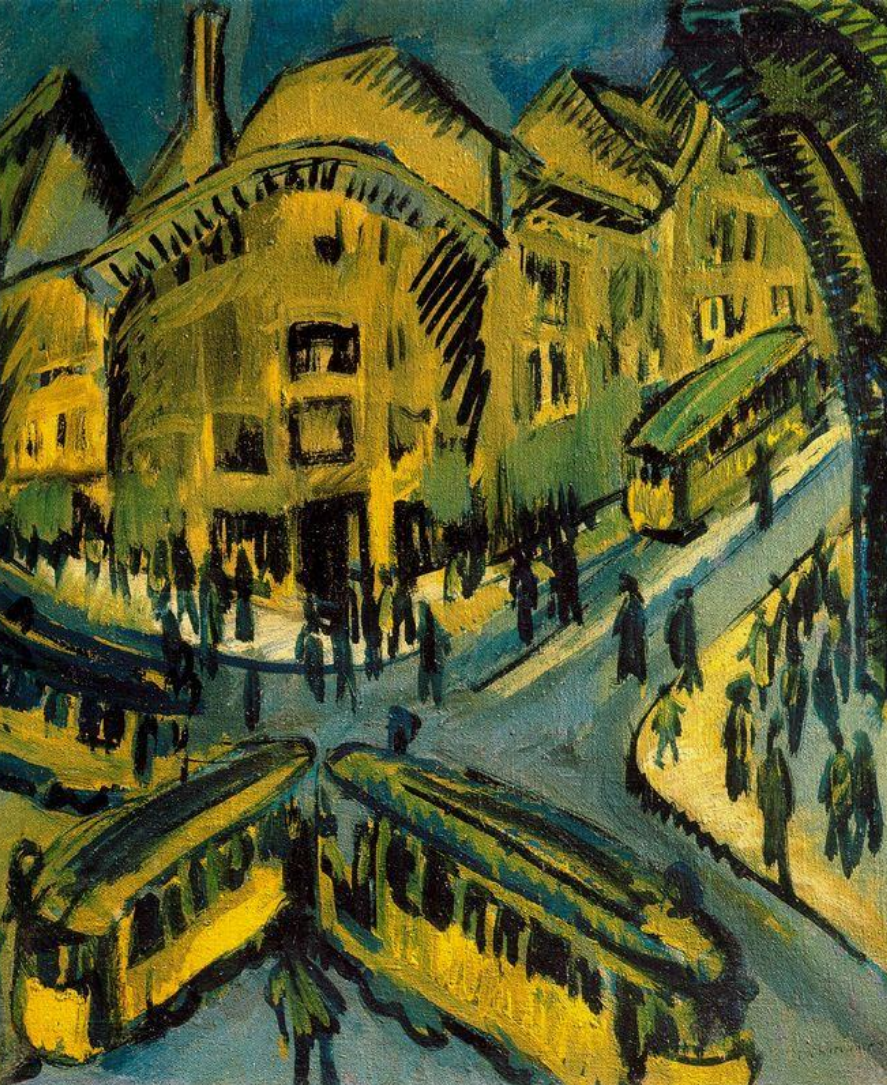




European
Commission

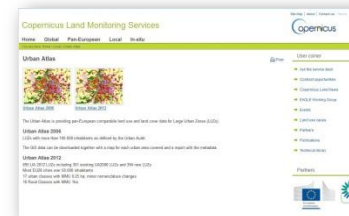
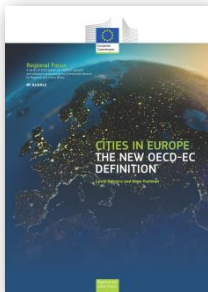


Enhancing indicators on urban public transport in combination with geostatistics

Hugo Poelman
European Commission
DG Regional and Urban Policy
GIS team

Harmonised indicators on European cities?

- EU-OECD definition of cities
- Eurostat city statistics (Urban Audit)
- Copernicus Urban Atlas land use data
- EFGS – GEOSTAT population and grid (1 km²)
- But: comparable indicators on public transport in urban areas remain problematic...



Aim of the analysis

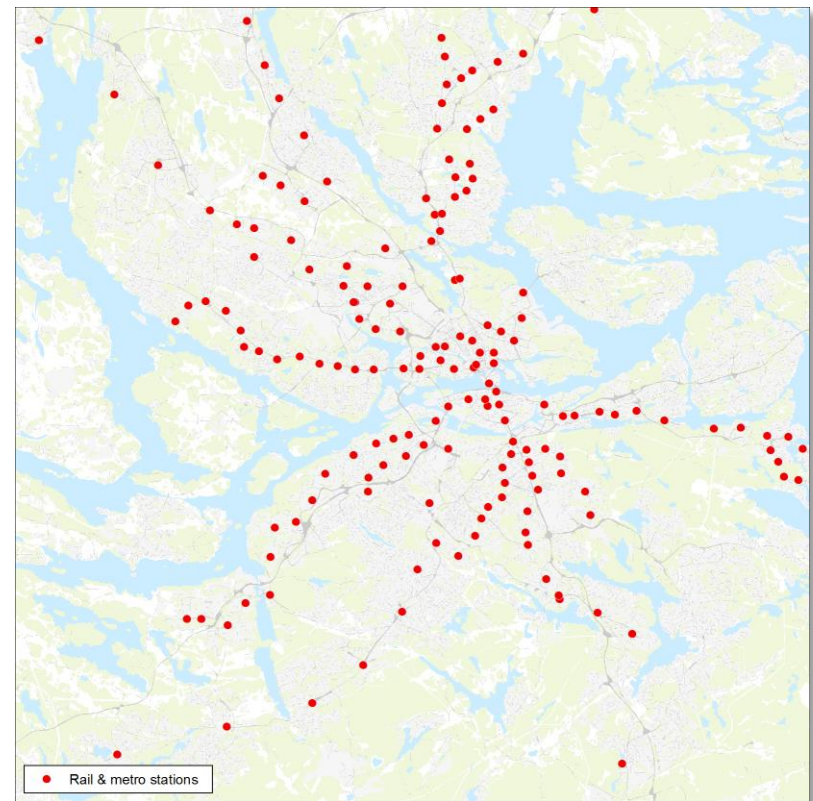
- Develop comparable indicators on
 - **Access** to public transport in urban areas
 - **Frequency** and **speed** of urban public transport
- Using standardised data sources
- Referring to **harmonised** concepts
 - City definitions
 - Spatial distribution of population

Measuring access to public transport: input data

- Location of all public transport stops
- Timetables of services: 2 groups:
 - bus and tram
 - train and metro
- Population per building block based on:
 - detailed population grids
 - census tracts
 - neighbourhood statistics
 - plus disaggregation using land use data and/or imperviousness if needed

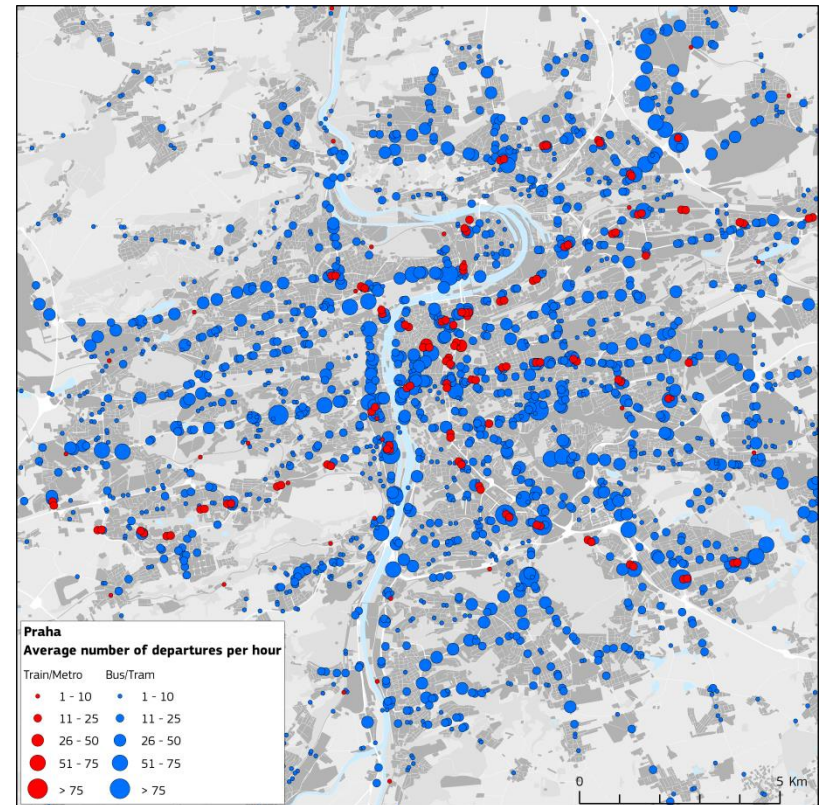
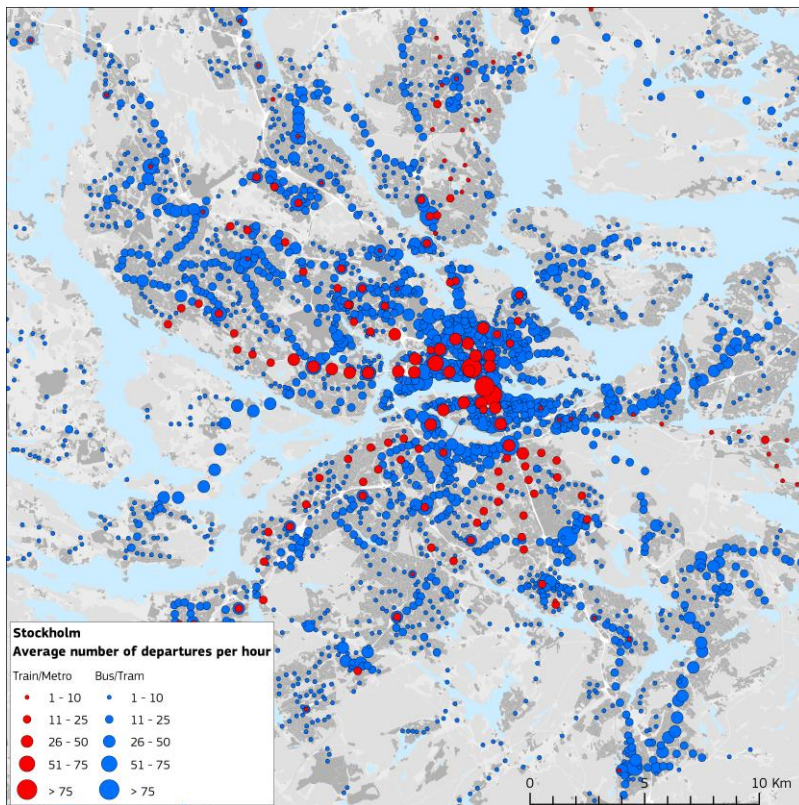


Location of stops



Stockholm

Average stops an hour from 6:00 to 20:00 on a normal week day



Service areas around stops

- Stops near to each other are clustered
 - stops at both sides of a street; bus stations
 - sum of available departures per cluster
- Service areas
 - 5 minutes walking distance for bus and tram
 - 10 minutes for train and metro
 - created using comprehensive street network, accessible to pedestrians



Frequency classes

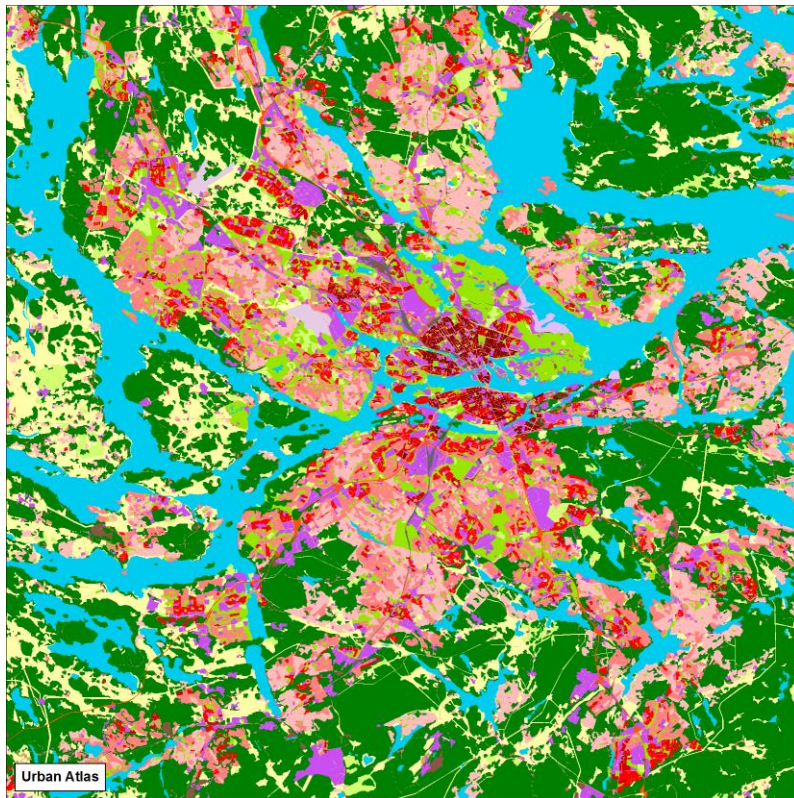
- Number of departures per service area
 - In overlapping areas: maximum value of the overlapping service areas
- Frequency classes of departures
 - High: > 10 departures an hour
 - Medium: more than 4 but less than 10 an hour
 - Low: less than 4 an hour
 - Null: no public transport stops within walking distance

Typology of frequency classes

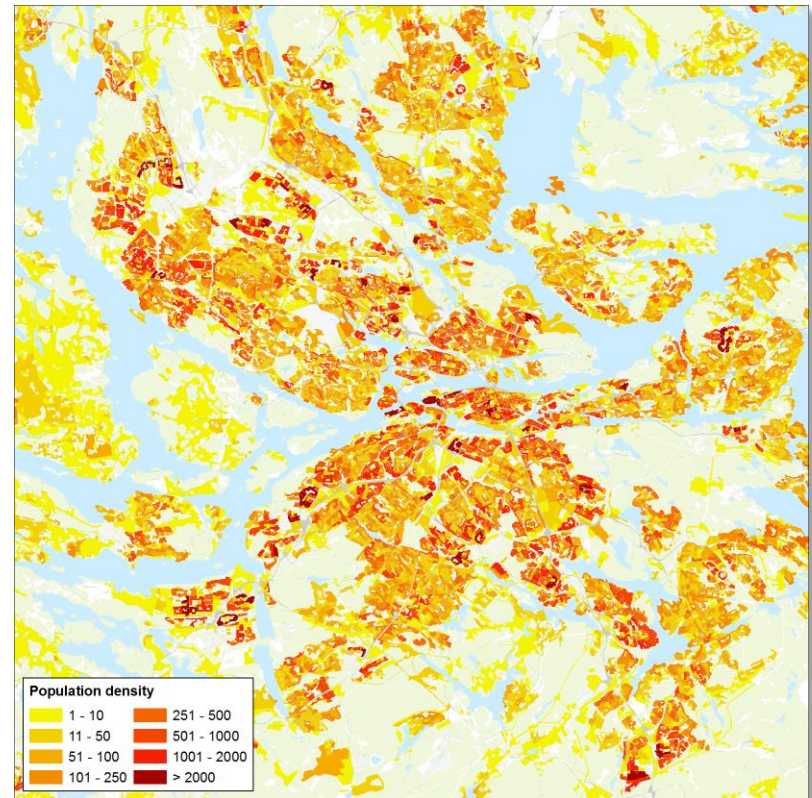
| | |
|-----------|--|
| Very high | Access to more than ten departures an hour for both medium- and high-speed modes |
| High | Access to more than ten departures an hour for one mode, but not both |
| Medium | Access to between four and ten departures an hour on one or both modes, but no access to more than ten departures and hour |
| Low | less than four departures an hour for one or both modes, but no access to more than four departures an hour |
| Null | No access within walking distance |

Population distribution

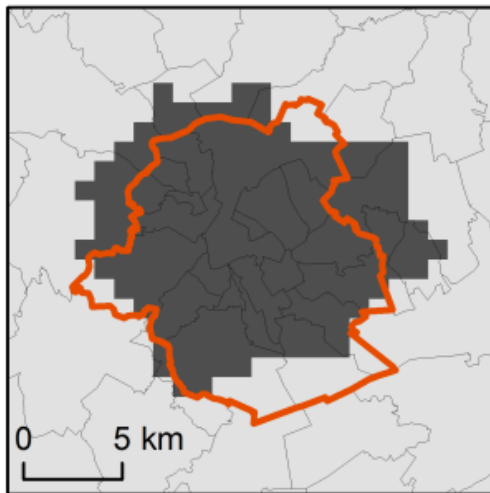
Urban Atlas: land use



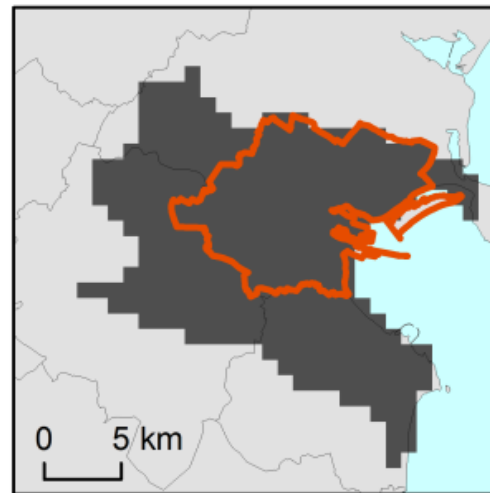
Population by block



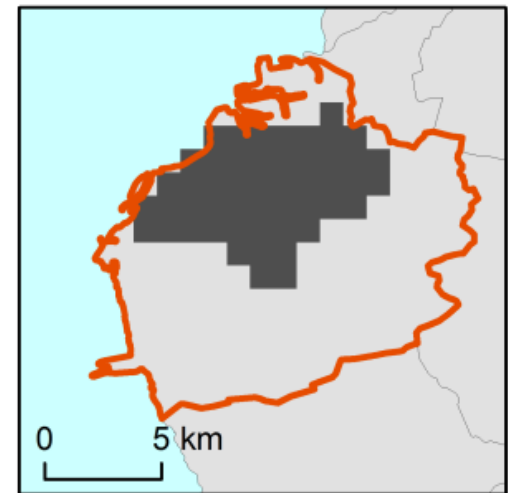
Urban centre versus administrative city



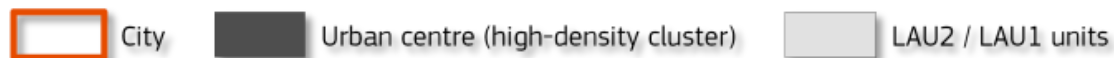
Brussels



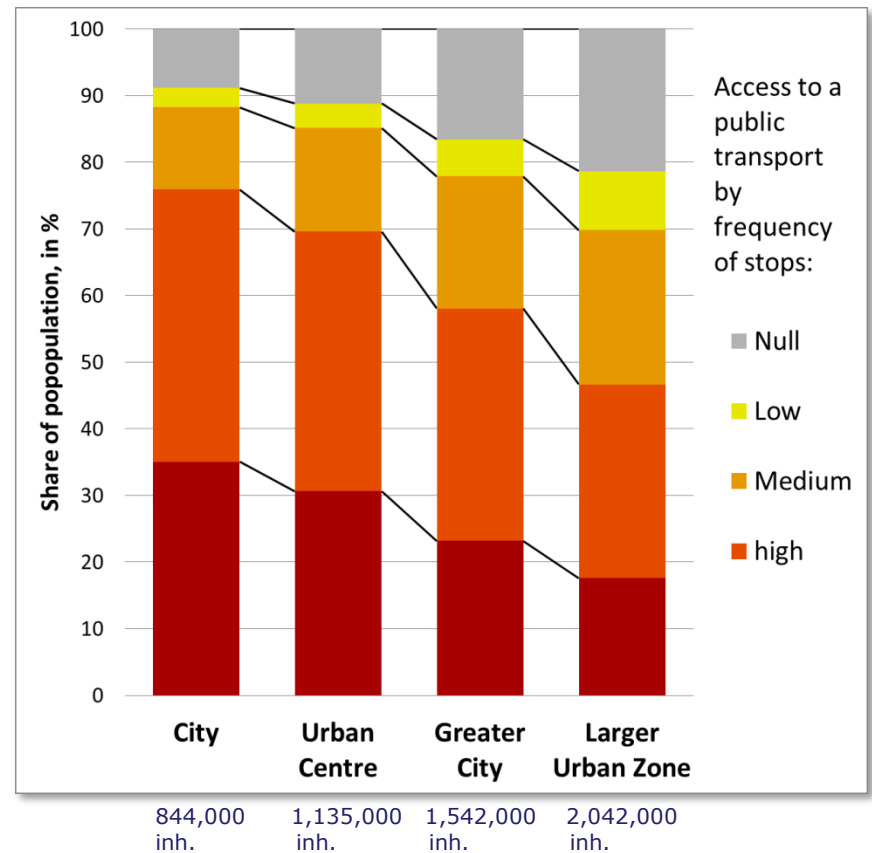
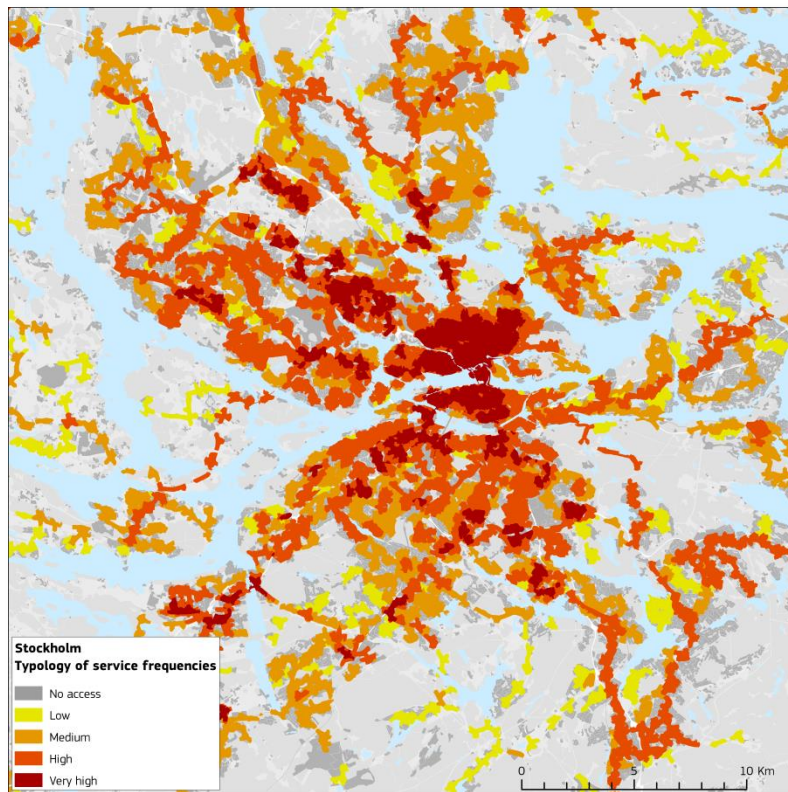
Dublin



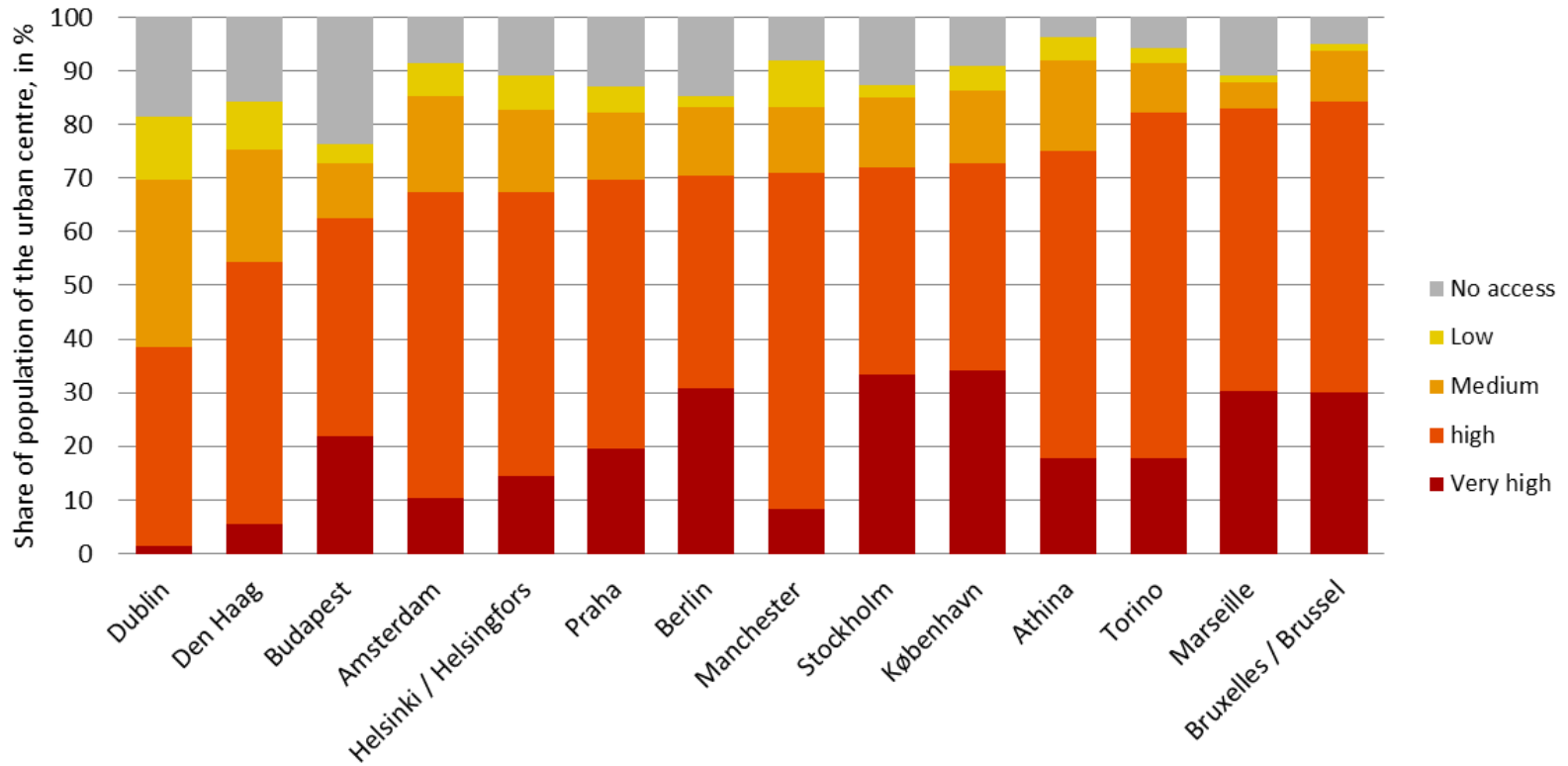
Malmö



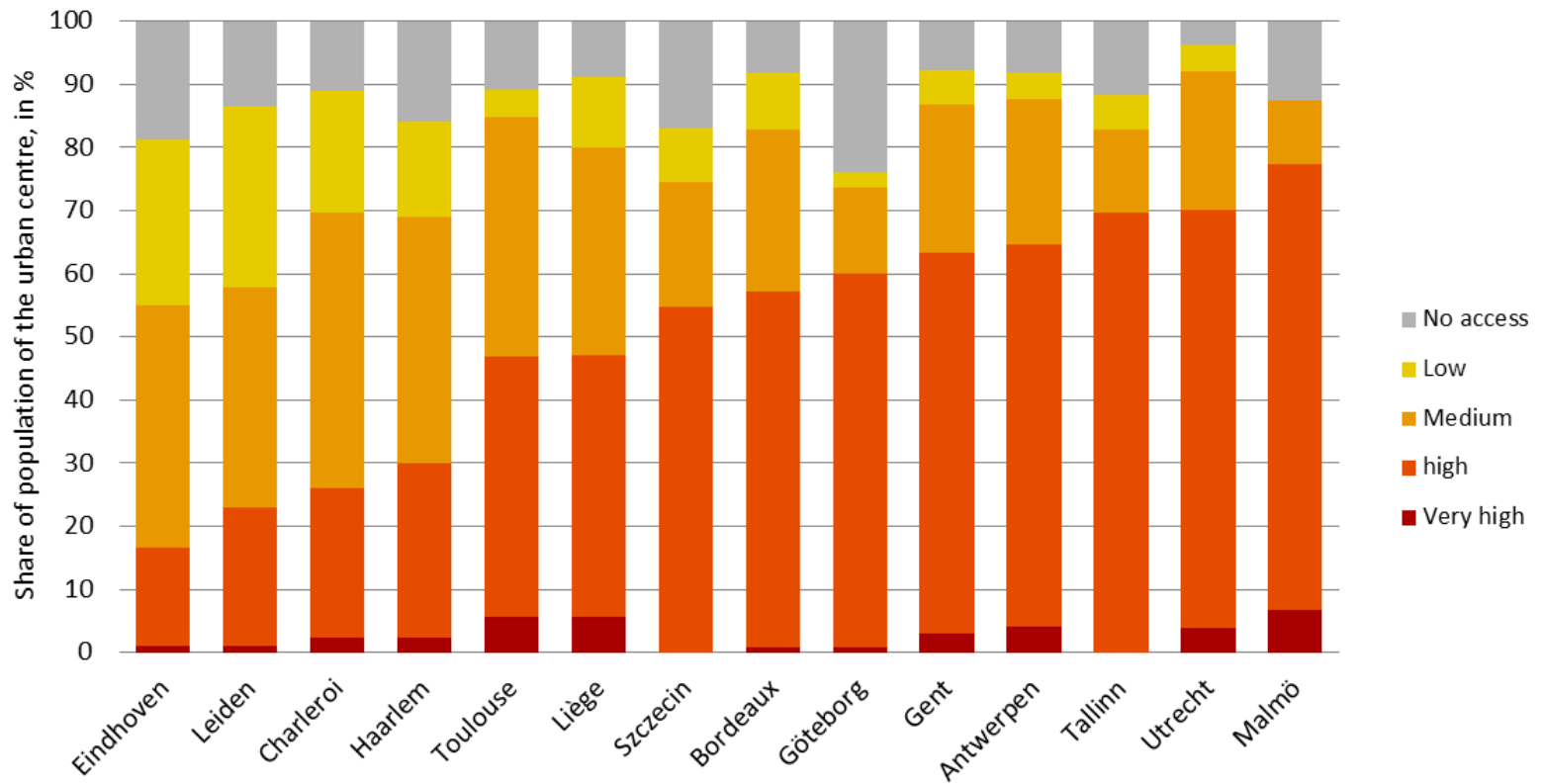
Stockholm: areas and population by access to public transport and its frequency



Access to public transport in large European cities

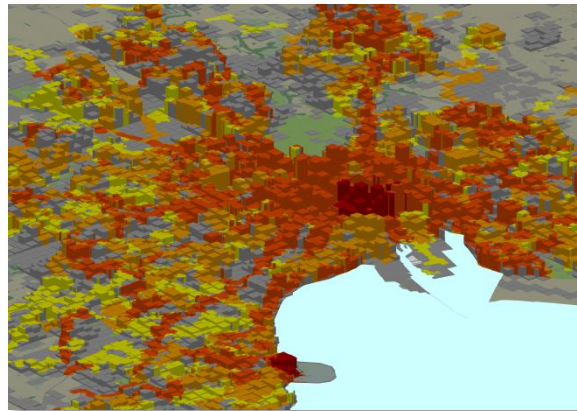


Access to public transport in mid-size European cities

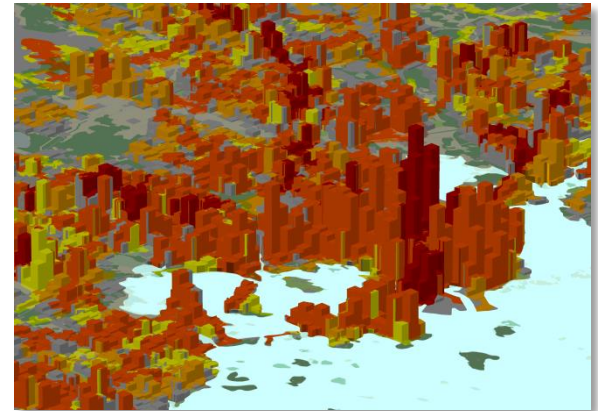


Population density, job density and typology of frequencies

Population density
(250x250 m cell size)

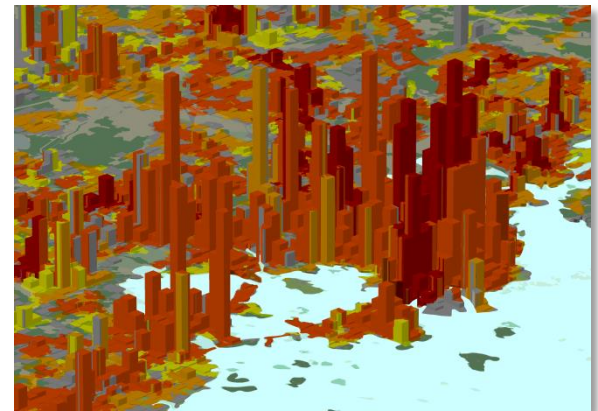
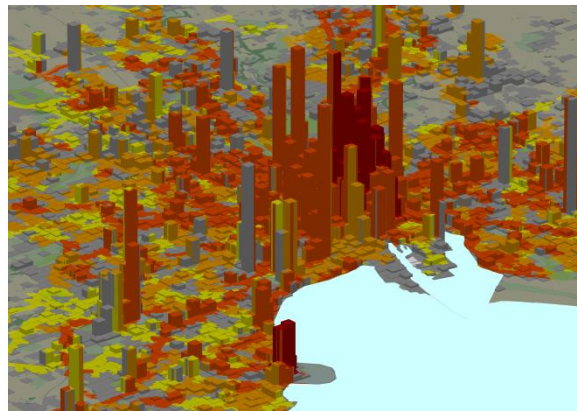


Dublin

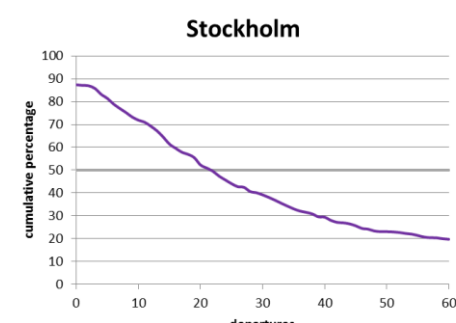
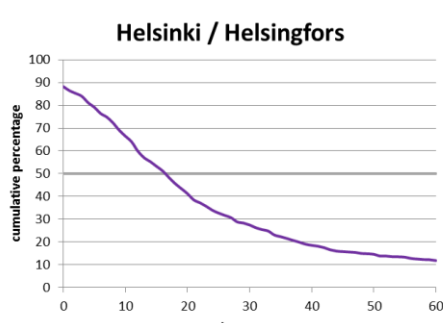
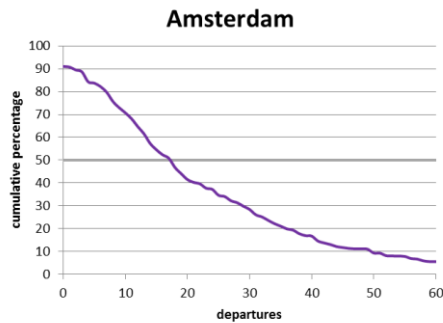
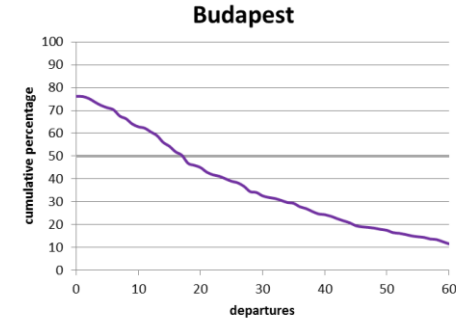
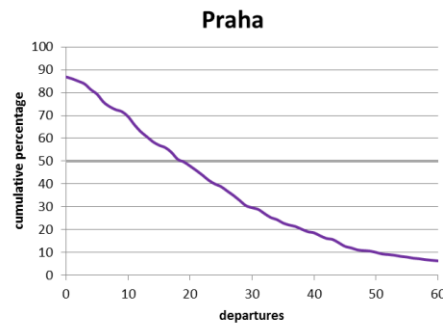
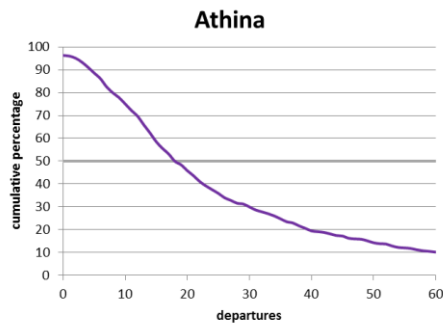
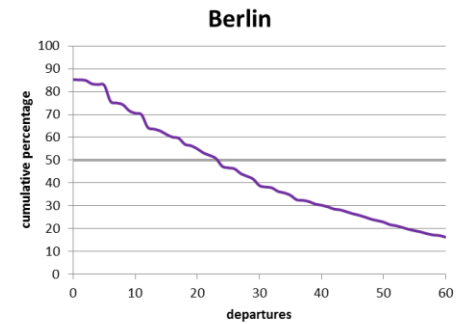
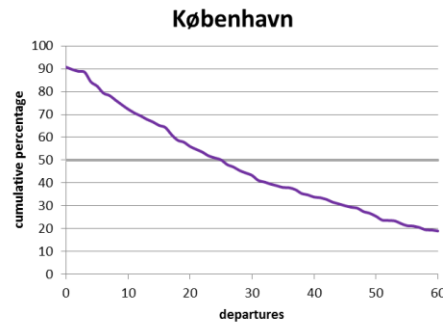
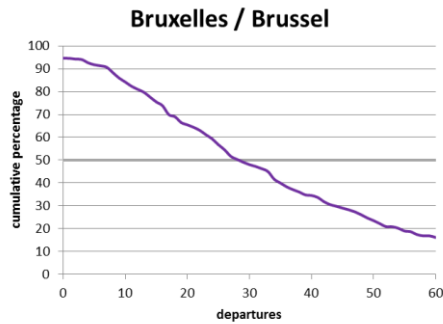


Helsinki

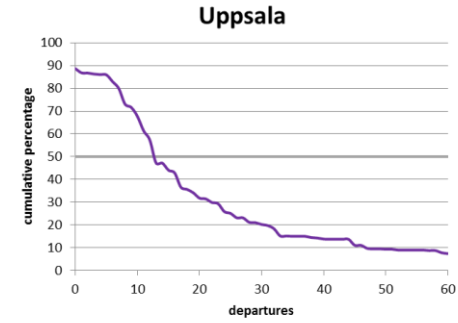
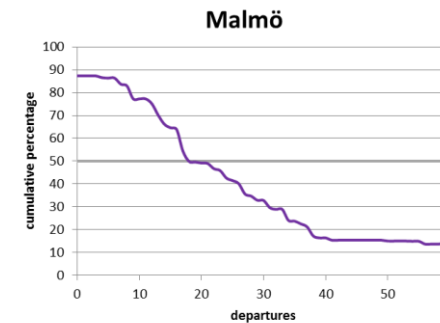
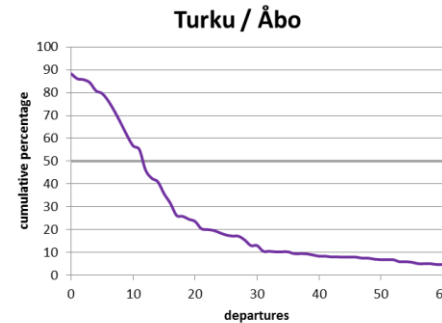
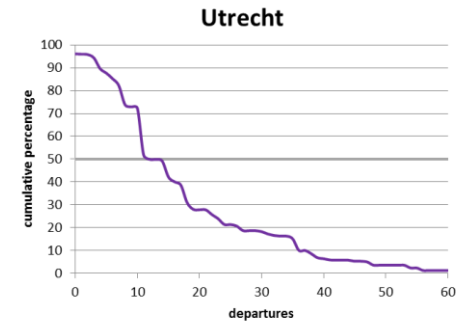
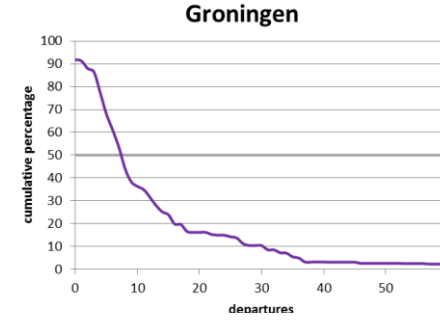
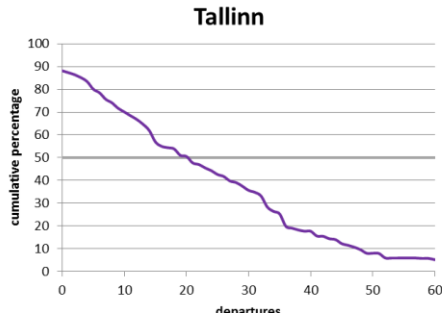
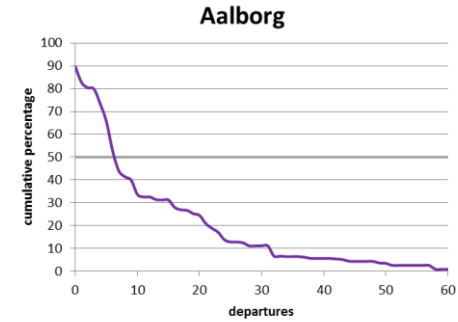
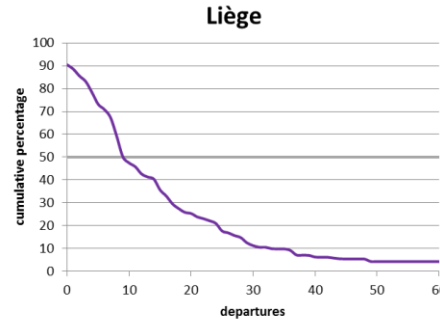
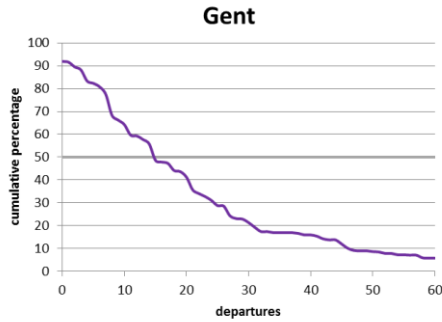
Job density
(workplace-based
employment)
(250x250 m cell size)



Population distribution and number of departures in large cities*



Population distribution and number of departures in mid-size cities*



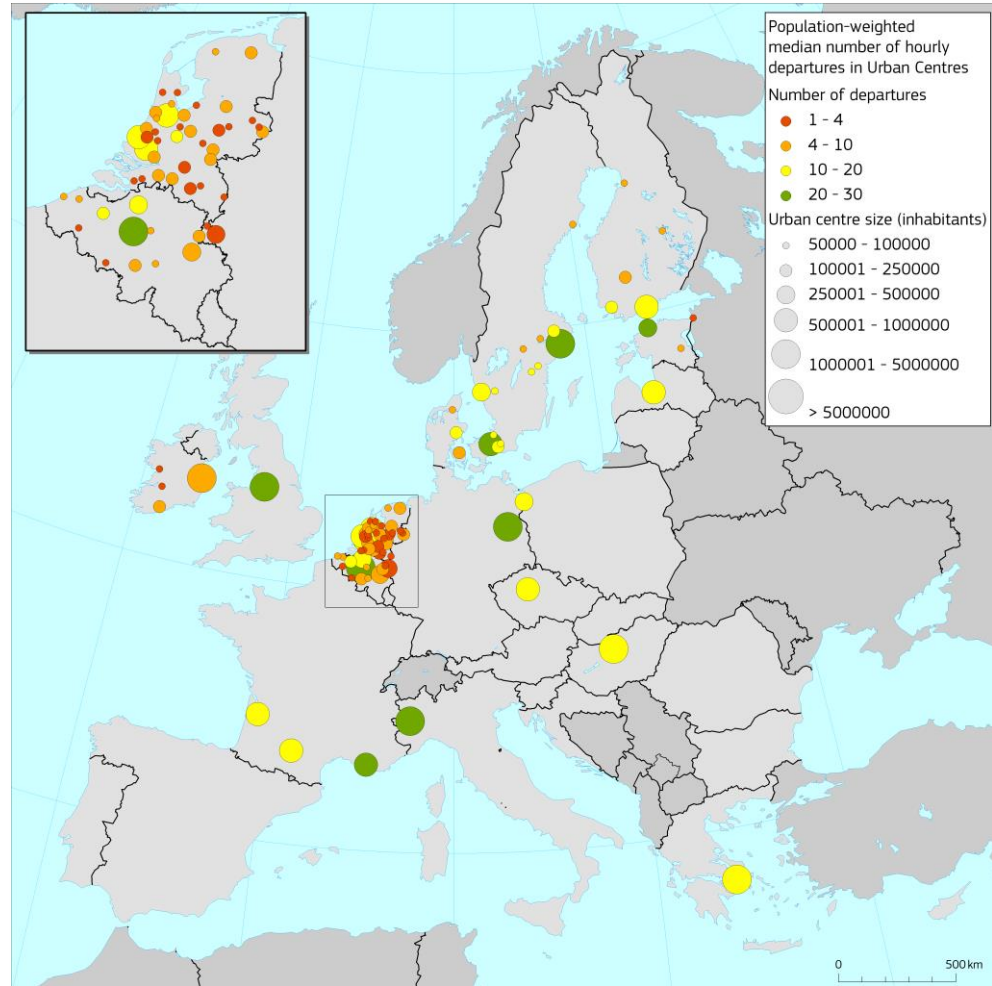
Y% of population has access to more than X departures an hour

and urban
Policy

* cities: defined as urban centres

Median number of departures an hour

- Number of departures to which 50% of the urban population has easy access
 - Varies between 7.4 and 28.3 departures in bigger cities
 - Between 3.5 and 20.2 in medium-sized cities



Conclusion

- A harmonised way of assessing access to public transport and services' performance
- Gives an internationally comparable method of assessment
- Could also be used to develop regional indicators
- Uses quite big data: millions of departures, thousands of bus, tram, train and metro stops

Challenges

- Timeliness and spatial resolution of population distribution data
- Spatial distribution of employment data
- A more harmonised implementation of public transport data standards
- Documentation and conversion of data according to national standards
- Availability of open data (timetables), data licensing policy
- (Performance of) origin/destination modelling

Forthcoming analysis

- Measuring frequency and speed of the services (by mode) inside the cities
- Origin/destination modelling
- Assess connectivity between cities by rail

Sources

- Delineation of cities: EC-OECD city definition
- Population distribution: national statistical institutes, GEOSTAT 2006 grid
- Copernicus Urban Atlas 2006 land use data
- Road network: TomTom MultiNet
- Public transport data:
 - BE: VVM De Lijn, STIB-MIVB, SRWT-TEC, NMBS-Infrabel;
 - CZ (Praha): urban transport: www.infoprovsechny.cz; DK: Rejseplanen.dk;
 - EE: www.peatus.ee; IE: dublinked.ie;
 - FR: open data portals of cities/départements and of SNCF;
 - IT (Torino): open data Torino; NL: OV-9292; PL (Szczecin): ZDITM;
 - FI: www.matka.fi, HSL; SE: www.trafiklab.se;
 - UK: Data.gov.uk (NapTAN and NPTDR);
 - various cities: <http://www.gtfs-data-exchange.com/agencies>; Die Bahn; station locations from EuroRegionalMap (EuroGeographics)

References

- Eurostat city statistics (Urban Audit): <http://ec.europa.eu/eurostat/web/cities/overview>
- Copernicus Urban Atlas: <http://land.copernicus.eu/local/urban-atlas>
- European Forum for Geography and Statistics: <http://www.efgs.info/>
- Eurostat GEOSTAT project: <http://ec.europa.eu/eurostat/web/gisco/geostat-project>
- Population estimates for the Urban Atlas polygons: http://publications.jrc.ec.europa.eu/repository/bitstream/111111111/30408/1/qms_h08_intesa_deliverable_2_2_eur_26437.pdf
- Cities in Europe: the new OECD-EU definition: http://ec.europa.eu/regional_policy/sources/docgener/focus/2012_01_city.pdf
- General Transit Feed Specification: <https://developers.google.com/transit/gtfs/>



Questions ?

hugo.poelman@ec.europa.eu