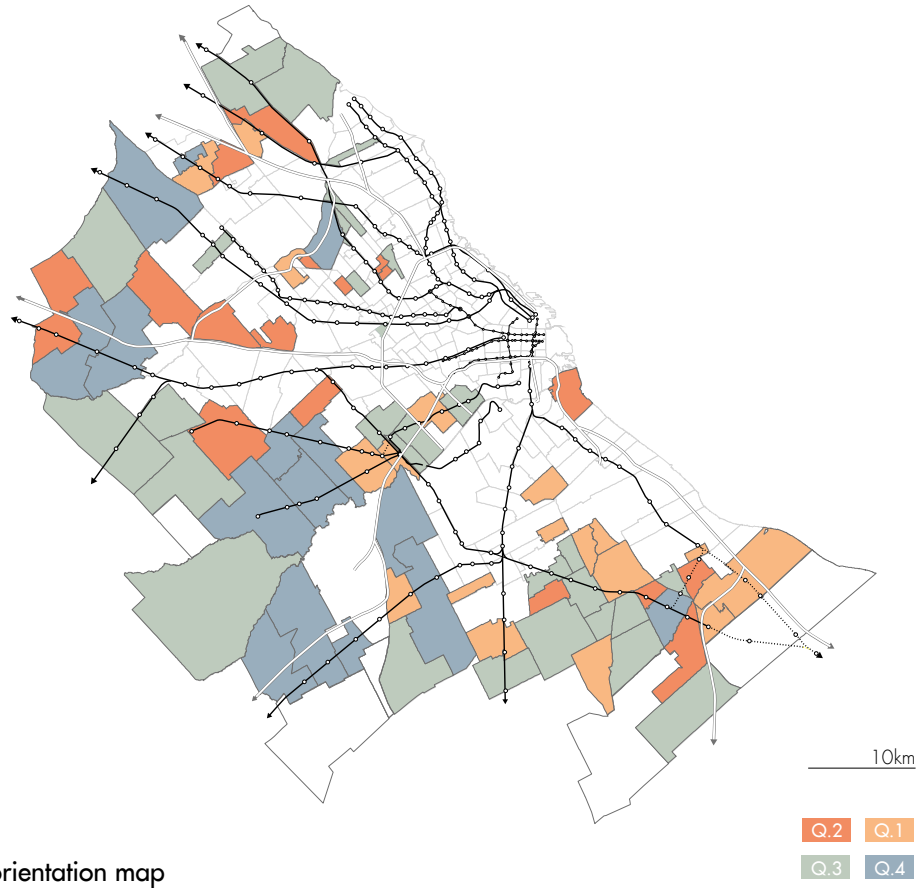


Fig. 2:
Policy orientation map

on the outbounds job opportunities. This is expressed by a low level of the self-containment index. In order to sustain this external existing relations and to, eventually, create new ones, the most effective policy should be oriented to the improvement of public transport network to ease the outbound connections. This kind of policy, for instance, may be put into practice by creating new bus lines, changing the actual paths or improving the connection with a fast rapid transit station. For this localities, the strengthening of the public transport network is necessary considering that needed displacements are made over longer distances. This is different from the case of Quadrant 1 where the range of possible solutions can be broader.

In the third and fourth quadrants are featured the localities that show low values of vitality Even if characterized by lower or higher levels of internal trips generation, the inhabitants tend not to move for working reasons. This can be due, in the first case, to a chronic deficiency of jobs opportunities inside the locality and supposedly a problematic social condition that constraints the inhabitants. In the second case, the scarce vitality of the population is still present even in a context where few opportunities may be available as expressed by the high levels of the self-containment index. This last profile that characterizes the fourth quadrant may be related to the presence of strong deprivated areas that may function as "autarkic" areas.

In conclusion, this final step which focuses on the most critical areas of the whole region, intends to provide a framework useful to address public transportation policies by highlighting the localities where even a small or short-term intervention may have a strong impact on the quality of life of its inhabitants. For this reason, places that show low levels of vitality (low values of mobility, self-containment and social deprivation) need integrated policies that go beyond actions related only to the sphere of public transportation.

It is worth noting that other kind of analysis should be made to enrich the set of policies to be potentially implemented in the most disadvantaged localities. For example, for the localities that are located in the Quadrant 1 it is certain that local opportunities exist but, it may be also promising to improve the outbound connections in the case in which other job opportunities could be reached. What is more, it could be interesting to understand if for the localities placed in the Quadrant 4, policies aimed to improve internal mobility on short distances may be adequate considering the magnitude of the social problems that affect the area.

Final remarks

Potential uses of the method

The method that has been proposed doesn't intend to be a definitive support for policy making. Instead, the main objective is to be applied in a previous step in order to allow policy makers to understand, firstly, general metropolitan dynamics in a more exhaustive manner. Secondly, it helps to identify locations in need and, thirdly, it orients future interventions in areas that reveal a real potential margin of improvement for their inhabitants in increasing their activity participation.

For this reason, the ideal recipients of this tool should be public or private bodies involved in transport planning practices. In the case of the field of study of this thesis, the authority that better matches this profile is the Metropolitan Transport Agency which, as mentioned before, has been settled to handle the region as one single entity.

The method is useful also because it can be operated with two different purposes: as an interpretative and propositive tool or as an evaluative tool.

The method as an interpretative and propositive tool

Taking into consideration the description of the Metropolitan Region that has been made in the first part of this thesis, it is possible to assume that some of the aspects that emerge from this study are of common knowledge. The fact that the service of public transport reduces its quality as it moves away from the richest areas has been implied by different authors. *"The territorial coverage and the level of service of the public transport diminish as the users of low socioeconomic level and those of homes without cars increase. That is, the offer of public transport registers an inverse gradient in relation to poverty and to the availability of owning a car"* (A. Gutierrez, 2012). These assumptions are always constrained to a general lecture of the Metropolitan Region and tend to have an ending point at the municipality scale. The smaller scale is only tackled when talking specifically within the boundaries of the CABA or outside of it.

One of the characteristics of the proposed

tool, probably attractive for policy makers, is that it allows, by using a scientific oriented approach, to identify specific parts of a territory that may present unwanted conditions. By applying a criterion of priority it suggests which are the areas where to intervene firstly. The propositive value of the tool emerges in this moment.

First of all, by analysing the results at a metropolitan scale, it is possible to identify positive or negative trends that may have an impact on several localities. In this way it is possible to make a first step towards a large scale strategic policy.

Secondly, by applying the last step of the method, it is possible to highlight which are the most promising locations, among the most disadvantaged ones, where a local scale operative policy, destined to the improvement of public transport, may be effective. At this scale, the inhabitants which are directly affected by the proposed interventions, should be involved in the decision process in order to ensure that the policy will effectively answer to their needs.

The method as it has been presented is experimental and could be furtherly improved and applied to different scales of analysis. For example, a possible scale of work could be one between the census track scale and the locality/neighbourhood scale where other type of complexities may appear. If the method here described, in combination with other ones, allows to identify the weakness of a whole train line (like the case of the Belgrano Sur), a further analysis in a smaller scale may allow to identify, for example, which are the stations with lower performances or if the distribution of land use is having a negative impact on the region. This type of processes should be combined with other kind of approaches able to allow the actual or potential user of the mobility network to be part of the final decisions. *"As mentioned in several instances, transportation planning can never be an exclusively technical exercise. Indeed, (...) a top-down, technical, approach will have to be complemented by a bottom-up, participatory, approach"* (Martens, 2017). Another characteristic of the method is that, having data and time availability to handle them, it could be applied in a selective way. For example, it could be applied to analyse the performance of the corridors with direction towards the CABA or vice-versa, or by taking into consideration the mobility patters with regards exclusively to the provincial area.

The method as an evaluative tool

All in all, the method could represent a valuable tool to interpret the needs of the territory with a different perspective and thus, update the planning tools that have been used so far to diagnose the Metropolitan Region of Buenos Aires.

The structure of the method also allows a possible use as an evaluative tool for proposed, ongoing or already concluded policies. It is necessary, in order to get to this result, to have a good availability of updated data.

Regarding the evaluation of concluded transport policies, data referred to pre and post implementation must be accessible. This is necessary to understand if, after a reasonable period of time, the performance of a place with respect to the quality of mobility and job accessibility has improved. In the case of a positive answer, it will be of great interest to consider if a similar improvement has happened also with respect to the social condition of the inhabitant of the locality of analysis. If a positive correlation is observed, this can be considered as a confirmation of the relation existing between public transport and social activity participation that constitutes the theoretical background of this research. In addition, a further use of this tool may be to evaluate the effectiveness of the operative policies oriented by the tool itself at a smaller scale.

At the same time, the method can also be used to evaluate ongoing or proposed policies referred to the sphere of public transport, with indicators that should have to be constructed by using data referred to the pre-implementation period. Additionally, in order to understand the possible impact of the policy, other data should be forecasted. This can be possible for the indicators related to mobility and job accessibility but less for the social indicators which tend to be more unpredictable. In any case, it is worth noting that, even with a scarce reliability with respect to the possible impact on the social sphere, according to the theoretical background of this research, any improvement on mobility may be at the base of a socio-economic improvement of an individual. Because of that, an evaluation of an ongoing policy may lead to the estimation of a possible outcome.

Starting from the observations made for this thesis, it is interesting to propose a concrete case of application of this method. As seen, the localities of the municipality of La Matanza present high level of priority due to the issues they are suffering, which are related to low social and mobility quality levels. Moreover, as La Matanza is the second most populated municipality of the whole country, it may represent an interesting area of intervention.

On May, 2017, the first section of the Metrobus La Matanza was opened to the public along a portion of the main route that crosses the municipal territory. As for the other six lines existing in the region, this BRT corridor was publicized as beneficial for a set of aspects such as time travel, congestion and neighbourhood quality (CABA, 2017). In this scope, the method proposed in the thesis could have been helpful in the planning

phase of the project by assessing the benefit inducted to the component of PMI and Job accessibility featured in the priority index. To do so, data related to the average travel time of the existing BRT lines in areas that features similar demand for mobility and land use configuration should be used to forecast a possible change in travel times and, therefore, to access to jobs. In this way, by comparing the obtained result with the one that is referred to the 2010 situation (as it is in this research) a possible evaluation of the potential benefit inducted to the localities could have been assessed. This could be done also for the localities that will be affected by the construction of the remaining segment of the line.

The tool could work in the same way also if applied to proposed policies. In this sense, the suggestion that emerges from this research is the evaluation of the RER project, that involves directly the Belgrano Sur train line. Hypothetically, it would guarantee a better interchange with the rest of the network by heading the line, which today ends in an unconnected area in the southern CABA, to the Central Business District and the other main subways and train stations. A better reliability of the train line could be at the base of better performances with respect to job accessibility and PMI for the disadvantaged localities touched by the line.

In conclusion, the objective of the method has been to propose an approach to transport planning different from the traditional ones that are still used for the study area. Even though it must be consider as an exercise that will require further refinement to be used in a concrete policy making field, it aims to be an initial step in order to have a different and more integrated perspective of the Metropolitan Area of Buenos Aires. The difficulty encountered while searching and managing the data, confirms the importance of having a good availability of open data. In this way, professionals that are not necessarily working for the official bodies, may also contribute to produce better analysis and evaluations. Finally, and most important, the method, thanks to its interpretative, propositive and evaluative values, may help to confirm the concept that promoting policies related to the sphere of public transport can increase the social inclusion of the inhabitants and, consequently, their quality of life.