SCALE MATTERS:

Proximity and cycling share in 40 European metropolitan areas

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mobil.TUM 2024

What are the boundaries defining a __metropolitan area__?

CITY vs. METROPOLITAN AREA vs. METROPOLITAN REGION

Administrative / economic / demographic criteria:

__(Rodriguez & Oviedo, 2001)__

1. The existence of a **central city** with a population of **at least 50,000 inhabitants**.

2. An **economic and social connection** between the central city and the peripheral. municipalities, reaching a **minimum total population of 100,000 inhabitants**.

3. **At least 75% of economically active**, non-agrarian individuals.

4. Have a **density of at least 50 inhabitants per square kilometer**.

5. At least **15% of the economically active population** had to have their place of **employment in the central city**.
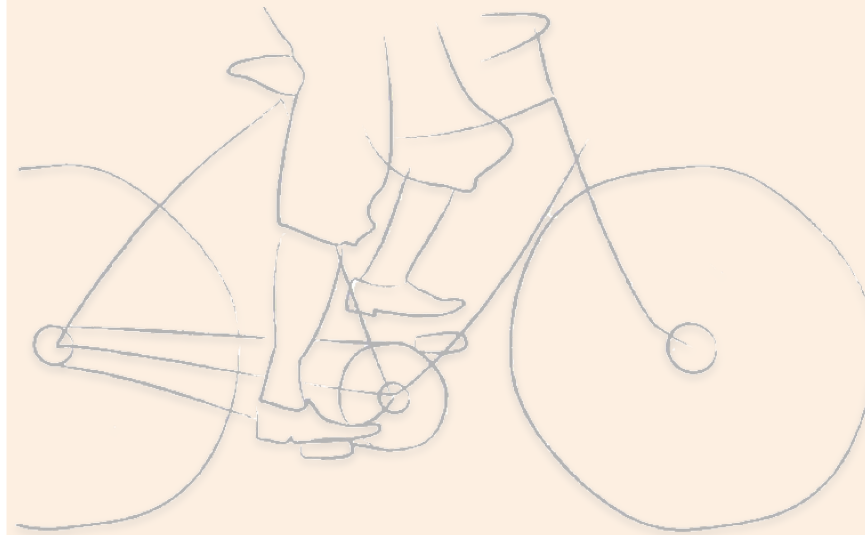
SCALE – PROXIMITY

SCALE – MODAL SHARE
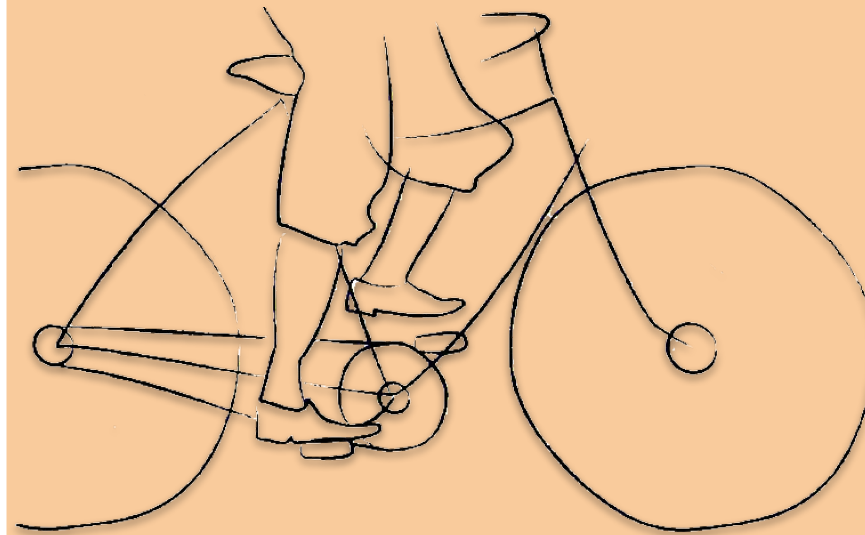
SCALE – 'PUSH' & 'PULL' MEASURES

SCALE
–
PROXIMITY

SCALE
–
MODAL SHARE

SCALE
–
'PUSH' & 'PULL'
MEASURES

PROXIMITY?

Can we achieve 15' cities everywhere? How about commuting to work?

Average travel time commuting in **XL** cities, like **Paris and London**: **>34 minutes**
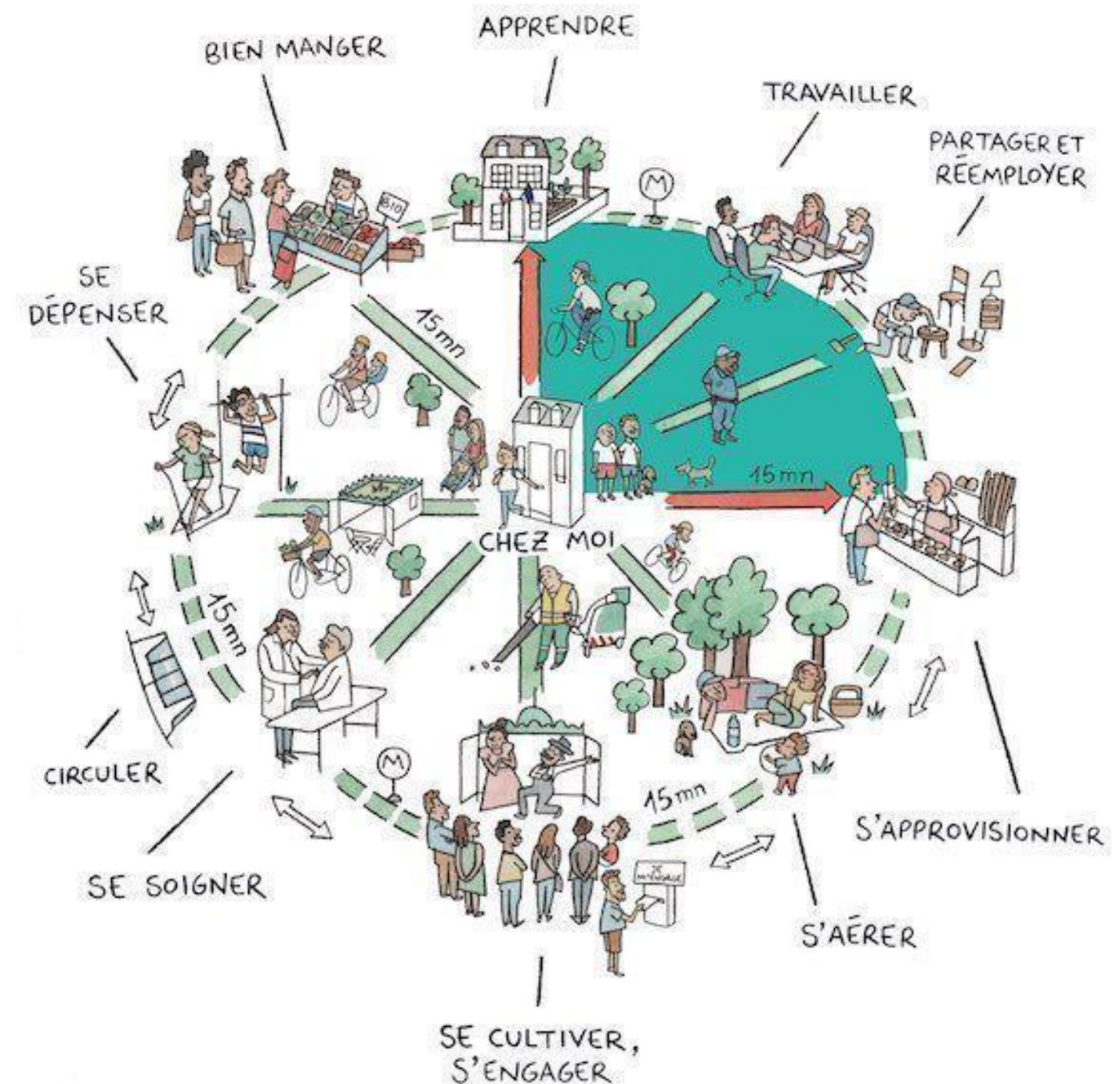
Average travel time commuting in **L** cities, like **Madrid and Rome**: **>24 minutes**

Average travel time based on place of residence and reason in Madrid:

Corona de residencia	Tiempo medio del viaje (minutos)						
	Promedio Viaje	Trabajo	Estudio	Compras	Ocio	Médico	Otros
Almendra Central	25	30	24	16	25	23	25
Periferia Urbana	26	34	22	16	24	26	25
Corona Metropolitana	25	34	21	15	25	25	23
Corona Regional	26	34	26	16	25	36	23
Total	**25**	**33**	**22**	**16**	**25**	**26**	**24**

- Researchers have mainly focused on **city centers or small to medium size cities**

- The scope of larger Metropolitan Areas, including Paris, London, Berlin, Rome, or Madrid, extends **far beyond** their city centers.

- A significant portion of the population lives outside city centers, impacting **travel times and distances.**

- While smaller areas may embody the concept of **15-minute cities**, larger metropolitan areas may require nuanced approaches due to **increased trip volume and distinct mobility cultures.**

- **Understanding the dynamics and transportation needs** of these outer areas is crucial for comprehensive urban planning and mobility strategies.


Le Paris du ¼ d'heure
https://ideesencommun.org/wp-content/uploads/2020/01/Dossier-de-presse-Le-Paris-du-quart-dheure.pdf

"Zoom Out"
Focus on the Metropolitan Areas

Origin-Destination relations in each metropolitan ring in Madrid

Relación Origen-Destino	Viajes Totales
Almendra Central - Almendra Central	11,1%
Almendra Central - Periferia Urbana	11,0%
Almendra Central - C. Metropolitana	5,2%
Almendra Central - C.Regional	0,5%
Almendra Central - Exterior Comunidad Madrid	0,1%
Periferia Urbana - Periferia Urbana	22,1%
Periferia Urbana - C. Metropolitana	8,0%
Periferia Urbana - C. Regional	0,6%
Periferia Urbana - Exterior Comunidad Madrid	0,2%
C. Metropolitana - C. Metropolitana	**33,9%**
C. Metropolitana - C. Regional	2,1%
C. Metropolitana - Exterior Comunidad Madrid	0,4%
C. Regional - C. Regional	4,5%
C. Regional - Exterior Comunidad Madrid	0,1%
Exterior Comunidad Madrid - Exterior Comunidad Madrid	0,0%
Comunidad de Madrid	**100,0%**

Corona Regional

Corona Metropolitana

Periferia Urbana
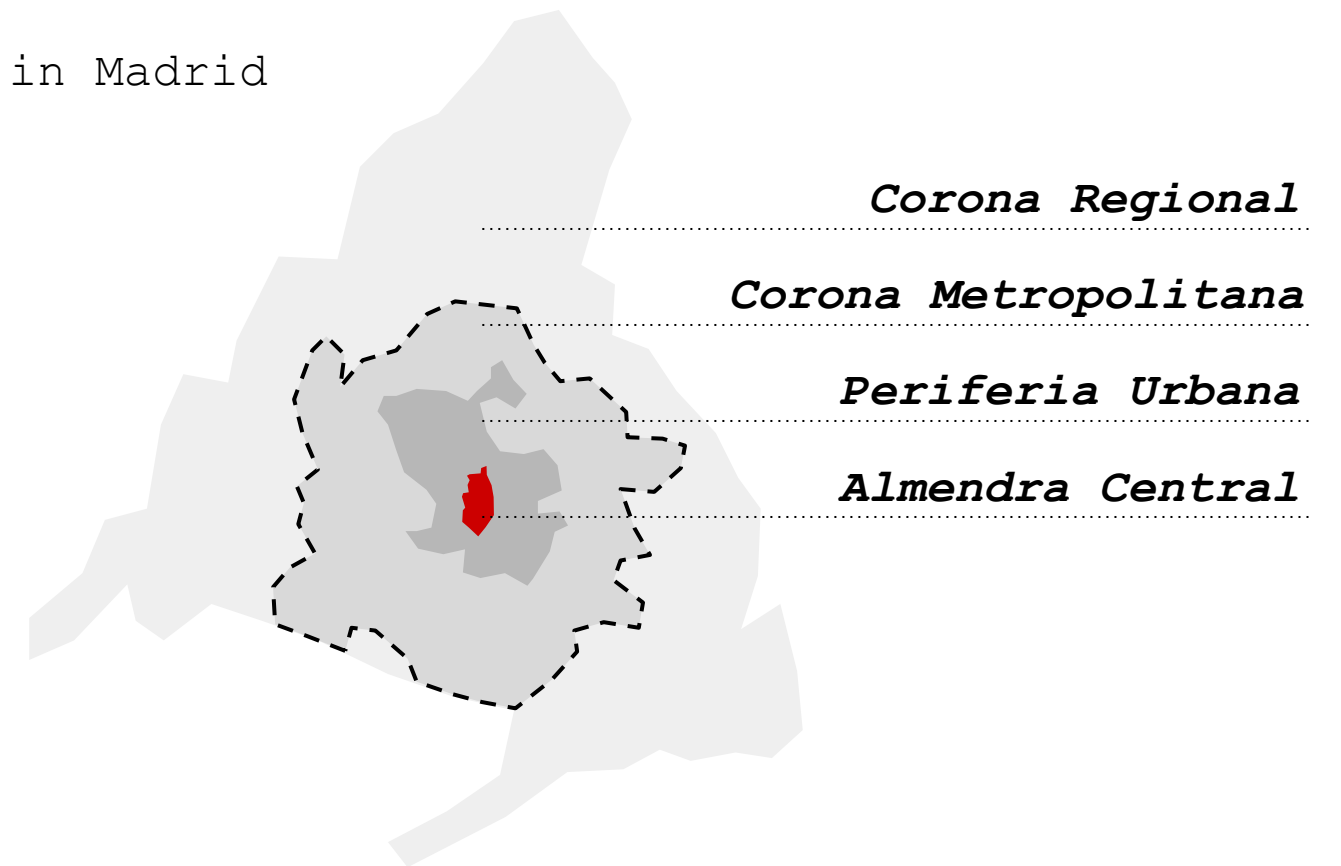
Almendra Central

Corona Regional: Municipalities closest to the edge of Madrid.

Corona Metropolitana: Municipalities closest to the capital.

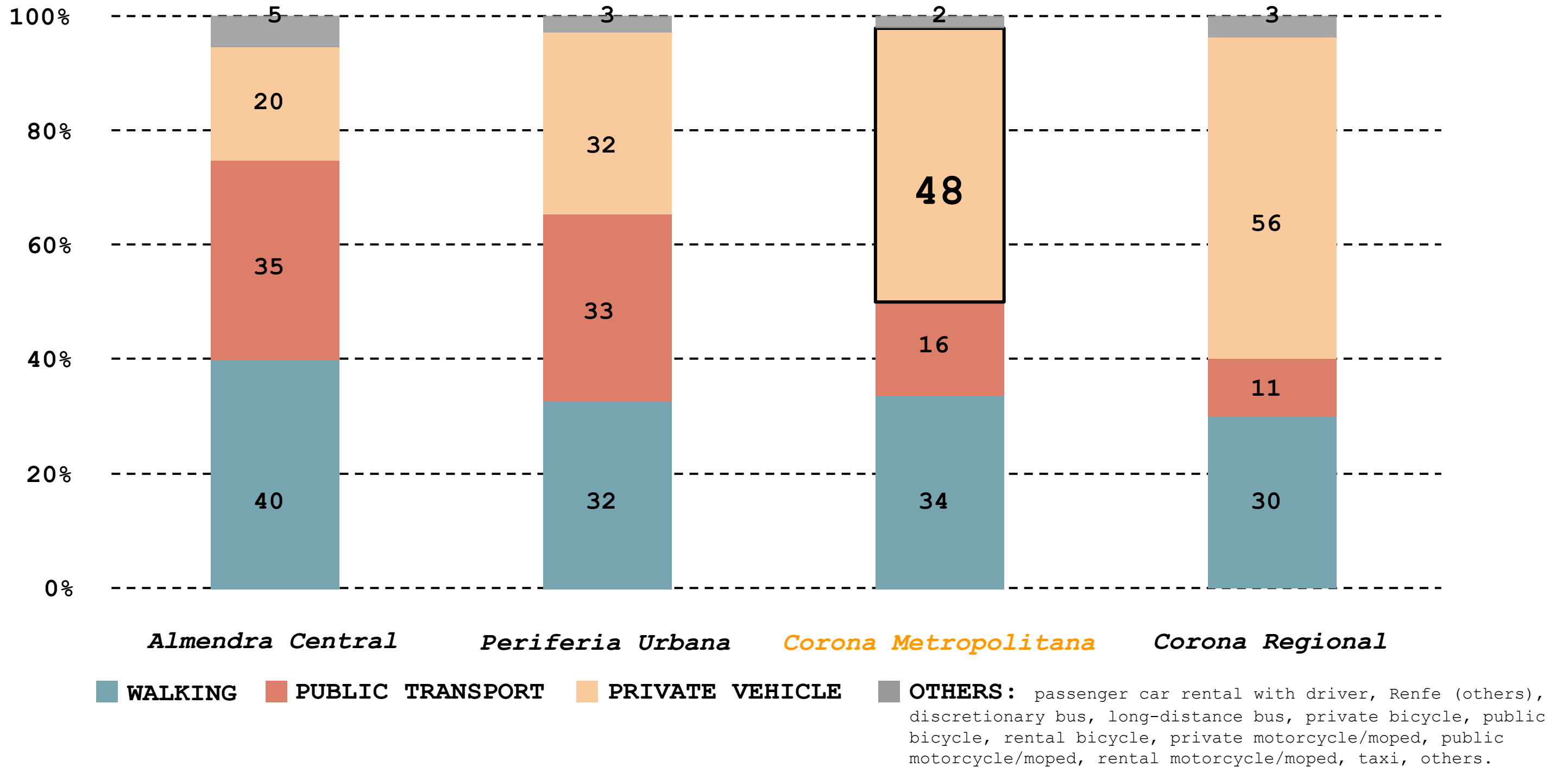*Periferia Urbana:* Districts of the municipality of Madrid, outside the M-30 highway.

Almendra Central: Area within the M-30 highway.

"Zoom Out"
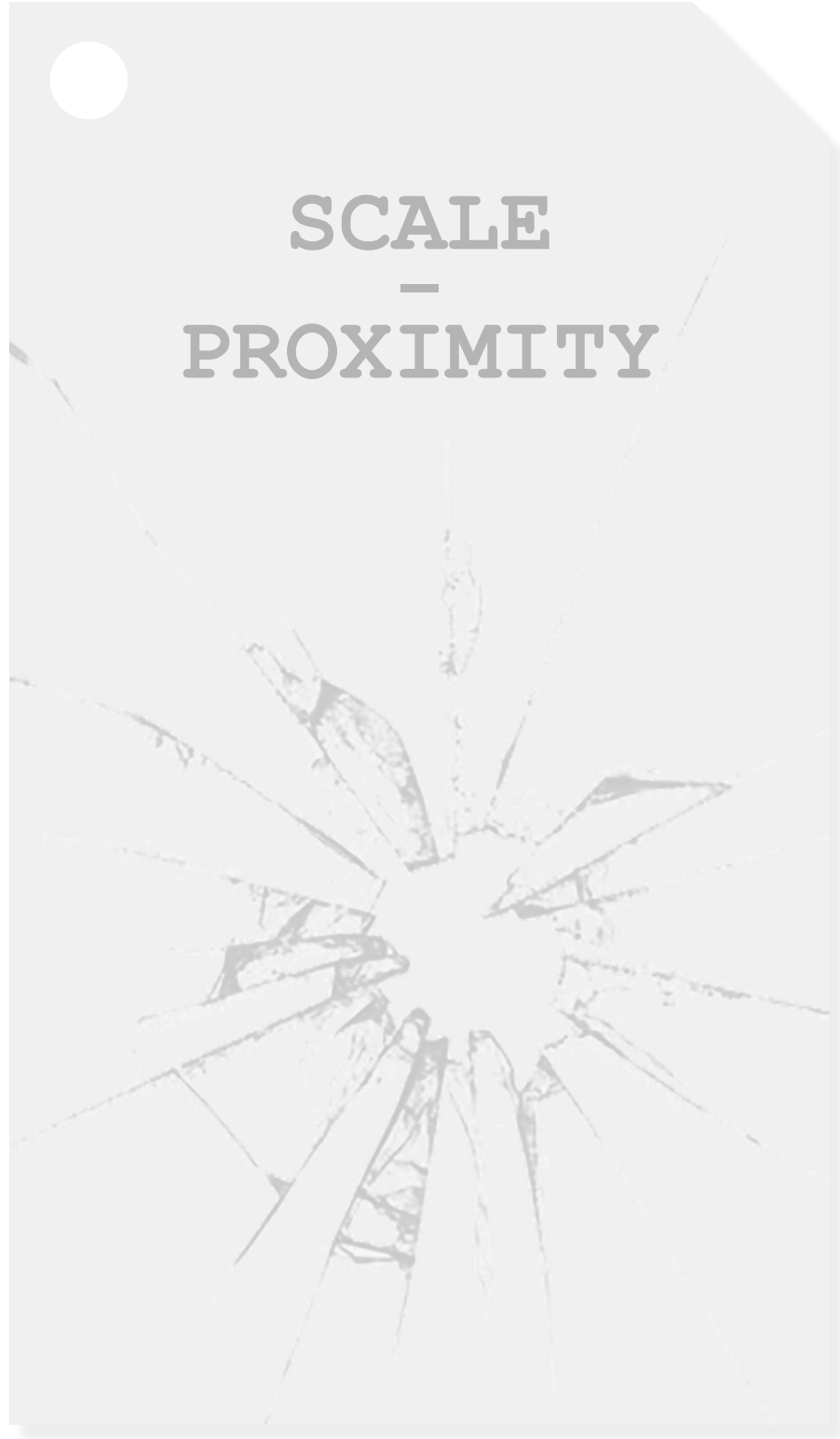## The private vehicle as the main transport mode in the Metropolitan Crowns
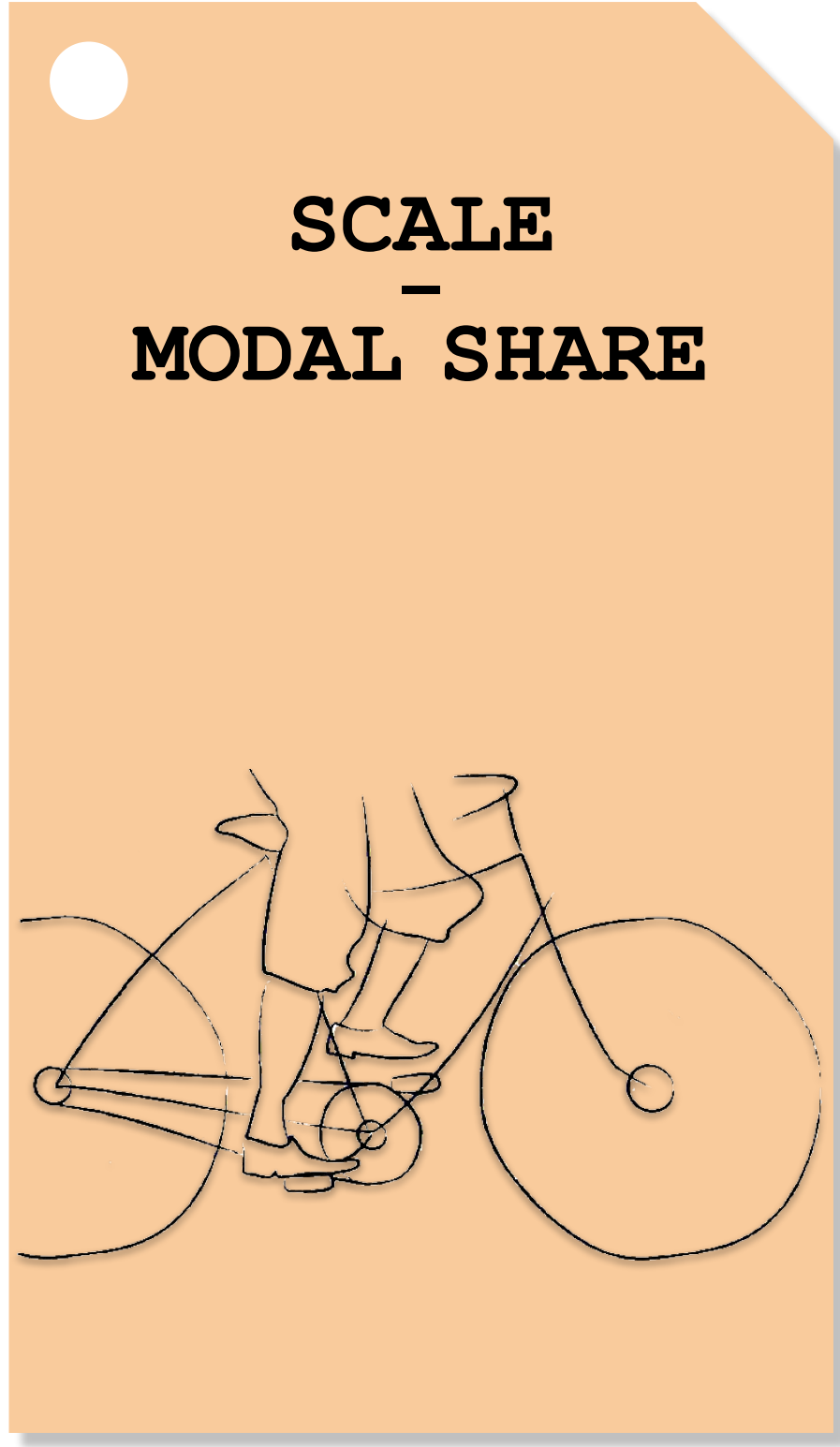
Transport mode depending on the place of residence (%):

	Almendra Central	Periferia Urbana	Corona Metropolitana	Corona Regional
OTHERS	5	3	2	3
PRIVATE VEHICLE	20	32	48	56
PUBLIC TRANSPORT	35	33	16	11
WALKING	40	32	34	30

WALKING **PUBLIC TRANSPORT** **PRIVATE VEHICLE** **OTHERS:** passenger car rental with driver, Renfe (others), discretionary bus, long-distance bus, private bicycle, public bicycle, rental bicycle, private motorcycle/moped, public motorcycle/moped, rental motorcycle/moped, taxi, others.

SCALE
–
PROXIMITY

SCALE
–
MODAL SHARE

SCALE
–
'PUSH' & 'PULL'
MEASURES

Freiburg — 34% CYCLING
Vitoria-Gasteiz
Prague
Helsinki
Zagreb
Berlin
Vienna
Utrecht — 51% CYCLING
Münster — 39% CYCLING
Amsterdam — 29% CYCLING
Zurich
Barcelona
Hamburg
Stockholm
Copenhagen — 27% CYCLING
Warsaw
Munich
Oslo
Sofia
Dresden
London
Gothenburg
Bratislava
Grenoble
Vilnius
Krakow
Madrid
Lyon
Valencia
Paris
Brussels
Tallinn
Luxembourg
Strasbourg
Dublin
Seville
Rome
Lisbon
Milan
Bordeaux

60%
50%
40%
30%
20%
10%
0%

—— % CYCLING   —— % CAR
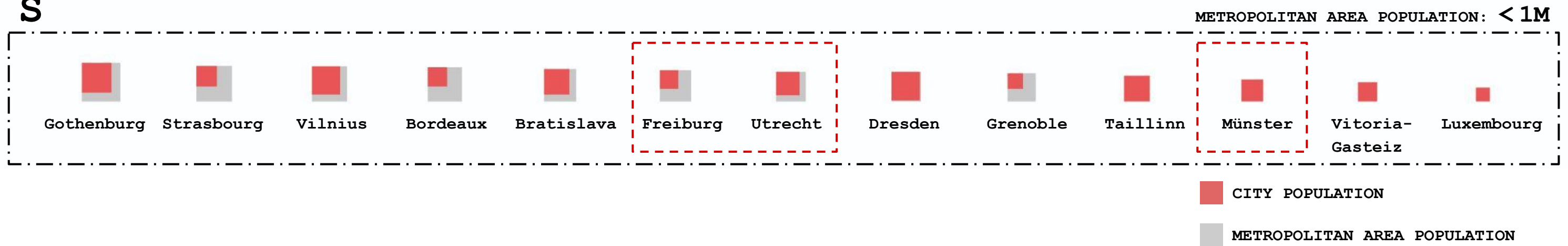
Sources: European Mobility Venture 2021 Report (MCube, TUM), Household Mobility Survey 2018 (Consorcio Regional de Transportes de Madrid), and various other studies. Own elaboration.
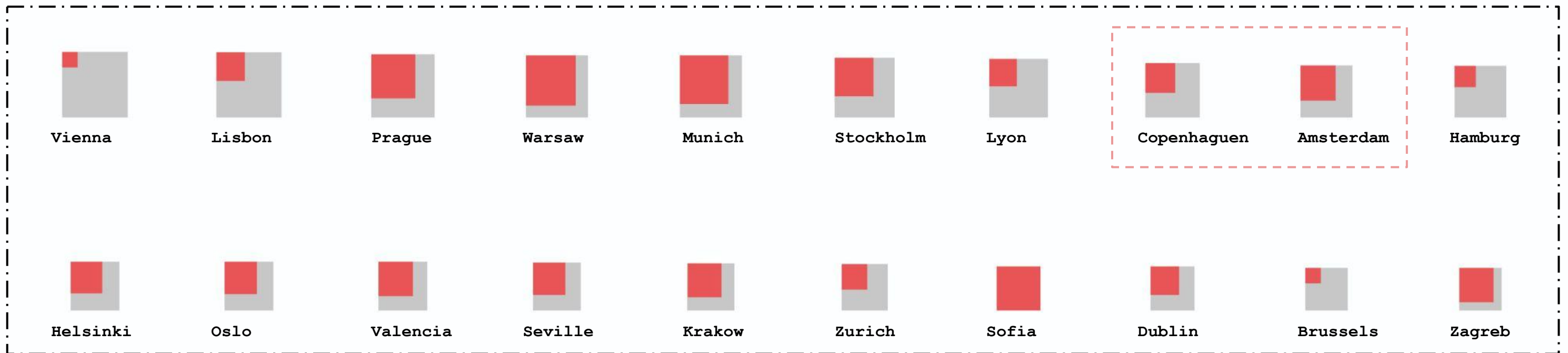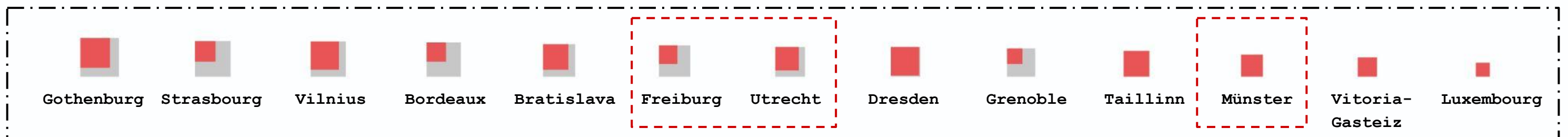
mobil.TUM 2024 | Scale Matters: Proximity and cycling share in 40 European metropolitan areas | Beatriz Martínez Rico

S

METROPOLITAN AREA POPULATION: **< 1M**

Gothenburg Strasbourg Vilnius Bordeaux Bratislava Freiburg Utrecht Dresden Grenoble Taillinn Münster Vitoria-Gasteiz Luxembourg

CITY POPULATION

METROPOLITAN AREA POPULATION

M METROPOLITAN AREA POPULATION: 1-3M

Vienna Lisbon Prague Warsaw Munich Stockholm Lyon Copenhaguen Amsterdam Hamburg

Helsinki Oslo Valencia Seville Krakow Zurich Sofia Dublin Brussels Zagreb

S METROPOLITAN AREA POPULATION: < 1M

Gothenburg Strasbourg Vilnius Bordeaux Bratislava Freiburg Utrecht Dresden Grenoble Taillinn Münster Vitoria-Gasteiz Luxembourg

■ CITY POPULATION

■ METROPOLITAN AREA POPULATION

Sources: European Mobility Venture 2021 Report (MCube, TUM), Household Mobility Survey 2018 (Consorcio Regional de Transportes de Madrid), and various other studies. Own elaboration.
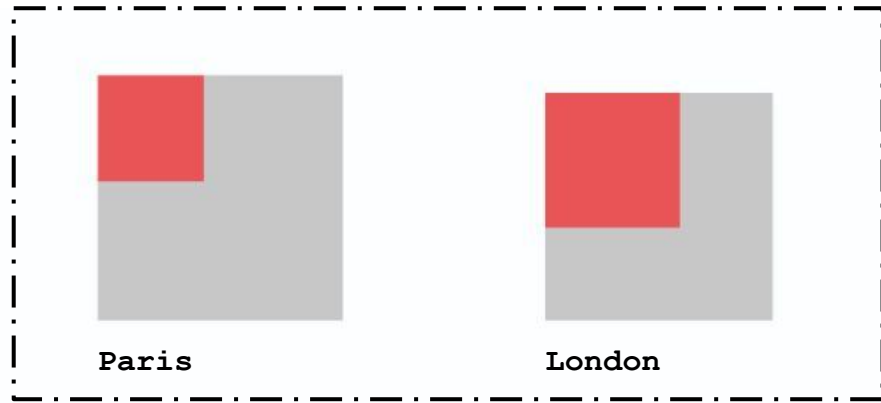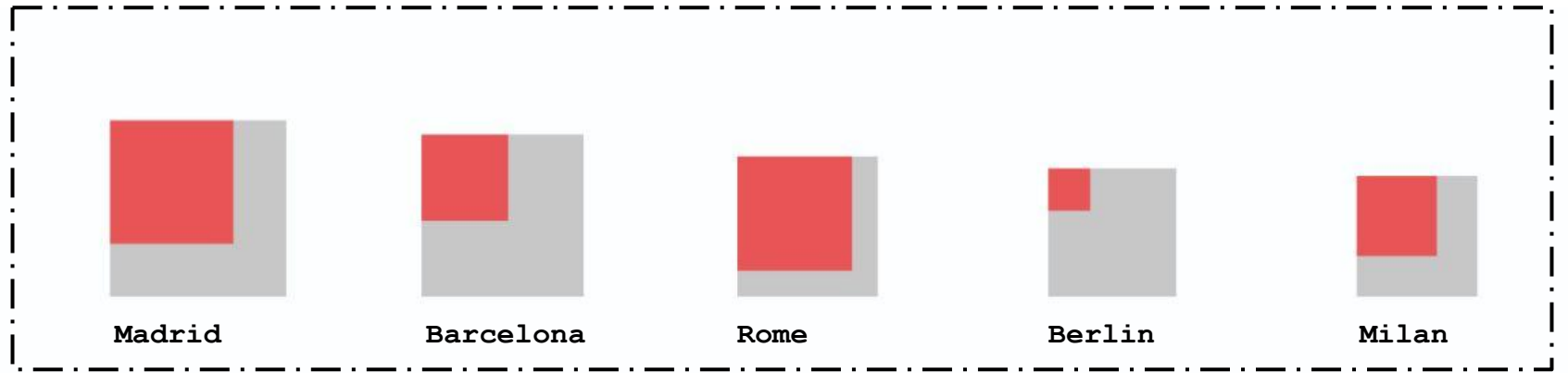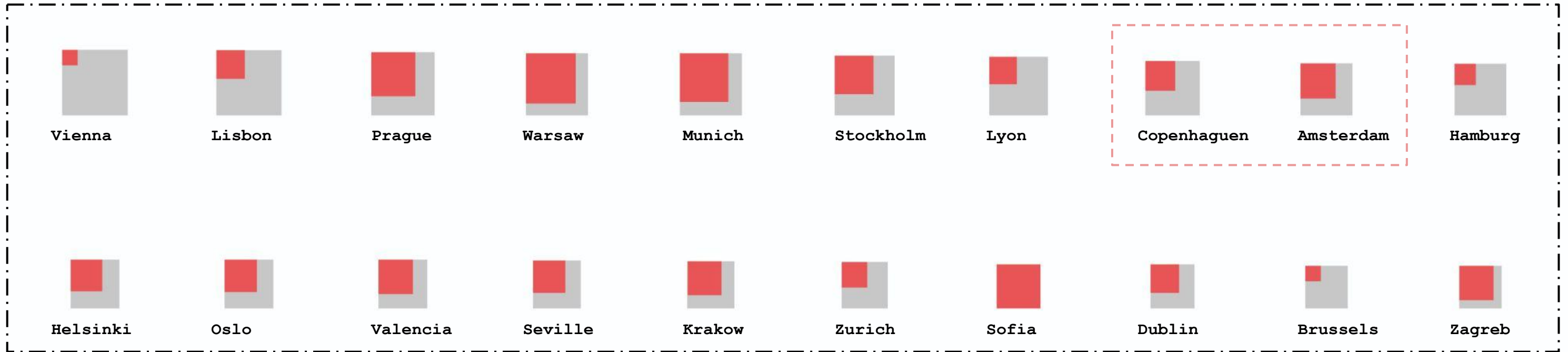
XL
METROPOLITAN AREA POPULATION: >8M

Paris

London

L
METROPOLITAN AREA POPULATION: 3-8M

Madrid

Barcelona

Rome

Berlin

Milan

M
METROPOLITAN AREA POPULATION: 1-3M

Vienna

Lisbon

Prague

Warsaw

Munich

Stockholm

Lyon

Copenhaguen

Amsterdam

Hamburg

Helsinki

Oslo

Valencia

Seville

Krakow

Zurich

Sofia

Dublin

Brussels

Zagreb

S
METROPOLITAN AREA POPULATION: <1M

Gothenburg

Strasbourg

Vilnius

Bordeaux

Bratislava

Freiburg

Utrecht

Dresden

Grenoble

Taillinn

Münster

Vitoria-
Gasteiz

Luxembourg

■ CITY POPULATION

■ METROPOLITAN AREA POPULATION

Modal share in 4 European metropolitan areas with different scales (%)
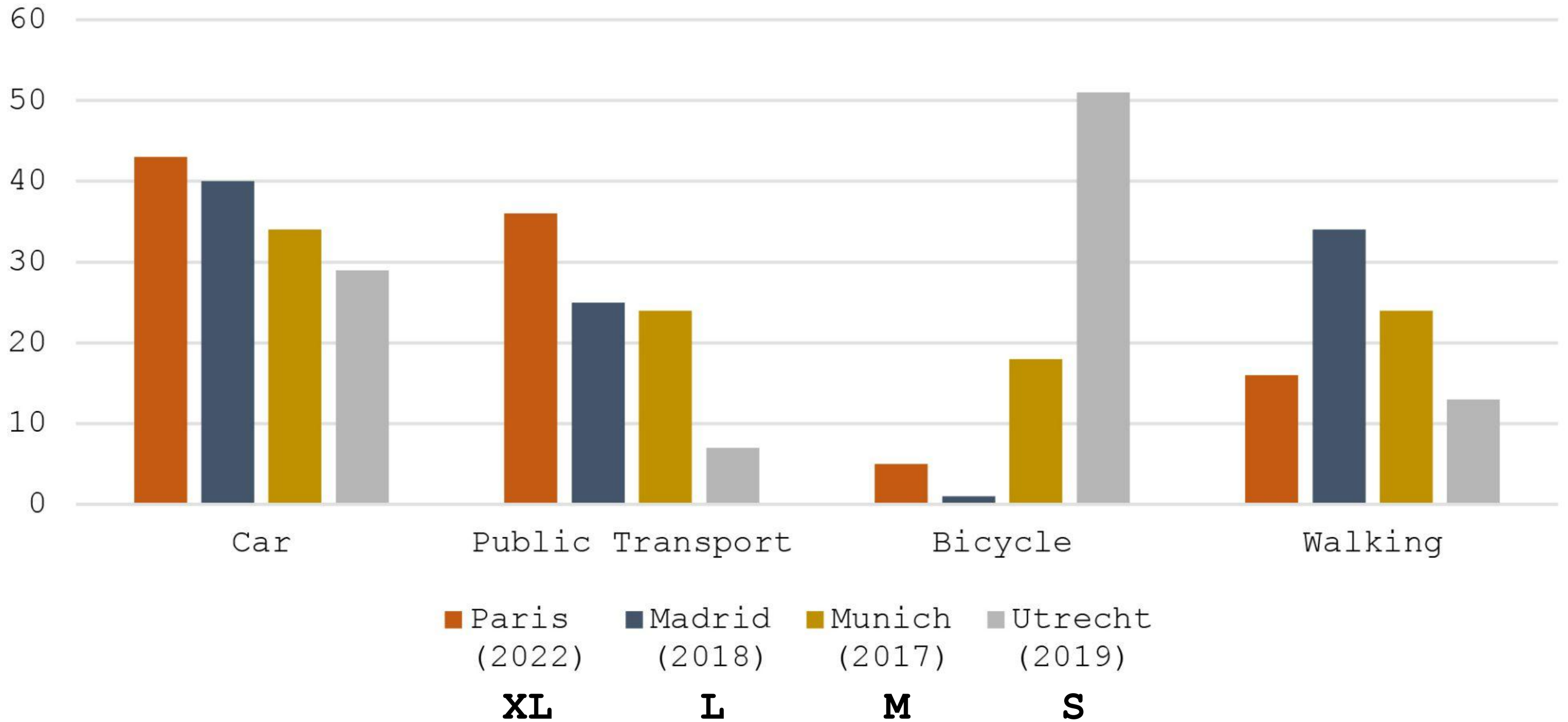
Legend:
- Paris (2022) — **XL**
- Madrid (2018) — **L**
- Munich (2017) — **M**
- Utrecht (2019) — **S**

Comparison with other modes of transport
The bicycle as a competitive mode of transport
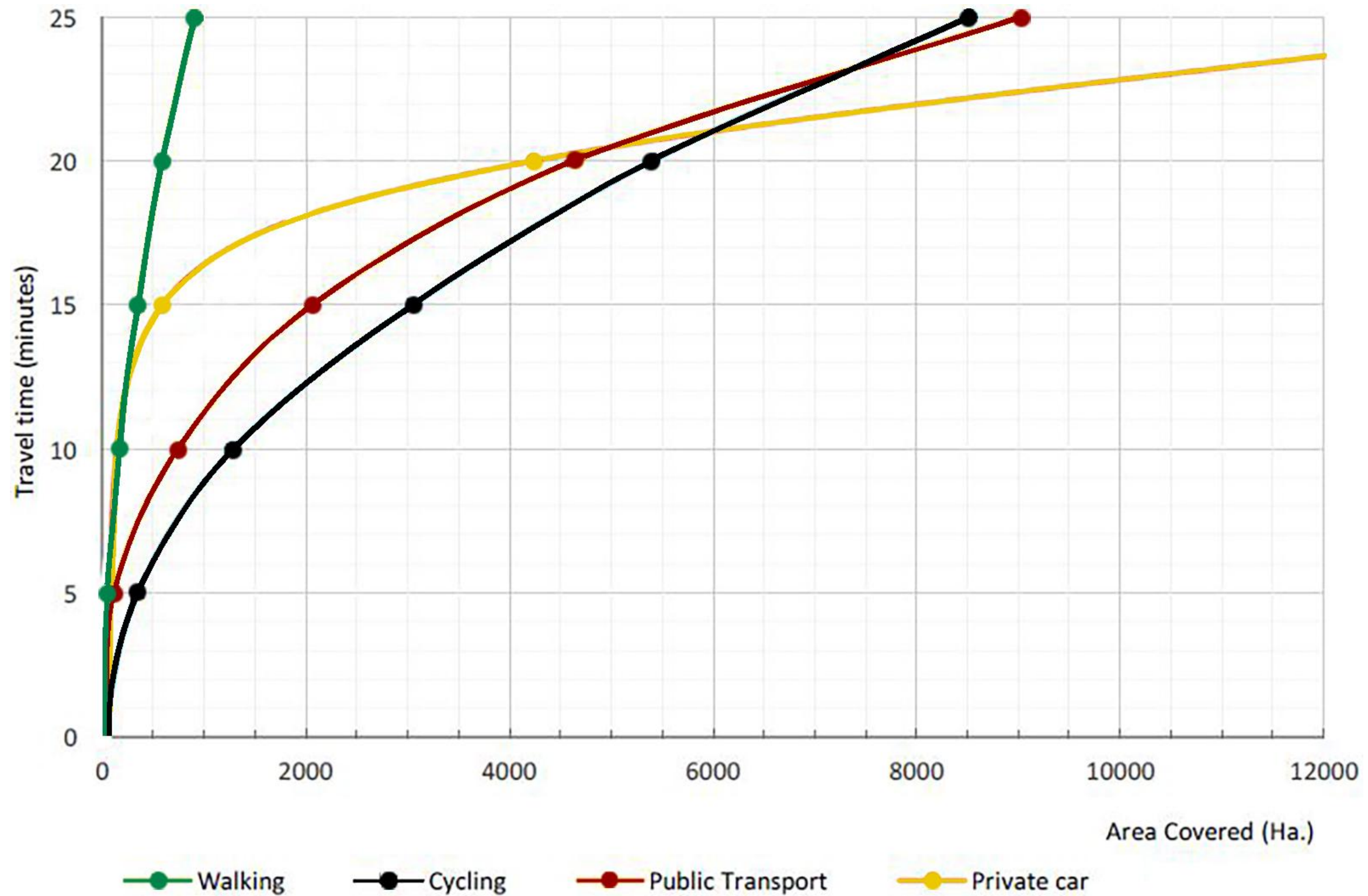
Source: Tesis Gustavo Romanillos (2019)

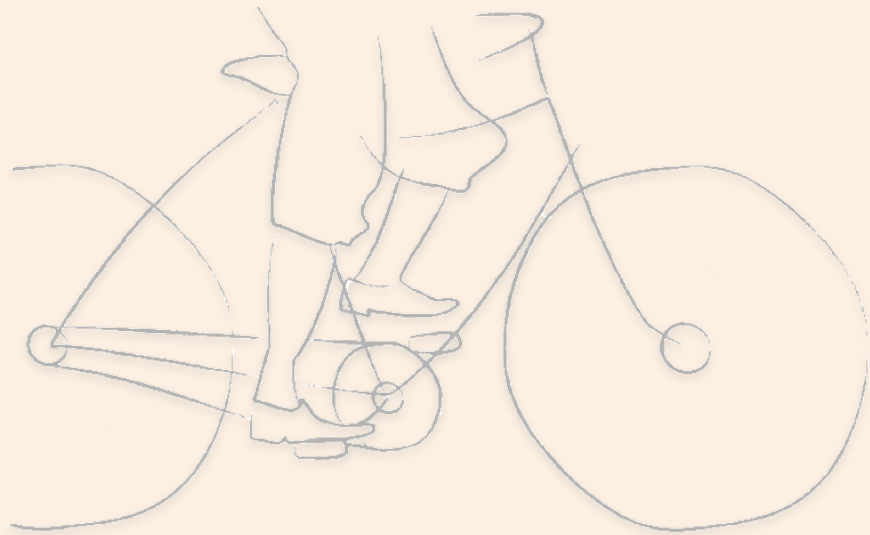# Strategies for larger Metropolitan Areas
The alliance between cycling and public transit as an opportunity
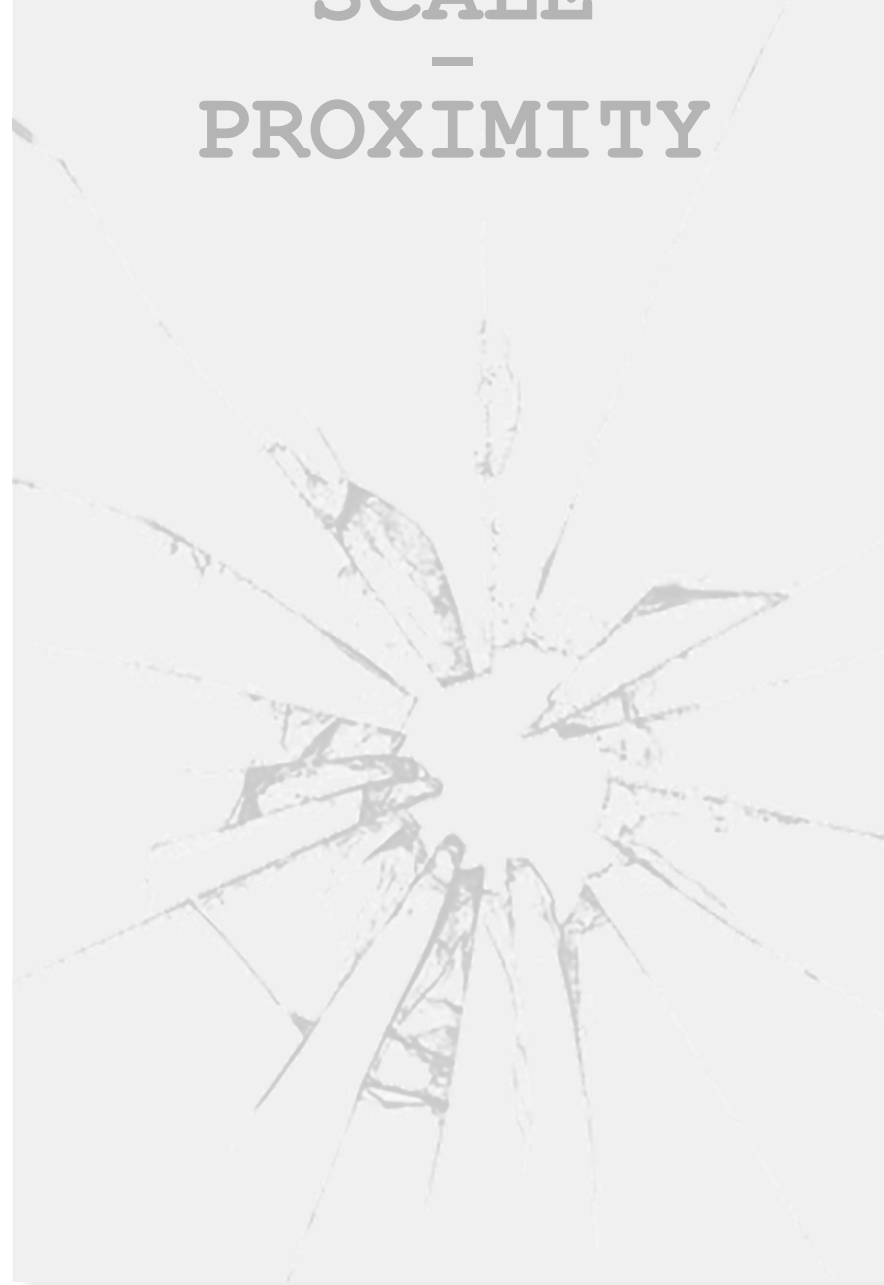

"Aligning urban development to <u>combine public transit with walking and cycling</u> is still—and perhaps more than ever—the best model to address the many challenges of fast-growing cities."

(Ploeger and Oldenziel, 2022)

SCALE
–
MODAL SHARE

SCALE
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PROXIMITY

SCALE
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'PUSH' & 'PULL'
MEASURES

*"It is precisely that double-barreled combination of **'carrot' and 'stick' policies** that make cycling so irresistible."*

*"Many measures to increase cycling run directly counter to planning to facilitate convenient car travel, precisely because **measures to disincentivize driving increase the relative attractiveness of cycling.**"*

(Pucher and Buehler, 2008)

'PUSH' MEASURES

Push measures are intended to **make cars less attractive in a direct manner.**
This, for example, results in making car utilization more expensive and less comfortable.

'PULL' MEASURES

Pull measures are associated with a positive affect. They are focused on **introducing alternative means of individual transport, such as bicycles, and making them more convenient, faster and trendy.**

advantages & disadvantages

Push	Pull
Restrictive	Enlarge behaviour options
Makes car use less attractive	Does not make car use less attractive in an absolute sense
May elicit reactance	Does not elicit reactance
Associated with negative affect and attitudes	Associated with positive affect and attitudes
More effective in activating car use reduction goals	Less effective in activating car use reduction goals
Lack of public support	Public support high

Source: Linda STEG, Department of Psychology, University of Groningen, the Netherlands (2006)

XL & L METROPOLITAN AREAS

'PUSH' MEASURES

✅ <u>Traffic calming</u>

<u>Car-free areas</u> during weekends ✅

✅ <u>Adjusting priorities at intersections</u>

<u>Limiting and pricing parking</u> ✅

❌ Not providing <u>park&rides</u> at the entrance of urban centers

<u>LEZ</u> (Low Emission Zones) <u>only in the city center</u>, creating more car circulation in the peripheries ❌

❌ Car <u>parking and fees still cheaper</u> than public transport

Free <u>public transit</u> for everyone on <u>days with bad air quality</u>
(does not encourage long-term habits) ❌

❌ <u>Speed is still too high</u> in some urban areas (40-50 km/h)

'PULL' MEASURES

✅ Extended <u>Bike Sharing Systems</u> (BSS), same for the city center and the peripheries. Example: Vélib' (Paris)

Adding safe, direct, attractive and connected <u>cycling infrastructure</u> ✅

✅ <u>Cycling highways</u> to connect the periphery and the city center

<u>Temporary free BSS</u> to allow people to test it and get the habit ✅

✅ <u>Showers and changing rooms</u> at workplaces

Safe <u>bike parking</u> at major PT hubs ✅

✅ Allow to take <u>bikes on PT</u>

<u>Educating residents</u> on time travel by bike to get to common destinations ✅

✅ <u>Campaigns for kids</u> to go to school by bike

<u>Bikes sharing the road with cars</u> in roads with a lot of <u>traffic</u> ❌

❌ <u>Different cards</u> for every transport mode

<u>Bike lanes taking the space of the sidewalk</u> ❌

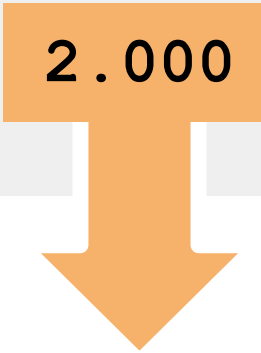❌ <u>Bad maintenance and quality of the BSS</u>

*"**The most effective strategies do not appear to be radical policies leading to fast implementation** of goals about sustainable transport, for example by implementing very car restrictive measures where routines and norms gradually change so that **car restraint measures gradually become part of the normal way of doing transport planning.***

Measures that especially benefit, walking, bicycle and public transport together create a development direction that leads to realization of the goals of reduced car travel."*

Hrelja and Rye (2023)

THANK YOU

	MILAN [MCM]	MUNICH [MVV]
AREA (Km2)	1.600	5.470
POPULATION (inhabitants)	3,2 M	2,6 M
DENSITY (inhabitants/ km2)	2.000	494

**3rd most
populated area
in Europe**