A Response to Brussels' Unexpected Population Growth in a Context of Existing Urban Fabric, or How to Densify while Keeping High Quality of Life

Mati Paryski, COOPARCH-RU scrl; Urban planners' Chamber of Belgium (CUB), Belgium

Ioulia Pankratieva, COOPARCH-RU scrl, Belgium

1. Introduction

There is a considerable amount of information about the decline and aging of Europe's population. Europe, including Russia, has seen since the 70's its birth rates go down and life expectancy increase. This trend is strong and brings into question all our economic and social systems. While this phenomenon is seen in many regions of Europe, Brussels, its capital, is clearly an exception.

After twenty-five years of diminution, the population figures have shifted and the number of inhabitants is growing at a quite unexpected rate. 120,000 new inhabitants are expected by 2020, with an actual population of 1,100,000. The institutional context of Brussels limits the responses to this problem mostly to a local level. This would not be a challenge if the entire regional territory was not already fully urbanized!

The following study is an attempt to find tools and guidelines to deal with this population growth by measuring the capacity of the physical territory to absorb more inhabitants while preserving a good quality of live. The study was contracted to COOPARCH, a private urban planning consultancy firm working mostly in Belgium and France by the Brussels-Capital Region.

This paper first addresses the many contexts that need to be understood to fully comprehend the issues at stake. Then the methodology and the specific different domains that were studied and their significance are described. Finally, our proposed solutions are explained with comments on the perspectives and limits of such a tool.

2. Context

2.1.   Brussels in Belgium and context of this study

Before examining the problems inherent in the adapting to population growth in the Brussels region, we shall describe the geographical context of Brussels.

The Brussels Region is at a crossroad between many major cities of the very densely populated North Western Europe urban area; as such Brussels is a pole of many different activities in the European Union. Brussels is on many Euro-corridors (Fig 1) linking the Randstad, Köln, Luxemburg, Paris, and London…
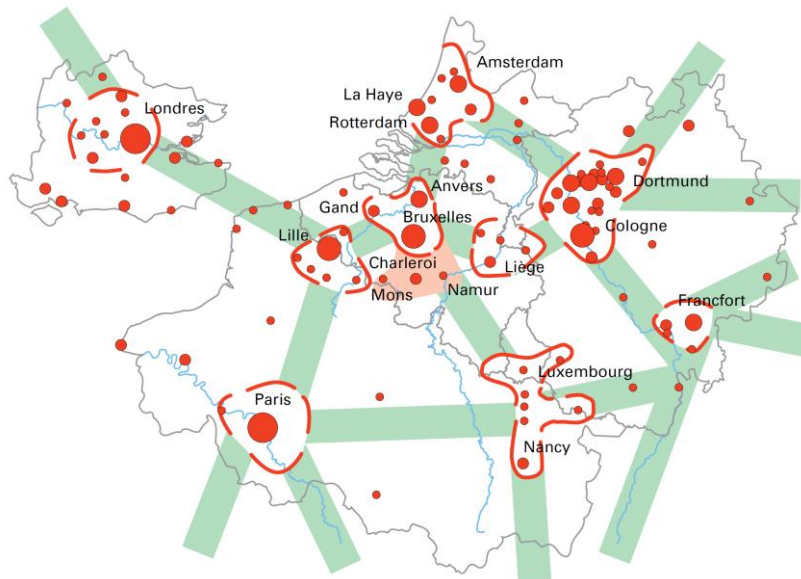

Fig 1: Euro-corridors integrated in the Wallonia Regional Development Plan (SDER) - 2006

The Capital Region is one of Belgium's three regions. With an area of roughly 30,500 sq. kms, the country's population is 11.1 million. The population of three regions is unequally distributed with 6.5 million in Flanders in the North, 3.5 million in Wallonia in the South and 1.1 million in Brussels.

Fig 2: Location of the Brussels-Capital Region

It is also interesting to underline that Brussels is not only a European crossroad, strategically located in the middle of Belgium, but it is entirely surrounded by the Flemish Region (Fig 2).

This particularity contributes to a complicated political context which reached its climax when the federal government was not nominated for more than 18 months after the elections of June 2010. This situation led to the regional government having to deal on its own with the many difficulties challenging the capital.

Since it has been put in place, the government of the Brussels-Capital Region is addressing five major challenges. Among them, "the challenge of the demographic growth demands concentration of means for construction of new infrastructures, housing units, daycare centers and schools accessible to all, a performing mobility, maintenance of quality services for all the population and a reflection on the organization of urban functions."

The population growth predicted is 190,000 inhabitants by 2040, 120,000 of those before 2020.

This defines the challenge: where and how to increase the density of the region and provide housing for these new populations?

This study aims at identifying the opportunities in the whole regional territory, and help set priorities for intervention. Densification must be understood as construction densification, with mixed uses, that may result in a decline in housing, schools, shops, services, economic activities while hopefully increasing sustainability.

The aim was to find tools to deal with this growth in an objective and geographically fair manner. The guideline had to be robust enough and not influenced by punctual projects.

2.2.   The demographics in Brussels

Before starting to propose solutions it is important to understand the current dynamics in the Region.

Since its foundation in 977, Brussels has been confronted by the problem of meeting its urban spatial needs during its demographic expansion.

The city of Brussels and eight neighboring communes have constituted together from 1229 to 1795 what was known as the "Brussels basin". Ever since the extension of the city has been a constant that has accompanied its successive acceptance as capital of many different territories: Lower Lorraine, Duchy of Burgundy, Netherlands, French department of the Dyle, and finally Belgium.

The need for expansion was linked to an important increase of population and to spatial needs coming from its role as political and administrative capital, as well as that of first industrial and commercial city of the country. In 1830 the population grew out of the city walls. The ensuing projects of Charles Vanderstraeten in 1840 and Victor Besme 1862 reflected the need for spatial planning of a rapidly expanding territory.

A population peak was then reached in 1970, followed by a decline until 1995. During that period, Brussels was facing a quite severe "emptying" of its town center, with many inhabitants, mostly the middle and upper class, fleeing to the suburbs. The construction of a highly efficient highway system and low energy costs, as well as high performance railway infrastructure definitely all played a role. Brussels was then strengthening its economical and international position but at the cost of its population.

It is in this context that the government was surprised when demographers suddenly predicted a strong population boom, less than ten years ago. This tendency is expected to continue with the population predicted to increase during the next 50 years.

After reaching a low point in 1995 (Fig 3), the population had reached its 1970's peak in 2007. In 2010 the population was of 1.089.538 inhabitants, an all-time record.

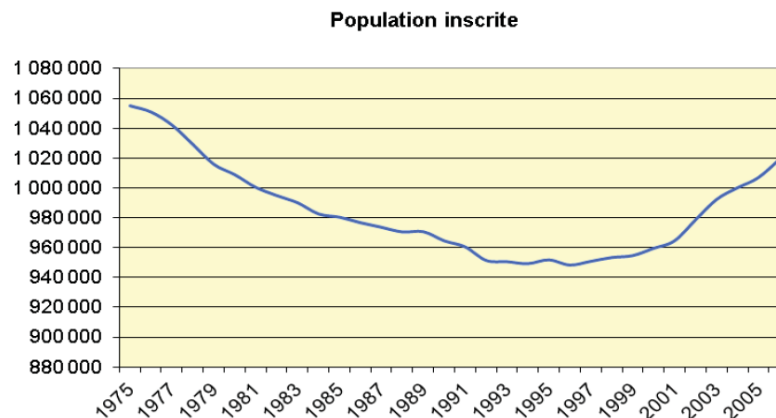EVOLUTION DE LA POPULATION DE LA RBC DEPUIS 1975

Population inscrite

Fig 3: Population evolution from 1975 to 2008

To understand this trend many factors need to be examined. Two kinds of immigration are present in Brussels, and both are important.

The first is the influx of the European bureaucrats with all the secondary economic activities that revolves around the European institutions. With the enlargement of the Union, more and more workers have come to Brussels as functionaries, lobbyists or journalists…

The second family of immigrants constitutes a poorer population that comes from outside the EU (northern Africa, sub-Saharan Africa, Eastern Europe, Latin America…).

While the first category sometimes stays many years in Brussels they usually end up going back to their countries of origin.

The second type of immigrants are those who have moved permanently to Europe, mostly when Belgium needed labor for its industry. Since then national policies have permitted family grouping and also encouraged naturalizations. This population comprises the most underprivileged part of Brussels' population, but has a strong birth rate that has contributing more and more in the last years to its growth.

Paradoxically, middle class Belgians are still leaving the capital when they have their first child, moving to a house in the suburbs. Although this trend is less marked than it used to be, it has not completely ceased.

2.3. Population density in the Brussels Region

Addressing building potential in Brussels requires having a good comprehension of the dynamics of its different neighborhoods.

Today the average density, taking into account the whole area of the Region, is 67 inhabitants per hectare (hab/ha), while the highest districts reach more than 300 hab/ha.

We analyzed the population figures in 1981 during the decennial census and in 2008, the last full figures available. We noted many interesting facts:

-   The most populated and least populated neighborhoods only changed marginally from 1981 to 2008;

- Globally the densest areas (Fig 4) are located around the inner city (or *Pentagon*) and the poor *croissant* (an area that concentrates the most negative indicators, shaped like a croissant at the west and around the region center) cannot be solely analyzed by density;
- Growth rate analysis of the 19 districts (Fig 5) of the capital shows a complex and subtle phenomenon. The area the west of the Brussels canal has known a stronger population growth than most eastern parts of the region. And some outer neighborhoods that have been urbanized in the past 30 years show up clearly on the maps;
- Some neighborhoods have seen their population drop significantly between 1981 and 2008 (Fig. 5) and therefore still have an important potential for welcoming new inhabitants. These neighborhoods account for a drop of 25,000 inhabitants. In some cases this can be explained by the aging neighborhoods where there once were more inhabitants per housing unit (couples whose children have left home and/or the departure of one spouse). Probably with the death of the elderly occupants, these units will naturally be able to house more people in a few years. Some neighborhoods that have been drastically transformed into office districts also account for this population drop.
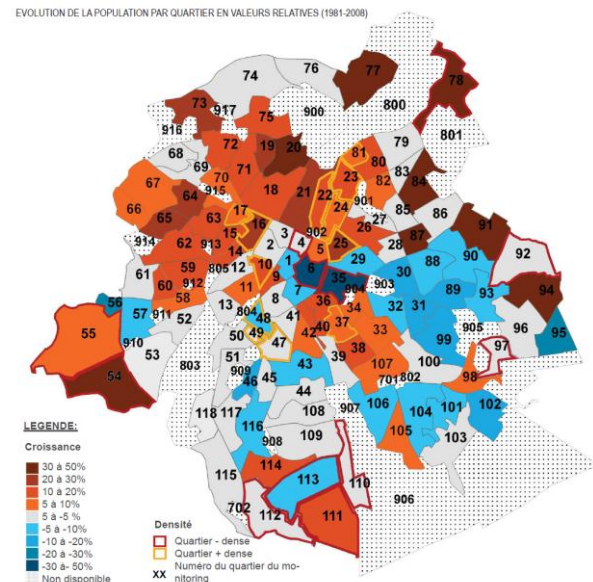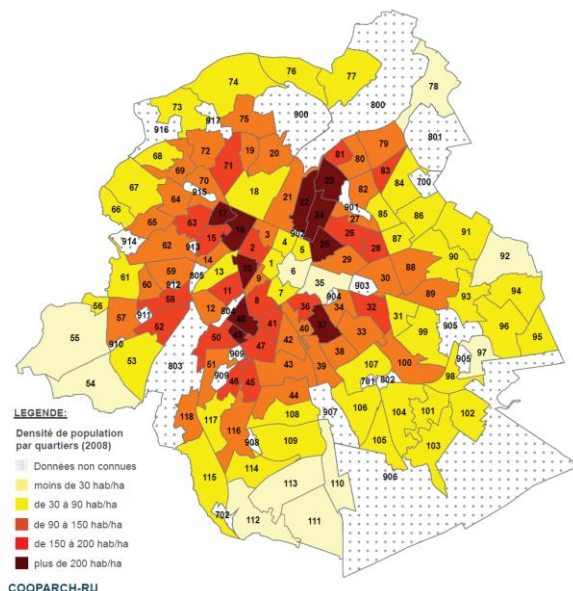

Fig 4: Density of population per neighborhood (brown is more dense) and Fig. 5: Evolution of the population densities between 81 and 2008 (brown is gain of population, as blue is loss).

3. Relevant methodological and analytic tools

3.1. Density – densities

The notion of density must be well defined as it has a very large application range in urban language: we speak of construction density, population, landscape and time density…

Specialists will quarrel about specific calculation rates, and we also went through a long process to define adequate modes to account for the realities we encountered.

Density encompasses many aspects.

First, urban density can be linked to different domains: humans, buildings and other infrastructure, flora and fauna including existent ecosystems, functions, information, communication… most often these can be quantified variables, and many indicators can be taken into account: square meters (surface area and volume), number of inhabitants or jobs, quantity of infrastructures or facilities…

Another measure of the densification of the city is its scale, whether at a metropolitan scale, or a district, a neighborhood, a block or a housing unit. This implies that the relation to area can also vary: km², ha…

Finally a crucial aspect of densification is rate of change or "speed": population growth change, construction speed of projects, etc. this gives a measure of the capacity of the territory to adapt. Actually adequate density in relation to mixed uses just might be a main ingredient for recipe of urban resilience, a key notion to help our urban societies go through many planned and unexpected shocks (environmental, demographic, etc.).

3.2. Density's operating modes

Three operating modes were formulated at the beginning of our study and served as methodological guidelines:

- Densification by in-fill, which takes place at the scale of a building and involves individual choices. Typically it's adding new inhabitants to empty stories above a commercial street, or building on an empty lot these opportunities were quantified by category in our study;
- Densification by restructuring urban fabric, with or without changing the road system. This implies actual urban planning, since it goes further than interventions within one property. It needs collaboration and a long term vision. It usually also uses tools that imply initiative by local or regional authorities.
- Densification by new urban form happens mostly on unconstructed areas, or when the reconversion is of such scale that we consider it as free areas.

4. Analysis of urban morphology of the region

Though many more aspects were analyzed and compiled, we have decided here to go through only the most significant data, which has led to the final results.

4.1.   Heritage urban fabric

One of the first aspects that arose was to determine where we needed to be careful when increasing the density of the city. A crucial feature of this consideration is cultural and architectural heritage and how to take it into account.

Of course a first consideration was to protect exceptional and recognized buildings. Brussels has a grade scale for the protection of its significant buildings, so these were taken into account without much discussion. This doesn't mean that densification cannot occur. We have examples of empty "exceptional" buildings that can house many more activities then they do today. It just implies that the respect of the characteristics of the buildings must be preserved and that the heritage rules are respected.

The second question that then arose was taking into account the value of coherent urban fabric at a larger scale: whole neighborhoods made of many blocks exhibited a high degree of consistency and coherence, but were not legally protected.

That opened discussion on the criteria to use for identifying and monitoring these valuable zones throughout the city. Due to time constraints, an in-depth of historic periods of construction and of modification, quality of architecture and public space planning was not possible. We finally used data collected during the before previous regional development plan (PRD) that located perimeters of heritage protection and beautifying of the city. We finally settled for the "heritage protection" data, without really finding out how it had been collected.

Without a doubt, the issue of quality urban fabric that tells the story of society at a given moment is very important, but seldom addressed. It includes buildings, which as individuals tell us the story of personalities in their context and more importantly about the history of a whole group and how "pieces" of the city where made and why. it seems important to transmit this to our children.

This second category of heritage does not need specific rules, just guidelines that permit society as a whole to understand the evolution of its particular urban form. More than protection, these pieces of the city need to be recognized then and then respected. That fabric can and must evolve, but this evolution cannot be solely the sum of individual decisions. It has to be coherent and somewhat supervised by public authorities, as well as understood and shared by local communities.

4.2.   Morphology and land occupation

Gathering and crossing different information on the morphology of the city fabric provided most of the new data needed to propose new insights for densification. It seemed the most reliable way of fulfilling our task with a global approach to the city.

A very systematic approach was developed by our team, using appropriate GIS tools for all our data and graphical analysis.

The first exploration was made in a very empirical way, discussing different approaches and ideas. We went through Bing remote imagery of the city trying to imagine where and how we could fit in more square meters of density.

We reached a first conclusion: the role and space occupied by cars in the city is astonishing. While Brussels is renowned for the quality of its green system with many private gardens counterbalancing more mineral and poorly designed public areas, we noticed a remarkable number of open-air parking lots all over the city. After collecting more precise data, we found many hundred hectares where occupied by parking lots.

Our first step was to gather all the existing information on empty lots, free of construction. A previous study had been conducted on this question and the data was integrated into ours, adding the information about the parking lots.

We also took into account large scale projects piloted by the Region, as these areas are bound to carry strong new programs with many new square meters.

FONCIERS DISPONIBLES ET GRANDS PROJETS URBAINS

LEGENDE:
- espaces vides et partiellement vides
- dents creuses
- Grands projets urbains
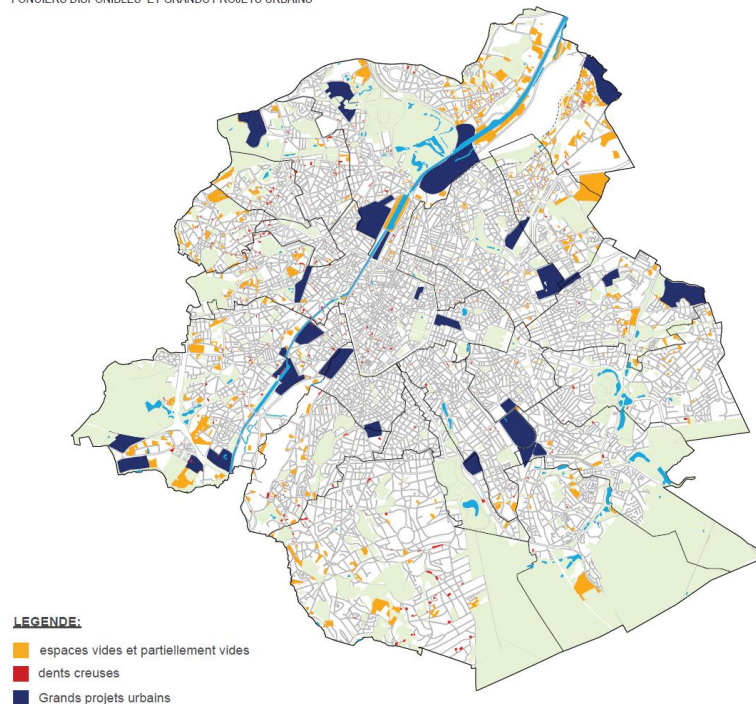
Sources: MSA/ULB La Cambre, BUUR, Cooparch, RBC

At the block scale, many elements where considered. These include:

- Average size of the blocks throughout the region.
  This gives insight on the main elements of the city. The average is around 2ha (total area / number of blocks) while the median size is 1ha (50% are bigger and 50% smaller). 32 % are between 1 and 2,5 ha and 18% are more than 2,5 ha. The hypothesis was that large blocks (more than 2,5 ha) could be appropriate for densification by division into smaller blocks.
  Very clearly we observe that the size of blocks increases as the distance from the center increases. The small and medium blocks are in the center and first agglomeration belt, larger blocks are located in the second belt and the largest ones are on the periphery, near the regional border.

- The average of floor area to building footprint ratio for each block, taking into account the total Floor surfaces of the block in relation to the actual ground Area of the block (F/A).
- The organization of the buildings on each block: open constructions, semi-open or closed blocks.
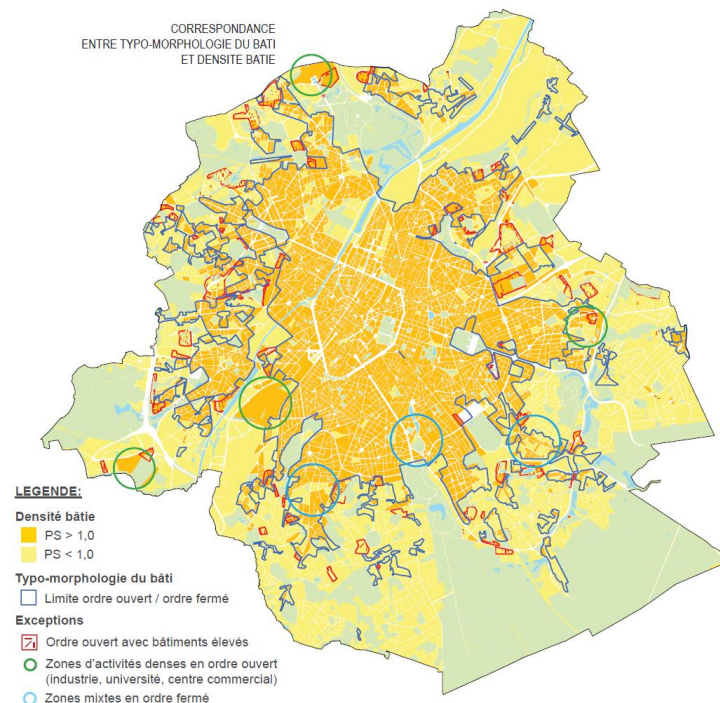

Fig 6: F/A ratio (orange is more than 1) superposed to closed block implementation (inside blue perimeter).

These two last data were found to be well correlated, as the F/A ratio was a good indicator of the type of building organization on the block, whether open or closed (Fig 6). The actual areas of divergence are linked to high rise housing units or to semi closed blocks at the limits of this perimeter.

Finally some data was also analyzed at the building scale, such as building heights (number of floors) in relation to their surface.

This data had flaws, since it was collected in 1998. It nonetheless permitted a good approach to general potential areas.

One type of data was quite interesting and revealed potential for densification: one story buildings. Those of more than 1000 m² and directly on the street offer a great potential for increasing building size and density. They can in some cases be heightened adding a good deal more square meters of construction. These buildings are also useful because in some cases they can contribute to a significant amelioration of the quality of life inside the blocks, by bringing in a garden or extra open space, whether private or public, in small confined blocks in central and already dense parts of the region. Many of these surfaces are industrial buildings or medium or large commercial infrastructures that can by their transformation help bring in mixed use be it housing, office space or greenery.

4.3. Green areas as a necessity for development

A strong characteristic of Brussels is its green system. The average square meters of park per inhabitant is quite high with 36m², and green space takes up to 25% of the region's area; In comparison, Milan which is approximately the same size, has only 26 sq/hab. Knowing that the quality of public space and parks in particular is a strong element of the attractiveness of cities, and that they are one of the key elements in permitting higher densities, these elements were analyzed in depth.

A distinction was made between neighborhood and large parks, i.e. those larger than a average city block (1ha).

We then calculated the impact zone of each park or accessible green public space, choosing a large perimeter of 600m for large parks, and 200m for smaller ones.

Based on this data, a map (fig 7) of zones in the city that need more green space was created. These zones are areas of important mutability and will host many important projects in the next years. Our study suggests that new projects take in consideration green density as well.
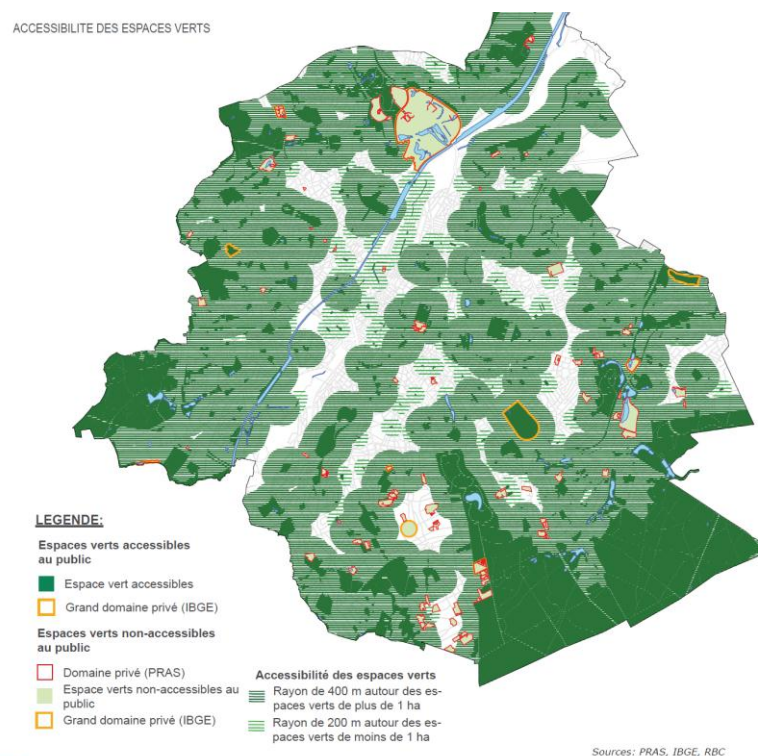

Fig 7: Parks over or under 1 ha and their influence at a regional scale

4.4. Mobility and transportation

When planning greater urban density, consideration of transportation facilities and systems is essential. An issue was whether our proposals should accept the current trends of the regional transport system under study, or propose changes to that system.

The uncertainty linked to the pace and speed of densification led us to integrate the data from these studies rather than suggest changes. Indeed if we can set rules for densification, the private sector at the scale of a whole region cannot be forced to follow, leading to important uncertainties.

The choice was to prioritize the influence of the different transportation modes on the densification process (Fig 8).

The heavy rail transportation was taken into account first (train and metro), as we proposed to strengthen densification in large areas around the stations. Some stations were highlighted as they are to become major points in the metropolitan grid.

Light rail transportation (tramway) was taken into account with a lesser impact on the process, with narrower corridors of densification.

The proposals also took into account the projected stations and new lines in order to start reinforcing their impact as soon as possible.
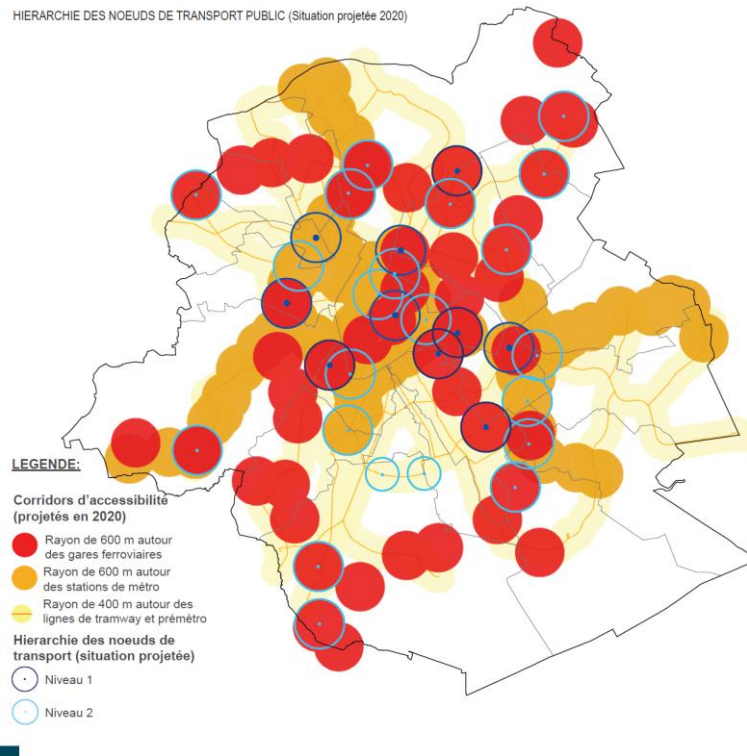

Fig 8: polarities of heavy transportation facilities in the Brussels region (projected at 2020).

5. Conclusions: building tools for planning

Our in-depth analysis has permitted COOPARCH to propose an effective method for planning.

This method is based on suggestions for every type of morphology, with minimal levels of constructed density (Floor/Area ratio) that apply to all new projects. The F/A ratio was used because it is a performance based criteria that adapts to different project sizes; it also does not put burdensome constraint on the destination of the square meters, as the ratios should be applied to the entire Region.

Proposed density levels also take into consideration the proximity of the existing and planned public transportation (train, metro and tramway).

This approach has permitted to offer guidelines for every block of the Capital Region. It sets quantified site specific objectives (F/A) that are based on actual realities encountered today in each neighborhood. In that way, the existing urban fabric serves as a reference, lowering potential conflicts with existing neighborhoods and preserving identity.

The study also takes into account many qualitative elements that are specific to Brussels. First Brussels' urban and architectural heritage is considered very important and valuable asset that needs to be respected, without excluding future development and transformation.

The study proposes that the Regions' green space system should be expanded and improved if significant new inhabitants are to move to Brussels without deteriorating the quality of life in the Capital.

Emphasis is also placed on the importance of planning not only housing units, but also all the square meters needed for a balanced development, with the goal mixed use.

Finally this study was designed as a roadmap to accompany and assist the decision making through management and development control, both at a local and regional level. Unlike many strategic tools, it was not a site specific or project oriented study. Nonetheless, this systematic approach when quantified has revealed that the projected population increases can be absorbed by the existing urban fabric without changing significantly the character or quality of life in Brussels.

The challenges will be social (involvement and participation of local governments and communities, integration…) or economical (how to pay for infrastructures, how to manage policies to reduce speculation, how to attract more economical activities…), but we can reasonably conclude today that the physical territory has the capacity to adapt and to welcome the projected new inhabitants in a sustainable way, perhaps reinventing the city as an evolving, exciting, dynamic public urban space and community. After roughly 1000 years of existence, Brussels can demonstrate its capacity as a unique city-region to adapt, evolve and be surprisingly resilient.