VIEWPOINT ON PARIS REGION SITUATION

S. COUTEL
Prospective Department, Cofiroute, France
simon.coutel@cofiroute.fr

ABSTRACT

Paris region has nearly 11 million inhabitants. The 20th century was characterized by a phenomenon of urban sprawl; the population first grew in the inner suburbs and nowadays the outer suburbs are winning the most people, and accounts for about 50% of the region population. Employment and population densities remain however concentrated within the inner area. The railway network inside Paris is dense whereas the suburbs benefit only from radial lines. This is a major obstacle to travelling across the suburbs nevertheless this kind of travel grew dramatically up to 120% between 1976 and 2001. Road networks are more equitably distributed but they remain underused by public transit. Public authorities have planned an ambitious project for development of rail network. Complementarily, the role of the road networks could be reinvented and their potential should be revealed, especially in terms of public transport (buses and coaches) as a solution to serve areas with low density rates, with connection with other transportation networks.

1. URBAN SPRAWL OF PARIS REGION

Paris region is composed of 1,300 municipalities, grouped in 8 departments. It is also customary to divide it into three distinct urban areas, namely:

- Inner Paris ; with a 5 kilometres radius,
- The inner suburbs, located between 5 and 15 kilometres from the city centre,
- The outer suburbs, located between 15 and 60 kilometres from the city centre.

From less than 5 million inhabitants in 1901, Paris region reaches about 11 million inhabitants in 1999 but with high differences from one urban area to another.

Detailing the different areas, one obtains the graph shown in Figure 1 revealing different trends for each area. Inner Paris has lost 1 million people during the last century, accounting for 2 million inhabitants in 1999. Meanwhile, the suburbs have grown from 2 million to 9 million inhabitants (INSEE census 1999).

Between 1975 and 1999, Paris region population grew of 11% on average over the region, and up to 33% in the outer suburbs. According to an INSEE's study, it should still grow by 10% by 2040 [1].

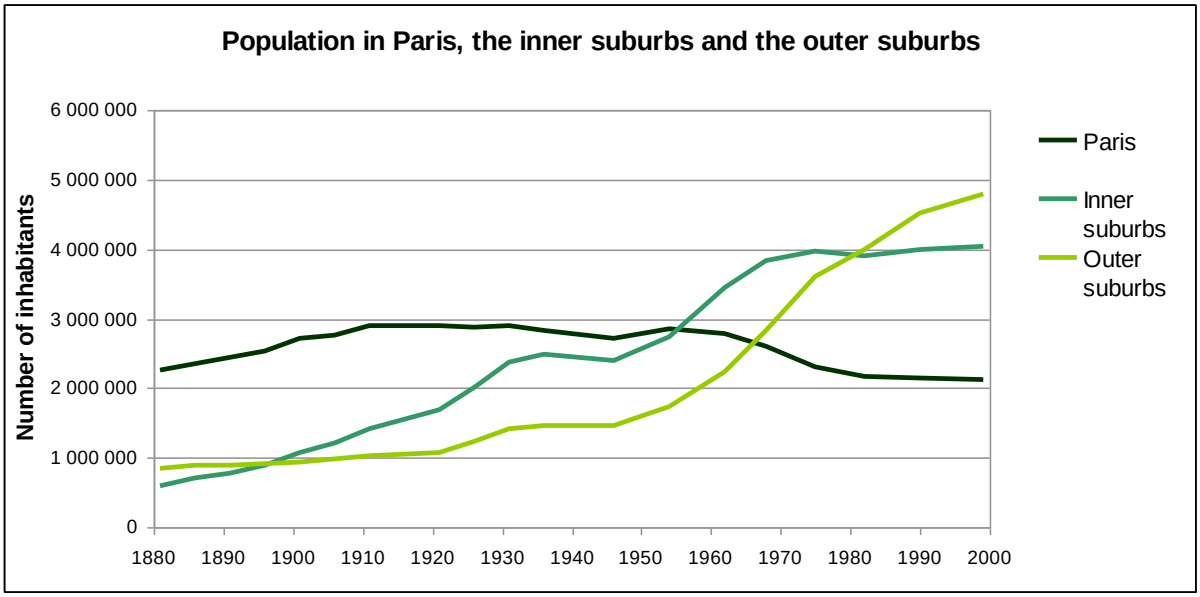

Figure 1 – Growth of population in inner Paris, the inner suburbs and the outer suburbs.

Population growth has moved from the inner suburbs to the outer suburbs. Early in the 20th century inner Paris and its inner suburbs had the most dynamic demography but from the last quarter of century, the outer suburbs are the only urban area to significantly get new inhabitants. Both Figure 2 and Figure 3 show changes in the population densities during the 20th century over Paris region.

Densities of population, employment and human activities (population and employment) of the Table 1 point out the sharp contrast between the three urban areas resulting of population growth and urban sprawl. Observing human activities densities, one can identify a factor 5 between inner Paris and the inner suburbs, and a factor 75 between inner Paris and the outer suburbs.

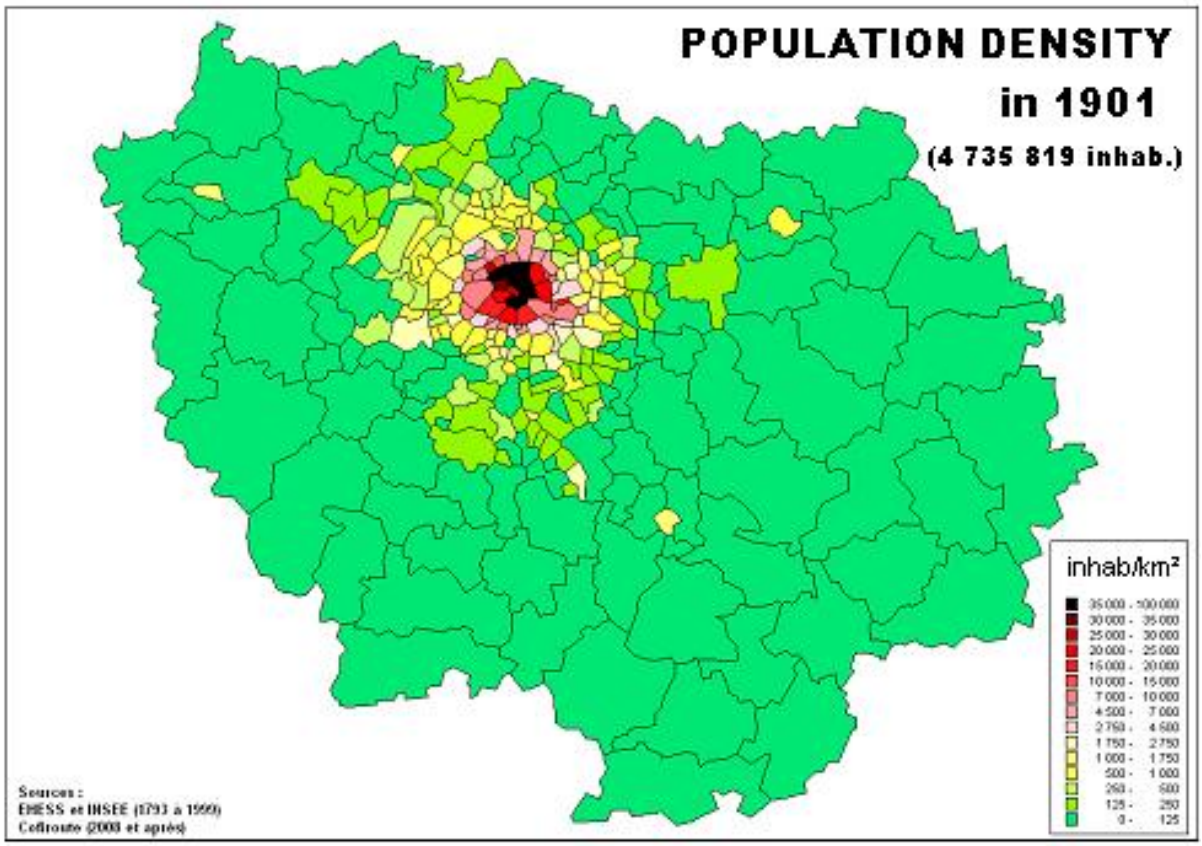

Figure 2 – Paris region population densities in 1901.

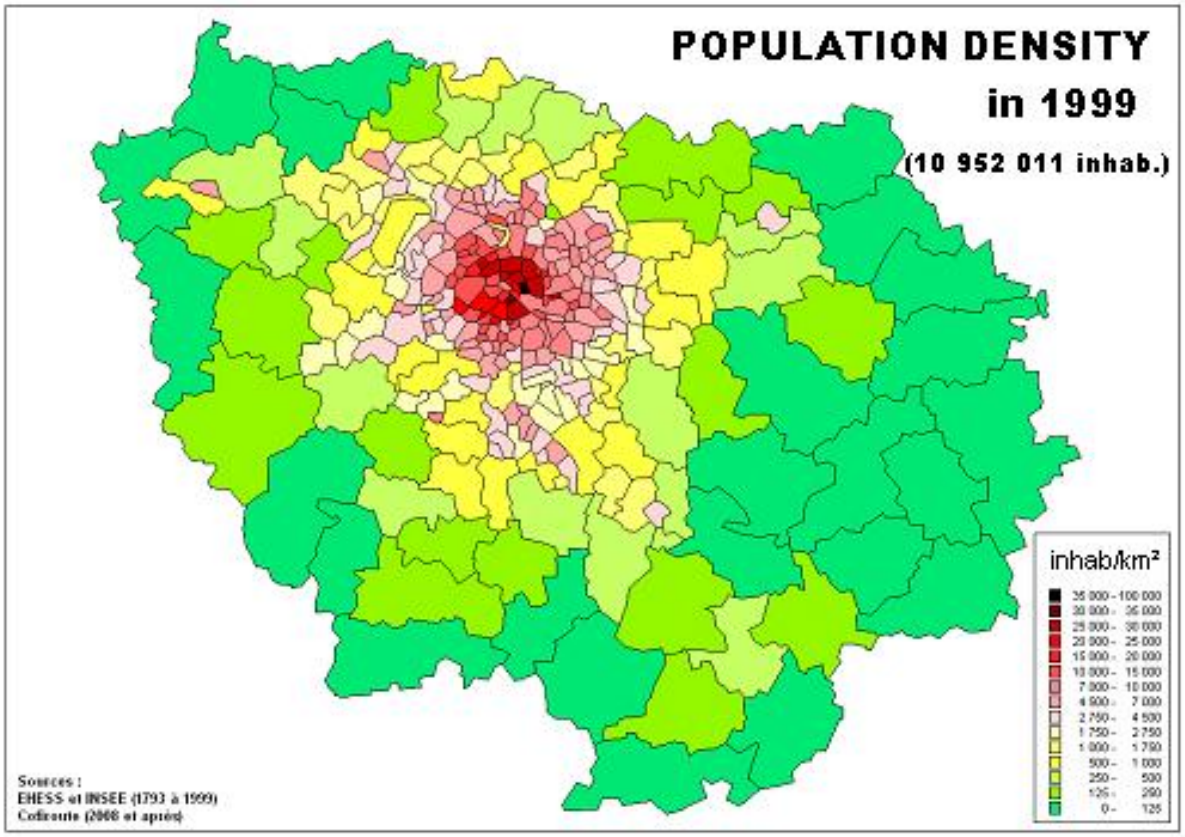

Figure 3 - Paris region population densities in 1999.

Table 1 – Population and employment densities of Paris region

Urban area	Area (km²)	Radius (km)	*Figures INSEE 1999*		
			Population density per km²	Jobs density per km²	Population and employment density per km²
Inner Paris	87	5	24 428	19 035	43 463
Inner suburbs	657	15	6 148	2 651	8 798
Outer suburbs	11 250	60	426	146	572
Total Region	***11 994***	***60***	***913***	***420***	1 334

The population growth has lead to an urban sprawl, and as shown Figure 4, the employment distribution has followed this population sprawl, however with higher densities within the core city.

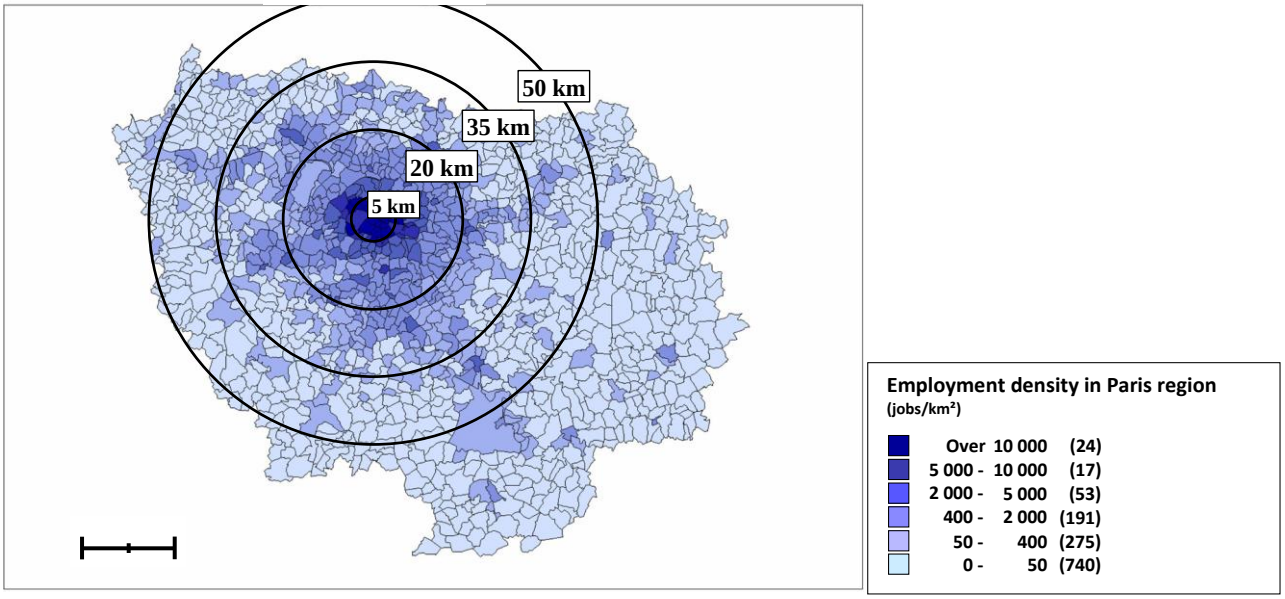

Figure 4 – Employment densities per municipalities within Paris region

(Census INSEE 1999)

This population and employment sprawl has resulted in a growth of transportation demand in terms of travelled distances, especially within the outer suburbs with poor rail mass transit services.

2. PARIS REGION MOBILITY STATISTICS

The following mobility figures are derived from global transport surveys performed for Paris region in 1976, 1983, 1991 and 2001.

According to the global transport surveys for 1976 and 2001, daily travelled distances have grew of 50% thus five times faster than the population of the region over the same period.

In terms of travelled distances for motorized modes, journeys within inner Paris have decreased of -3% whereas journeys within the suburbs have increased up to 120% in the case of journeys within the outer suburbs.

The number of trips has changed little between 1976 and 2001.
However, this masks an increase in the number of motorized trips, compared to non-motorized ones. In 2001, non-motorized modes account for 2 of 3 journeys and 96% of the total travelled distances (Table 2).
Detailing the different transportation modes, one can observe that travelled distances by rail public transit have grown of 30% whereas travelled distances by passenger cars have grown of about 75% on the whole region. On the same period, travelled distances by buses and coaches have grown of 20% and their modal share stays very small.

Table 2 – Paris region mobility statistics in 2001.

Global transport survey 2001		**Trips** (1,000 / day)			**Travelled distances** (1,000 pass.km / day)			**Range*** (km / trip)	**Trip time** (min / trip)
Mode†		**Total**	**%**	**Sub Total**	**Total**	**%**	**Sub Total**	**Average**	**Average**
Rail		4 593	14%	4 593	50 654	31%	50 654	11	50
Road	Bus			2 150			7 841	4	33
	PC+2WM	17 540	53%	15 390	107 467	65%	99 626	7	22
Cycling and walking		10 730	33%	10 730	7 304	4%	7 304	1	14
Total				**32 863**			**165 425**	**5**	**24**

(PC: Passenger car and taxi, 2WM: 2 Wheels Motorized)

In terms of modal share of travelled distances, the Table 3 points out very different situations between inner Paris and the suburbs. The modal share of the rail reaches 64% for trips between the outer suburbs and inner Paris. However, the road accounts for 94% of trips within the outer suburbs.

Table 3 – Modal shares in terms of travelled distances per link for motorized modes (Global transport survey 2001)

Link	**Road**		**Rail**	**Total Travelled distances**
	Bus	**PC & 2WM**		1,000 km
IP <-> IP	14%	31%	55%	9 185
IP <-> IS	3%	39%	58%	22 598
IP <-> OS	1%	35%	64%	26 893
IS <-> IS	10%	69%	21%	21 244
IS <-> OS	2%	72%	26%	30 654
OS <-> OS	6%	88%	6%	47 546

(IP: Inner Paris, IS: Inner suburbs, OS: outer suburbs,

PC: Passenger car and taxi, 2WM: 2 Wheels Motorized)

In terms of accessibility and mobility, Paris region has so far benefited from strong assets, known worldwide in international competition inside which the major great cities are involved. Thus, the "Global Cities Attractiveness Survey 2008", published by Ernst & Young in 2008 and conducted among economic policymakers around the world [2], puts Paris at the forefront of major European cities for its attractiveness related to transport infrastructures, before London and Berlin.

* Trip ranges correspond to distances as the crow flies. On average accurate travelled distances are longer from 30% to 40%.
† Main transport modes according to categories from the global transport survey from 2001.

To this end, Paris region mobility statistics can be analyzed, especially in terms of commuting trips, leading to mandatory and time constraint journeys which are often the result of arbitration for more square meters for suburbs inhabitants and sizing for transport infrastructure planning.

3. INCREASING HARDSHIP FOR HOME-TO-WORK JOURNEYS

The performance level of transport infrastructures of a territory has a direct effect on its economic attractiveness. The diversity and rapidity of connections between economic stakeholders – working population, companies, consumers - directly affect the level of production achieved. Thus, an effective regional transportation system limits the lost of time and productivity for employees when getting to the workplace, or it expands job opportunities for unemployed people, and business opportunities for a company.

Few investments have been made over recent decades in transport infrastructures in Paris region. Since about 10 years, the only road commissioning was the Duplex A86 allowing the closure of the second ring of Paris region with a 10 km tunnel financed by toll. Regarding the rail network (Transilien, RER and Metro), the last significant investments were also done some decades ago. This lack of significant investments in transport infrastructures may explain why the existing supply is not able to meet the current demand in good conditions.
Transportation networks of the region have reached their capacity and it implies daily hard situations, especially for commuters and a lost of competitiveness.

Main figures for home-to-work journeys are summarized in the Table 4.

Table 4 - Paris region mobility statistics for home-to-work journeys in 2001

Global transport survey 2001 *Home-to-work*		**Trips** (1,000 / day)			**Travelled distances** (1,000 pass.km / day)			**Range** (km / trip)	**Trip time** (min / trip)
Mode		**Total**	**%**	**Sub Total**	**Total**	**%**	**Sub Total**	**Average**	**Average**
Rail		2 088	30%	2 088	28 723	43%	28 723	14	56
Road	Bus	4 036	59%	422	36 902	56%	1 857	4	38
	PC+2WM			3 614			35 045	10	29
Cycling and walking		726	11%	726	771	1%	771	1	14
Total				**6 849**			**66 397**	**10**	**36**

(PC: Passenger car and taxi, 2WM: 2 Wheels Motorized)

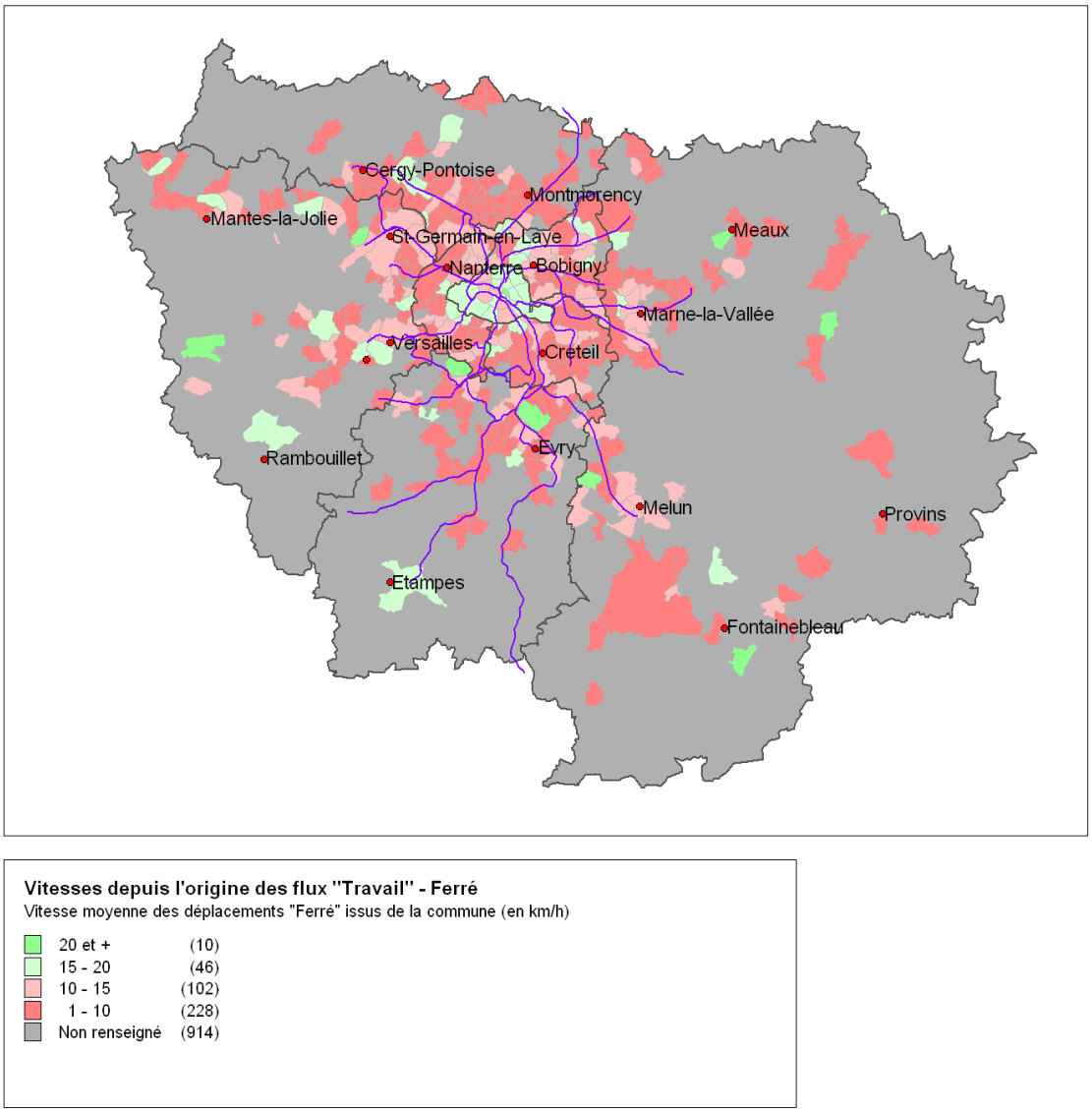

Figure 5 – Average speeds for rail modes per municipality as origin of journeys, for home-to-work journeys – Global transport survey 2001

Regarding home-to-work journeys, it comes from global transport survey 2001 that motorized modes account for about 90% of trips and 99% of travelled distances. Non-motorized modes seems dedicated to a very local use with an average range of one kilometre.

Trip ranges are large and respectively of 14 kilometres for rail mass transit, and 10 kilometres for passenger cars. Same kind of findings can be observed for trip times. Trips by passenger car are 30 minutes long on average, and trips by rail mass transit are about 60 minutes long on average. Home-to-work journeys account for 40% of daily travelled distances thus they are compulsory long and arduous journeys because of an average of more than 1 hour per day (round trip).

These latter results hide the fact that many Paris region inhabitants spend at least 2 hours per day in transportation to get to and from work. Indeed, 25% of home-to-work journeys (with motorized mode) have a trip time over 60 minutes. In addition, the number of such journeys has increased of 40% since 1976.

The speeds for home – work journeys are represented by municipalities as origin in Figure 5 for rail modes and in Figure 6 for road modes. They can explain choices on the used transportation mode according to the residential area, largely in favour of road modes within the suburbs. These figures also give an insight on the hardship of travelling by rail modes for workers living within in the outer suburbs towards workplaces also located within the outer suburbs.

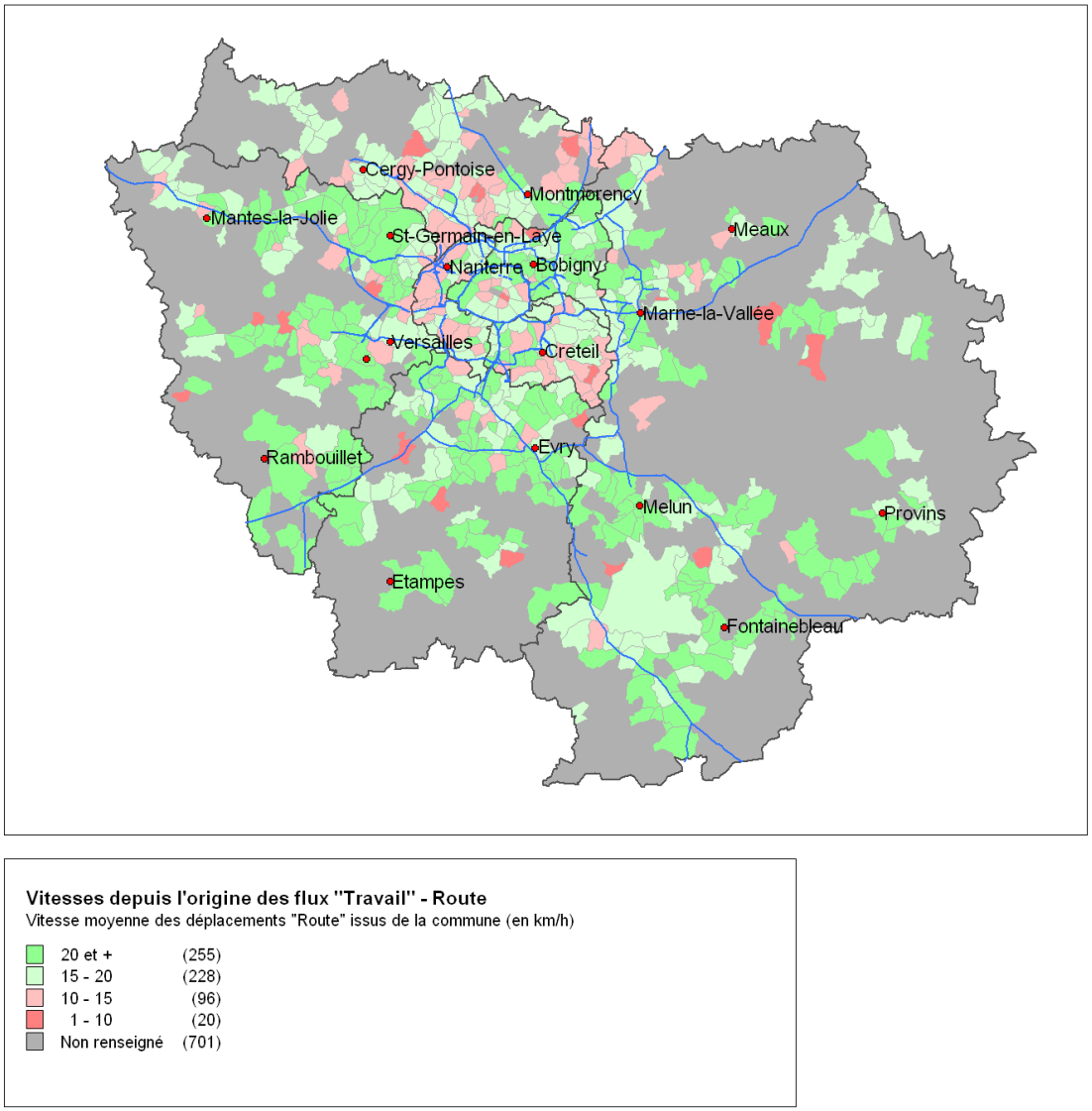

Figure 6 - Average speeds for road modes per municipality as origin of journeys, for home-to-work journeys – Global transport survey 2001

4. TRANSPORTATION DEVELOPMENT PROJECTS FOR PARIS REGION

To address the dual problem of an efficient transportation system and the economic development, a regional plan was developed and ambitious rail transit projects have been put under public discussion in 2010.

In total, 32.4 billion will be raised by 2025 to achieve the program of modernization and development of public transport in Paris region (Figure 7).
This long-term programme can be decomposed into two sets:

- 20.5 billion euros for the construction of an inter-suburban ring metro
- 11.9 billion euros for the modernization of existing transport networks.

After its completion, the proposed inter-suburban ring metro could be composed of three automatic metro lines, for a total of 175 km (double loop) around Paris and 57 new stations (Figure 7). It is expected that 44 of these 57 stations are in correspondence with the network of existing or forthcoming public transportation and 7 stations are in correspondence with the high-speed network. The objective of this project is to link economic districts existing or emerging in Paris region.

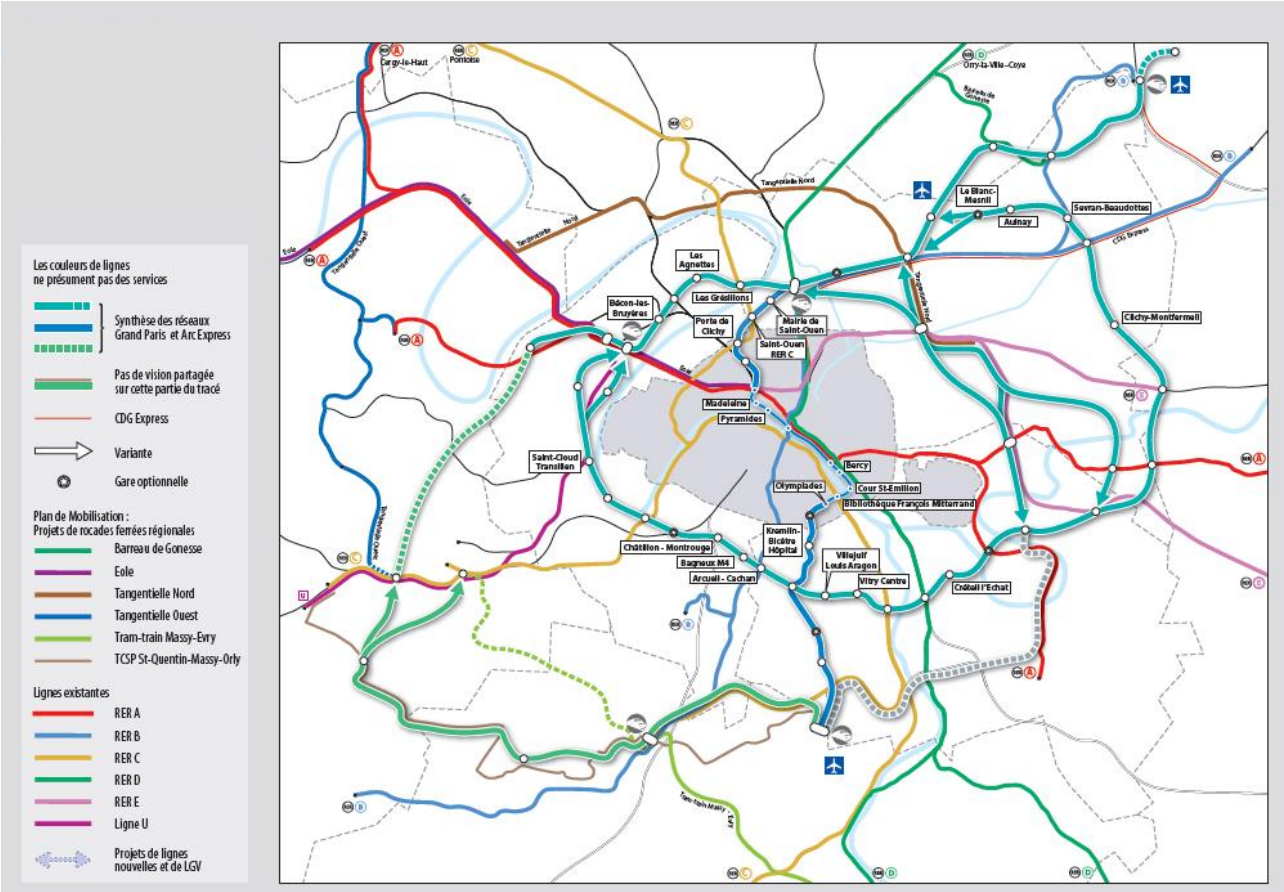

Figure 7 - Development projects of the mass transit network in Paris region and existing lines

5. VIEWPOINT ON PROMISING MOBILITY OUTLOOKS FOR PARIS REGION

According to their authors, the projected attendance for the new sections of the inter-suburban ring metro is 2 million passengers per day upon completion. It was estimated that 85% of the attendance of these sections would come from passengers rerouting within the public transport network, thus meeting the objective to relieve existing lines from congestion.

Regarding short range journeys, especially for leisure, shopping and school, individual public transports, meaning for instance shared cycling, meet a major success and provide a solution for highly urbanized areas characterized by a high density of services. As such, on can evoke “ Vélib’ ”, which is the shared cycling service of Paris city.

Regarding long and medium range journeys, and especially home-to-work journeys, one should initiate complementary actions to improve mobility in areas not served by rail modes. This will require rethinking the role of the road in the suburbs, and identify

solutions to implement to maximize the capacity of road infrastructures in terms of passengers flow.

For example, these initiatives could draw on good practices on road mass transit observed in Madrid*, or on what is done in the United States to optimize road capacity, namely the implementation of High Occupancy Toll lanes, free for high-occupancy vehicles (bus, carpool) and funded by individual modes whose attendance is regulated through appropriate pricing.

REFERENCES

1. La population des régions en 2040, INSEE, 2010.
2. Global cities' attractiveness survey 2008, Paris et ses principales concurrentes européennes dans la compétition mondiale, Ernst & Young et CSA, 2008