International Transport Forum

OECD

Zero Car Growth ? Managing Urban Traffic

ITF Roundtable – 16-17 December, 2019, Paris

Car and Space Consumption: Rethinking the Regulation of Urban Mobility

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Road Speed and Time Losses

Cities	Annual time losses for car users (hours)	Road speed for the last mile (m/h)
Paris	237	8
Brussels	195	7
London	227	7
Rome	254	8
Milan	226	8
Dublin	246	6
Bordeaux	223	7

Source: INRIX, report 2018

CONTENT

- **1) Car and road congestion:**
  a microscopic approach

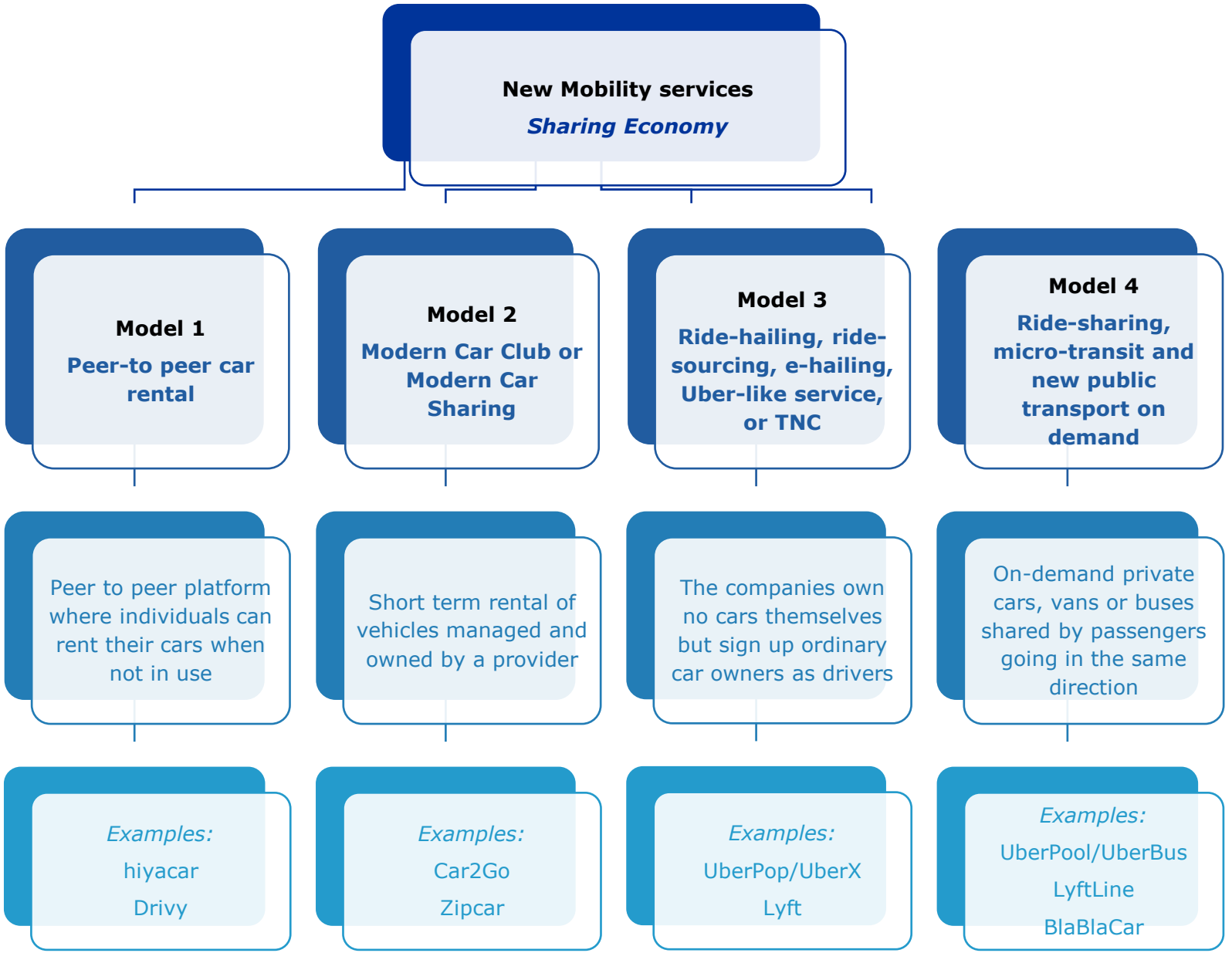
- **2) Car, accessibility and land use:**
  a macroscopic approach

- **3) Regulation of urban mobility:**
  toward coherent policy packages

The promises of shared mobility…

- Time and monetary gains, thanks to the development of platforms and new apps on smartphones.
- Toward a radical transformation: i.e. a shared use of cars and finally less car owners?
- A systematic sharing of connected and autonomous vehicles could greatly reduce congestion, pollution and even travel time.
- See the studies conducted by the International Transport Forum in Lisbon, Helsinki or Dublin (Viegas and Martinez, 2016, 2017)

New mobility services and road traffic



From time gains to space consumption…

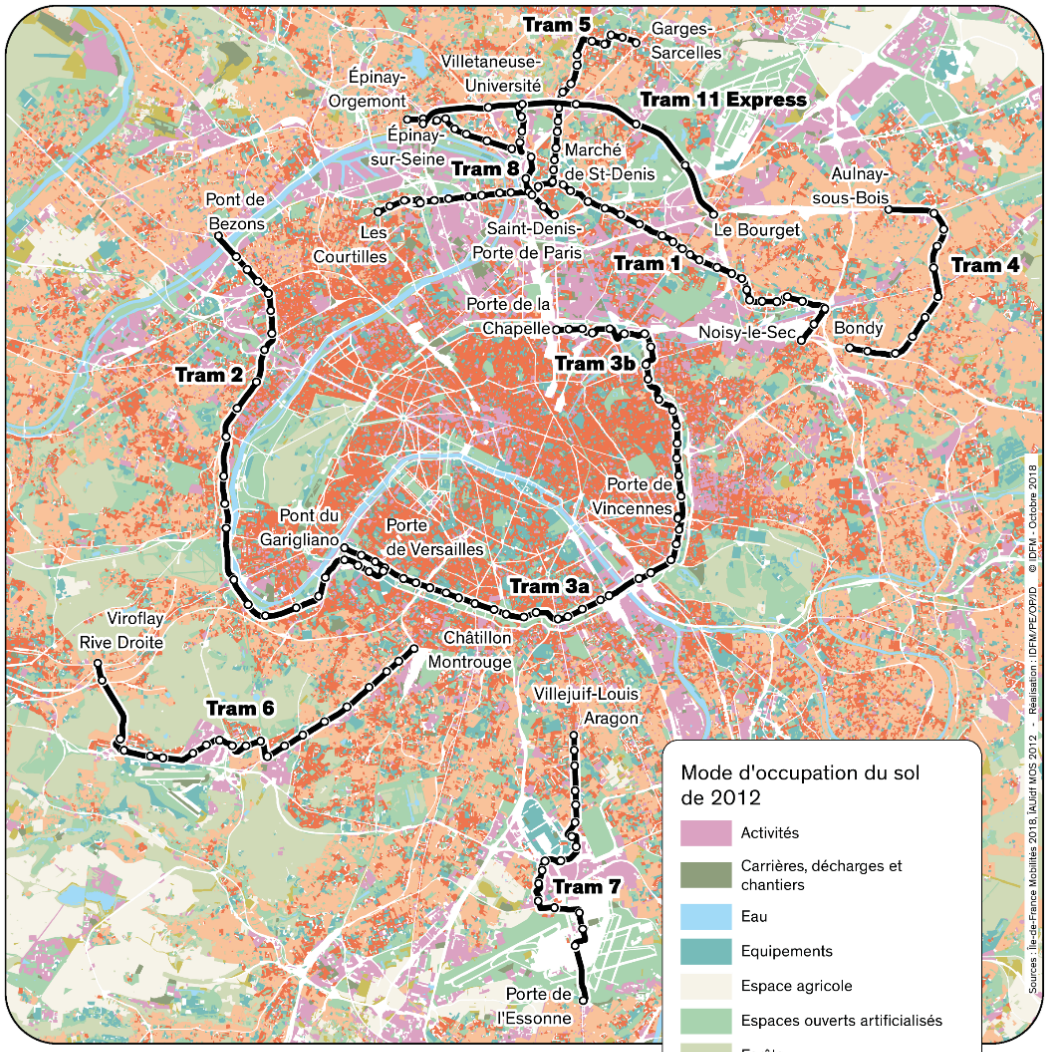
- A car is a car. Whatever the car, the consumption of space is the same. Private vehicle = taxi = a car rented from a peer (Model 1) = car sharing scheme (Model 2) = ride-hailing service (Model 3).
- A reduction in congestion, pollution and CO_2 emissions is possible **only if** there is a large switch from solo trips to ride-sharing (Model 4)
- Until now, the volume of ride-sharing (model 4) is too small to compensate the negative impacts of the development of ride-hailing (model 3).
- UBER and LYFT seem to be responsible of a higher degree of congestion in some American cities (Schaller 2018).
- In the USA, ride-hailing takes passengers away from public transport.

Compared Space-Time Consumption

	m^2.h/veh km	Occupation rate	m^2.h/traveler km	Difference / pedestrian
Pedestrian	0,3	1	0,3	1
Cyclist	0,6	1	0,6	2
Two-wheeled motor vehicles	1,7	1,05	1,6	5
Cars	1,8	1,3	1,4	5
Bus (12 m)	7	17	0,3	1,4
in peak hour	7	50	0,15	0,5
Articulated bus (18 m)	10	23	0,3	1,4
in peak hour	10	70	0,15	0,5

Paris: light rail and traffic calming

Source : Christophe Belin/Mairie de Paris



Le réseau de tramway en Île-de-France en 2017

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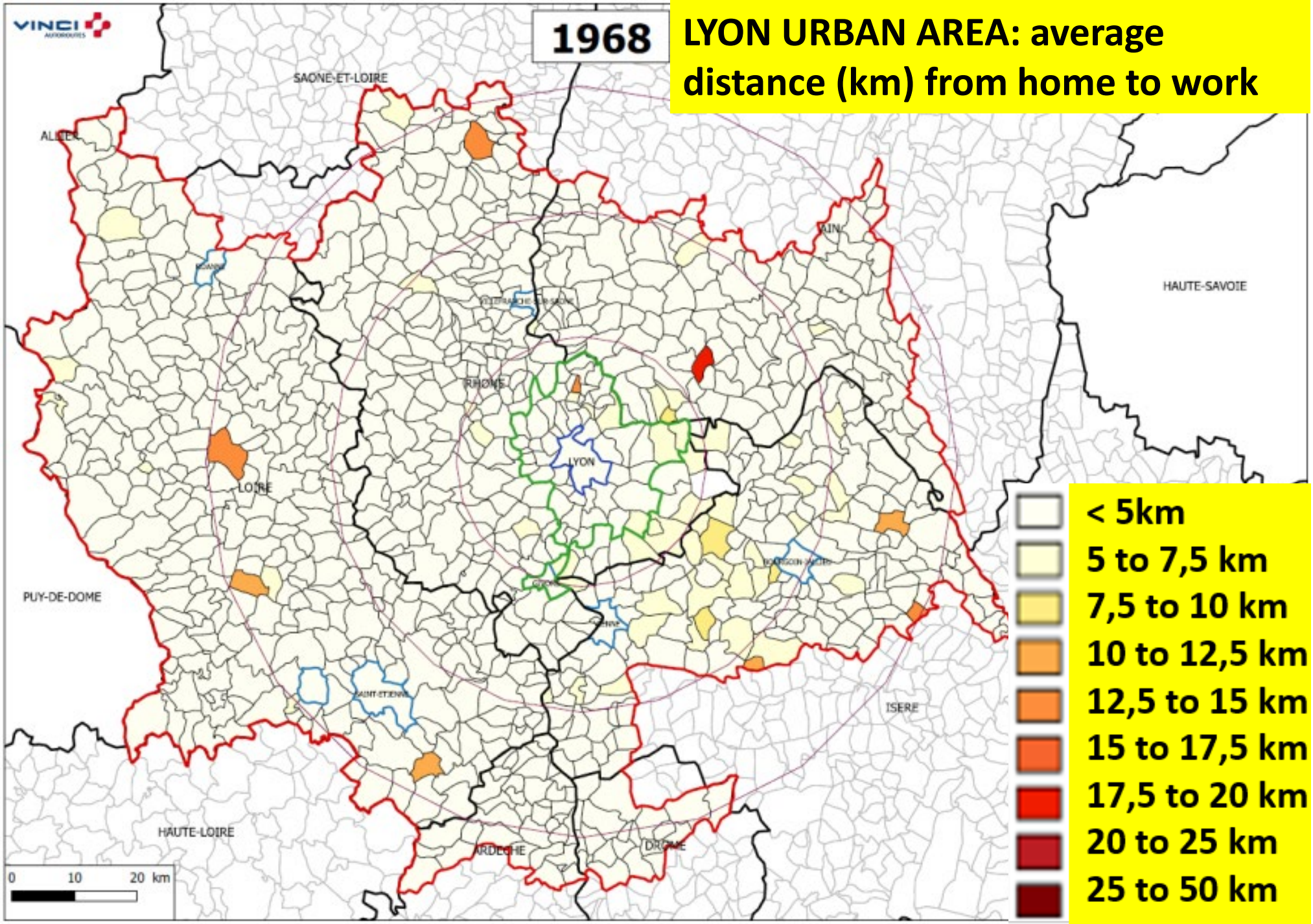
Accessibility at point ***i*** to a particular type of activity at points ***j*** is directly proportional to the size of the activity at points ***J*** and inversely proportional to a function of the distance separating the two points (Hansen 1959)

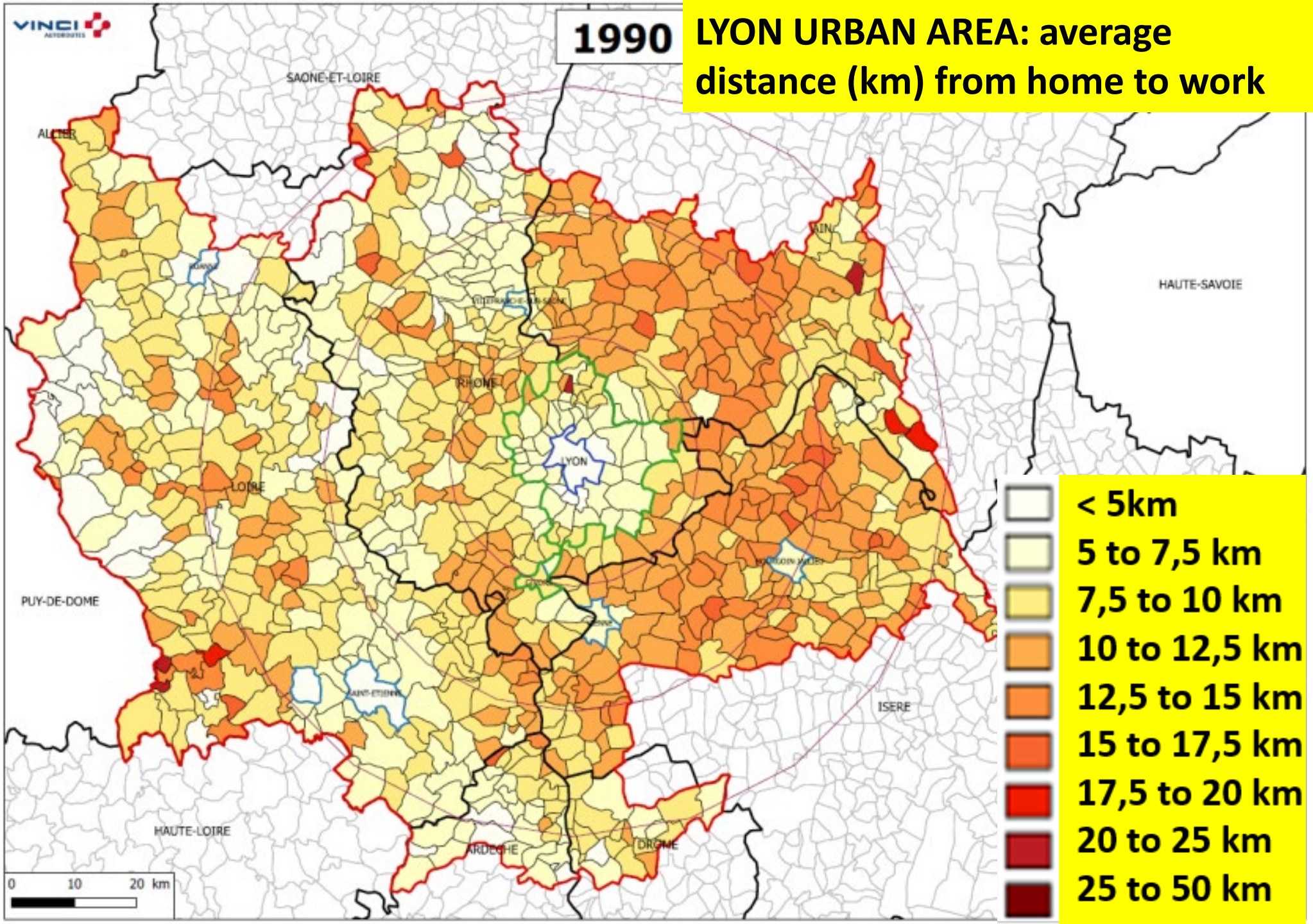
$$A_i = \sum_j D_j \; f(c_{ij})$$

with

- A_i = Accessibility to destinations D_j from point ***i***
- D_j = Activity destinations at points ***j***
- C_{ij} = Generalized cost (time, price…)

- Two ways to improve accessibility, density (D_j) or cost (C_{ij})


1968
LYON URBAN AREA: average distance (km) from home to work
SAONE-ET-LOIRE
AIN
HAUTE-SAVOIE
RHONE
LYON
LOIRE
PUY-DE-DOME
ISERE
HAUTE-LOIRE
ARDECHE
DROME
0 10 20 km
< 5km
5 to 7,5 km
7,5 to 10 km
10 to 12,5 km
12,5 to 15 km
15 to 17,5 km
17,5 to 20 km
20 to 25 km
25 to 50 km


1990
LYON URBAN AREA: average distance (km) from home to work
SAONE-ET-LOIRE
ALLIER
AIN
HAUTE-SAVOIE
RHONE
LYON
LOIRE
PUY-DE-DOME
ISERE
HAUTE-LOIRE
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DROME
0 10 20 km
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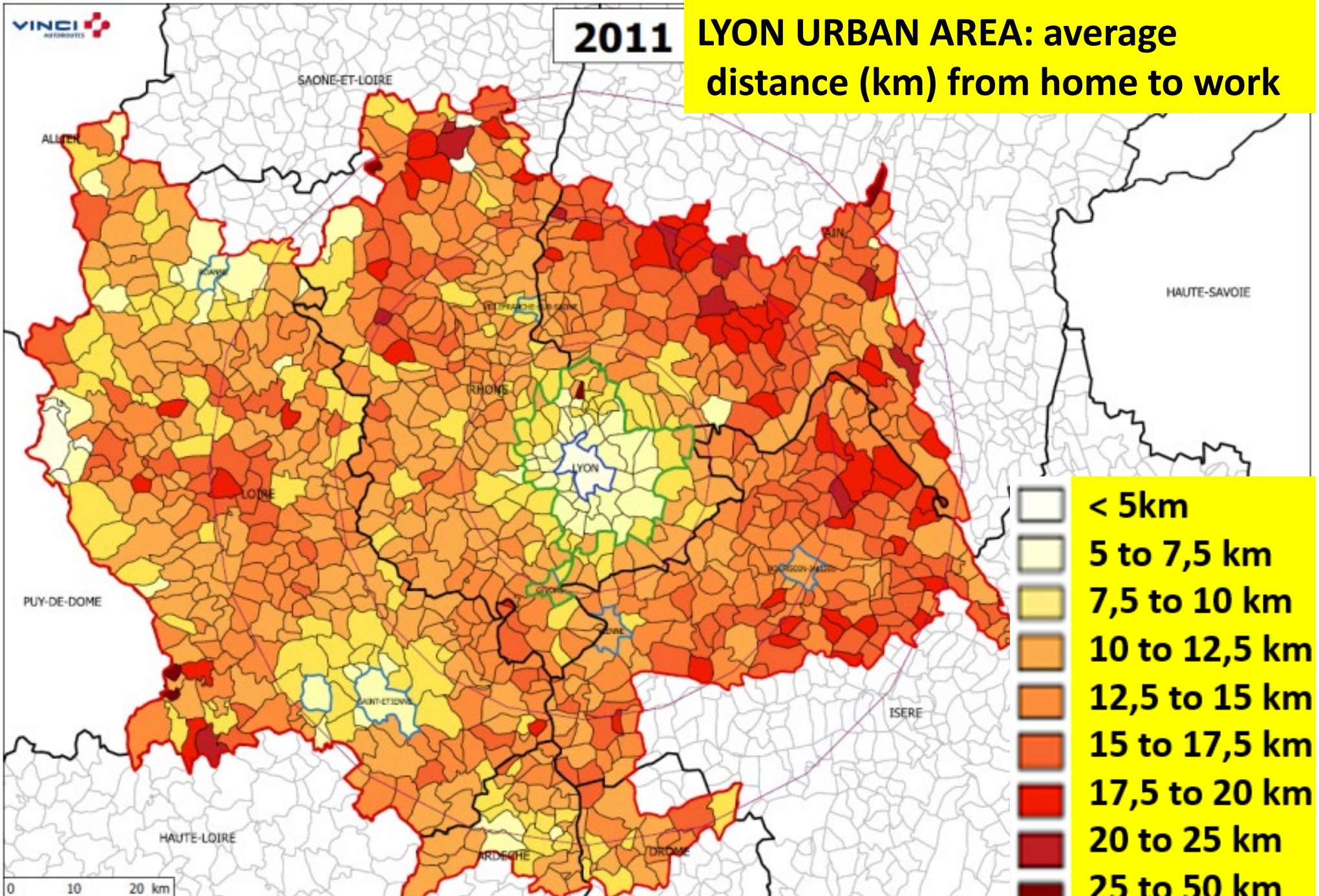
2011
LYON URBAN AREA: average distance (km) from home to work
SAONE-ET-LOIRE
ALLIER
AIN
HAUTE-SAVOIE
RHONE
LYON
LOIRE
PUY-DE-DOME
ISERE
HAUTE-LOIRE
ARDECHE
DROME
0 10 20 km
< 5km
5 to 7,5 km
7,5 to 10 km
10 to 12,5 km
12,5 to 15 km
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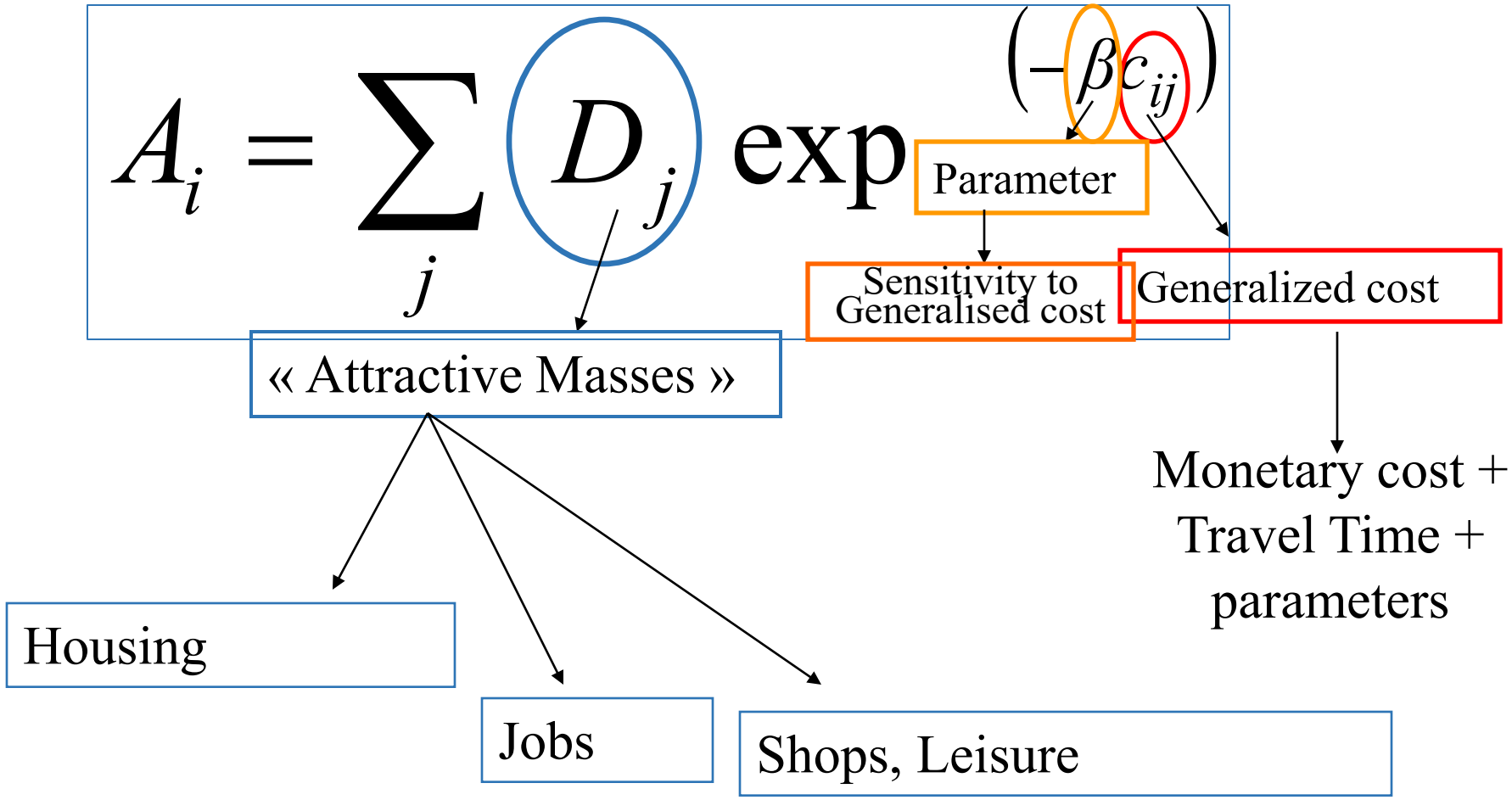
17,5 to 20 km
20 to 25 km
25 to 50 km

« Accessibility turn », what does it mean?



The components of the “accessibility turn”…

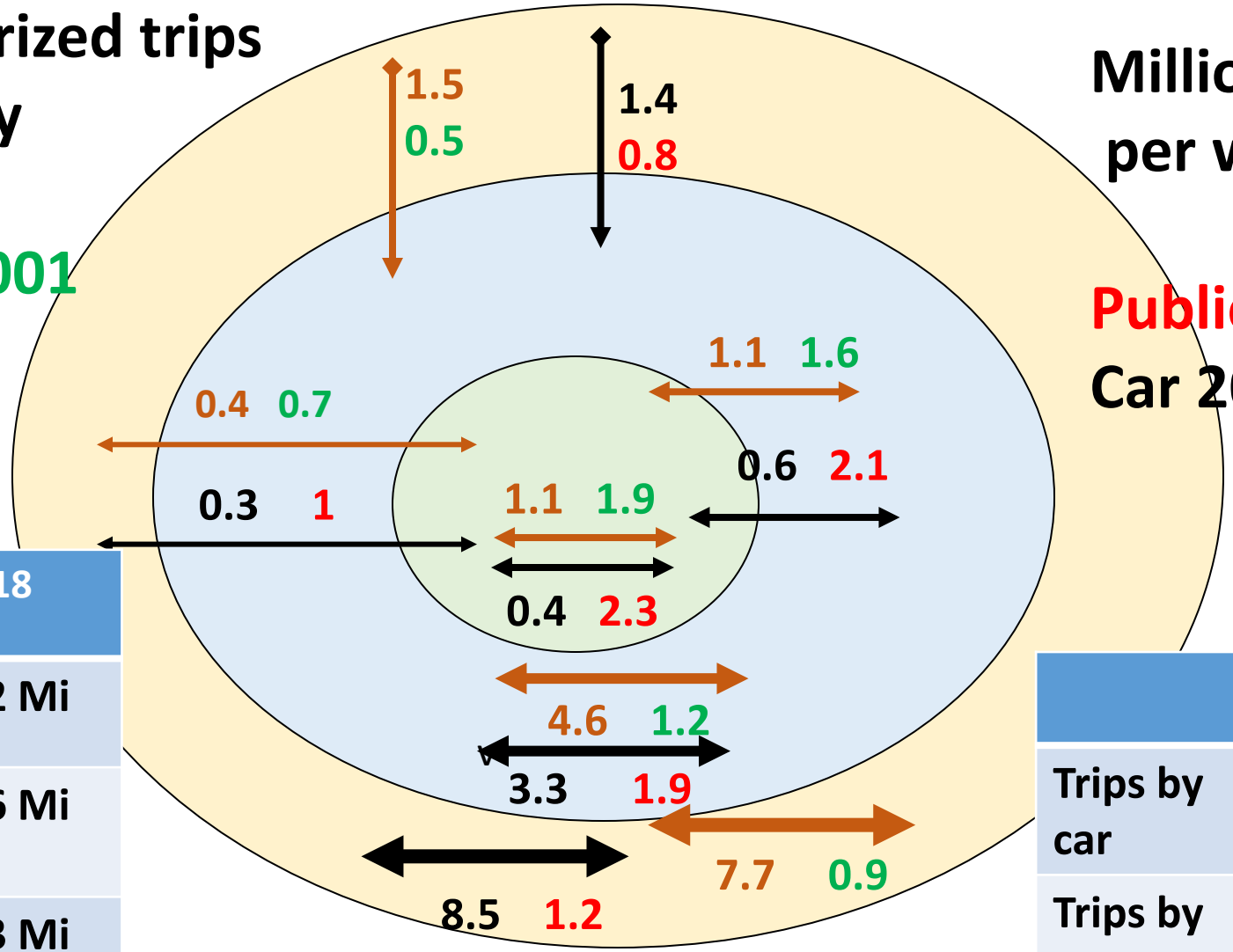
- The first component of the accessibility turn appears when accessibility gains are researched by the development of public transit supply instead of road building or enlargement
- A second component of accessibility emerges when land use issues are taken into account to promote proximity and density, in relation with the development of public transit (TOD), not only in the city centre, but also in the peripheries
- Other components ???

Zero car growth in Paris Region thanks to the development of PT?

Million of motorized trips per working day

Public Transit 2001

Car 2001



Million of motorized trips per working day

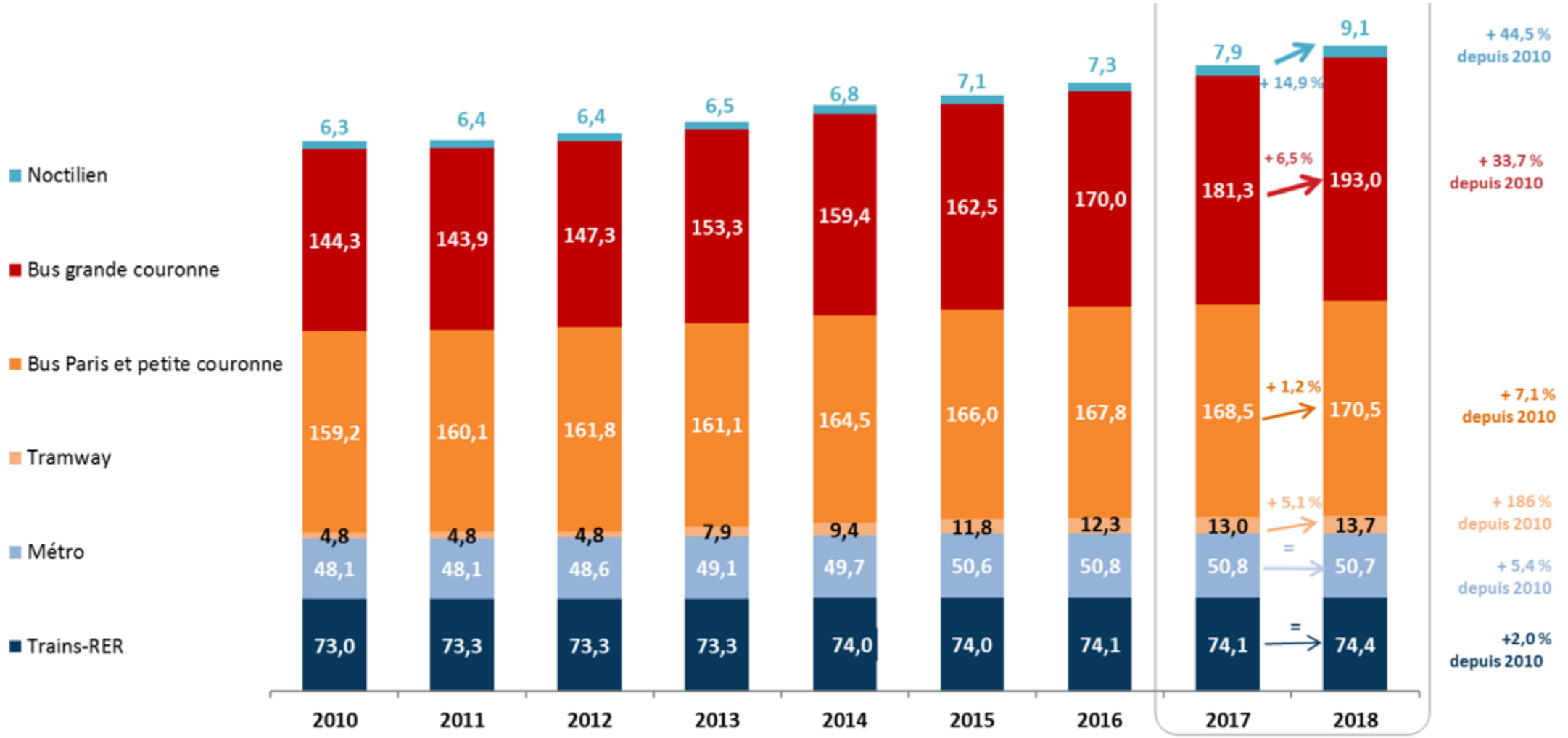
Public Transit 2018

Car 2018

	2001	2018
Paris	2.2 Mi	2.2 Mi
First Ring	4 Mi	4.6 Mi
Second Ring	4.8 Mi	5.3 Mi

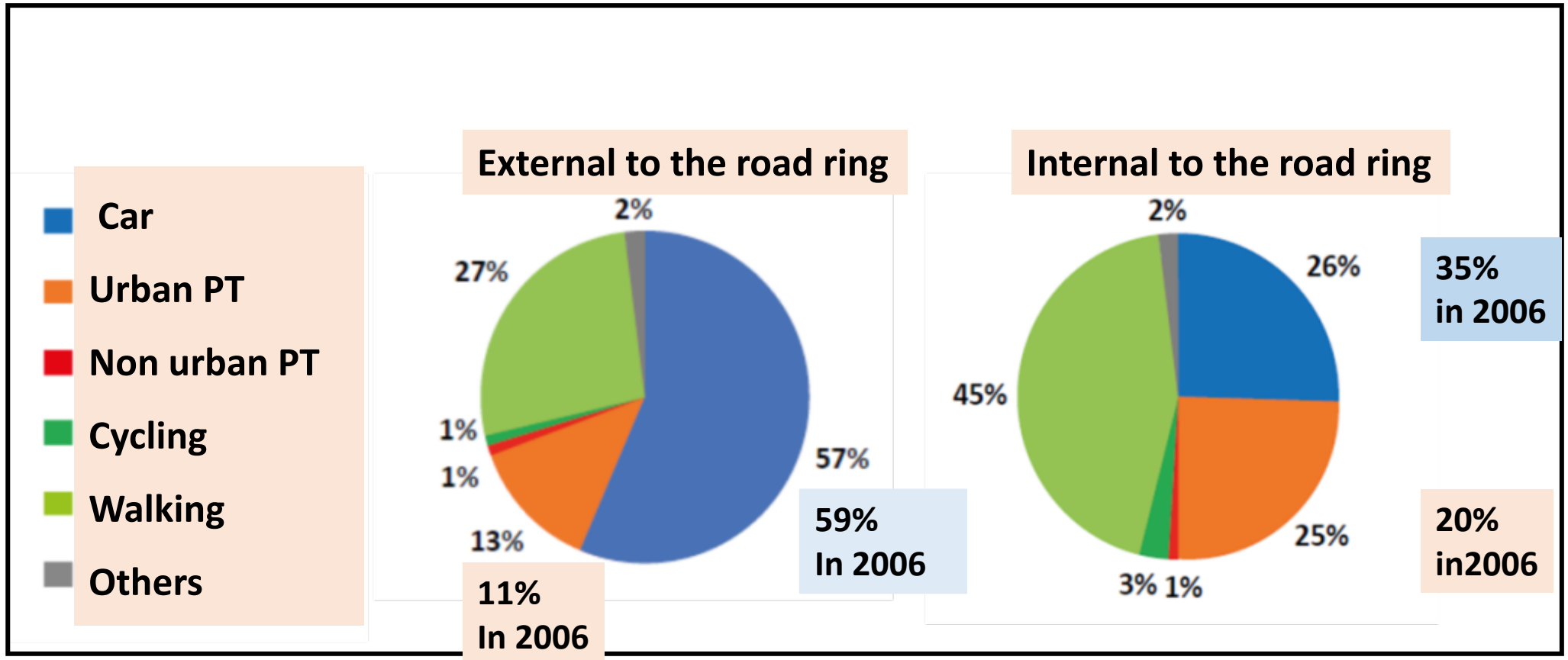
	2001	2018
Trips by car	16.4 Mi	14.5 Mi
Trips by PT	7.8 Mi	9.3 Mi

Public Transit supply in Paris Region (in vehicle-km)

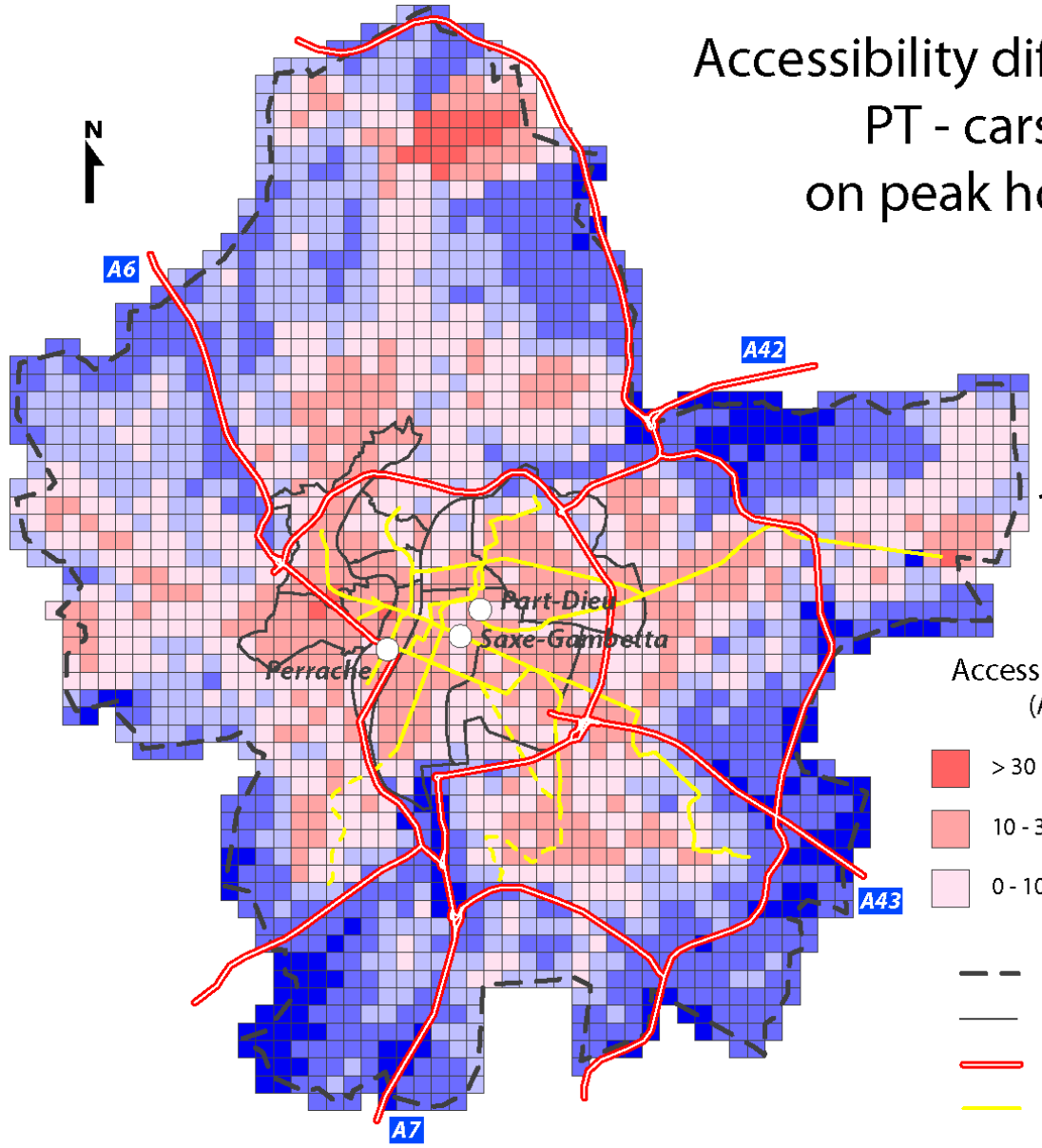


Source : Île-de-France Mobilités, 2019

Lyon Metropolitan area, daily trips in 2015



Accessibility difference PT - cars on peak hour



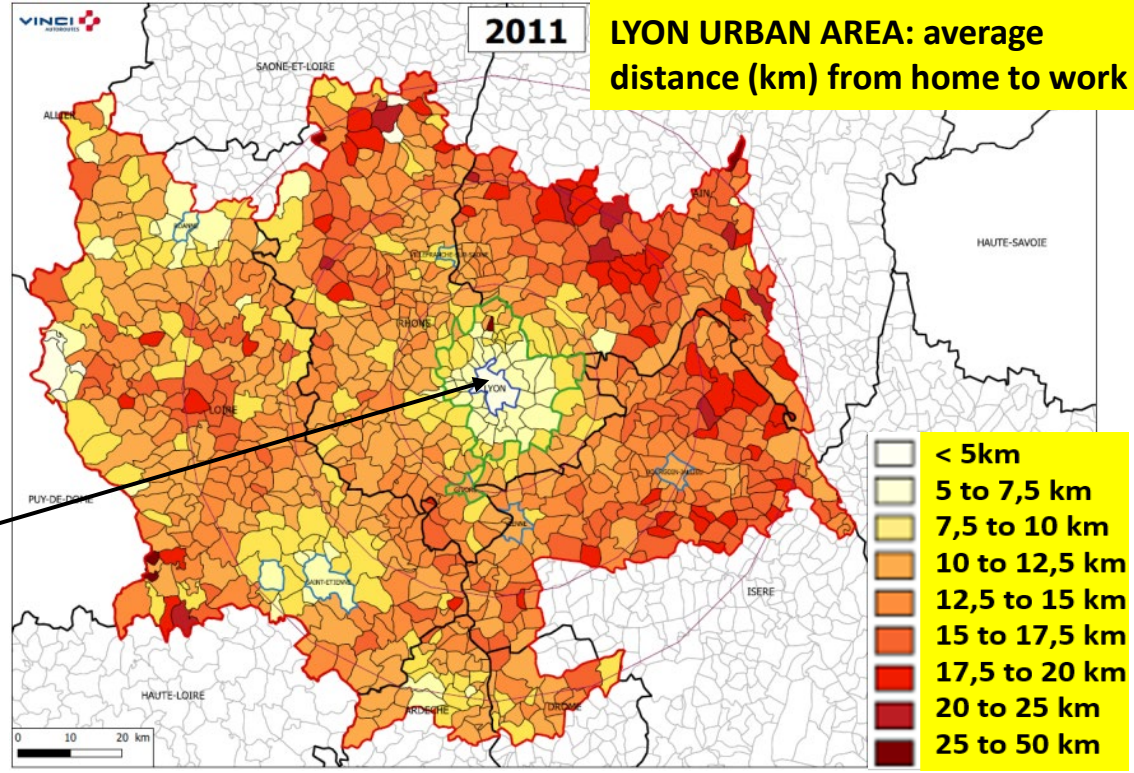
Accessibility difference
(Ai TC- Ai VP)

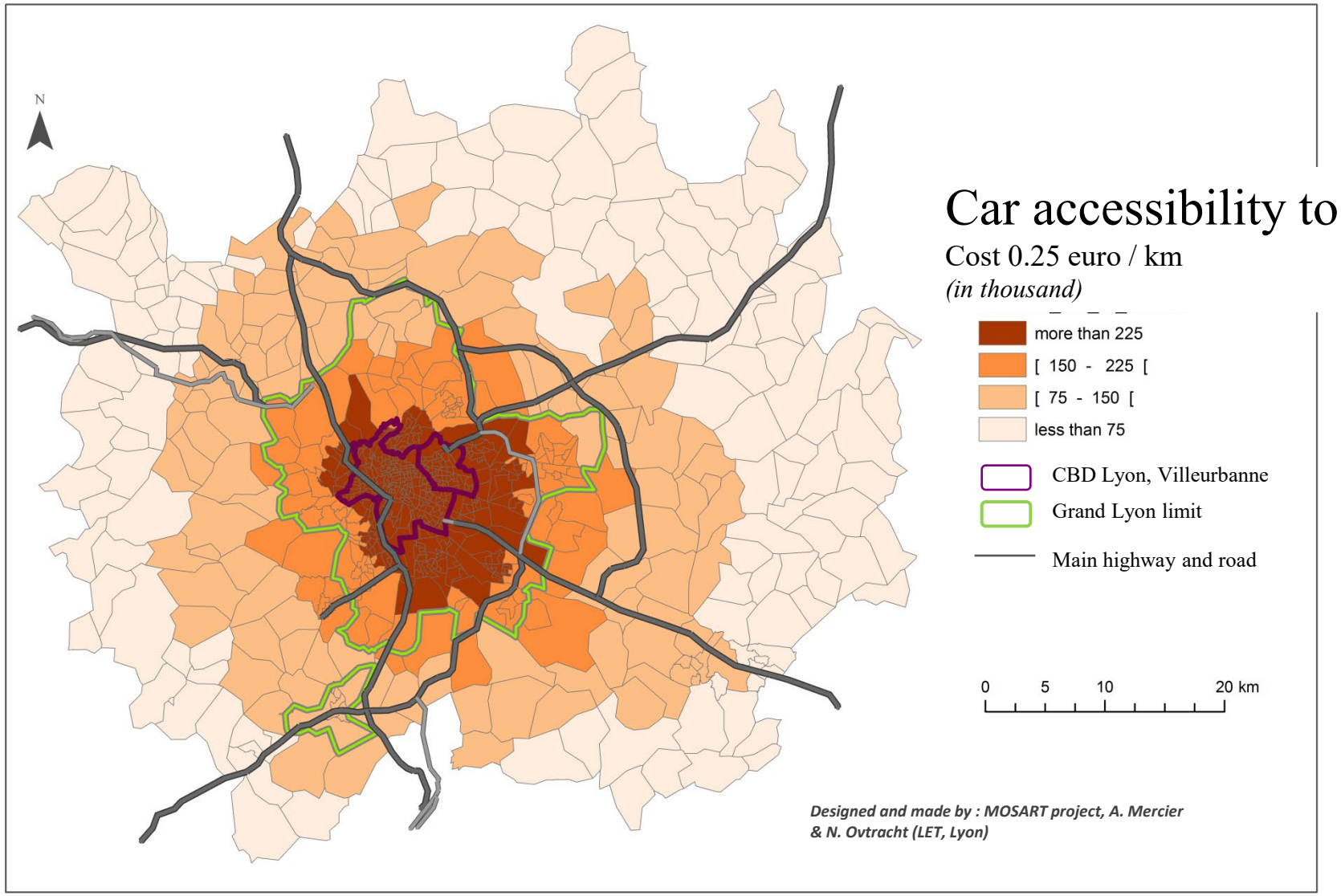
> 30	-10 - 0
10 - 30	-30 -10
0 - 10	< -30

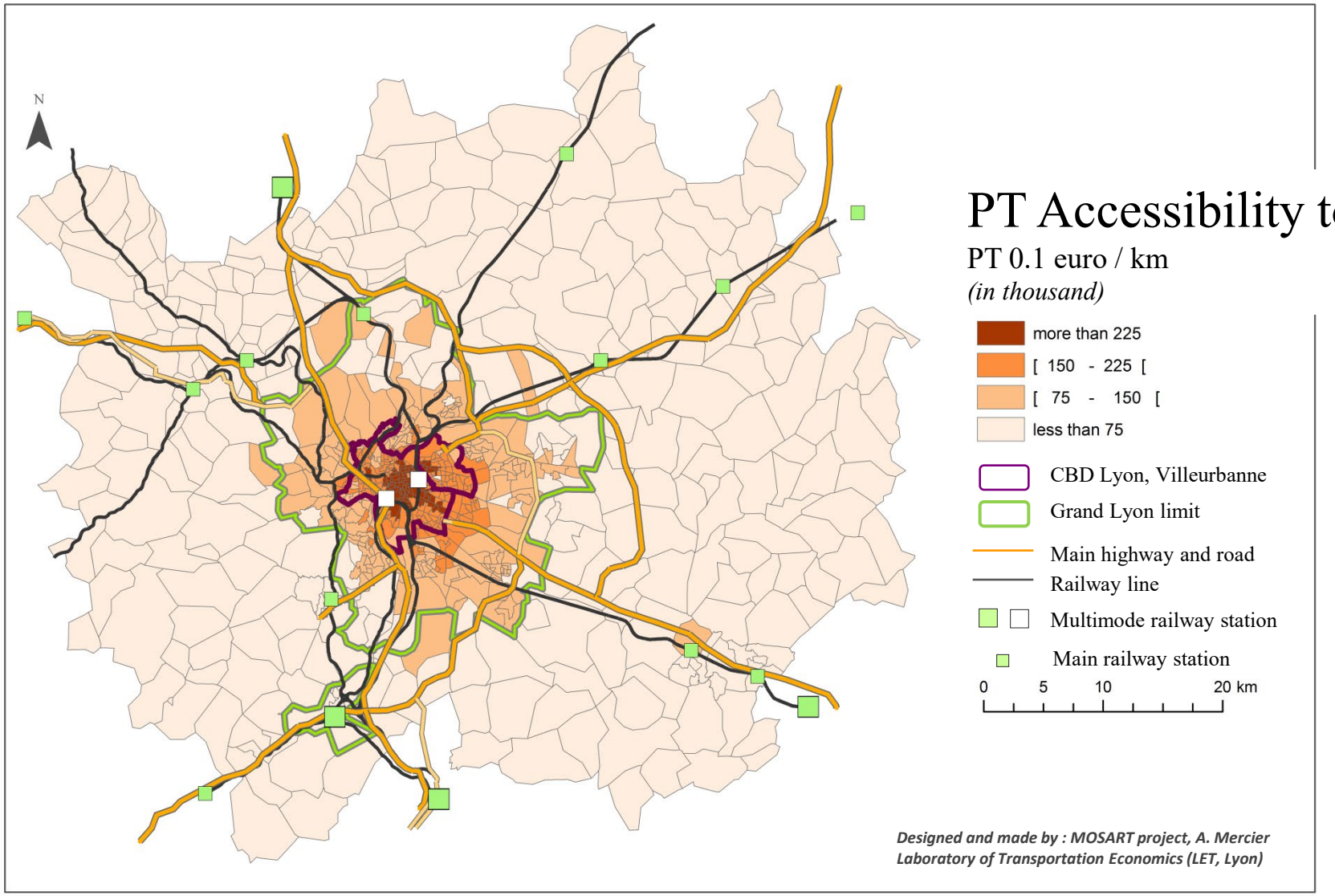
Grand Lyon 2006 limit
Lyon-Villeurbanne limit
Highway
Right of way network

0 5 10 km

Realisation : N. Ovtracht, V. Thiébaut - UMR LET CNRS




N
Car accessibility to jobs
Cost 0.25 euro / km
(in thousand)
more than 225
[150 - 225 [
[75 - 150 [
less than 75
CBD Lyon, Villeurbanne
Grand Lyon limit
Main highway and road
0
5
10
20 km
Designed and made by : MOSART project, A. Mercier
& N. Ovtracht (LET, Lyon)


N
PT Accessibility to jobs
PT 0.1 euro / km
(in thousand)
more than 225
[150 - 225 [
[75 - 150 [
less than 75
CBD Lyon, Villeurbanne
Grand Lyon limit
Main highway and road
Railway line
Multimode railway station
Main railway station
0 5 10 20 km
Designed and made by : MOSART project, A. Mercier
Laboratory of Transportation Economics (LET, Lyon)

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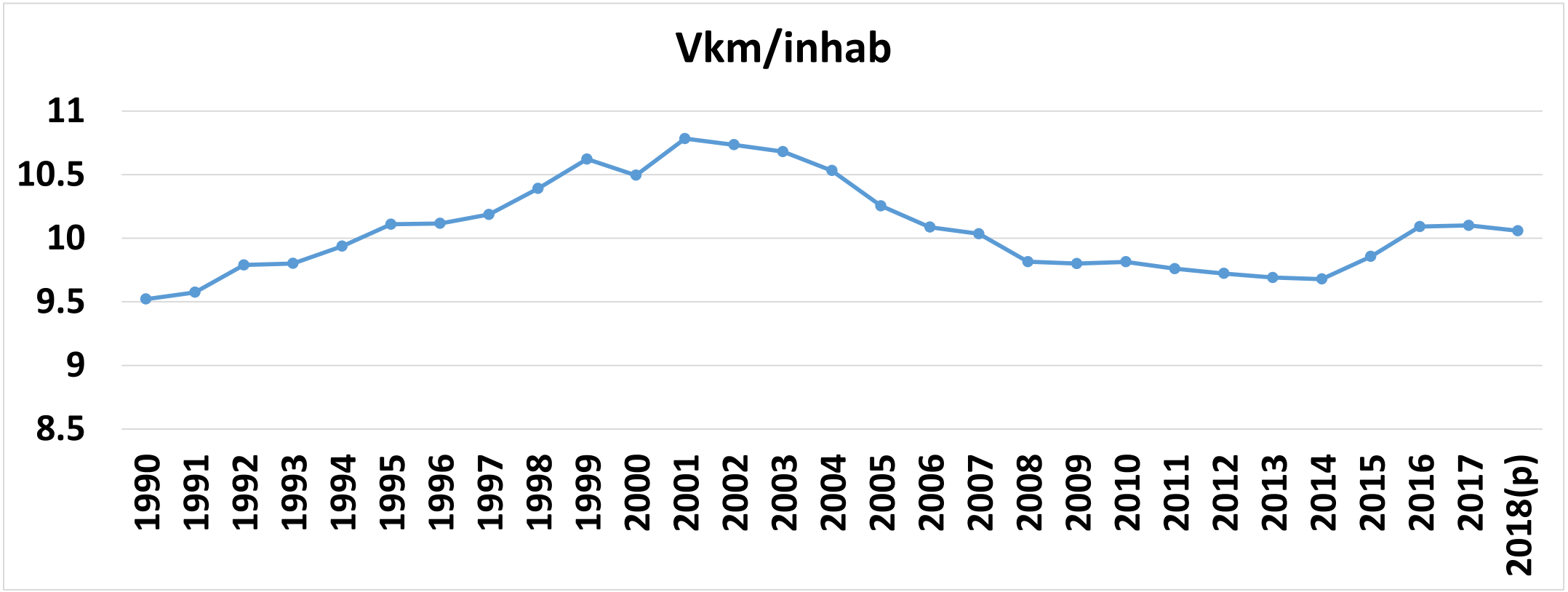
From the “peak-car” to a “bumpy plateau”



Source: French Ministry of Transport

Daily distances and travel times for different locations in France (2008)

	City centres		Suburbs and peripheries		Small towns		Rural areas	
	Travel time (min.)	Distance (km)	Travel time (min.)	Distance (km)	Travel time (min.)	Distance (km)	Travel time (min.)	Distance (km)
Mean value	61.5	17.8	62	23,2	52	26.2	50.7	31.2
Median value	53.6	11.5	53.6	16.6	42.4	16.7	42.9	23
1st quartile	28.1	4.6	28.1	6.5	21.4	5.5	20	7.9
3rd quartile	85.7	22.6	85.7	32.7	72.9	37.5	71.1	45.3
Ratio 3rd q./ 1st q	3.04	4.91	3.04	5.03	3.40	6.81	3.55	5.73

Source: Y. Crozet 2016 p.33

Policy Packages: what is at stake?

- Car and auto-mobility remain at a high level in the peripheries of big cities and in rural areas
- But the attractiveness of car mobility is declining, especially in dense and multifunctional areas
- Public authorities have to give the good incentives in different domains
  - Road and traffic management (size of the road network, speed, urban toll)
  - Development of efficient public transit services
  - Development of new mobility services and shared mobility
  - Land use management
- Unified public authorities can improve the regulation of urban mobility by proposing coherent policy packages

Scarcity of times vs scarcity of space

- Travel time is important, but public authorities have not to be only focused on time gains
- If time is the rarest resource for individual, space is the rarest resource for urban public authorities (and money too)
- The scarcity of space is leading to a stronger regulation of the uses of public spaces, namely roads
- The development of ride-sharing is an interesting option
- But encouraging the development of ride-sharing will require limiting access to roads for vehicles transporting one person only.

The third accessibility turn: a single “mobility and land use authority”?

- The regulation of urban mobility is generally fragmented.
- At the urban area level, there is **a variety of public authorities (PAs) involved in mobility:** municipalities, transport authority (MTA), region, etc.
- Most often, the PAs in charge of road (maintenance and traffic management) are not the same as the PTA in charge of public transport and not the same as the land use authority
- **The regulation of urban mobility must be unified and integrated in order to** take into account the complex interactions between land-use and transport, social conditions and environmental issues.

Mobility and modal split: city centres and peripheries

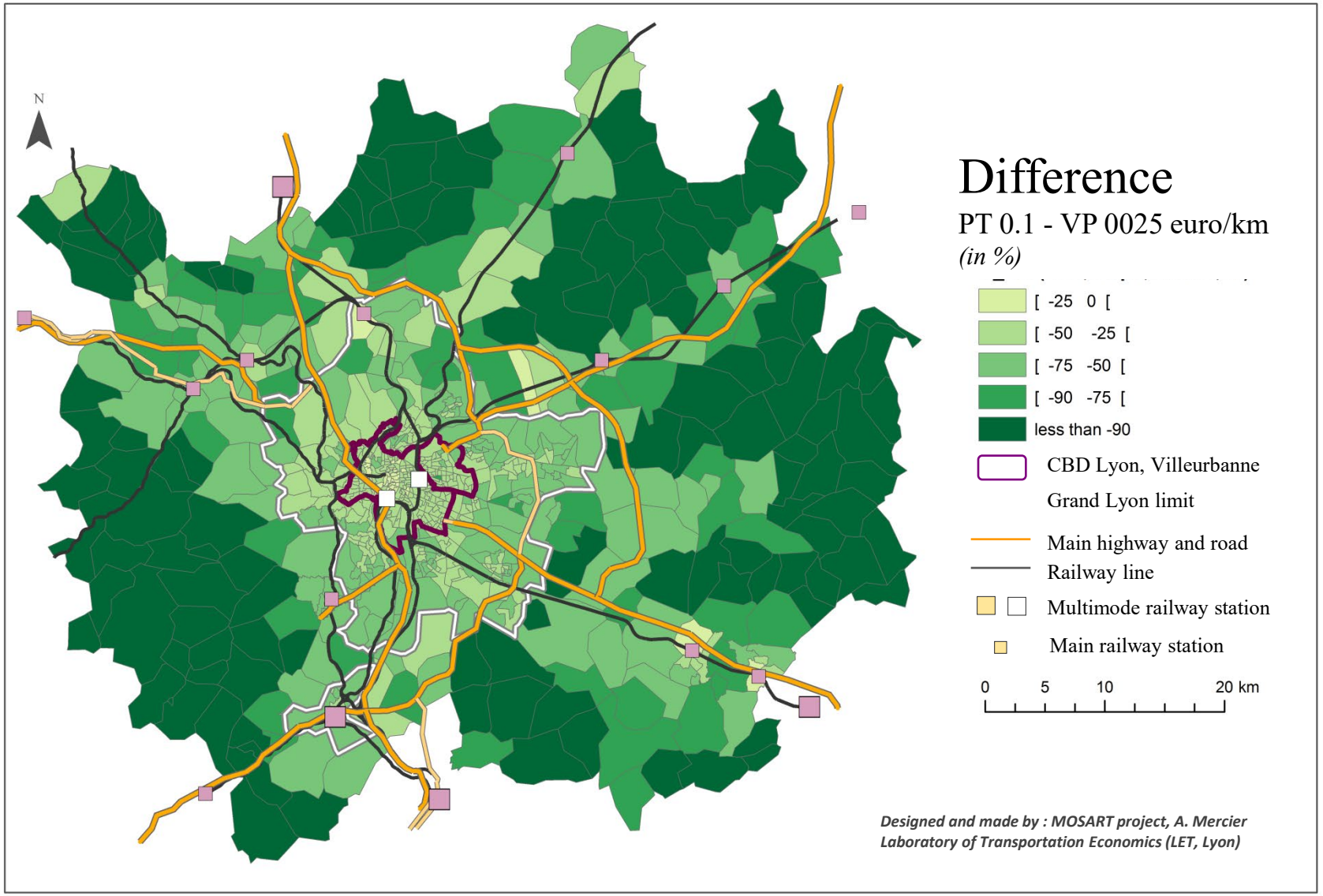
	Walking	Public transit	2 wheels	Cars
Barcelona	42 %	34 %	11 % (9 + 2)	13 %
Frankfurt	30 %	22 %	13 %	35 %
Oslo	13 %	68 %	5 %	14 %
Paris	53 %	29 %	4 %	14 %

	Walking	Public transit	2 wheels	Cars
Barcelona	39 %	23 %	6 % (4 + 2)	32 %
Frankfurt	27 %	11 %	11 % (2 + 9)	51 %
Oslo	32 %	26 %	5 %	37 %
Paris	34 %	19 %	2 %	45 %

Source: Crozet et alii 2019 (p. 71).

Road pricing: a fourth accessibility turn?

- Road pricing in urban areas is generally considered as congestion charging in order to improve the fluidity of traffic
- But why not another option, you don’t pay for time gains, according to your value of time, but you pay because you are using a scarce resource: i.e. public space
- And then why not a road charging not only in the central part of the city, but also in the periphery?
- A dream or a nightmare?


N
Difference
PT 0.1 - VP 0025 euro/km
(in %)
[-25 0 [
[-50 -25 [
[-75 -50 [
[-90 -75 [
less than -90
CBD Lyon, Villeurbanne
Grand Lyon limit
Main highway and road
Railway line
Multimode railway station
Main railway station
0 5 10 20 km
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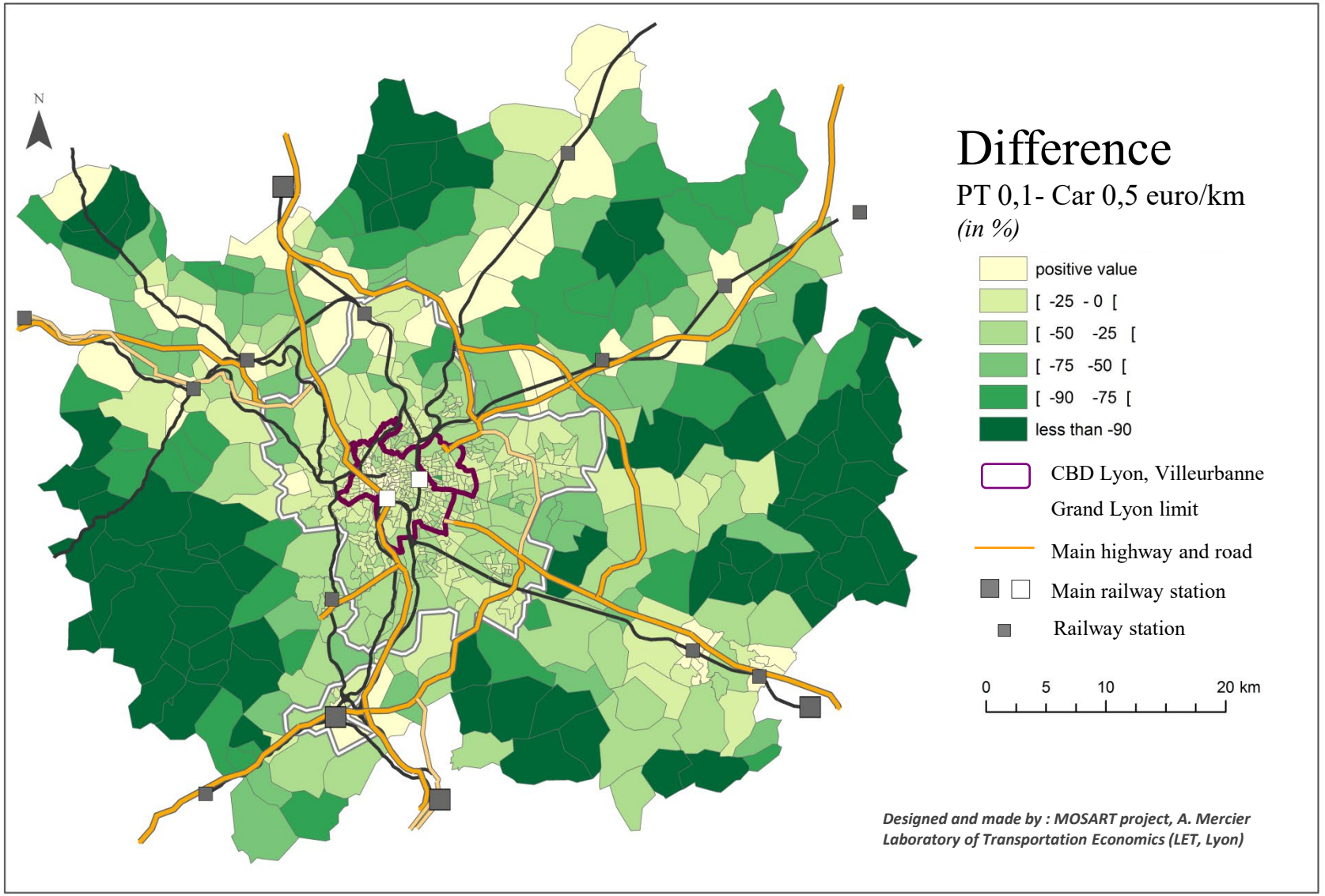
N
Difference
PT 0,1- Car 0,5 euro/km
(in %)
positive value
[-25 - 0 [
[-50 -25 [
[-75 -50 [
[-90 -75 [
less than -90
CBD Lyon, Villeurbanne
Grand Lyon limit
Main highway and road
Main railway station
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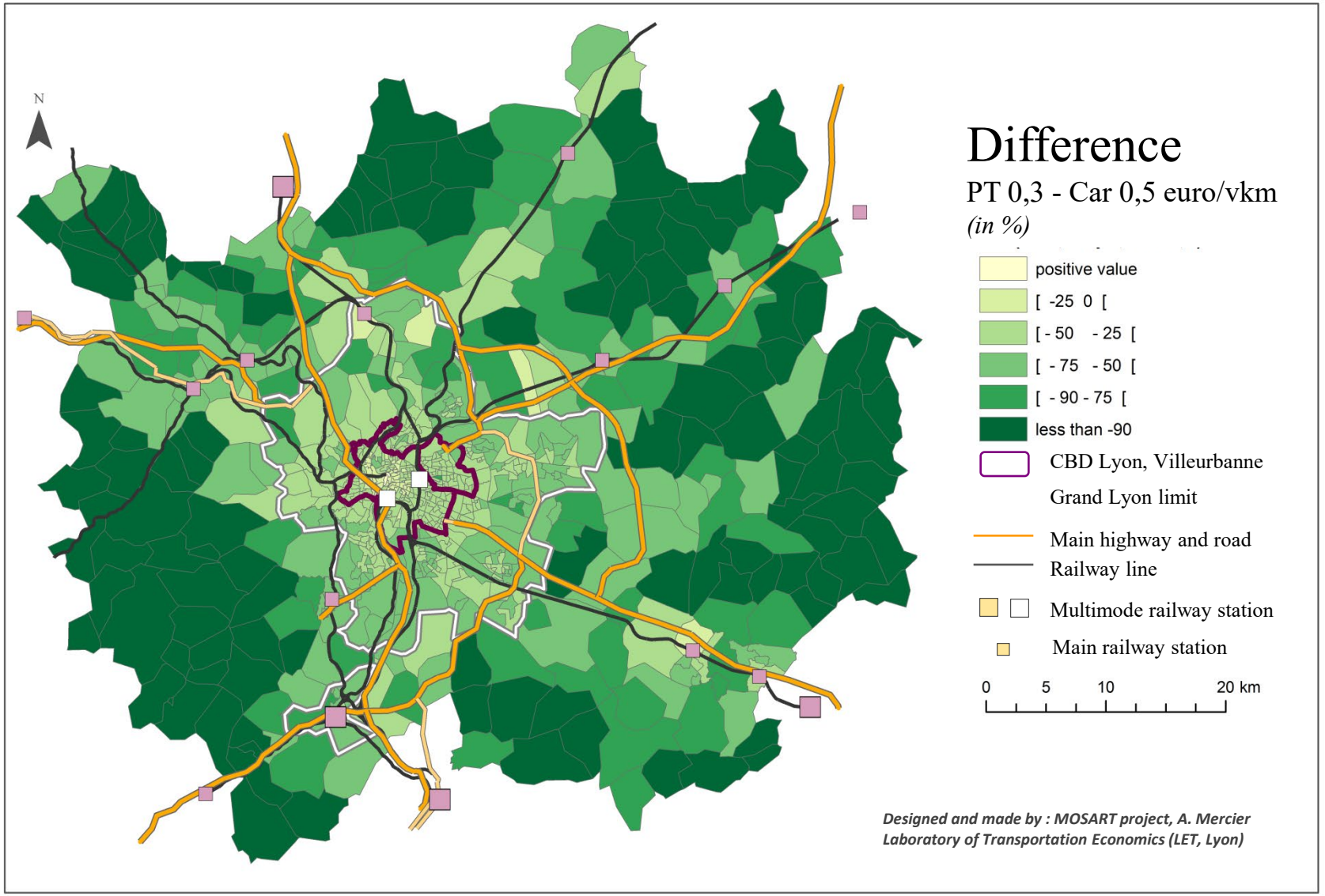
N
Difference
PT 0,3 - Car 0,5 euro/vkm
(in %)
positive value
[-25 0 [
[- 50 - 25 [
[- 75 - 50 [
[- 90 - 75 [
less than -90
CBD Lyon, Villeurbanne
Grand Lyon limit
Main highway and road
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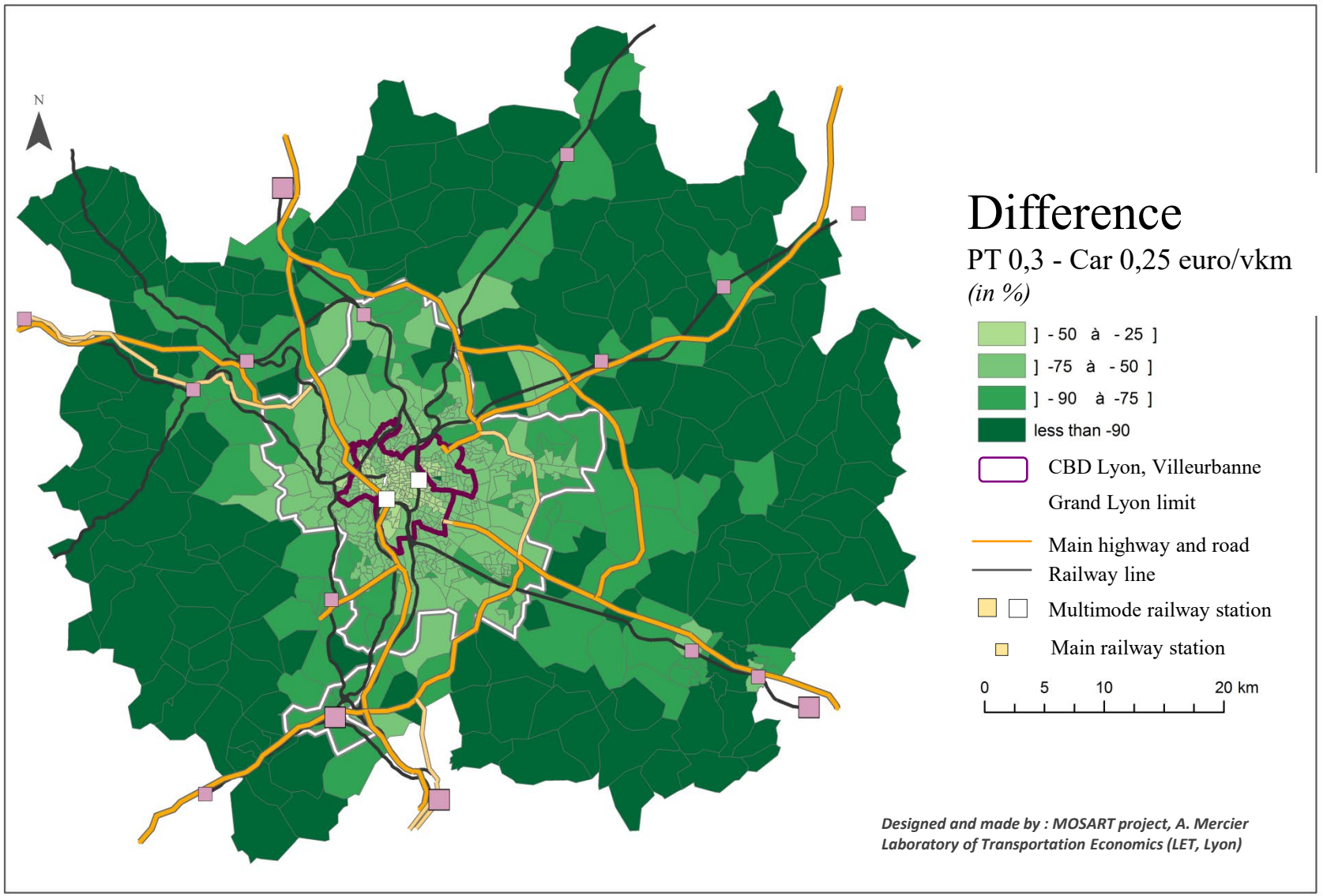
N
Difference
PT 0,3 - Car 0,25 euro/vkm
(in %)
] - 50 à - 25]
] -75 à - 50]
] - 90 à -75]
less than -90
CBD Lyon, Villeurbanne
Grand Lyon limit
Main highway and road
Railway line
Multimode railway station
Main railway station
0 5 10 20 km
Designed and made by : MOSART project, A. Mercier
Laboratory of Transportation Economics (LET, Lyon)

Conclusion

- Car remains an important mode of transport in urban areas, especially in the periphery
- But the domination of “auto-mobility” is declining via the different components of an “accessibility turn”
  - The priority given to public transit + traffic calming measures
  - The priority given to land use optimization (proximity, density) and the end of public policies focused on time gains
  - Unified “mobility and land use public authorities” taking into account all the mobility services, including shared mobility
  - Road pricing on the whole road network…