

# Bicycle and Social Inclusion: assessing the impacts of cycling accessibility distribution

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## CYCLING INFRASTRUCTURE

The **equity impacts** are often overlooked during planning and decision-making processes.

**INEQUITABLE** distribution of investments

WEALTHY and PRIVILEGED groups

**DISADVANTAGED & VULNERABLE**

The general **lack of awareness** as well as equity-oriented indicators may perpetuate social-spatial **segregation** and **inequalities** in cities.

MOVEMENT  
BARRIER  
PROBLEM



1) Measuring the equity impacts of **Bicycle Master Plans** in European cities.

2) Assessing the extent to which **planners** take **equity issues** into account during the planning and decision-making processes.



## QUANTITATIVE

OPENSOURCE DATABASE (OSM, CENSUS, MOBILITY SURVEY)

GIS, NETWORK ANALYST, SPSS

## MAPPING & VISUALIZATION

BICYCLE ACCESSIBILITY INDICATOR

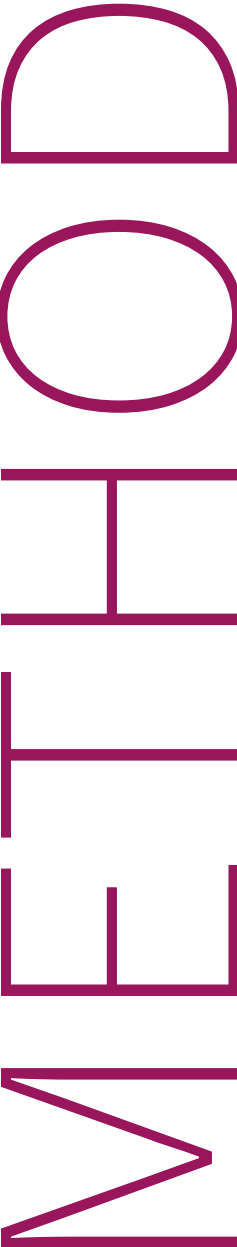
SOCIOECONOMIC INDEX OF ADVANTAGE AND DISADVANTAGE

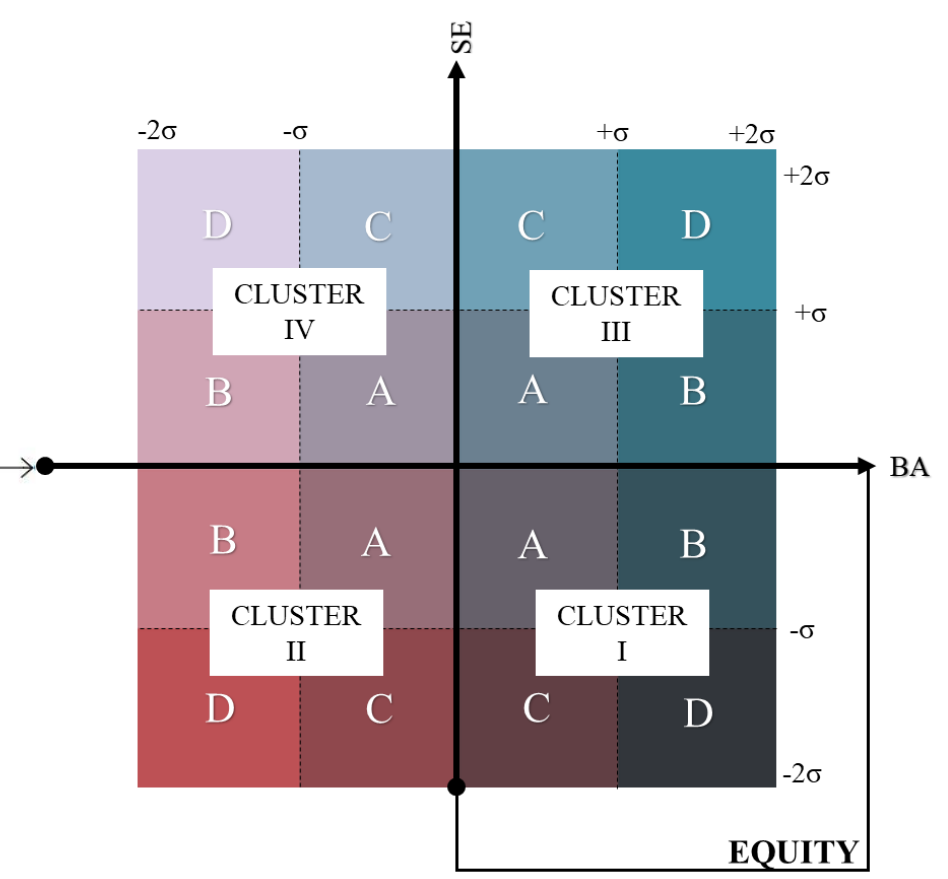
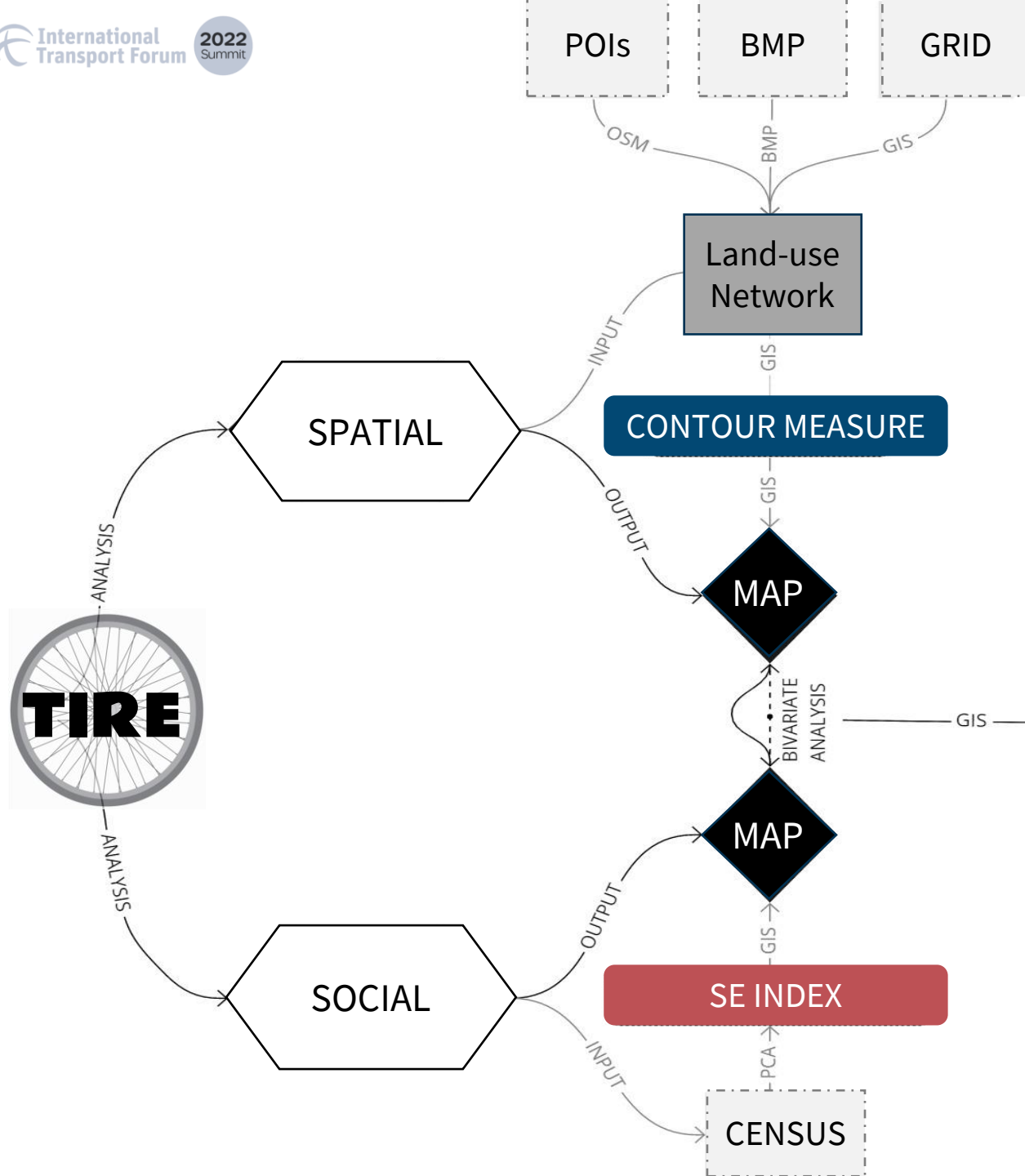
GEO-SPATIALIZATION OF DISTRIBUTIVE IMBALANCES

ACCESSIBILITY VIS-À-VIS SOCIOECONOMIC CLUSTERS



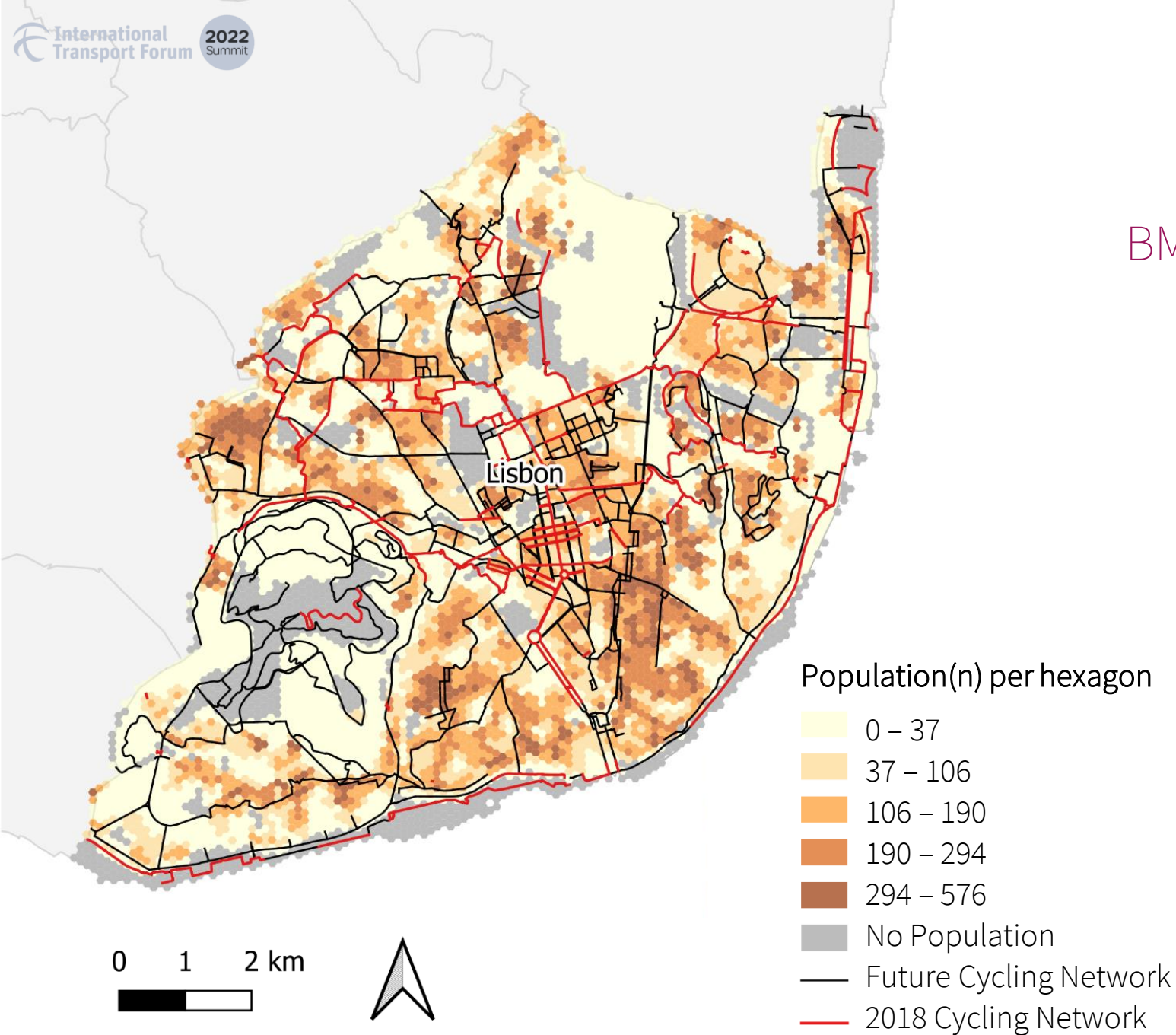
Tool for assessing the **Relative Equity Impacts** of Bicycle Plans





THE ROAD





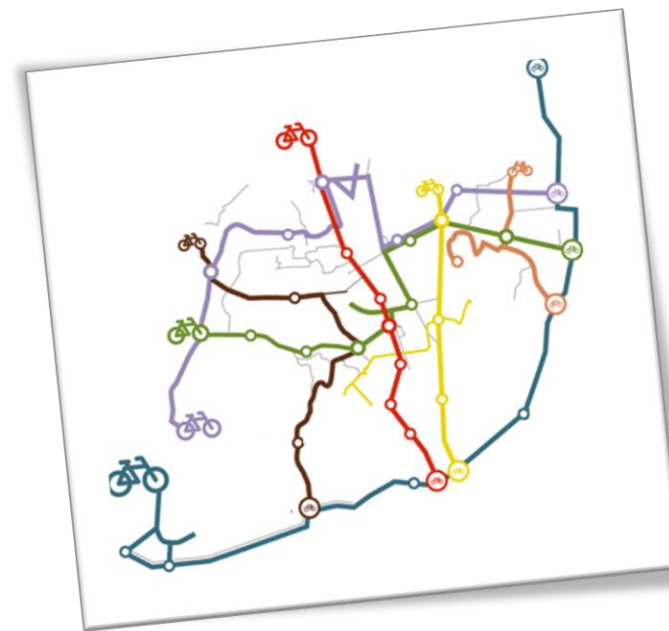
# LISBON, PORTUGAL

STARTER CYCLING CITY

BMP UNDER IMPLEMENTATION

CURRENT NETWORK 90KM

FUTURE NETWORK 200KM



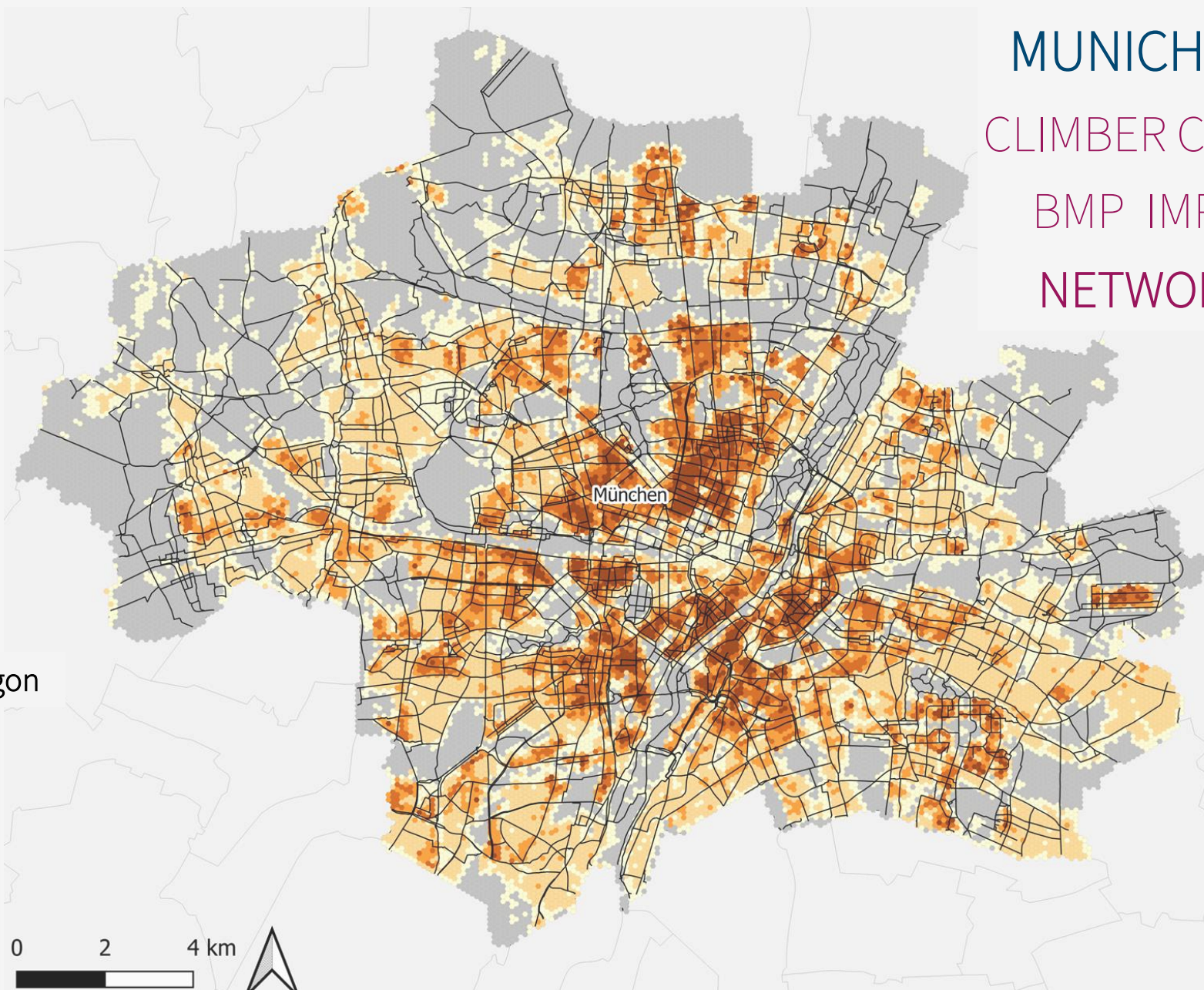
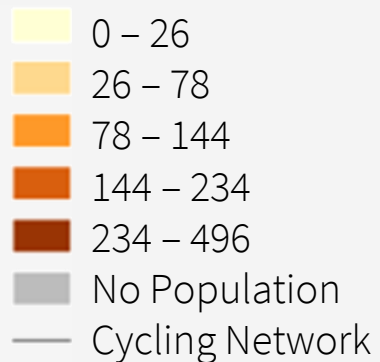
# MUNICH, GERMANY

CLIMBER CYCLING CITY

BMP IMPLEMENTED

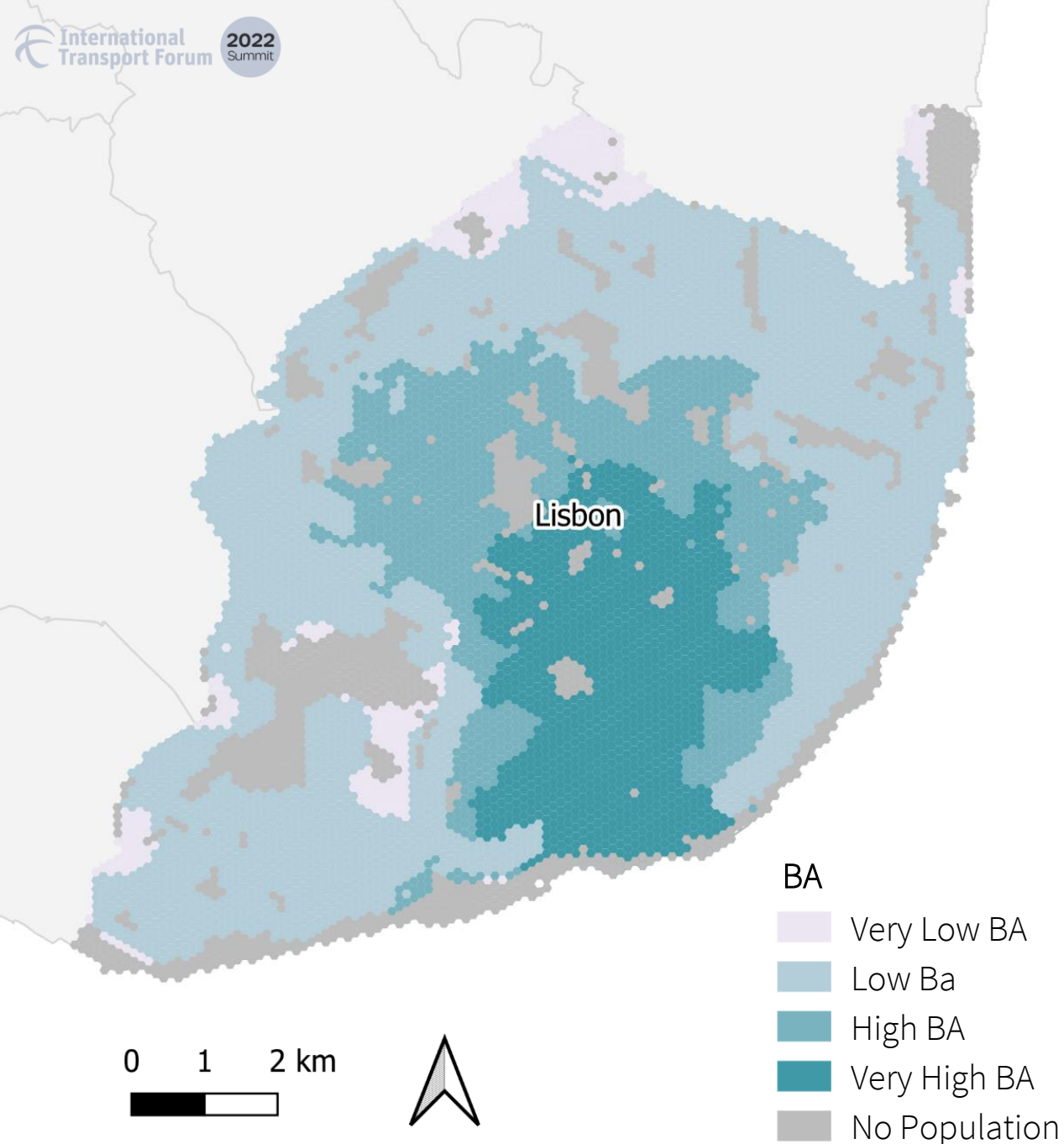
NETWORK >1200KM

Population(n) per hexagon



SOURCE: LOCAL CENSUS (2011)





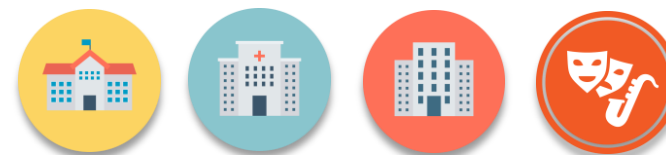
# CONTOUR MEASURE

## ORIGIN-BASED

### SUM ACCESSIBLE ACTIVITIES

### FIXED TRAVEL-TIME THRESHOLD

15 MINUTES



5 MINUTES

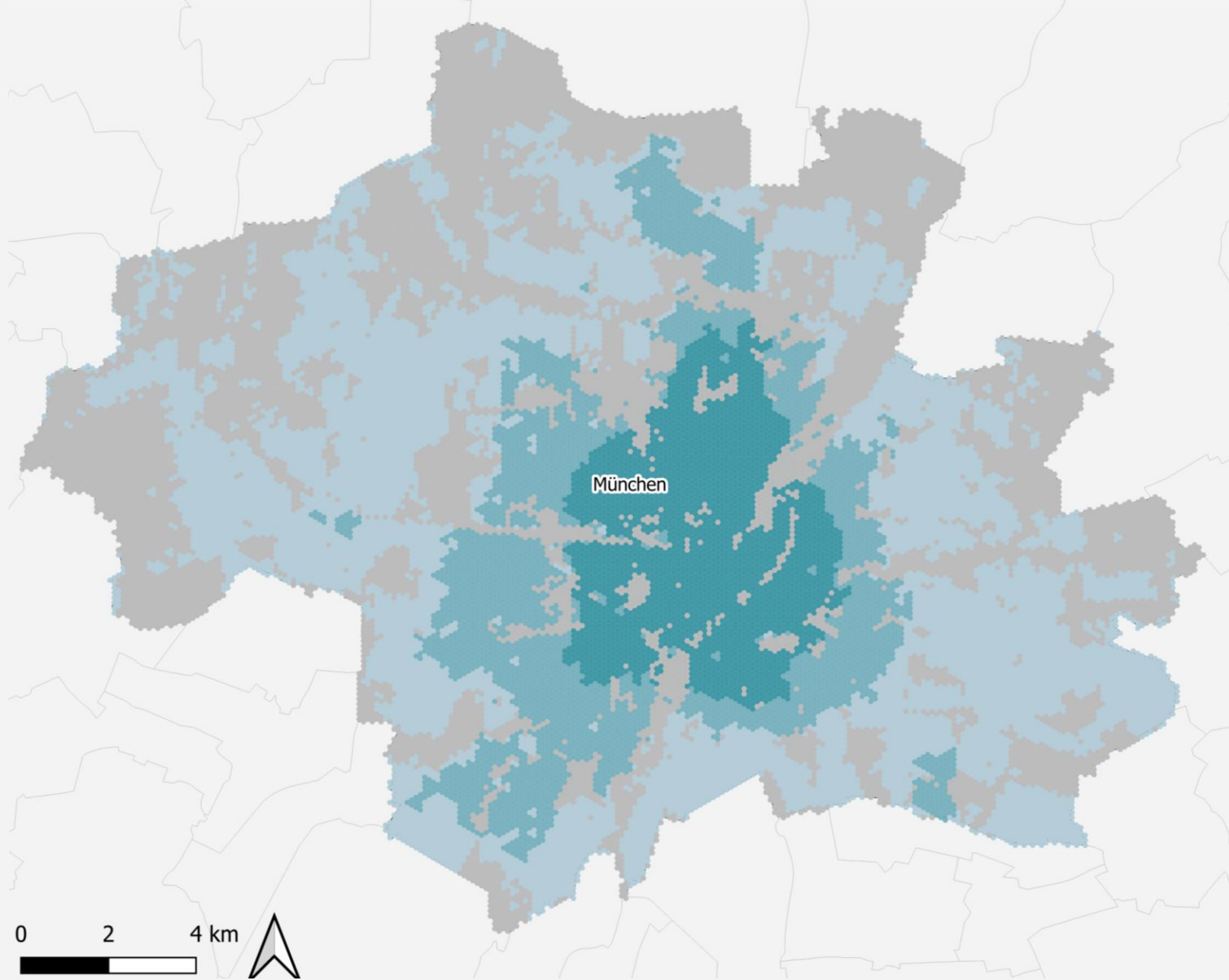


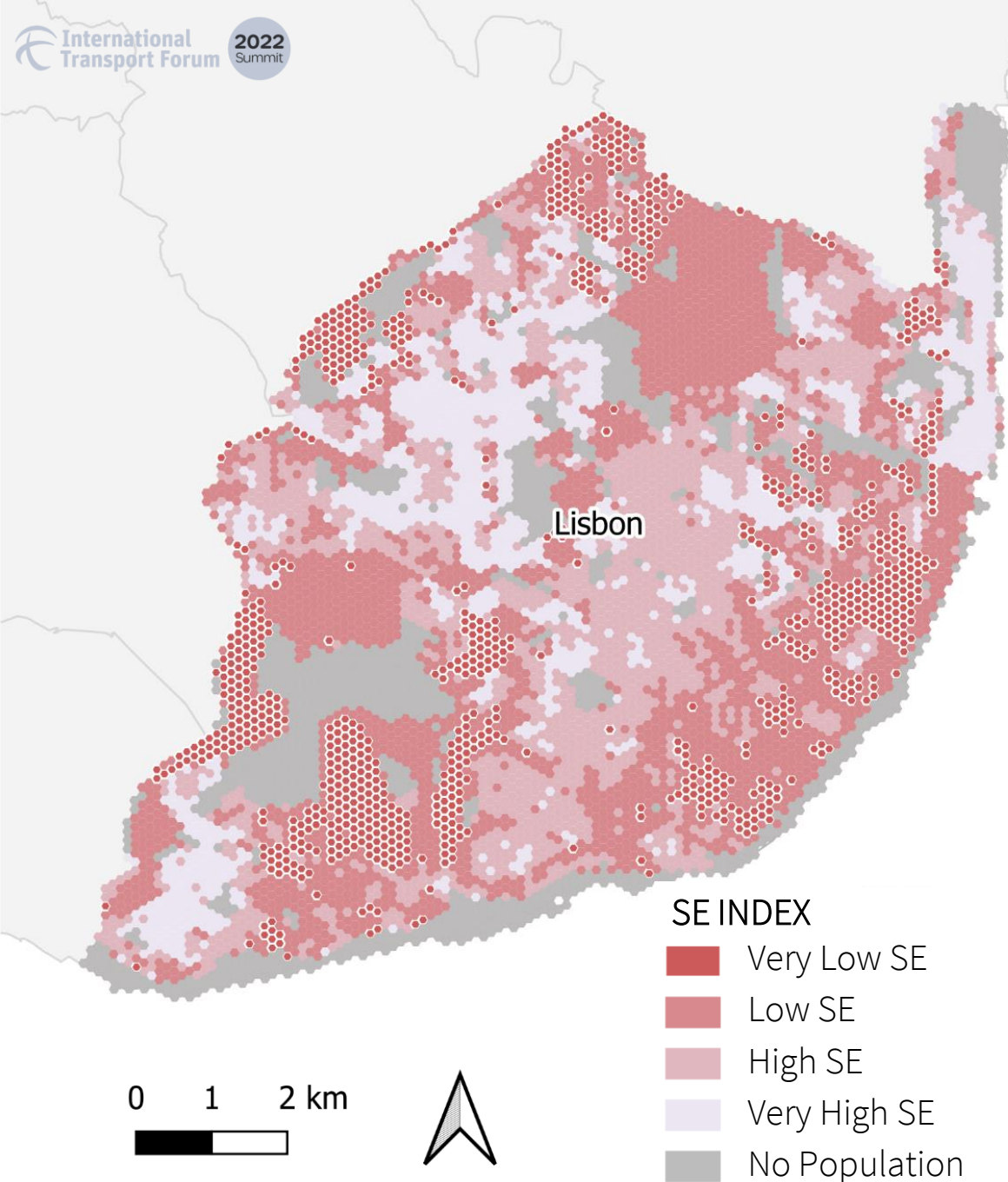
$$A_i = \sum_{j=1}^{n=1...7} O_j f(t_{i,j})$$

values were rescaled to a mean of 0 and standard deviation of 1.

ACCESSIBILITY



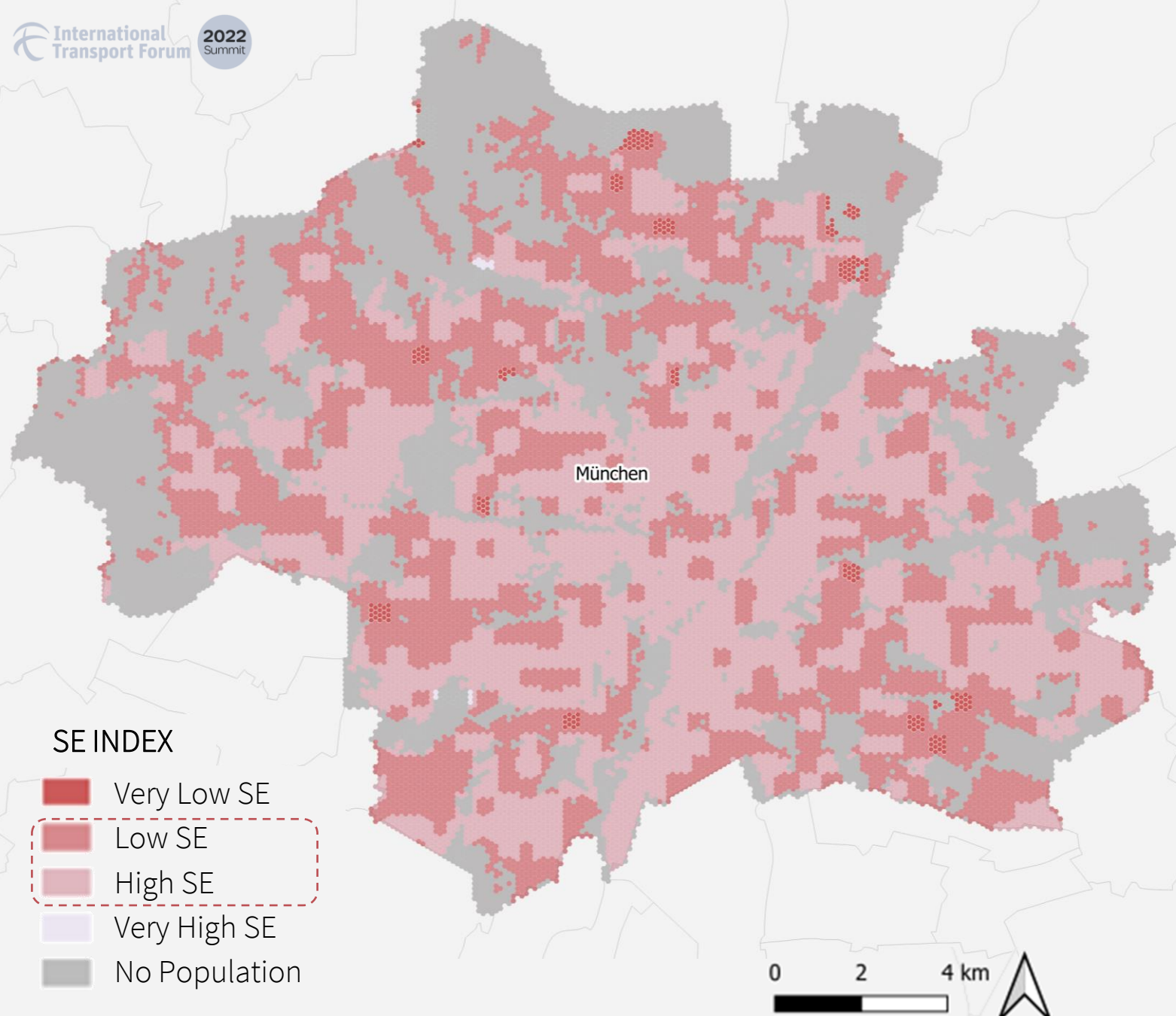




## LISBON, Source: Local Census

Socioeconomic advantage and disadvantage		Weight
Briefcase icon	No_Job: % People searching for a job	-0,407
	F_1PNoJob: % Family with one unemployed person	-0,404
	FY_Job: % Family with employed people	0,373
Graduation cap icon	Student: % Student people	0,328
	No_edu: % Illiterate people	-0,298
	Bas_edu: % People whose highest level of education attainment is basic	-0,353
	Sec_edu: % People whose highest level of education attainment is secondary	0,307
House with % icon	Ter_edu: % People with a higher degree	0,368
	H_rent: % House under rent tenure	-0,419
	H_own: % House occupied by the owner	0,385
	H_50m 2 :%Housing measuring up to 50m 2	0,404
Car icon	H_100m 2-200m 2: %Housing measuring between 100m 2 and 200m 2	0,364
	Y_car: % People who commute by car	0,373
	Immobile: %People who do not make utilitarian trips	-0,275





## MUNICH, source: Mobilität in Deutschland

Socioeconomic advantage and disadvantage	Weight
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No_Job: % People searching for a job	0,734
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Ret: % Retired people or pensioner	-0,815
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Low_edu: % People who have no education attainment or basic level	0,637
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Ter_edu: % People with a higher degree qualification	-0,867
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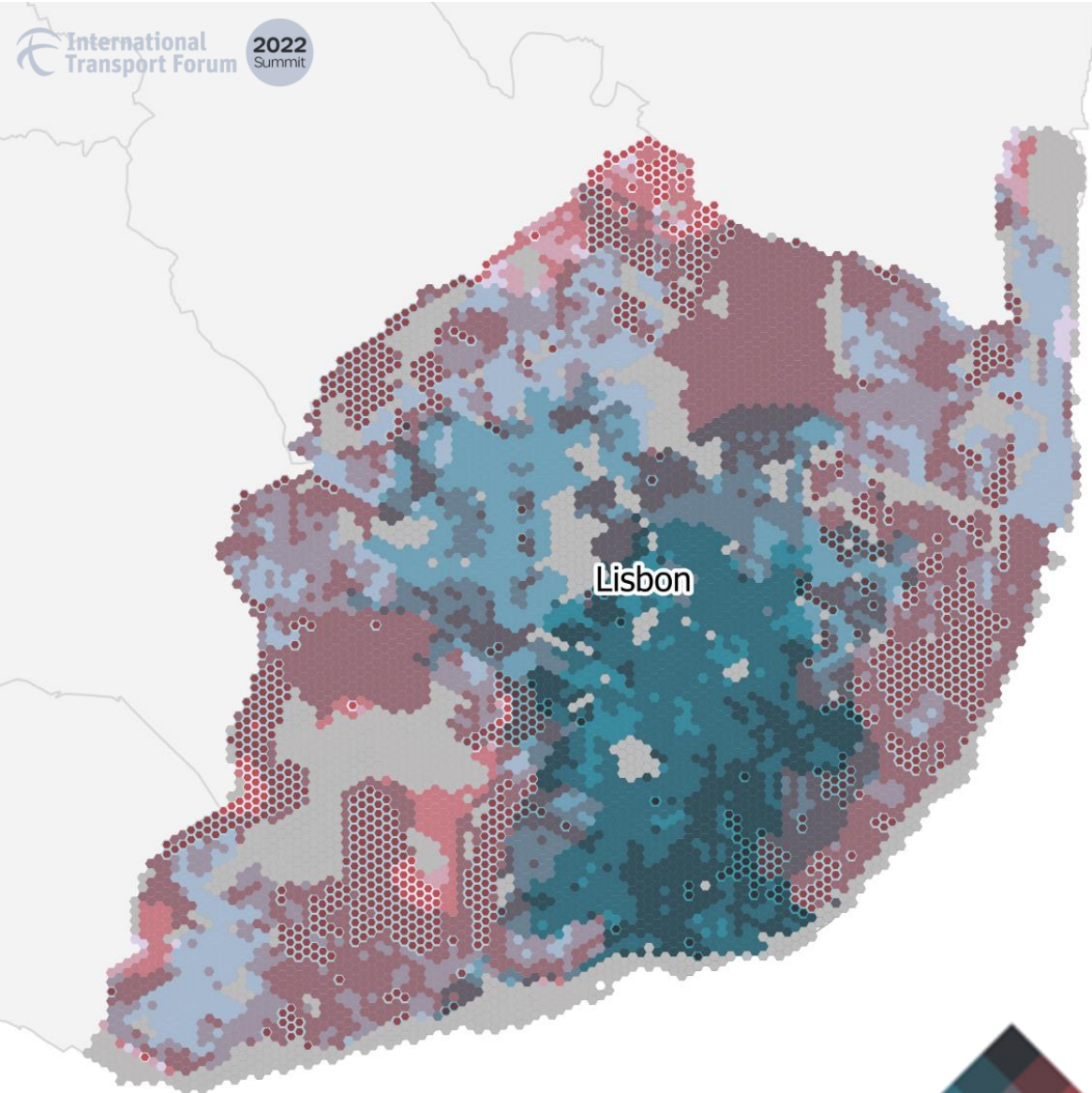
LSE: % Households with low economic conditions	-0,687
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HSE: % Households with high economic conditions	0,716
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Y_car: % People who commute by car	0,614
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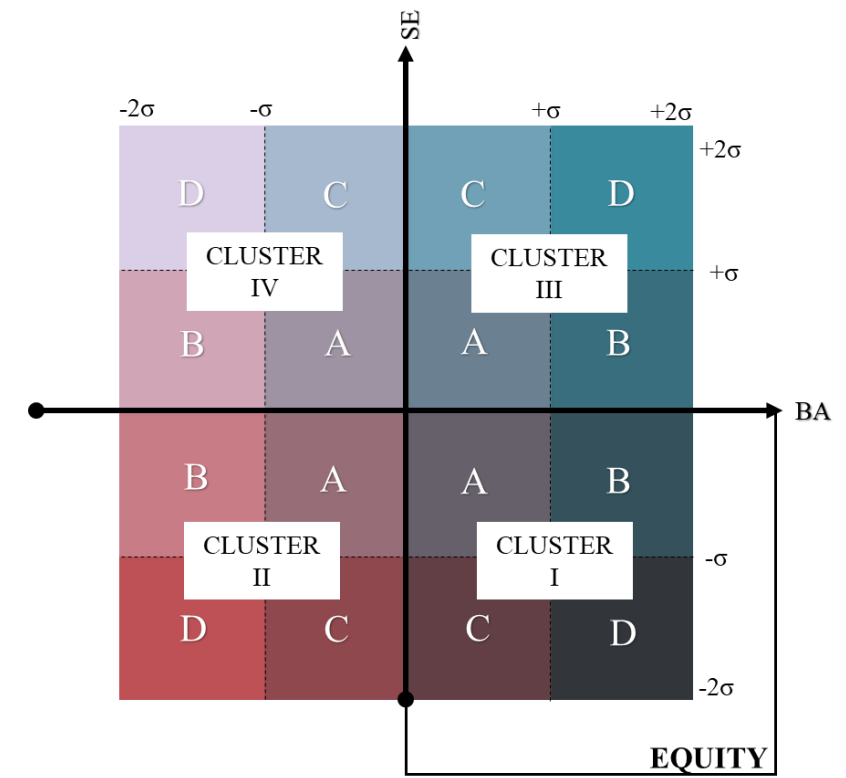
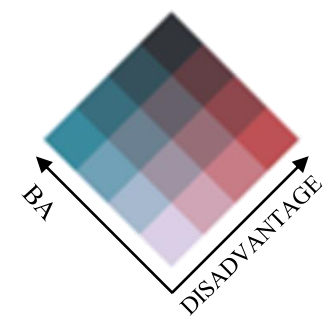
Immobile: % People who do not make utilitarian trips	-0,615
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0 1 2 km



TIRE Bivariate Analysis  
 No Population

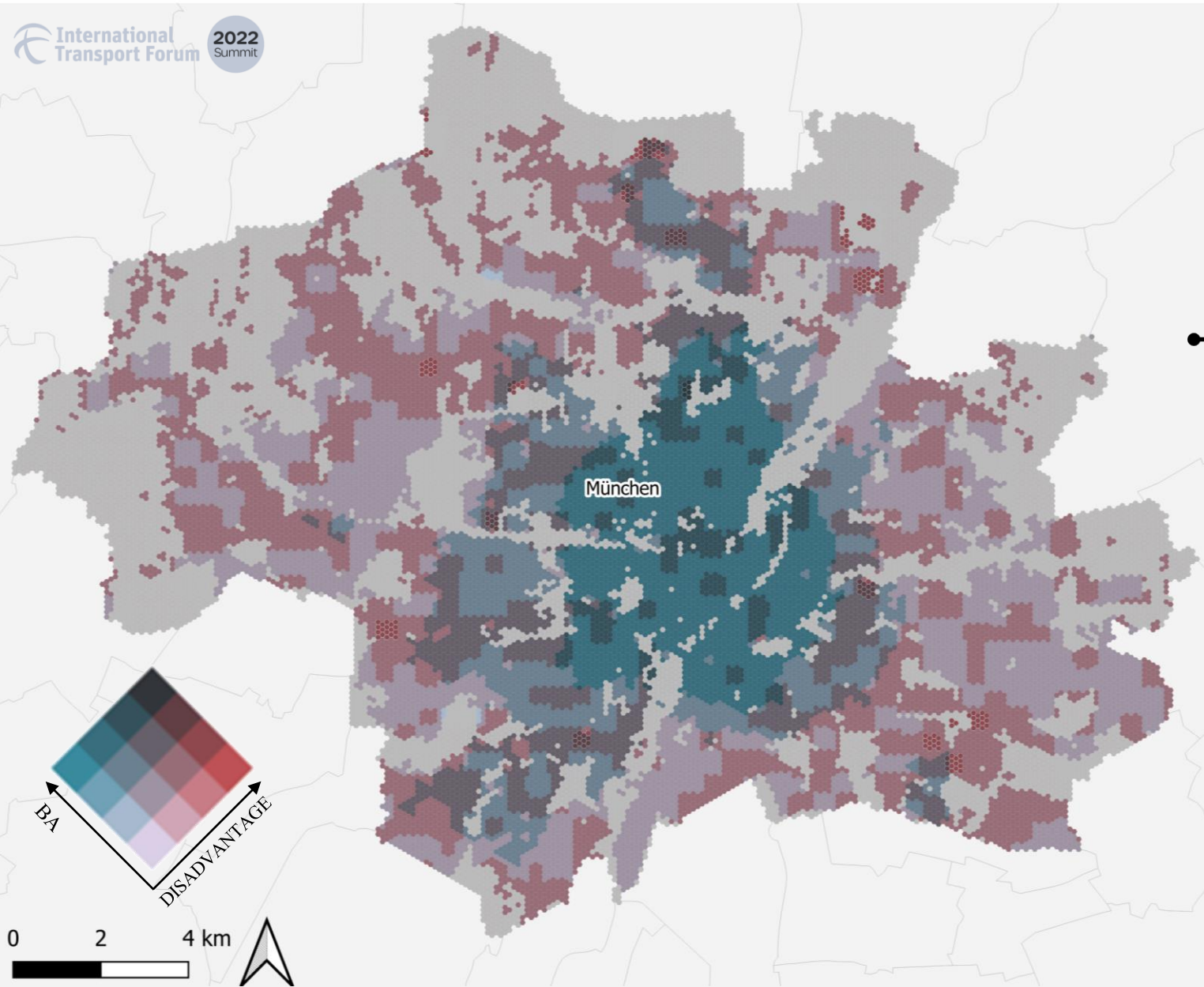


CENTRAL & EXTREME QUANTILES

Clusters	Population	Area
IABCD	20.17 %	14.41%
IIABCD	26.57%	39.09%
IIIABCD	30.7%	24.61%
IVABCD	22.56%	21.09%

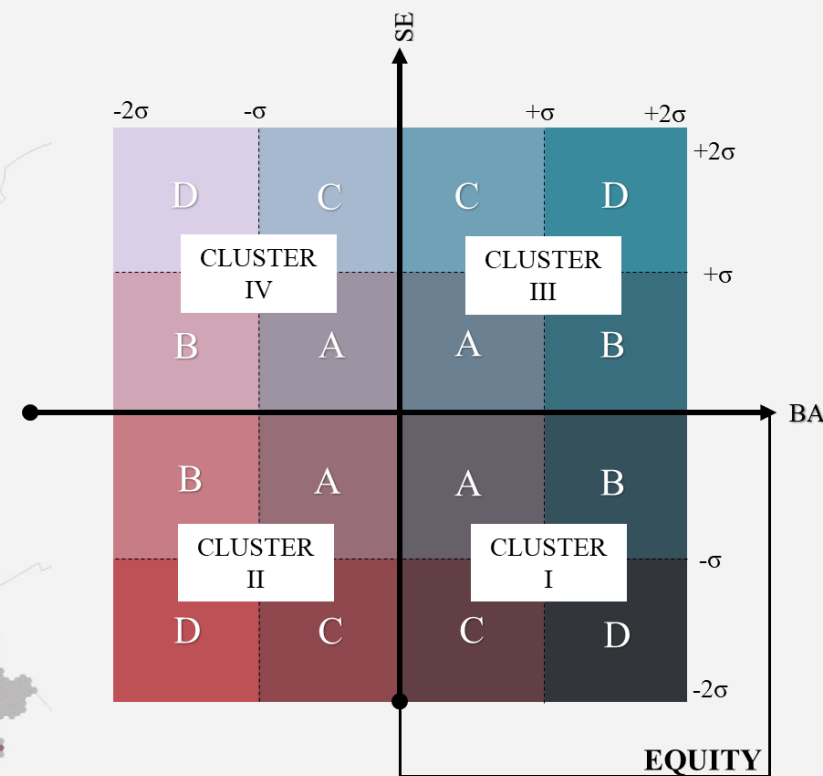
SPUR





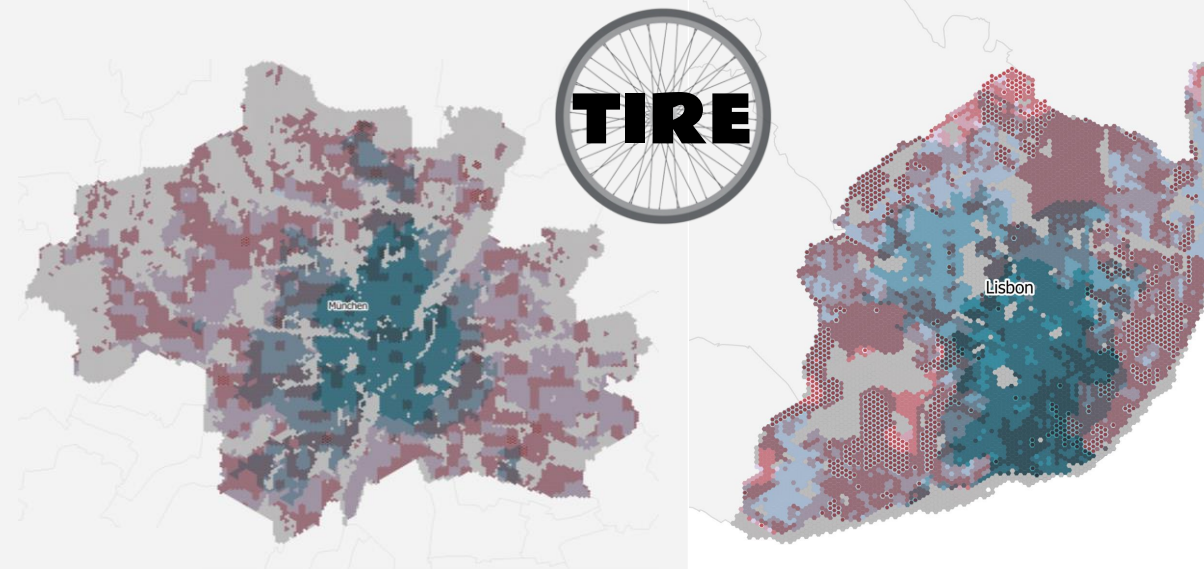
TIRE Bivariate Analysis

■ No Population



CENTRAL & EXTREME QUARTILES

Clusters	Population	Area
IABCD	20.1 %	15.7%
IIABCD	21.1%	29.5%
IIIABCD	40.2%	26.3%
IVABCD	18.5%	28.5%



**60%** of the population (located across 42% of the territory) have accessibility conditions above the municipality average.

More than half of the population has advantaged socioeconomic conditions (58% of the population).

Disadvantaged groups often have better accessibility conditions than advantaged ones.

To address a vertical equity distribution, future interventions could target 29% of the territory.

**51%** of the population (located across 40% of the territory) have accessibility conditions above the municipality average.

The great majority of disadvantaged segments have levels of accessibility below the municipality average.

Advantaged groups have systematically higher levels of accessibility than disadvantaged ones.

To address a vertical equity distribution, future interventions should target 39,09% of the territory.






## Tool for assessing the Relative Equity Impacts of Bicycle Plans Workshop with local Planners


Examining the extent to which planners and decision-makers address equity issues in the local bicycle planning. Measuring the usefulness of the tool to the planning practice.

# NEXT STEPS


# Thank you!

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