Cities in shape:

Assessing the impact of urban morphology on accessibility to urban amenities

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Prof. Rachel Franklin
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Dr. Joe Matthews

Contents

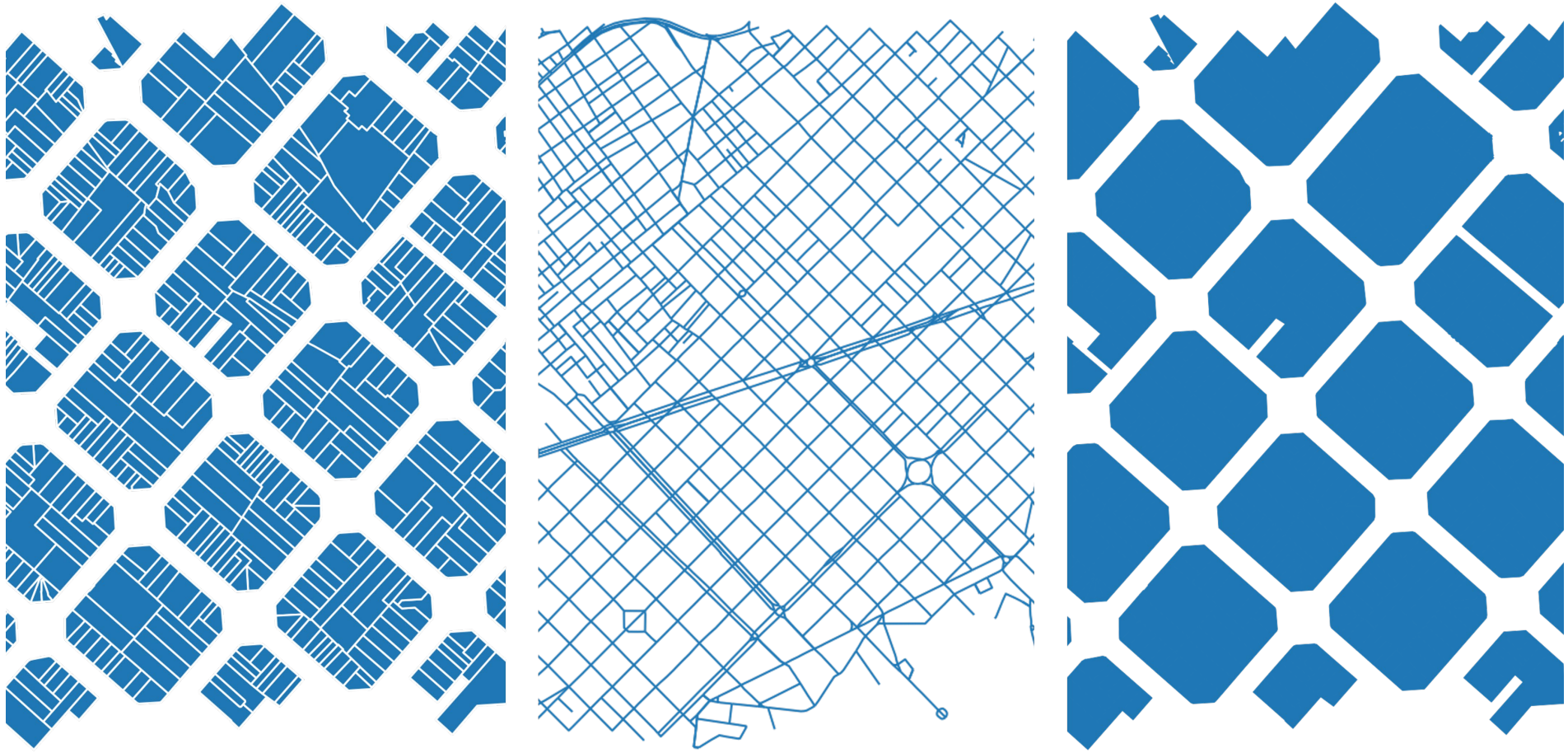
Background: Accessibility & Urban Morphology

Accessibility

Accessibility *is the ease with which opportunities can be reached from an origin*

Hansen, W. G. (1959). How accessibility shapes land use. Journal of the American Institute of planners, 25(2), 73-76.
Páez, A., Scott, D.M. and Morency, C., 2012. Measuring accessibility: positive and normative implementations of various accessibility indicators. *Journal of Transport Geography*, *25*, pp.141-153.

Urban Morphology



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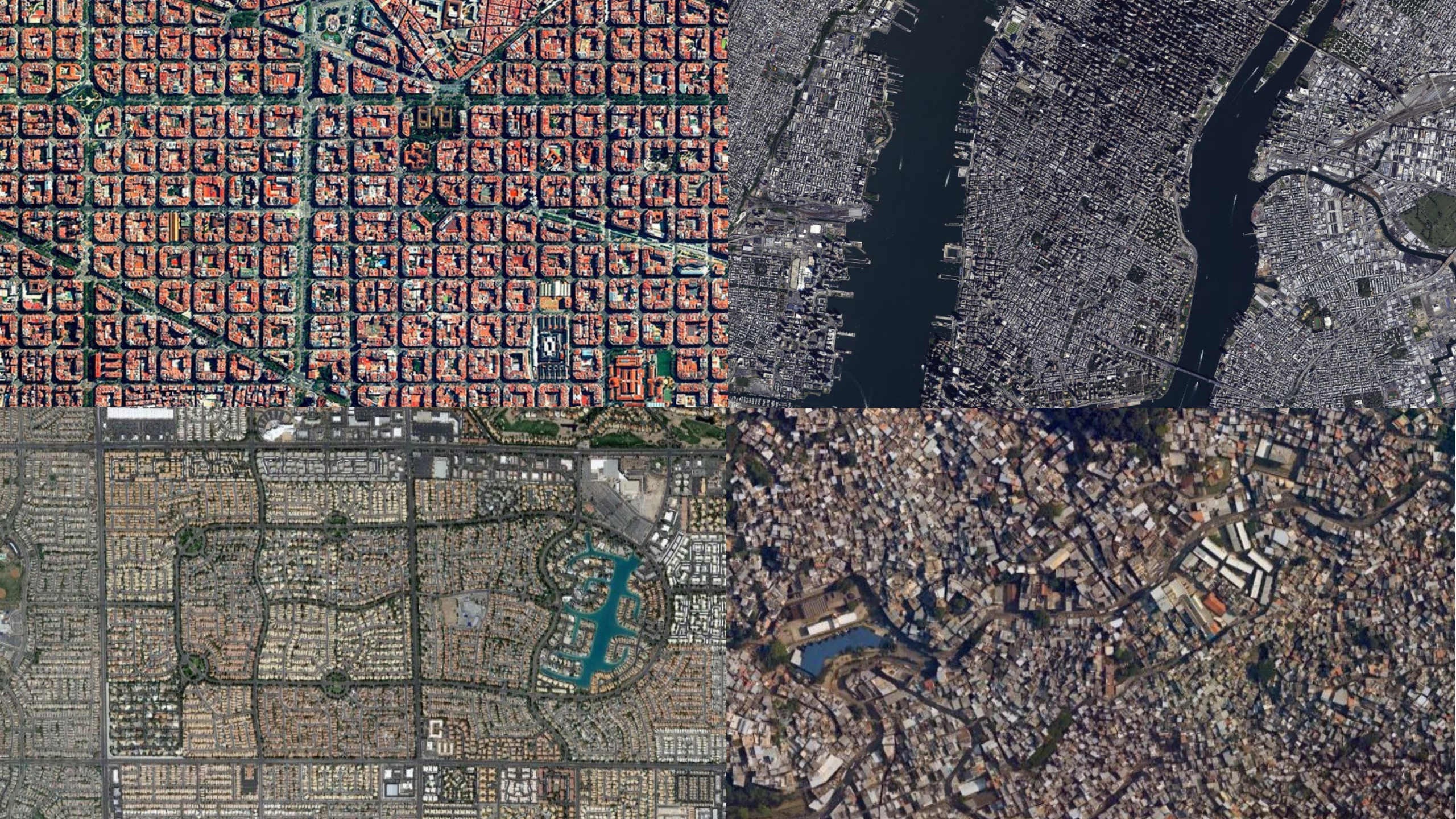


Background

- **Accessibility + Urban morphology + Sustainable cities** (Boeing, G., et al., 2022, Ewing, R., & Handy, S., 2009)
- **Urban air pollution** (Burnett et al., 2018; Khomenko et al., 2021; Landrigan et al., 2018)
- **Motorised traffic** (Kumar et al., 2020; Sicard et al., 2020; Tobías et al., 2020)

Research Gap & Questions

Research Questions

- RQ1 – How does an accessibility index to urban amenities vary when considering different demographic groups?
- RQ2 – What urban tissues favour accessibility the most? (quantitative analysis)
- RQ3 – Can urban tissue simulation help us evaluate the accessibility of future urban developments?

Methods & Data

Accessibility score

Morphometric analysis

Urban tissue simulation

Accessibility score

↓

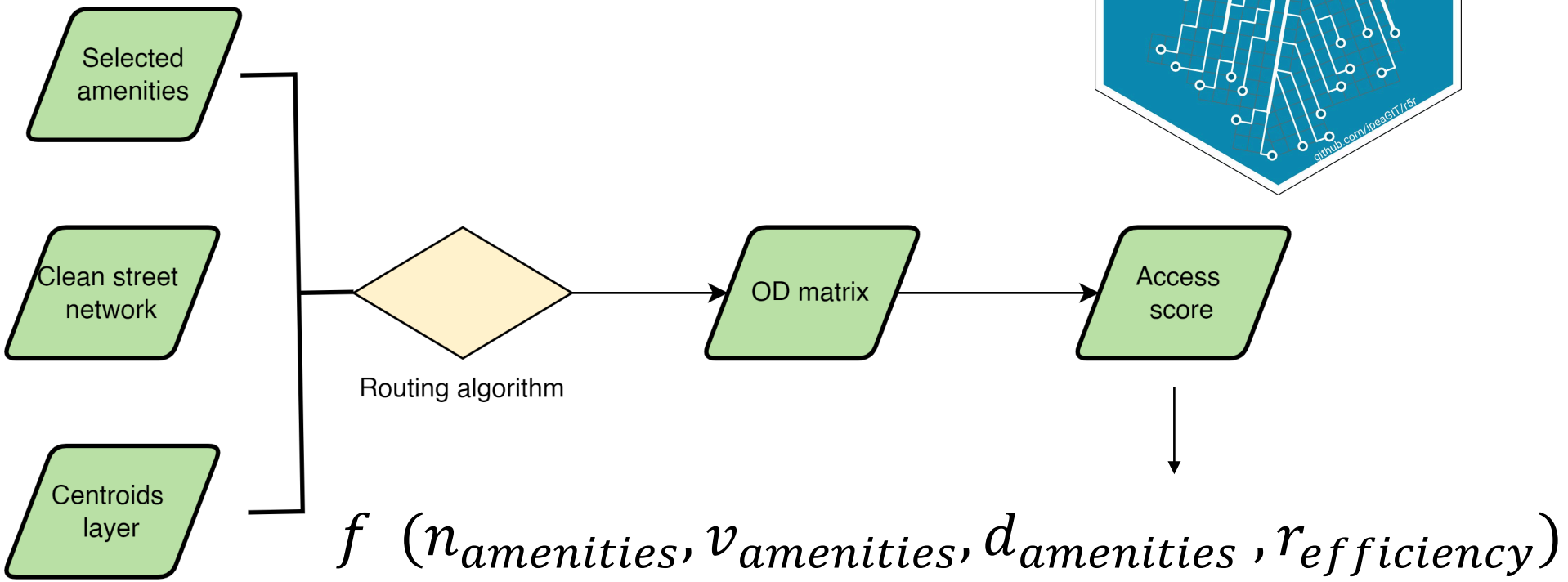
Morphometric analysis

↓

Urban tissue simulation

Methods & Data

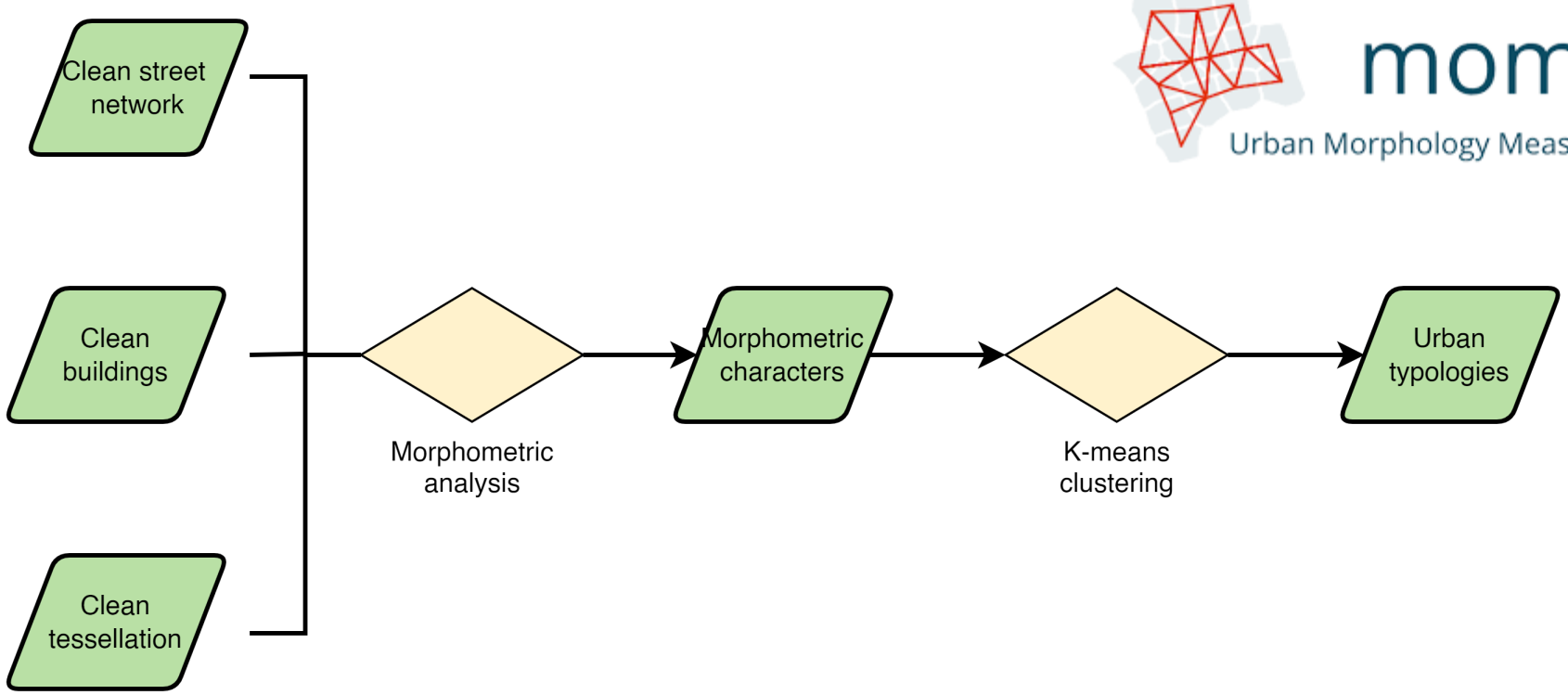
Selected cities in Europe and North America



$$f\ (n_{amenities}, v_{amenities}, d_{amenities}, r_{efficiency})$$

Pereira, Rafael H. M., Marcus Saraiva, Daniel Herszenhut, Carlos Kaue Vieira Braga, and Matthew Wigginton Conway. 2021. “R5r: Rapid Realistic Routing on Multimodal Transport Networks with R5 in R.” Findings, March.

Methods & Data



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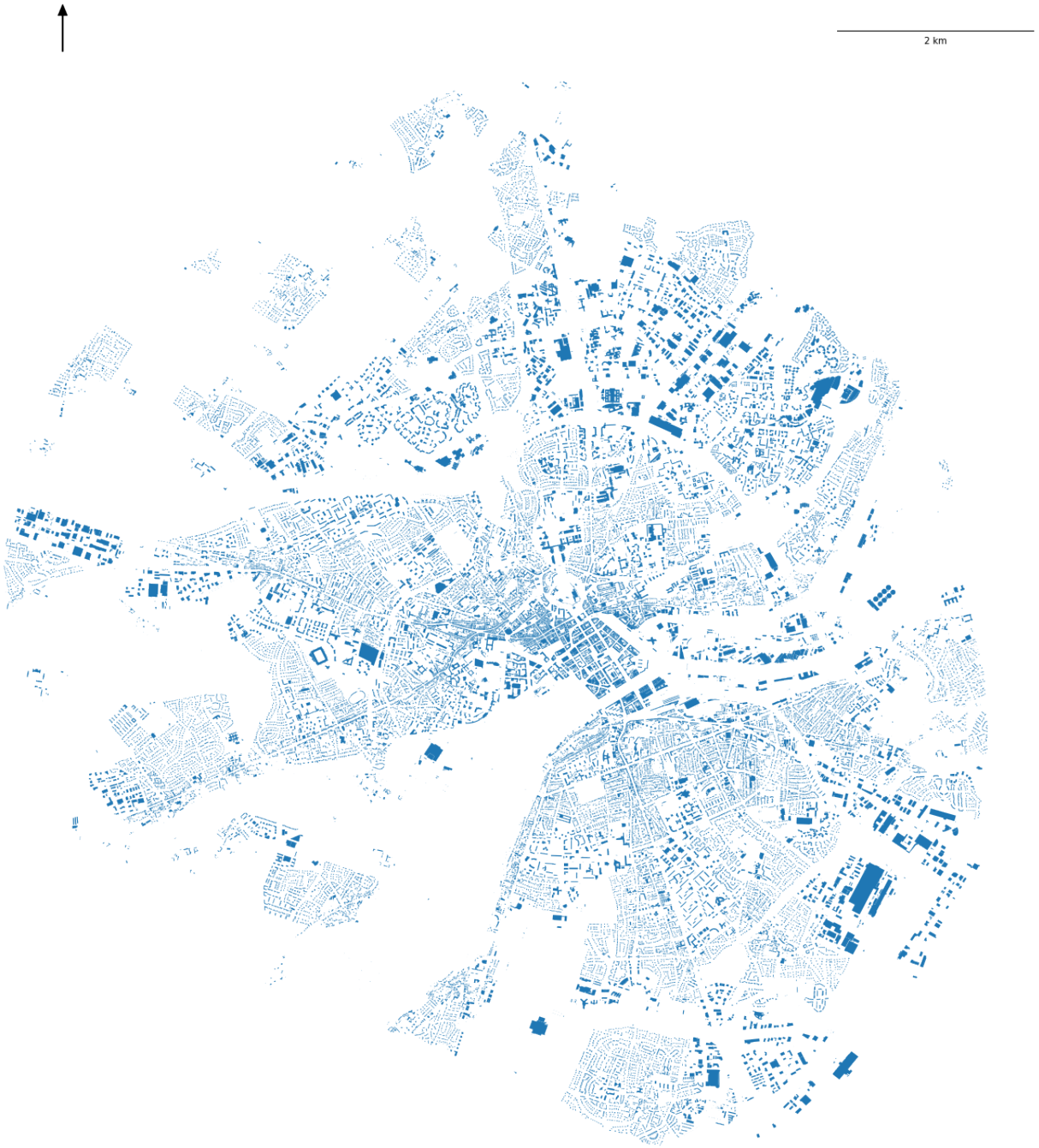
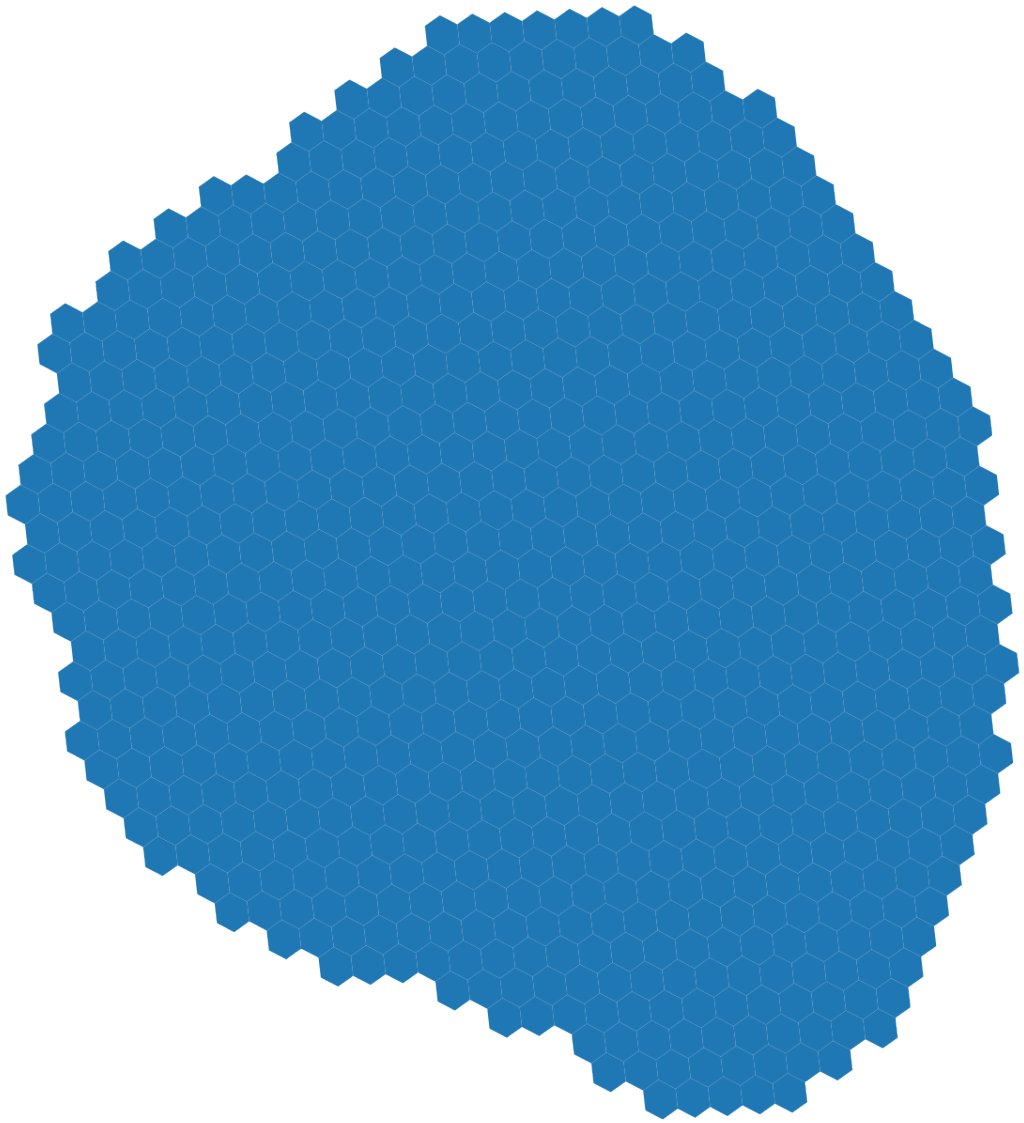
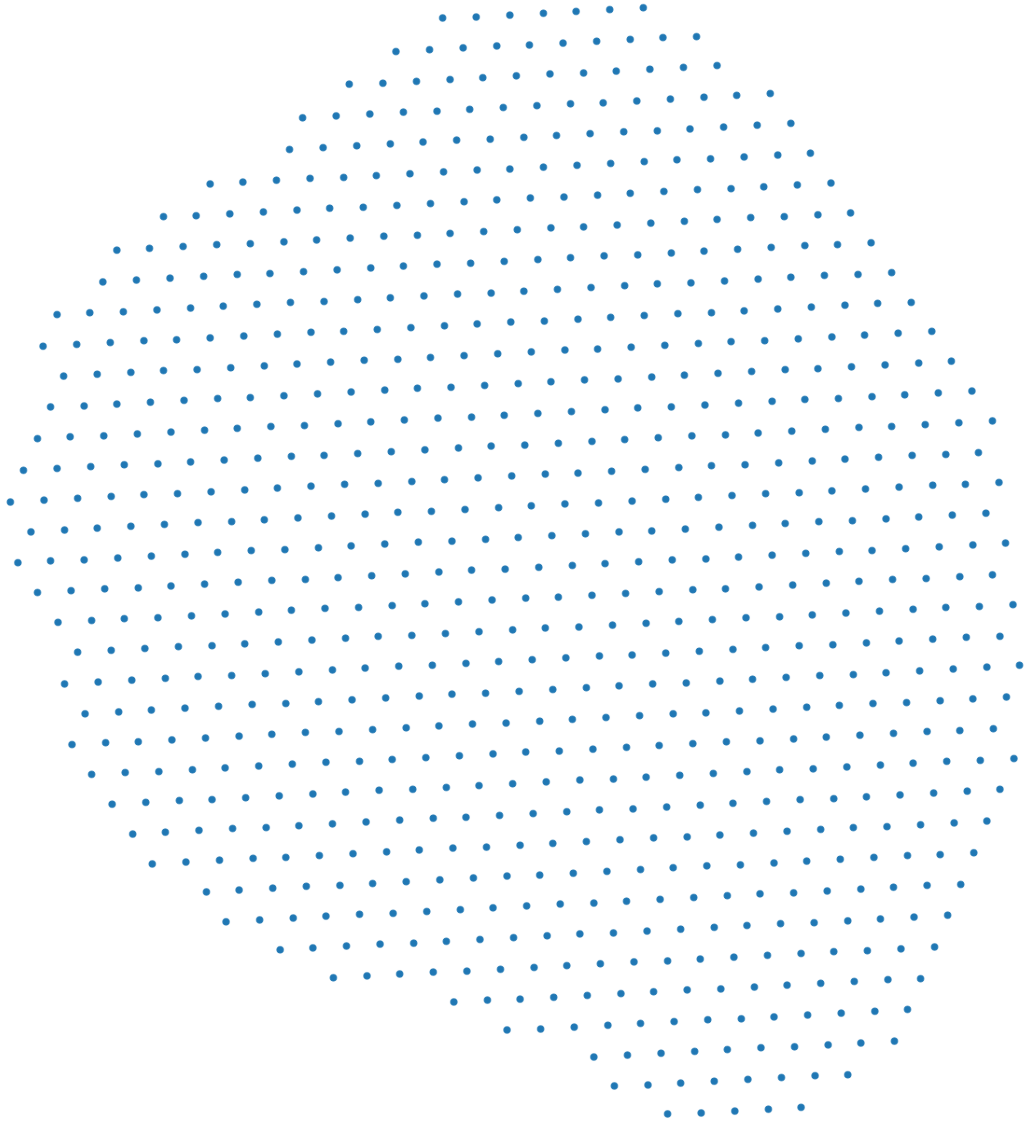

2 km

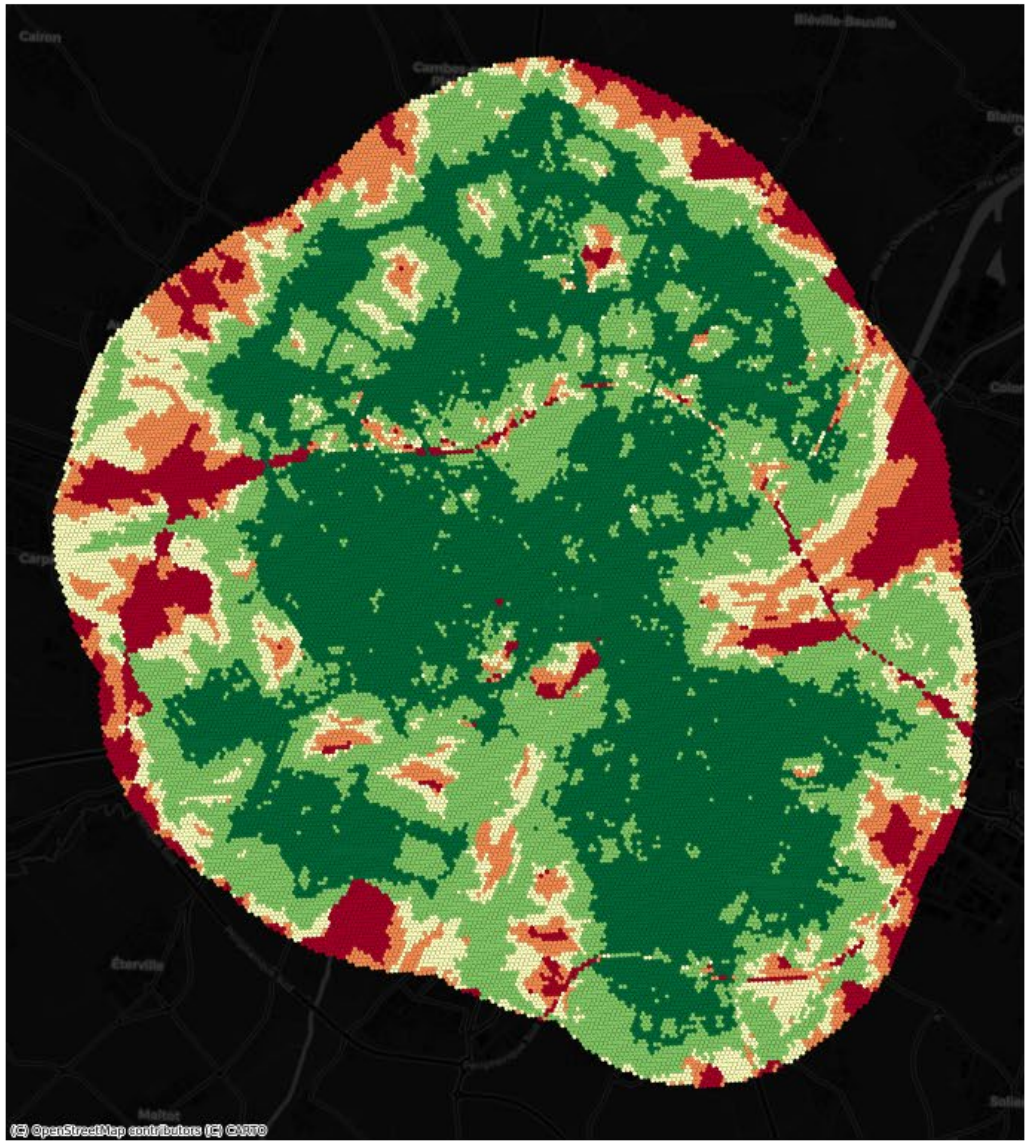

2 km

Sample Results

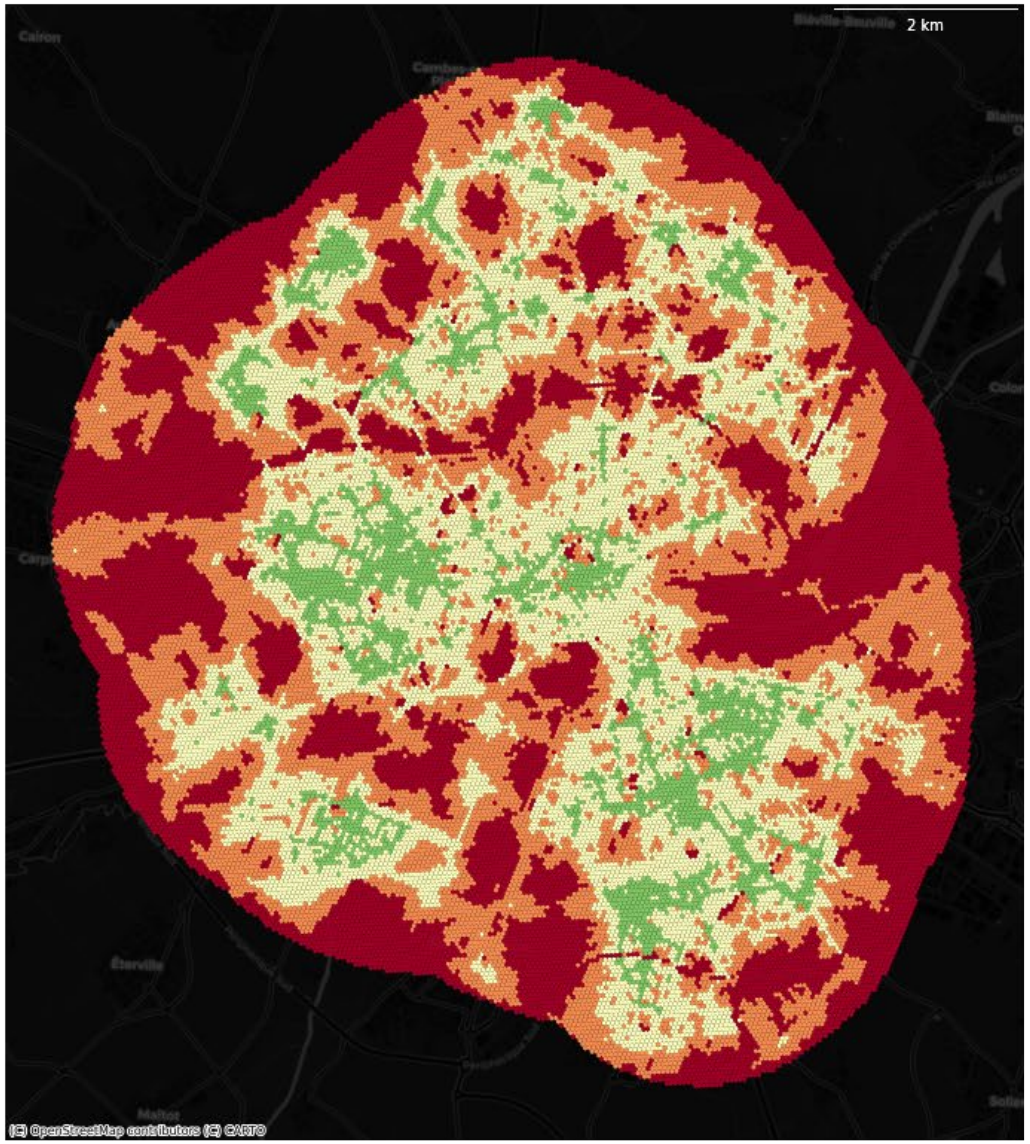




Results Adults



Results seniors



Very low access
Low access
Medium access
High access
Very high access

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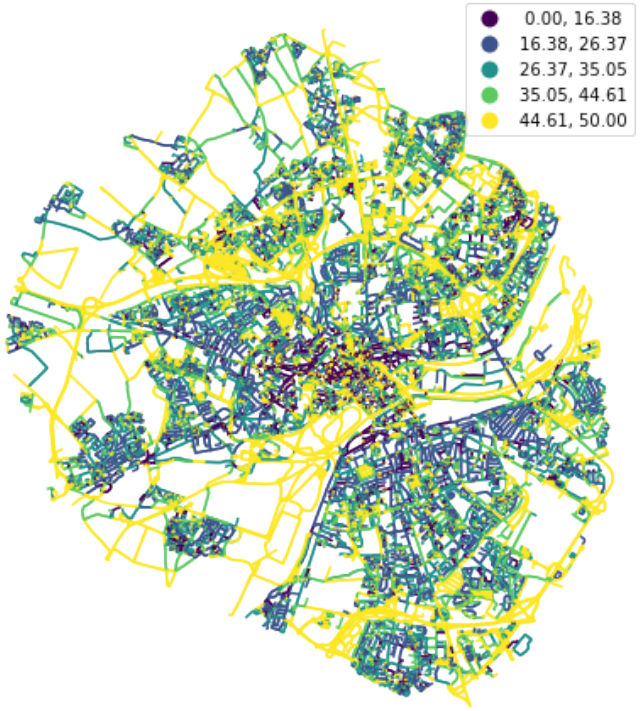
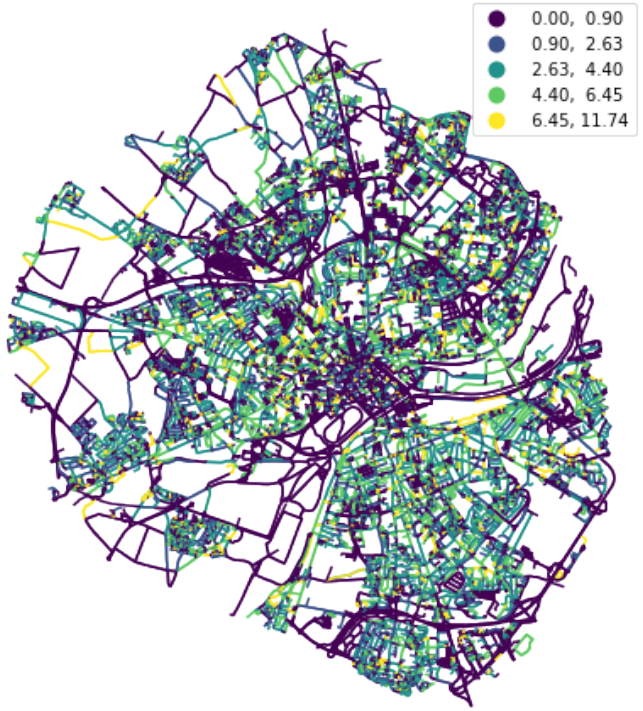
GEOSPATIAL SYSTEMS
CENTRE FOR DOCTORAL TRAINING

Width

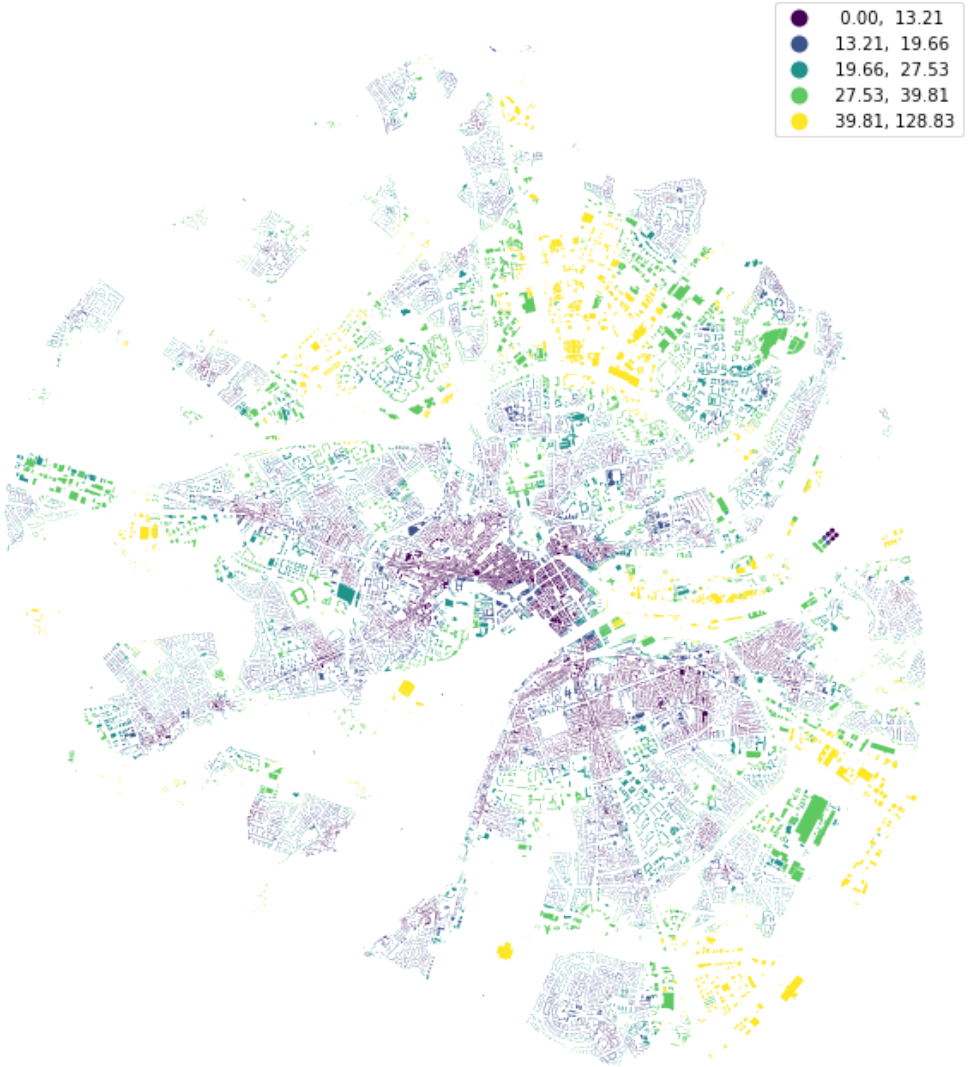


Width deviation

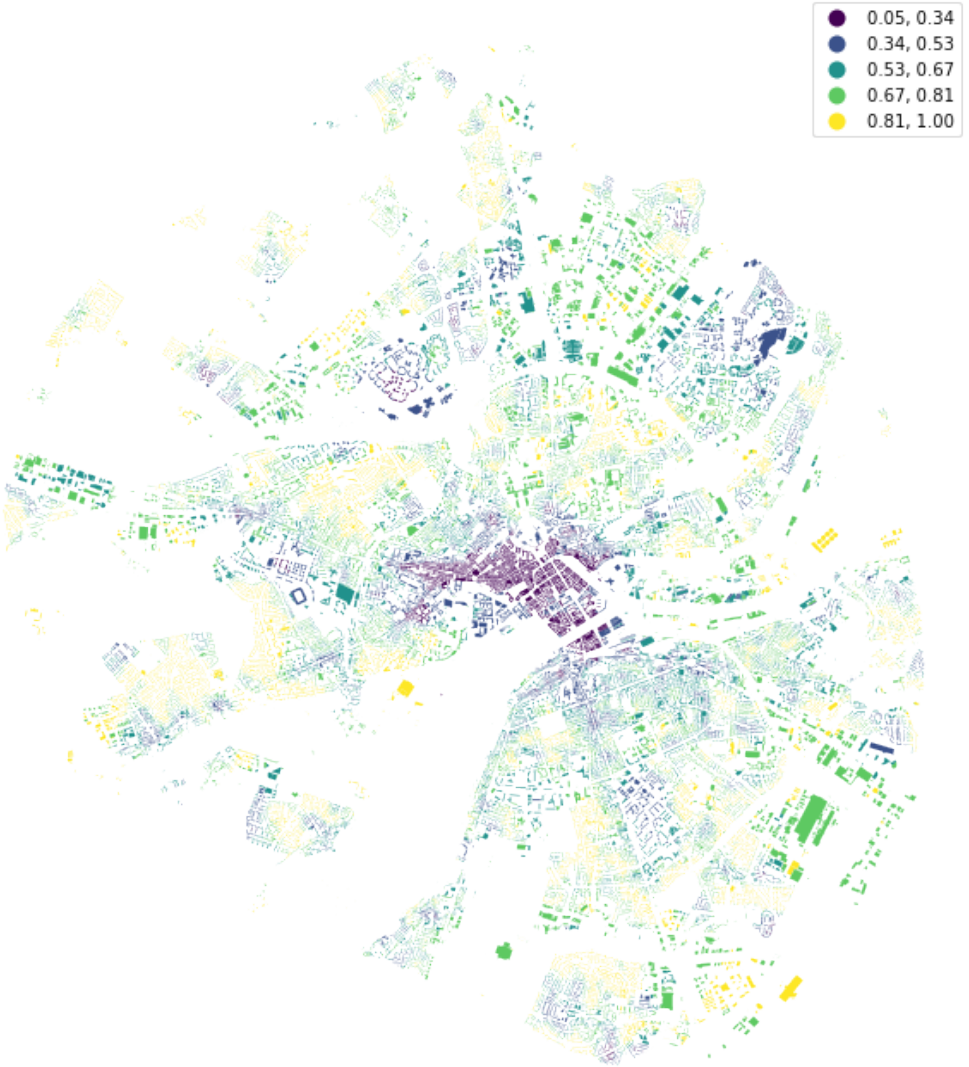


Openness

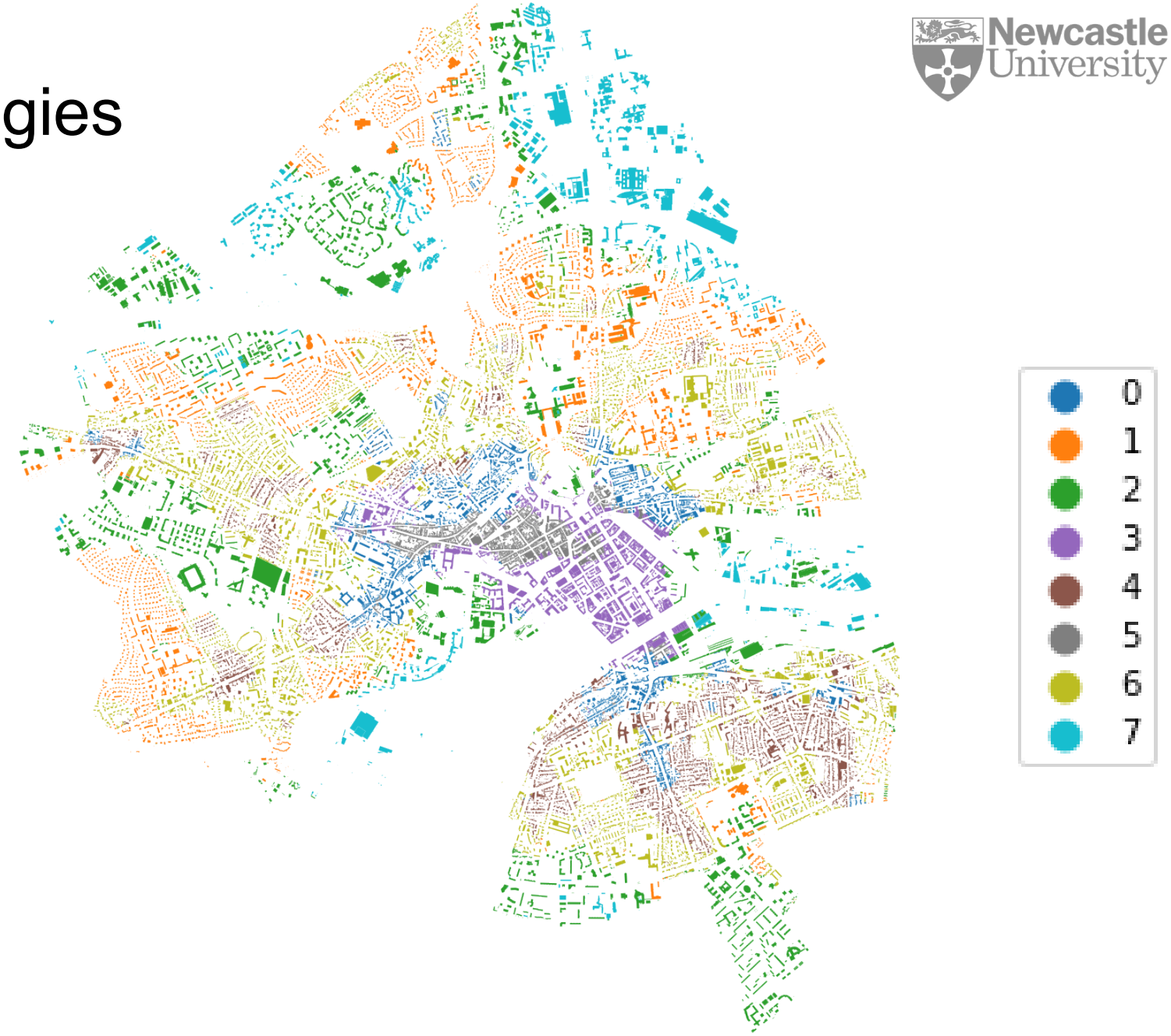
Inter-building distance



Adjacency



Urban typologies



Future Work & Limitations

Future Work

- Time Use Survey for amenity weighting - UK
- GWR to quantify relationship between access and form.
- Deep Learning for urban tissue simulation.
- Dasymetric population methods for socioeconomic variables

Limitations

The limits of open data

Thank you

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