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# Cities in shape:

Assessing the impact of urban morphology  
on accessibility to urban amenities

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# Contents

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I. Background

II. Research Gap & Question

III. Methods & Data

IV. Sample Results

V. Future Work & Limitations



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# Background: Accessibility & Urban Morphology

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# Accessibility

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*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

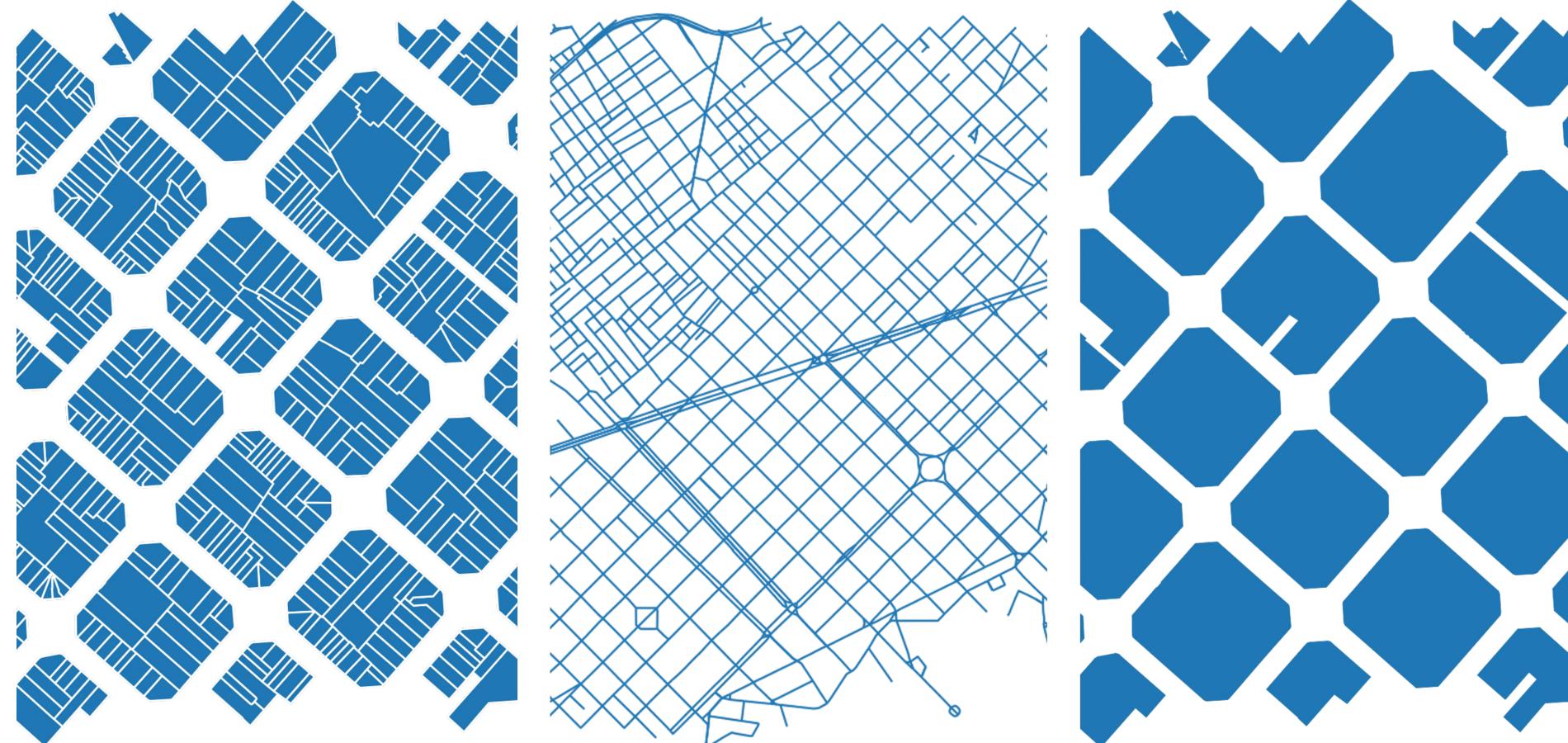
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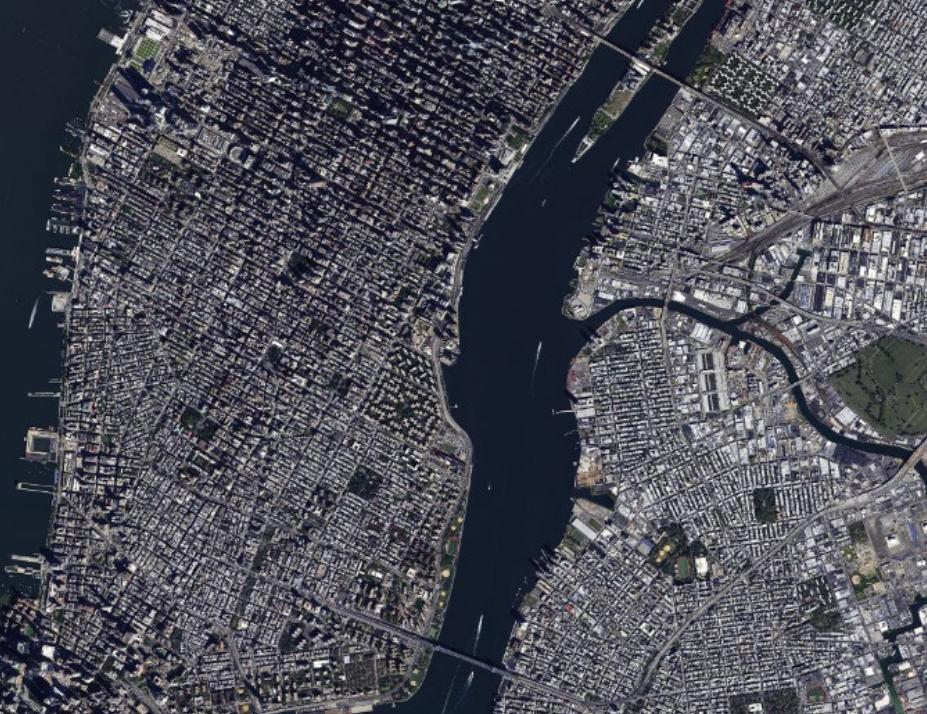
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Oliveira, V., Oliveira, V. (2016). Urban Morphology: An Introduction to the Study of the Physical Form of Cities. Germany: Springer International Publishing.





# Background

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- **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)



# Background

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- Boeing, G., et al. (2022). **Using open data and open-source software to develop spatial indicators of urban design and transport features for achieving healthy and sustainable cities.** *The Lancet Global Health*, 10(6), p. 907– p. 918.
- Lahoorpoor, B., et al. (2022). **Access-oriented design? Disentangling the effect of land use and transport network on accessibility.** *Transportation Research Interdisciplinary Perspectives*, 13. 100536.
- Ewing, R., & Handy, S. (2009). **Measuring the Unmeasurable: Urban Design Qualities Related to Walkability.** *Journal of Urban Design*, 14(1), 65–84.
- Calafiore, A., et al. (2022). **The 20-minute city: An equity analysis of Liverpool City Region.** *Transportation Research Part D: Transport and Environment*, 102, 103111.



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# Research Gap & Questions

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# Research Questions

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



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# Methods & Data

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# Accessibility score



# Morphometric analysis



# Urban tissue simulation

# Accessibility score

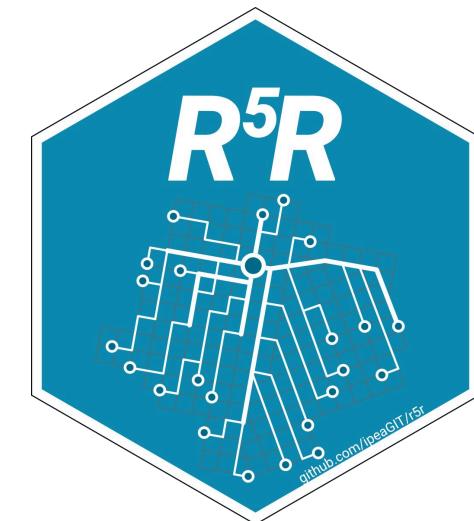
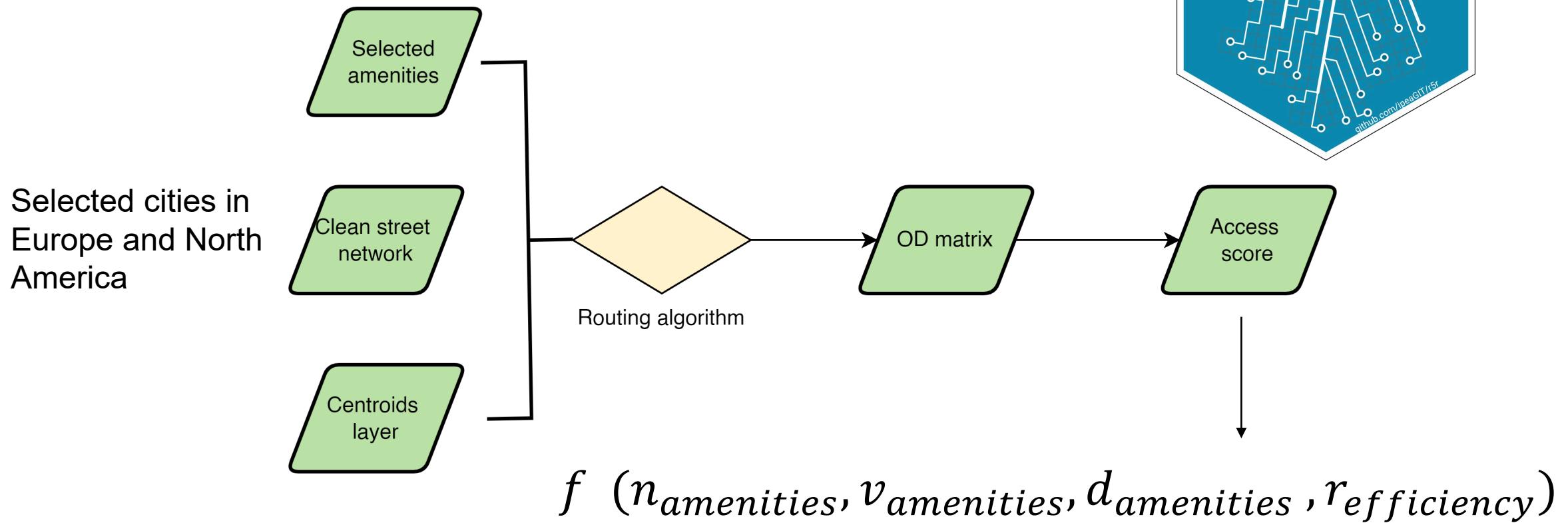


# Morphometric analysis



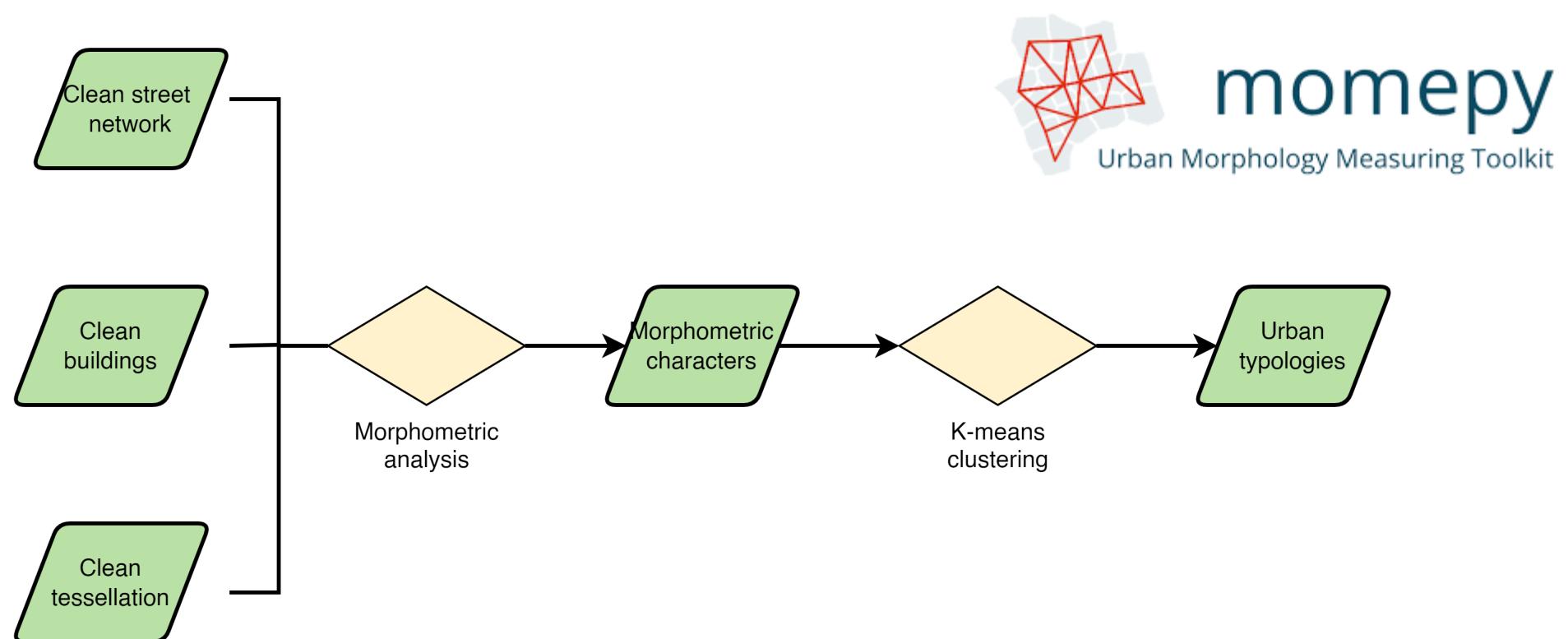
# Urban tissue simulation

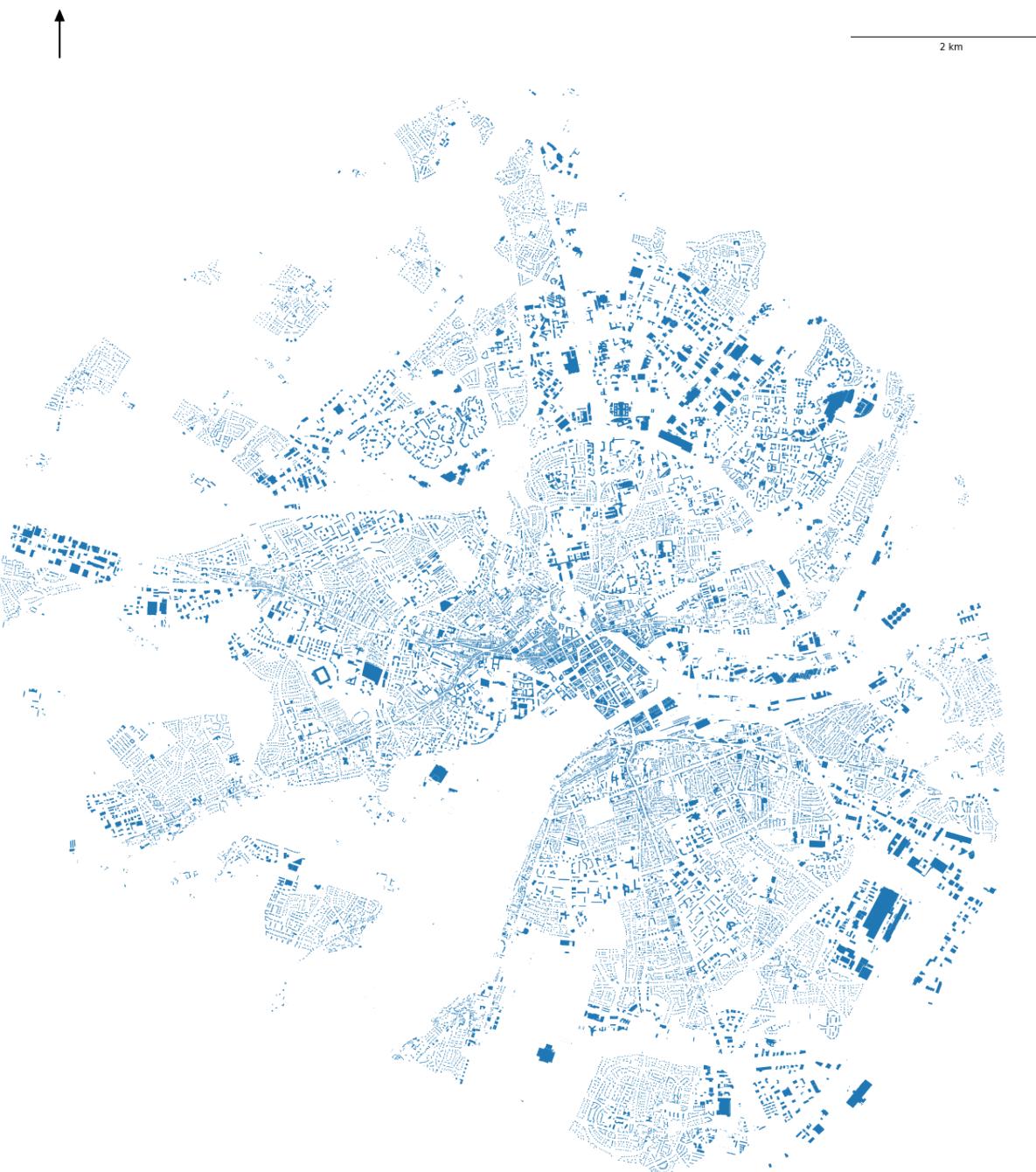
# Methods & Data



# Methods & Data

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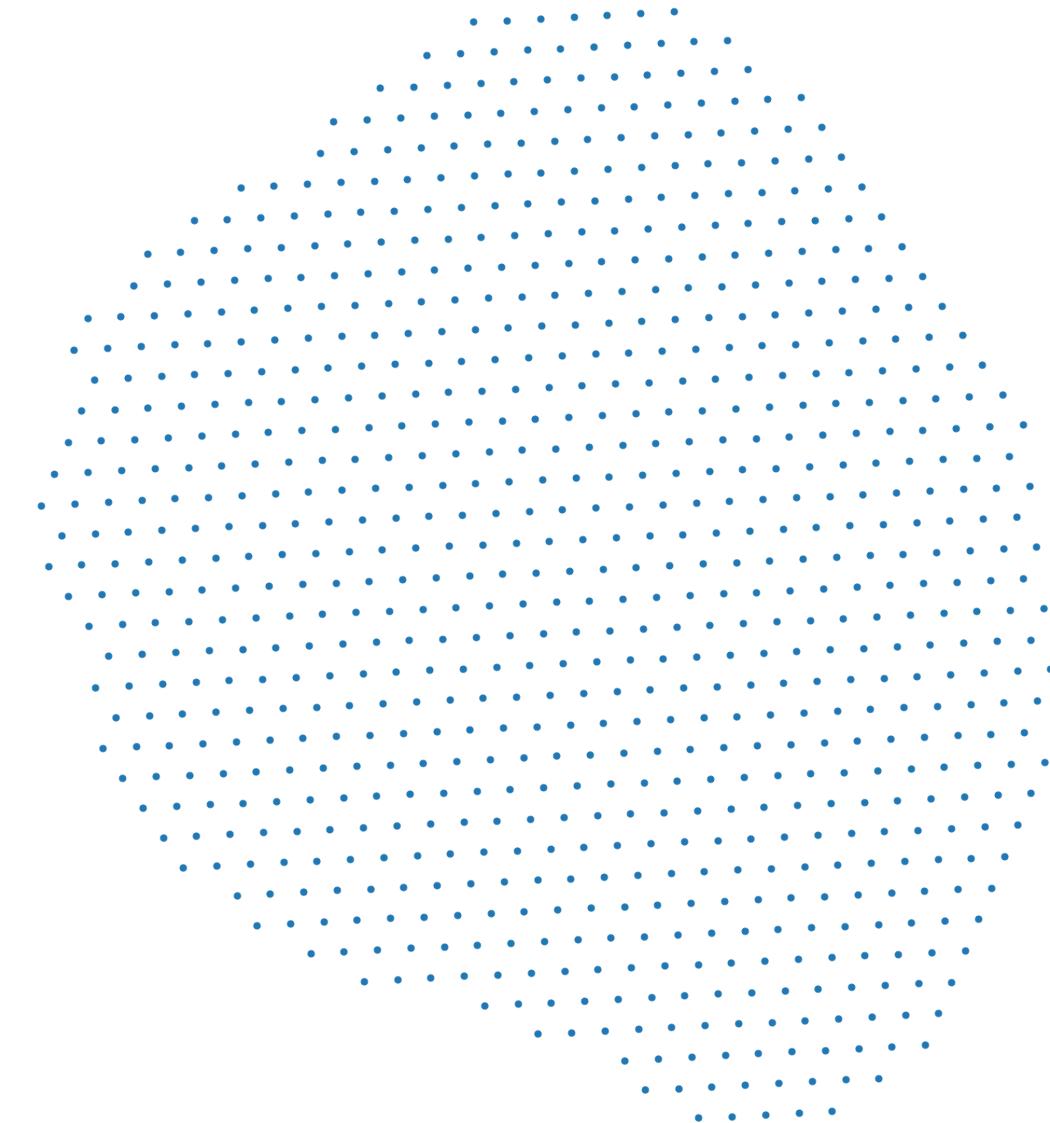
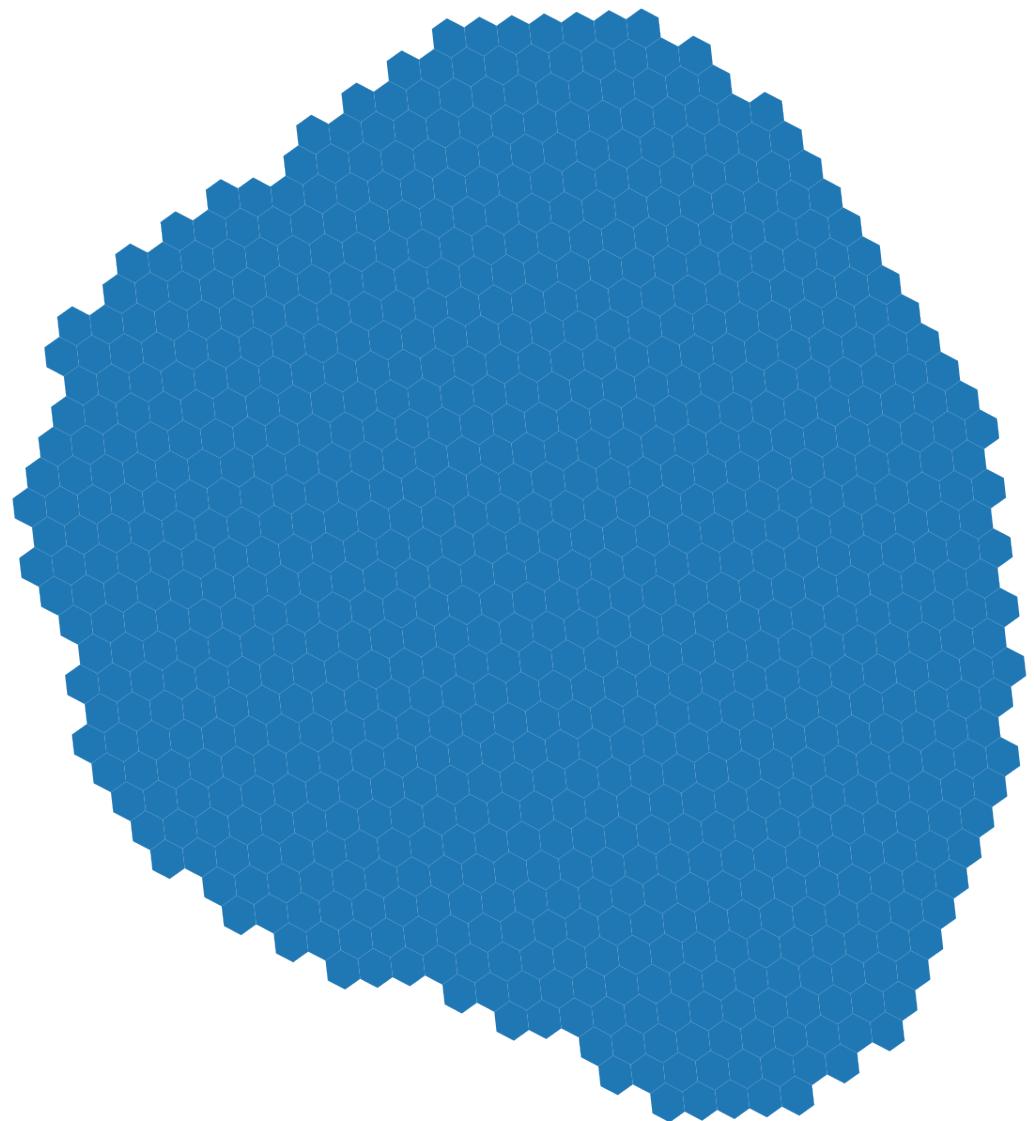


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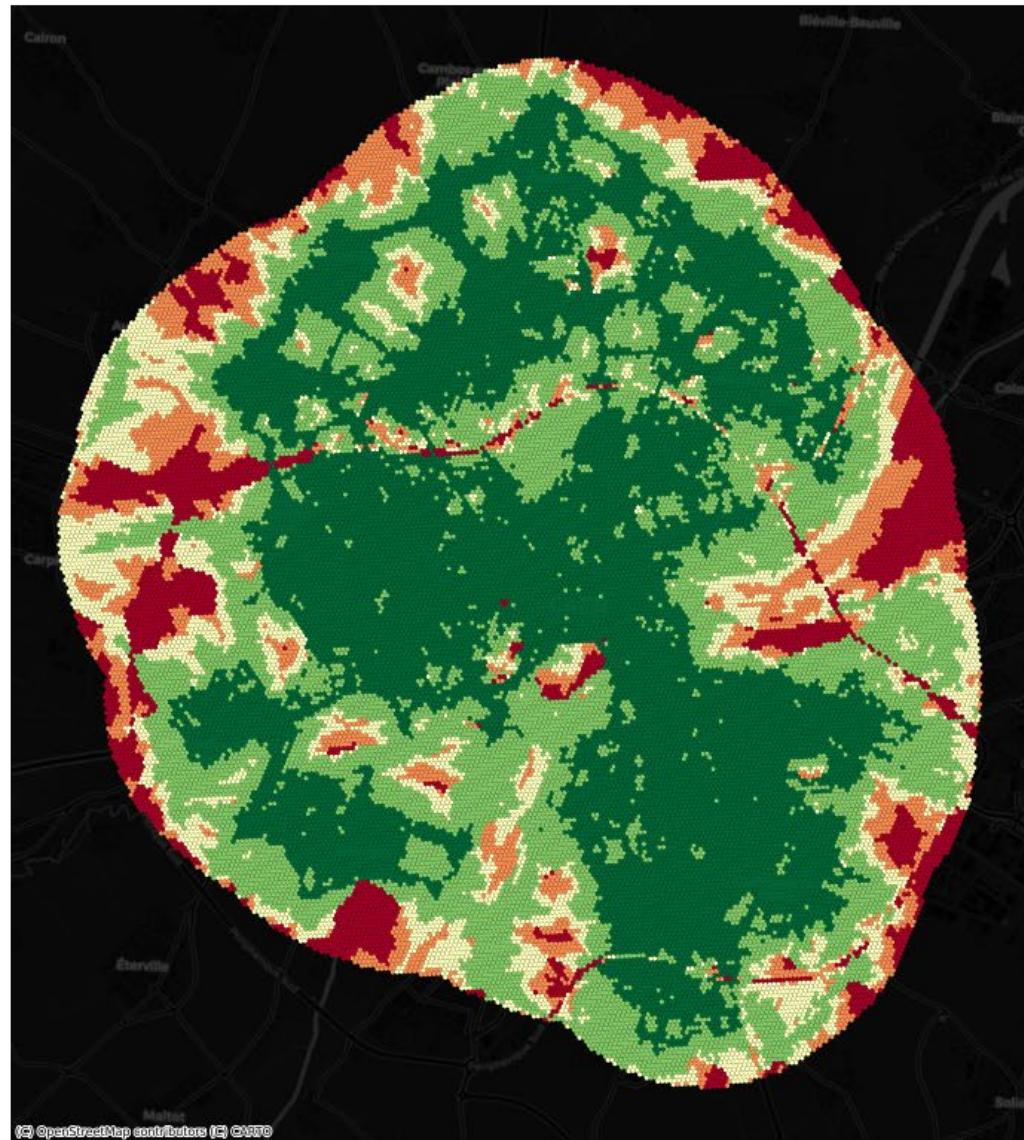


# Sample Results

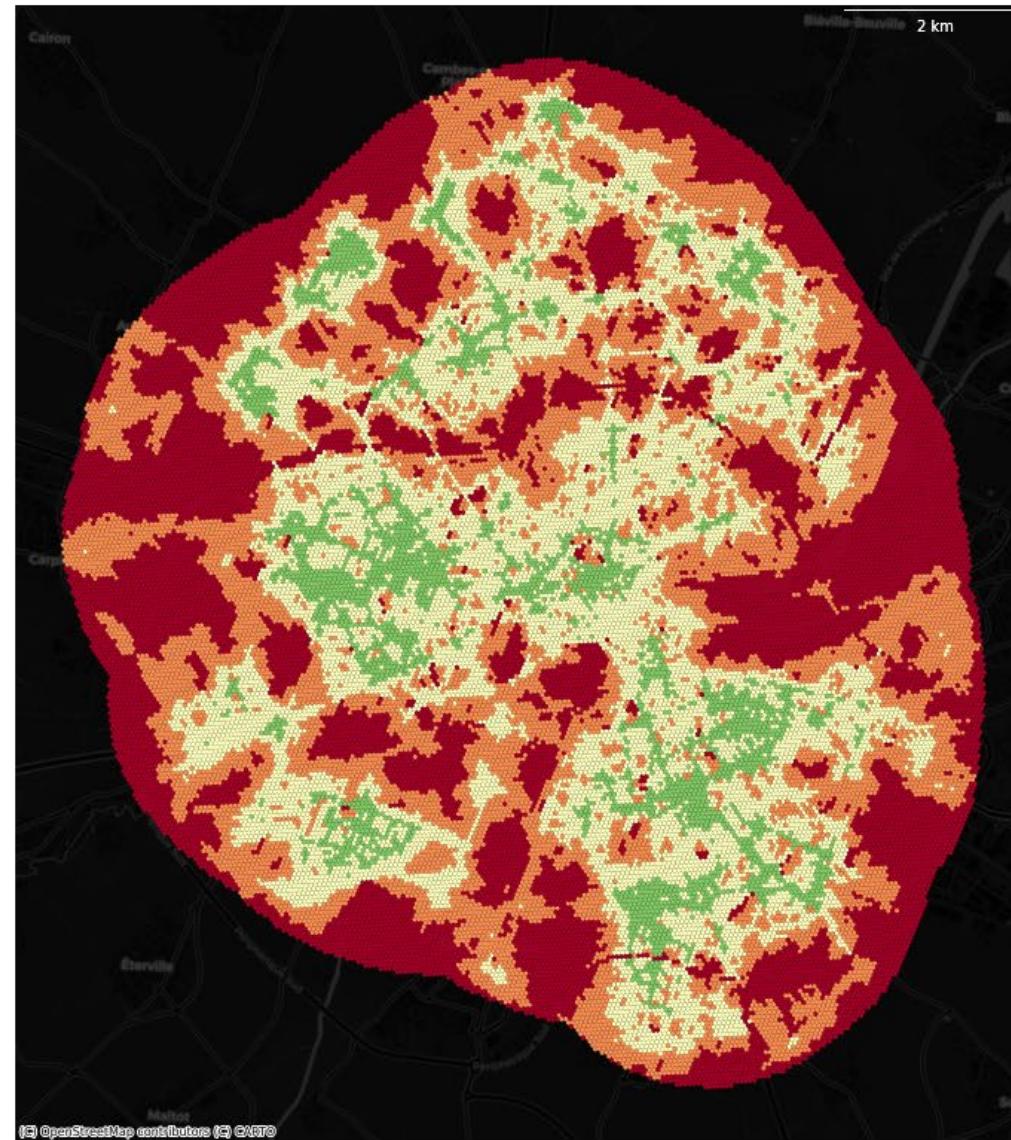
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# Mobility score adults



# Mobility score seniors

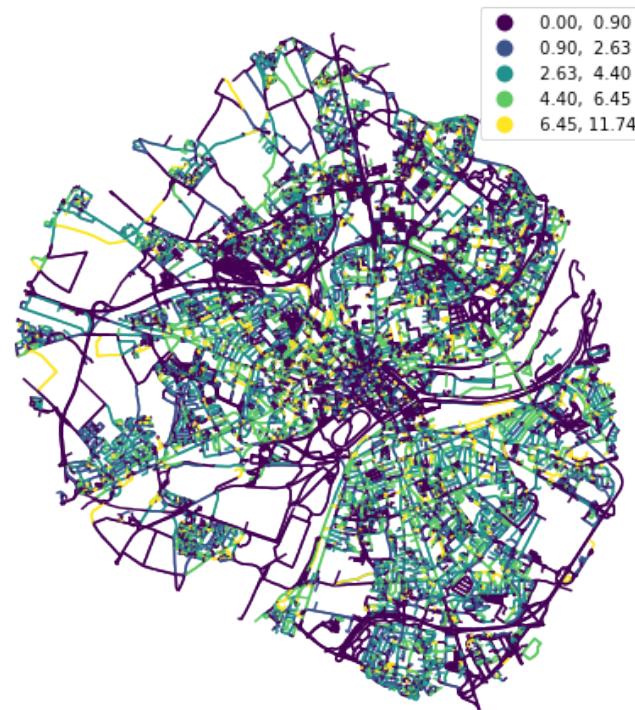


- Very low access
- Low access
- Medium access
- High access
- Very high access

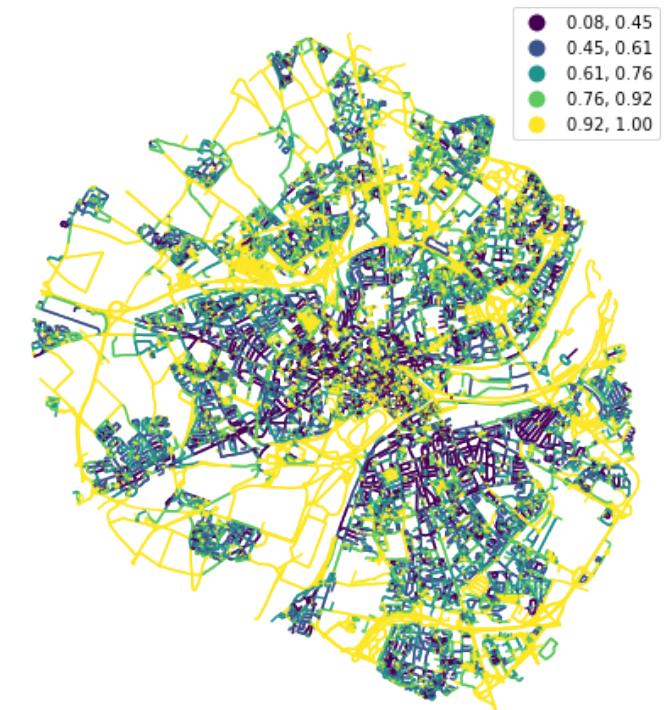
## Width



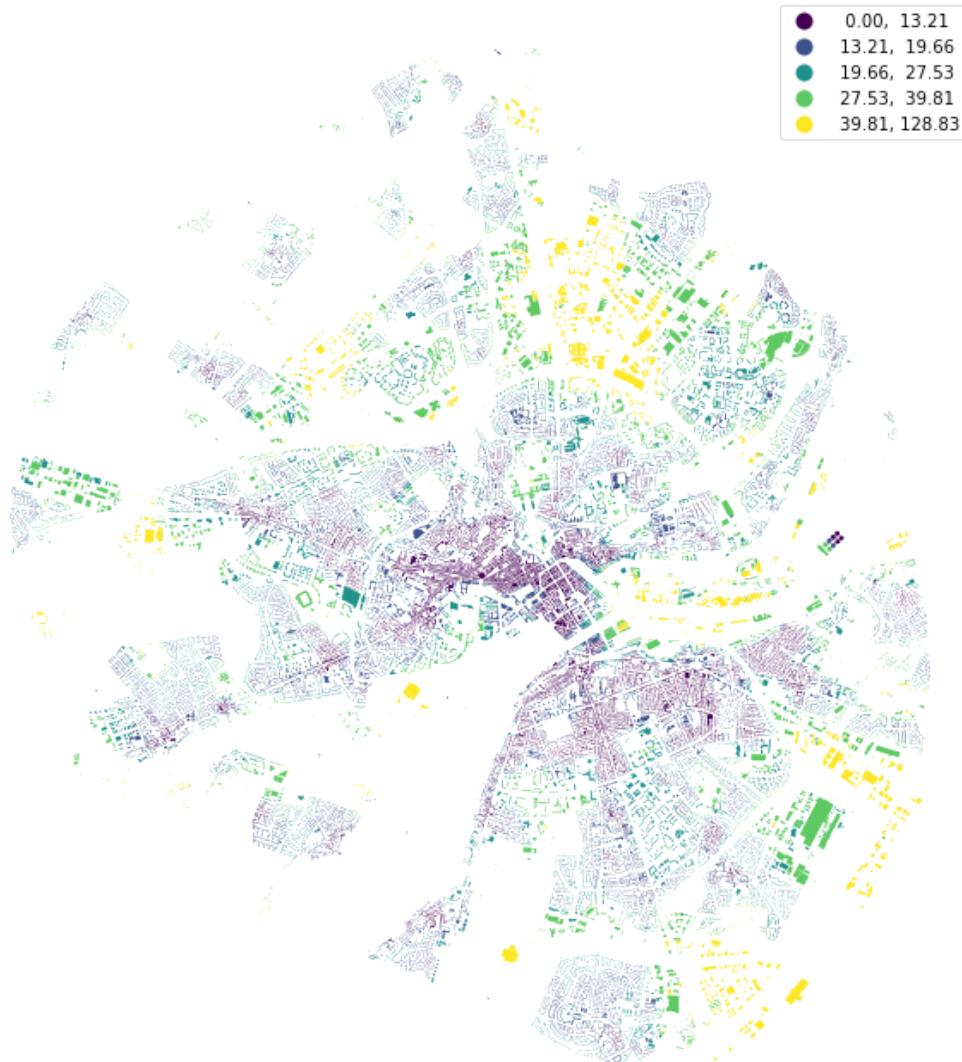
## Width deviation



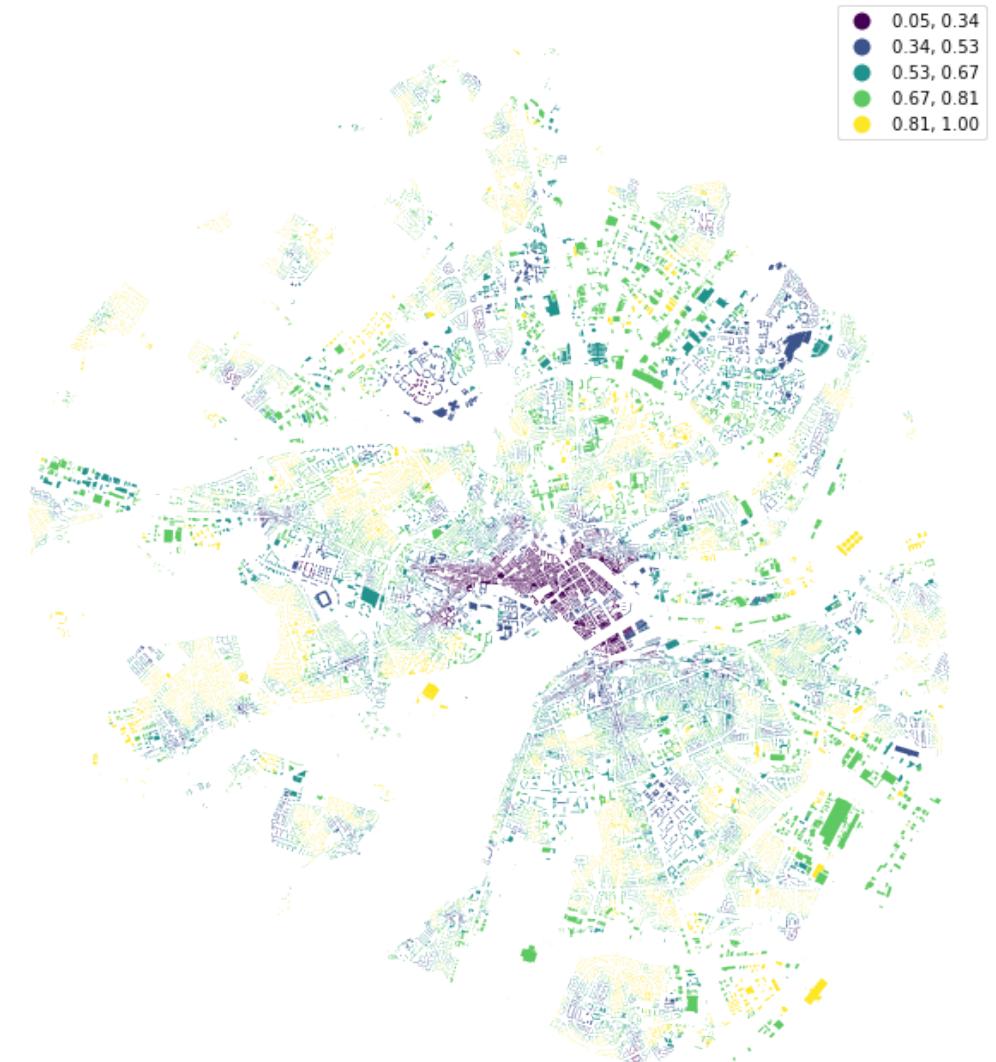
## Openness



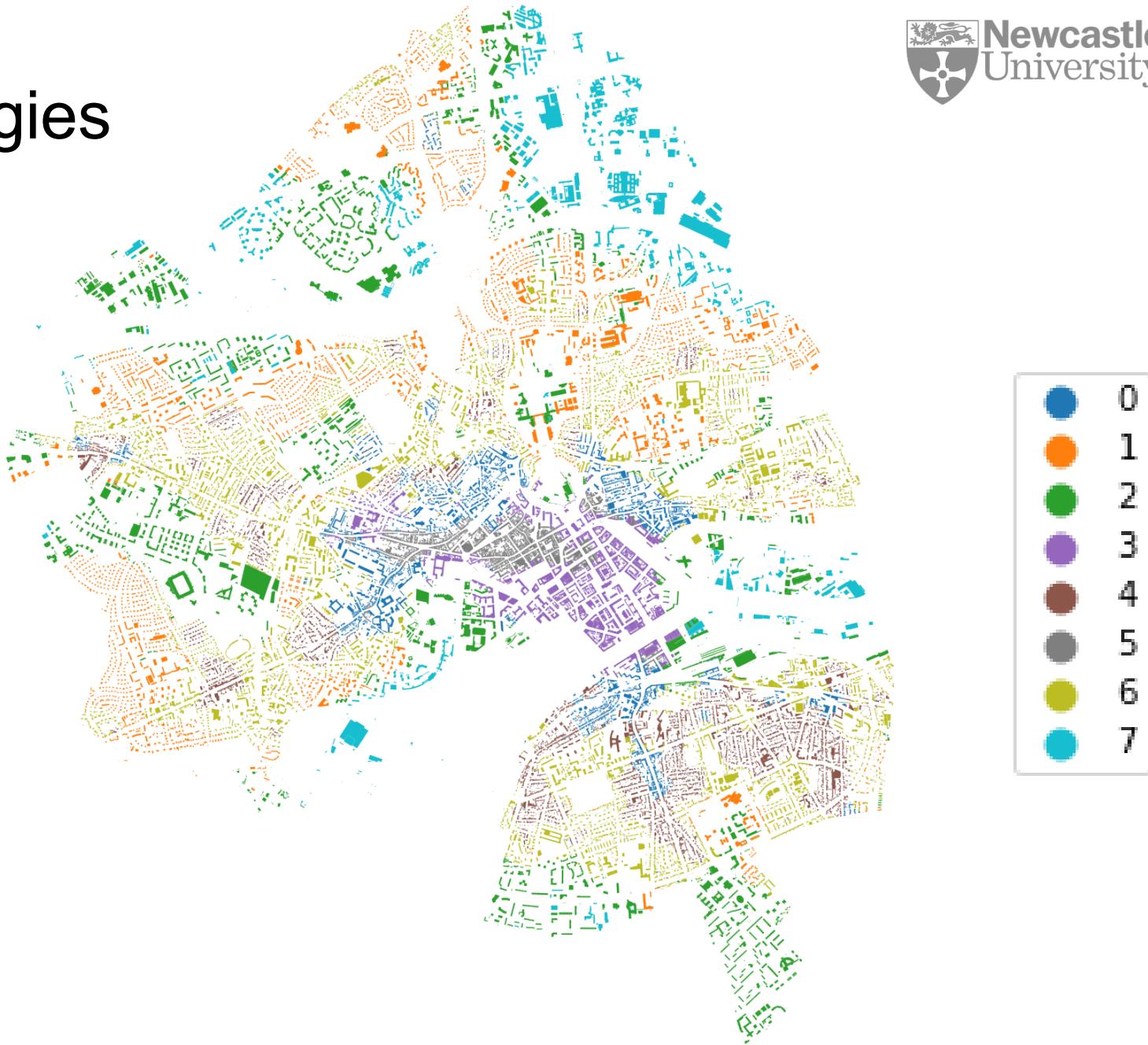
# Inter-building distance



# Adjacency



# Urban typologies





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# Future Work & Limitations

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# Future Work

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- 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



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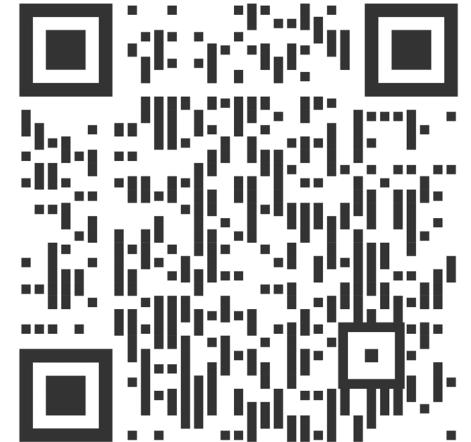


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# Limitations

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OSM is not perfect!



# Thank you

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