



# Geospatial information for urban sustainable development goal monitoring

**Hugo Poelman**

European Commission

DG Regional and Urban Policy

Policy Development and Economic  
Analysis Unit

*Regional  
and urban  
Policy*

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## Overview

- UN sustainable development goal 11
- Potential for use of geospatial information
- Data infrastructure prerequisites
- Use cases
- Conclusions and outlook



## UN Sustainable Development Goal 11

- Make cities inclusive, safe, resilient and sustainable
- Amongst the targets and related indicators (extracts)
  - Provide access to safe, affordable, accessible and sustainable transport systems for all, ..., notably by expanding public transport, ...  
*Proportion of population that has convenient access to public transport, by sex, age and persons with disabilities*
  - Provide universal access to safe, inclusive and accessible, green and public spaces, ...  
*Average share of the built-up area of cities that is open space for public use for all, by sex, age and persons with disabilities*



## Potential for use of geospatial information

- **Public transport:** operationalise the concept of "convenient access", including the spatial distribution of this access
- **Green and public spaces**
  - Complement the indicator on share of open space with indicators relative to the location of population
- In general: take into account of the spatial heterogeneity of cities
  - In terms of population distribution
  - In terms of services provisions



## General data infrastructure prerequisites

- Harmonised definition of **cities**: people-based definition (criteria of population size and density)
  - Based on regular population grid at 1 km<sup>2</sup> resolution
- Comparable **land use** data and compatible street network layout with adequate network segment attributes
  - Copernicus Urban Atlas; commercial street network or OSM network
- High-resolution **population** distribution data
  - Downscaled using Urban Atlas and building footprint data



## Use case 1: access to public transport

- Convenient access to public transport
  - Access point within walking distance
    - 5 minutes walking to bus or tram stop*
    - 10 minutes walking to metro or rail station*
  - Taking into account the level of service offered at these points
    - Number of departures per hour*
- Combination with population distribution provides summary metrics at city level

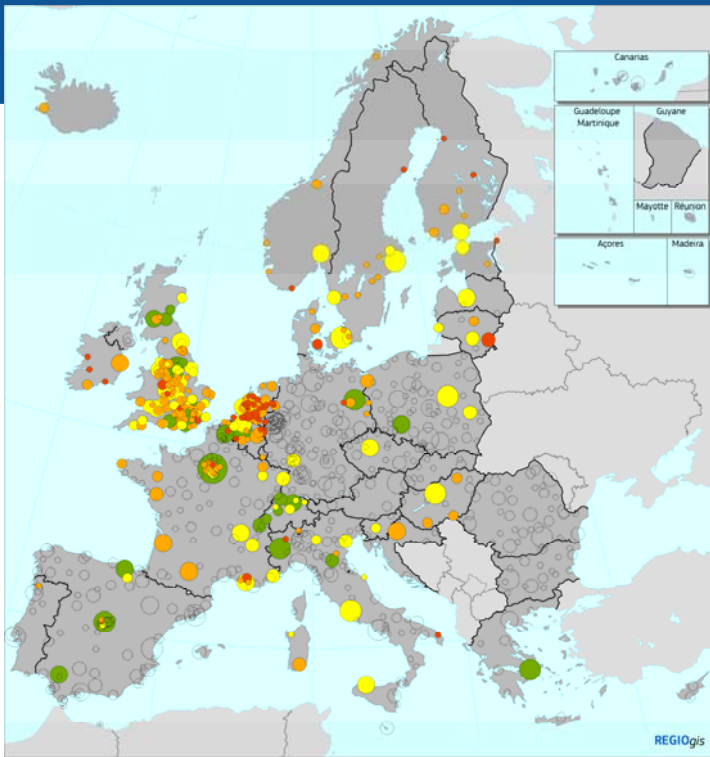


## Metrics on access to public transport

- Population-weighted median number of departures available within walking distance
- Classification of population according to the level of access found in their neighbourhood
- Classification of workplace-based employment is possible if high-resolution employment distribution data are available



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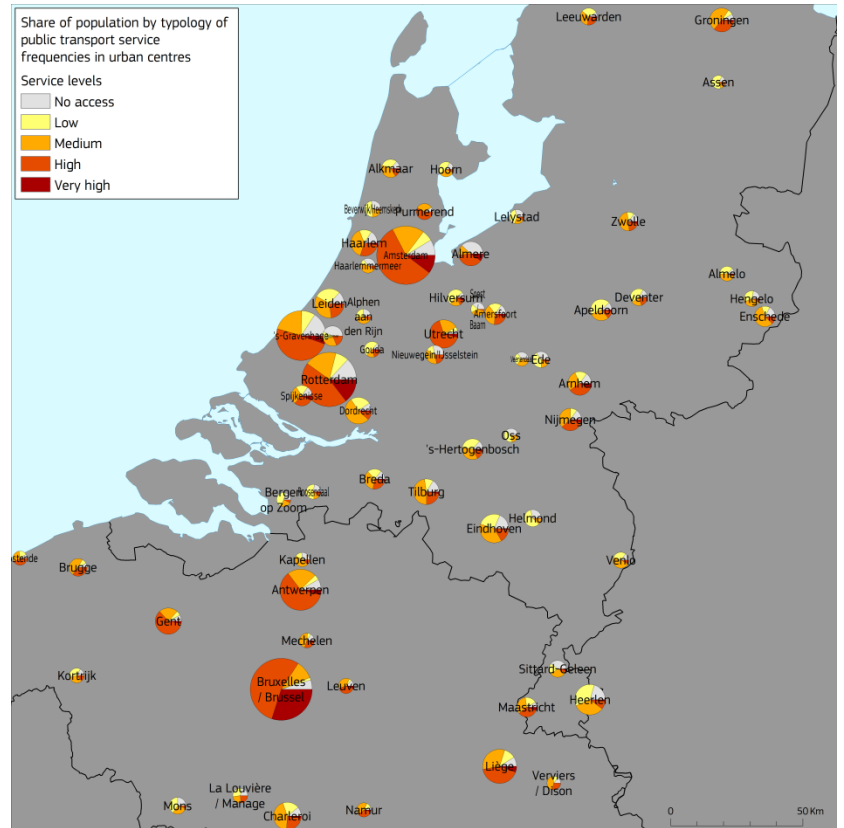
### Public transport departures in cities, 2013-2015



Population-weighted median number of hourly departures between 16:00 and 20:00  
Sources: public transport operators, Eurostat, REGIO-GIS



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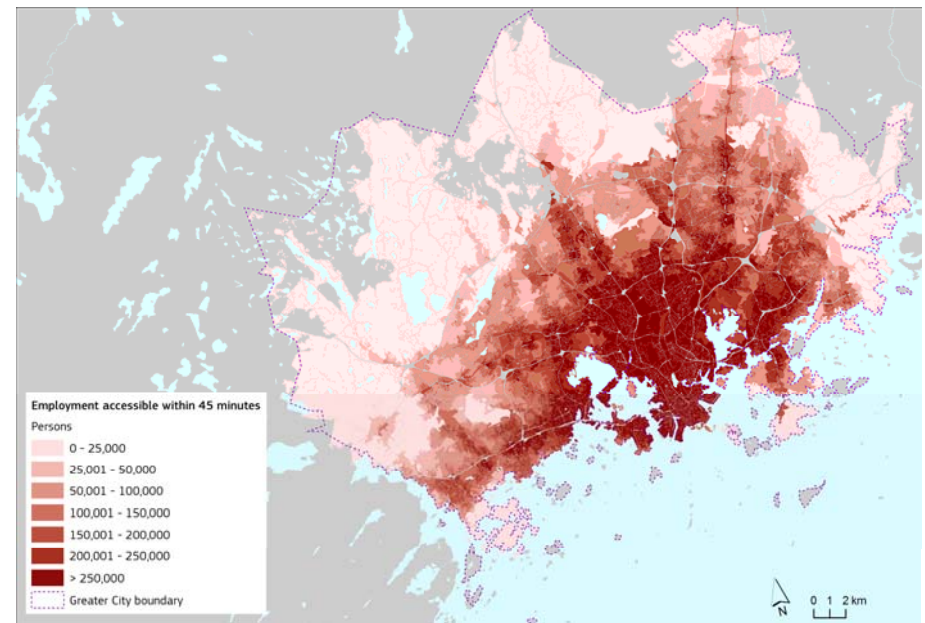
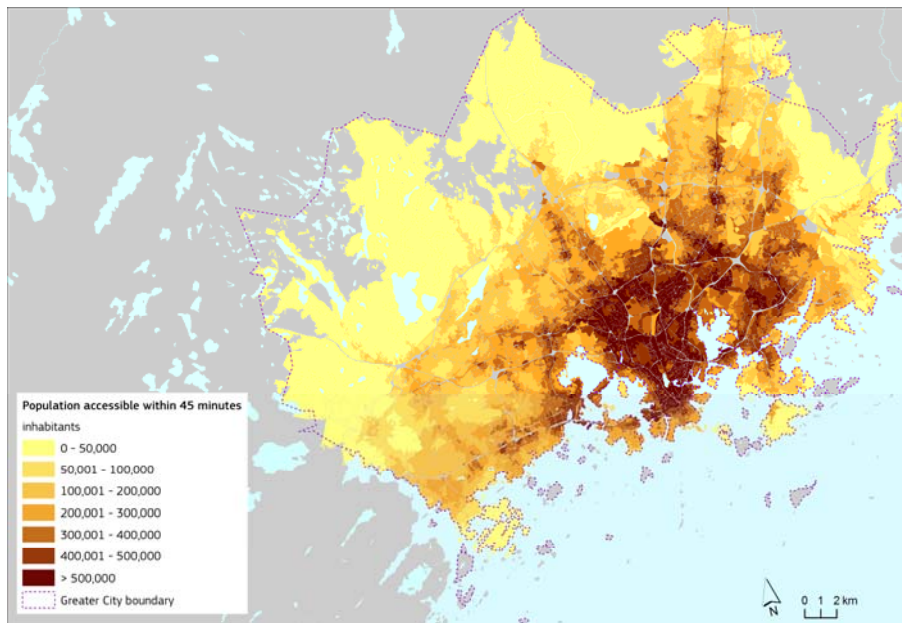
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## Further developments

- Assess accessibility to population (alternatively: employment) in cities by using public transport
  - Origin-destination travel time calculations between all building blocks of a city
  - Intervals between service departures are modelled by repeating the calculations every quarter of an hour during a two-hour peak period
- Results are scalable from building block level to city level
- Absolute number of people accessible within 45 minutes; share of accessible city population; comparison with accessibility by walking or in straight line



Helsinki: population and employment accessible within 45 minutes by public transport

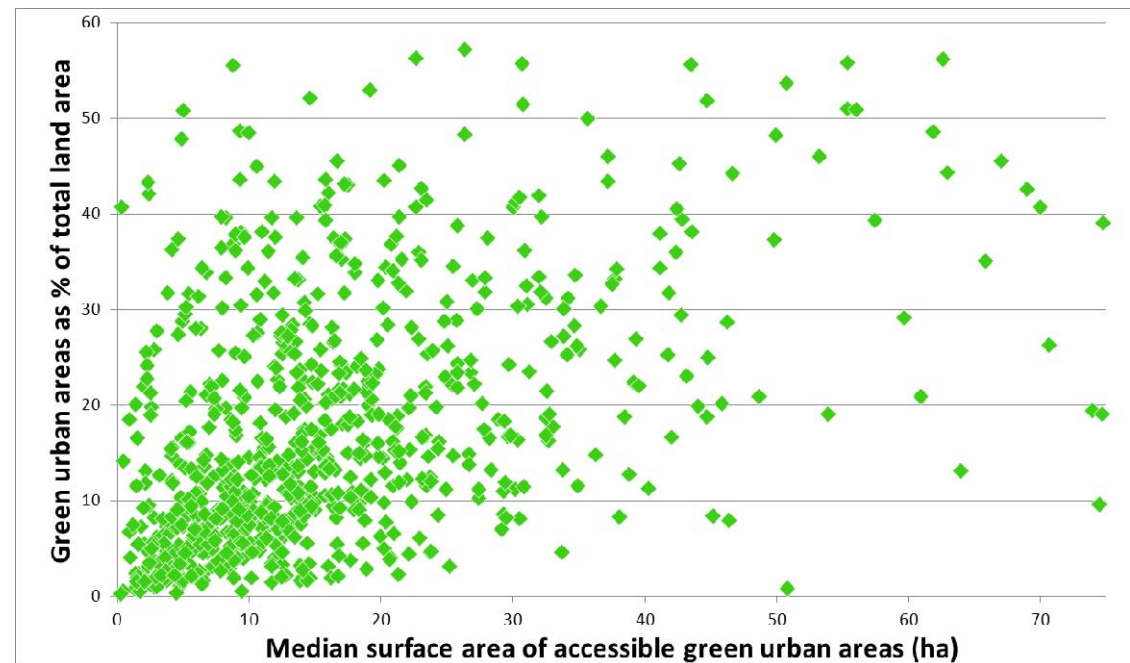


## Use case 2: access to green urban areas

- Copernicus Urban Atlas selection of green urban areas and forests
- Assessment of surface of green available within walking distance from each inhabited Urban Atlas polygon (building block)
- Aggregation at city level is weighted by spatial population distribution: population-weighted median surface of nearby green urban areas

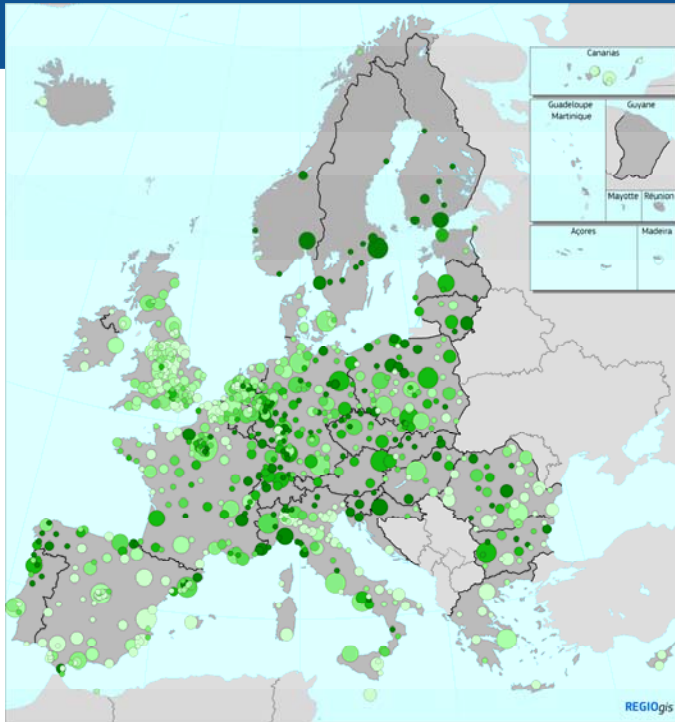
## Results for European cities

- Complementarity relative to the simple share of green urban areas
- Also allows for an assessment of the equity of spatial distribution of green areas relative to population

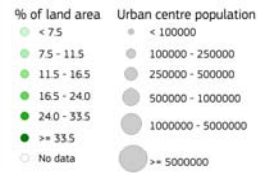




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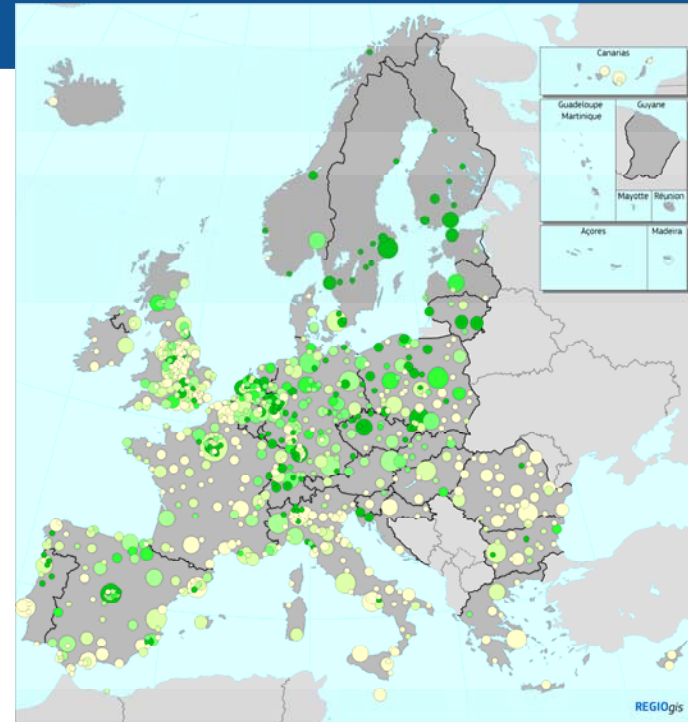


Share of green urban areas and forests by city, 2012

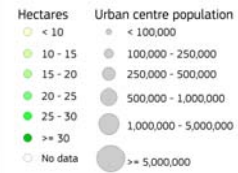


Source: Copernicus Urban Atlas

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Access to green urban areas in cities, 2012

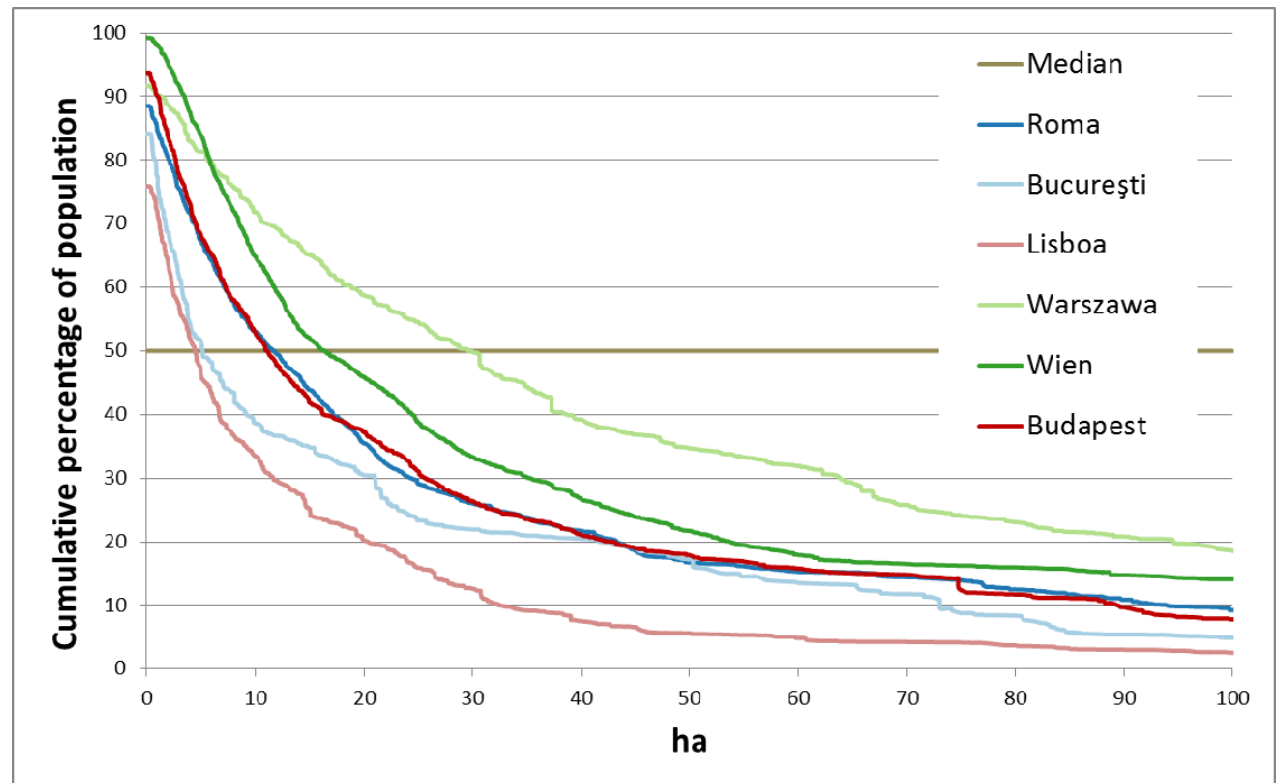


Population-weighted median area of green urban areas and forests that can be reached within 10 minutes' walking time.  
Sources: Copernicus Urban Atlas, NSIs, TomTom, REGIO-GIS

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Distribution of population according to the surface area of nearby green areas in selected large capital cities





## Conclusions and outlook

- Geospatial indicators add insight next to the official SDG indicator list
  - Spatially scalable (neighbourhoods, communities inside cities)
  - Aggregates at city level can be designed to reflect the spatial patterns
- Some challenges regarding the extension of the methodologies
  - Openness and availability of data, especially on public transport
  - More thematic precision needed on public access to open space
  - Local, timely data on population breakdown by age, gender, disabilities may be problematic



## References

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- Copernicus Urban Atlas: <http://land.copernicus.eu/local/urban-atlas>
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- Access to green urban areas (updated edition is forthcoming): [http://ec.europa.eu/regional\\_policy/en/information/publications/working-papers/2016/a-walk-to-the-park-assessing-access-to-green-urban-areas-in-europe-s-cities](http://ec.europa.eu/regional_policy/en/information/publications/working-papers/2016/a-walk-to-the-park-assessing-access-to-green-urban-areas-in-europe-s-cities)
- Access to public transport (update forthcoming): [http://ec.europa.eu/regional\\_policy/en/information/publications/working-papers/2015/measuring-access-to-public-transport-in-european-cities](http://ec.europa.eu/regional_policy/en/information/publications/working-papers/2015/measuring-access-to-public-transport-in-european-cities)