Developing harmonised indicators on urban public transport in Europe

Hugo Poelman

European Commission

DG Regional and Urban Policy

GIS team

Regional and urban Policy

May 2015

Policy context

- EU Cohesion Policy

  - European Regional Development Fund (ERDF) support

    Sustainable urban development

    Promotion of sustainable multimodal urban mobility

    Environmentally-friendly and low-carbon transport systems

  - Allocations for clean urban transport

    2007-2013: about 6 bn EUR

    2014-2020: about 11.7 bn EUR (provisional figure)

  - Output indicators explicitly refer to public transport

    Length of new or improved tram and metro lines
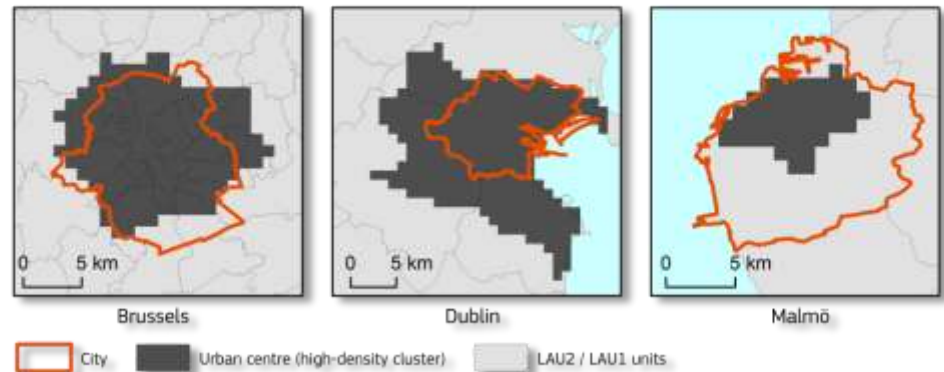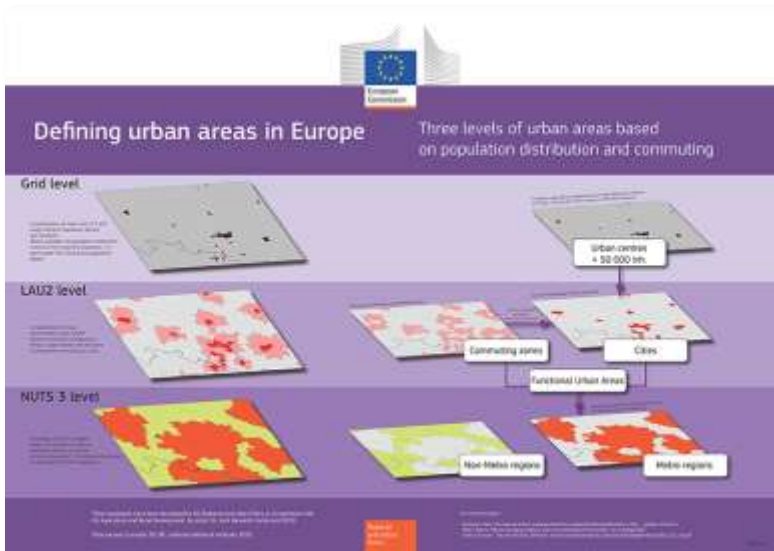
Problem statement

- Many attempts to collect data on supply and access to public transport

- Obstacles:
  - Non-comparable geographies
  - Absence of spatial distribution of population
  - Scarcity of data on scheduled frequency of public transport

- Need for harmonised and comparable indicators allowing benchmarking of cities

Aim of the analysis

- To 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
  - Definitions of urban areas
  - Spatial distribution of population

# A harmonised definition of cities

- European system of city concepts
  - Essentially grid-based
  - "Urban Centres" (high density clusters): the preferred concept for inter-city comparisons

Defining urban areas in Europe — Three levels of urban areas based on population distribution and commuting

Brussels   Dublin   Malmö

City   Urban centre (high-density cluster)   LAU2 / LAU1 units

Regional and urban Policy

Distribution of population in a city

- High level of spatial detail needed when mapping the population distribution
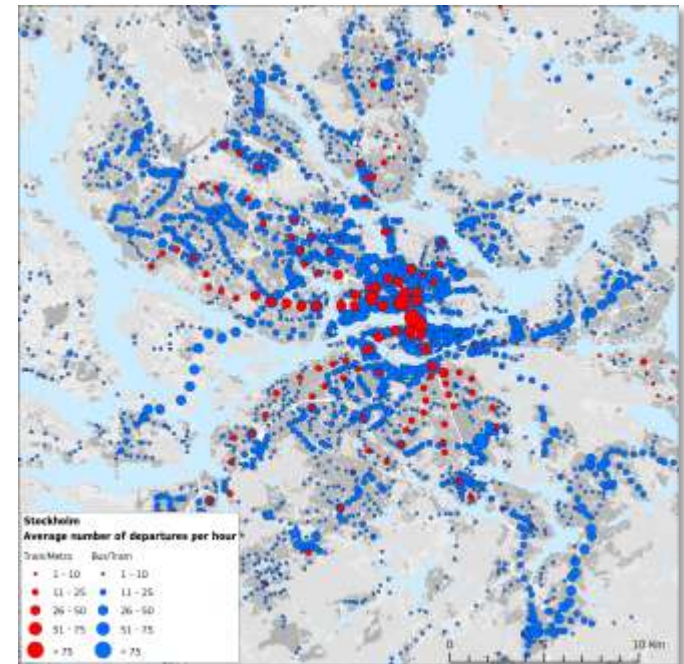- Copernicus Urban Atlas land use data used as a framework

Urban Atlas land use
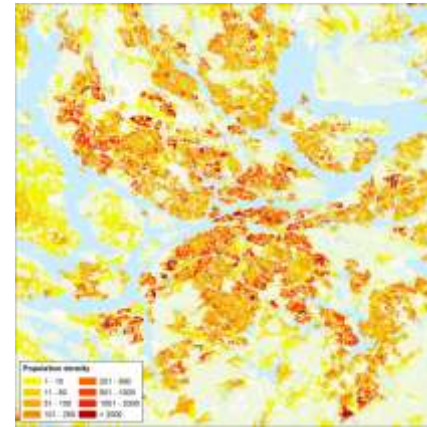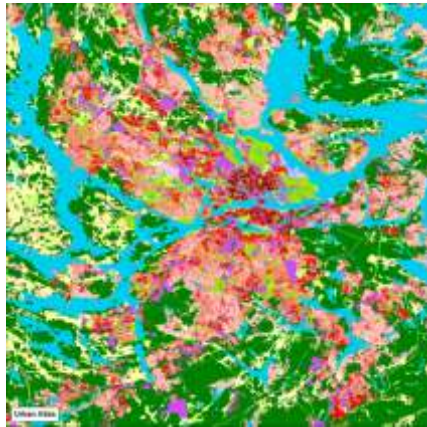
Population by block

Frequency of departures

- Location of all public transport stops
- Timetables in 2 groups:
  - *bus and tram*
  - *train and metro*
- For each stop:

  average number of departures an hour between 6:00 and 20:00 on a normal weekday
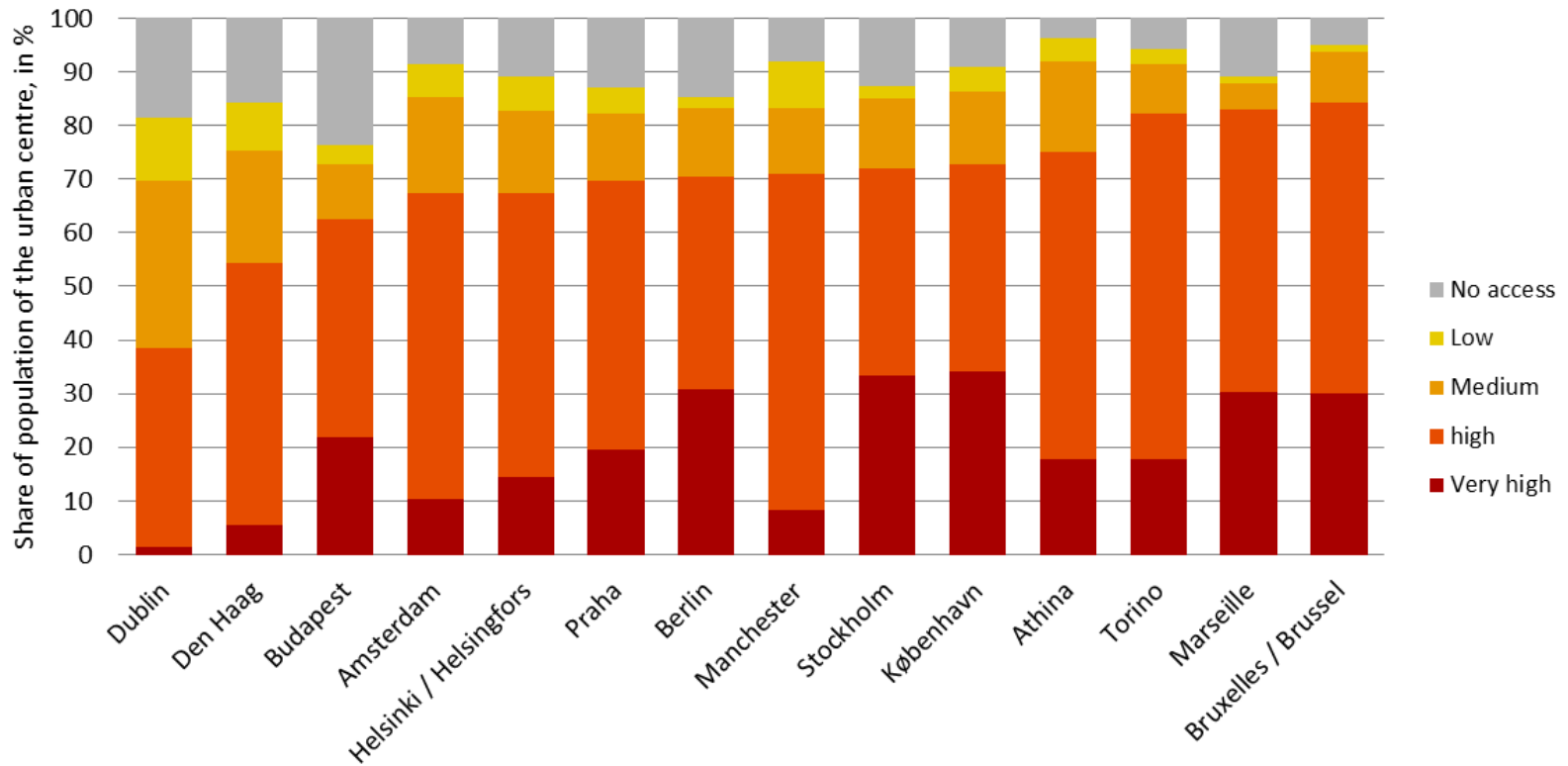
Measuring access to public transport

- Who has easy walking access to a public transport stop?
  - Maximum 5 minutes walk to bus or tram stop
  - Maximum 10 minutes walk to train or metro
- Walking distance calculated using a street network
  - Density of the street network matters
  - Obstacles for pedestrians are taken into account
- Creation of a surface of service areas, representing the number of departures available within walking distance
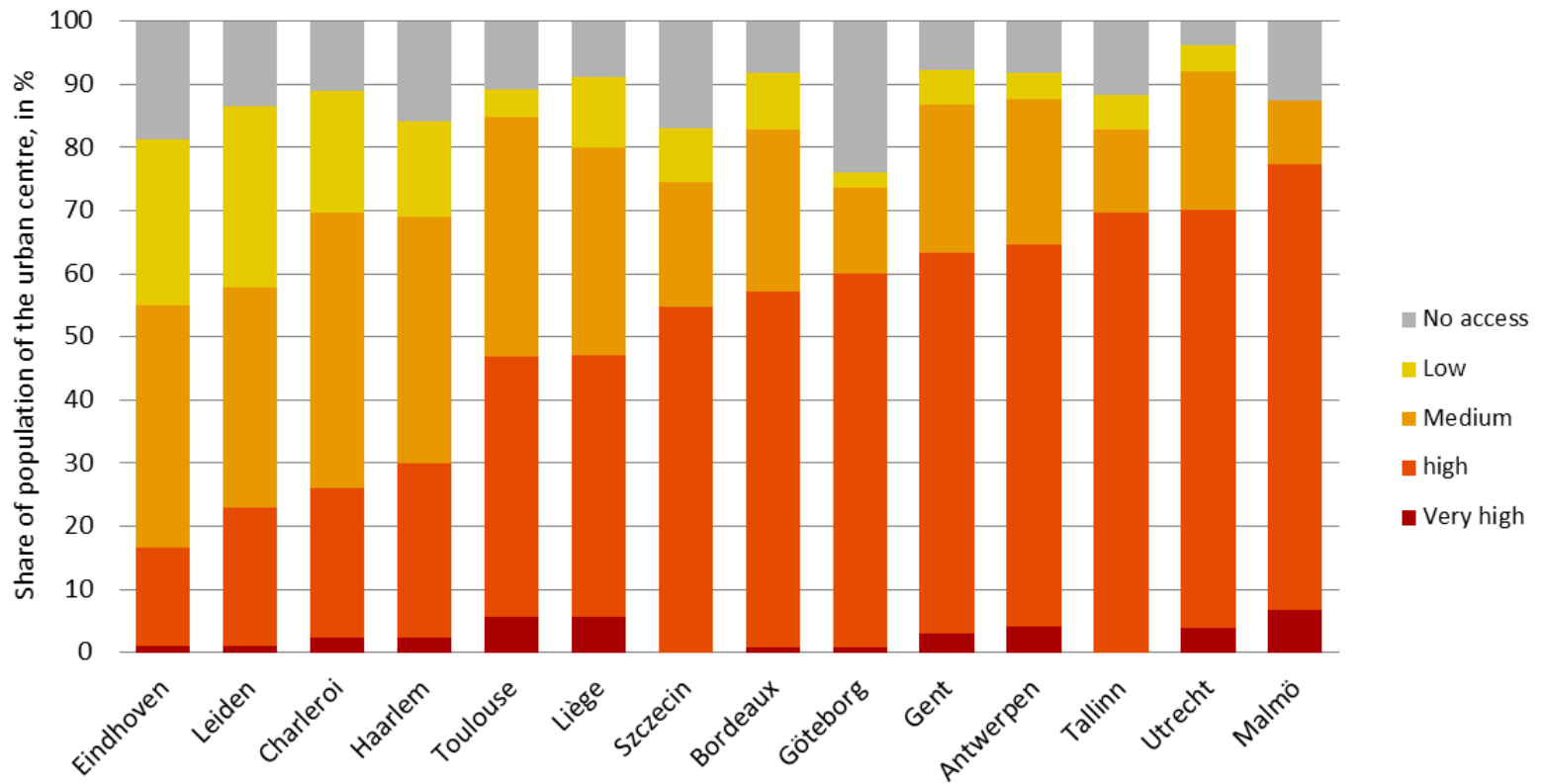- Intersected with population distribution layer

Frequency classes

- 5 groups based on access and departure frequency

		Metro and train			
		High frequency (> 10 departures/hour)	Medium frequency (between 4 and 10 departures/hour)	Low frequency (less than 4 departures/hour)	No services
Bus and tram	High frequency (> 10)	**VERY HIGH**	**HIGH**	**HIGH**	**HIGH**
	Medium frequency (4 to 10)	**HIGH**	**MEDIUM**	**MEDIUM**	**MEDIUM**
	Low frequency (< 4)	**HIGH**	**MEDIUM**	**LOW**	**LOW**
	No services	**HIGH**	**MEDIUM**	**LOW**	**NO ACCESS**

Access to public transport in large European cities

Share of population of the urban centre, in %

Cities (left to right): Dublin, Den Haag, Budapest, Amsterdam, Helsinki / Helsingfors, Praha, Berlin, Manchester, Stockholm, København, Athina, Torino, Marseille, Bruxelles / Brussel

Legend:
- No access
- Low
- Medium
- high
- Very high

European Commission

Regional and urban Policy

Access to public transport in mid-size European cities

Distribution of frequencies and residential population

- Population-weighted median number of departures an hour

- Line graphs: "Y% of the total population of the urban centre has easy access to more than X departures an hour"
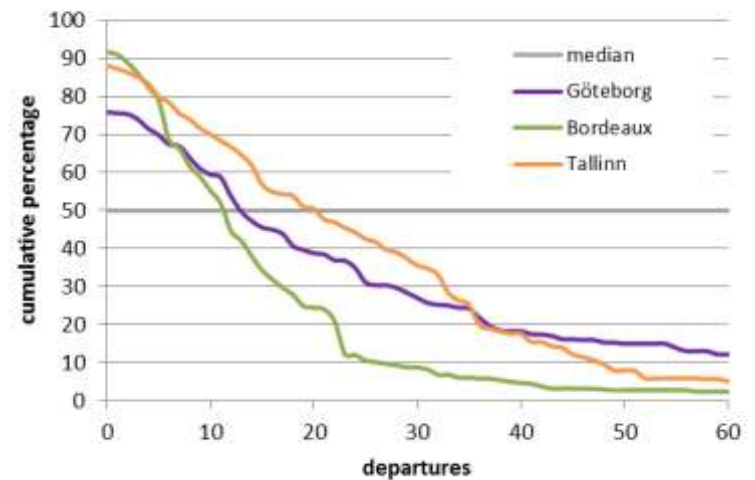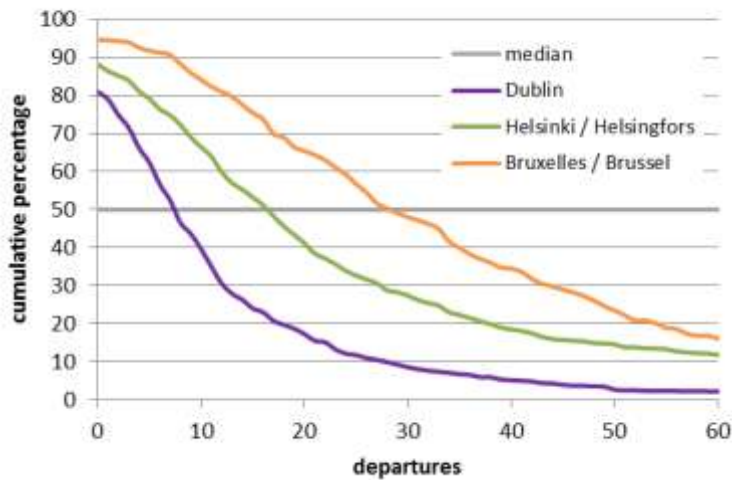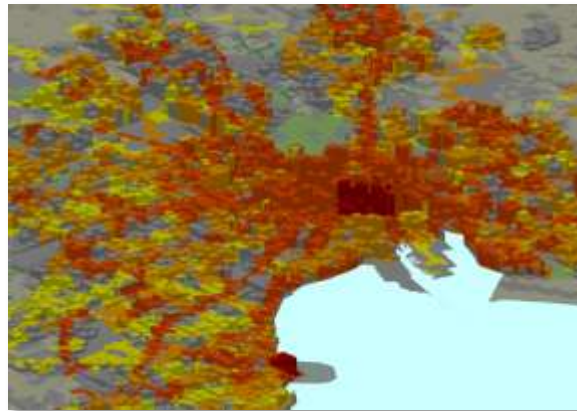
Median number of departures an hour

- Number of departures to which 50% of the urban population has easy access
  - *Varies between 7.4 and 28.3 departures in bigger cities*
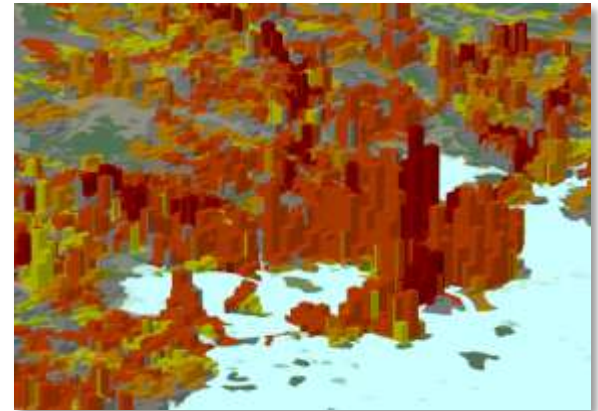 - *Between 3.5 and 20.2 in medium-sized cities*
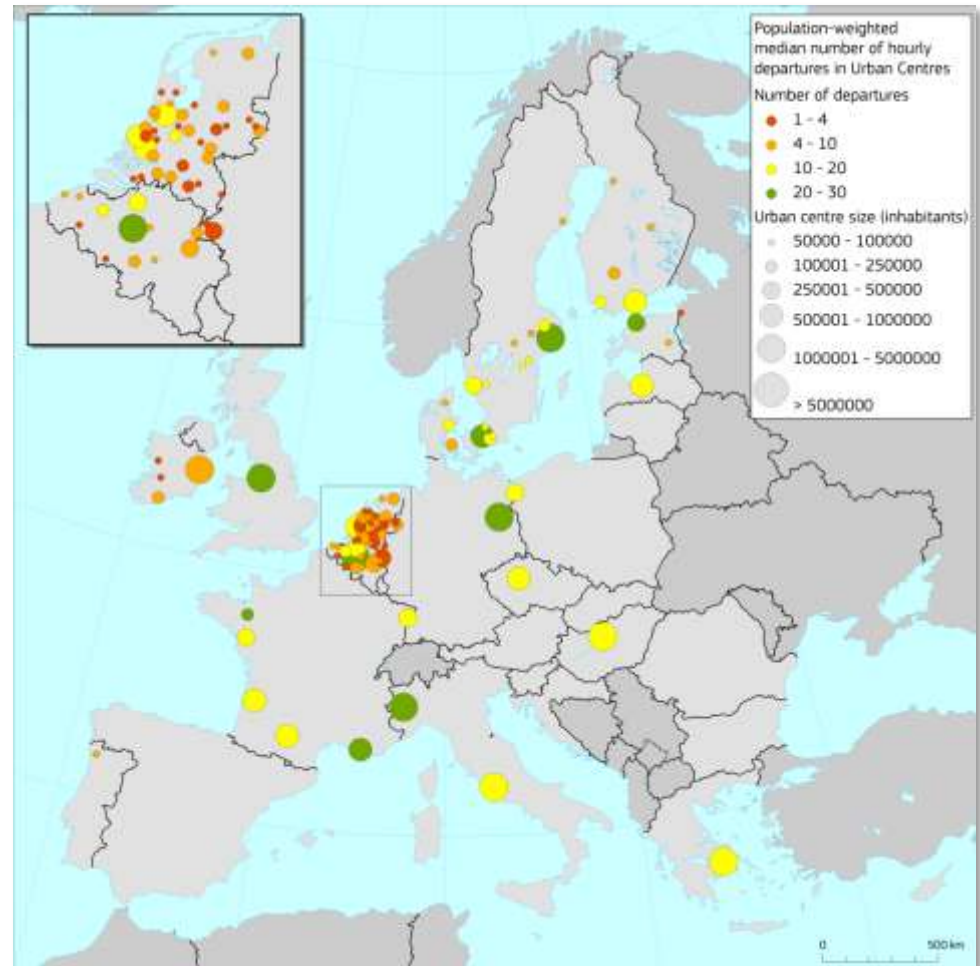
Population density, job density and typology of frequencies

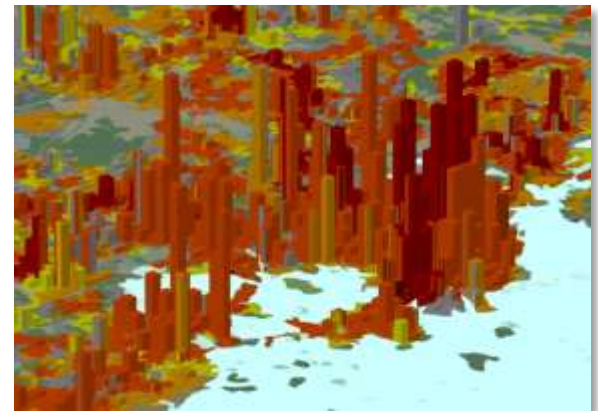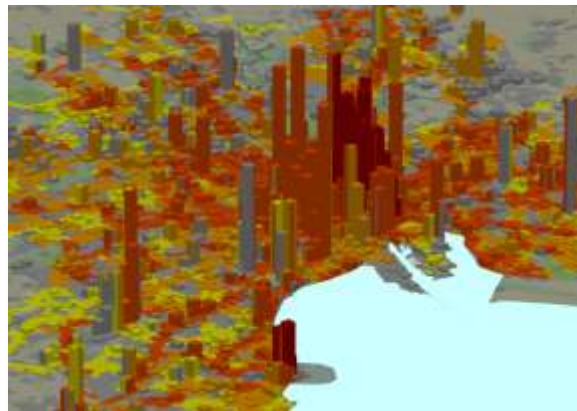Population density
(250x250 m cell
size)

Dublin

Helsinki

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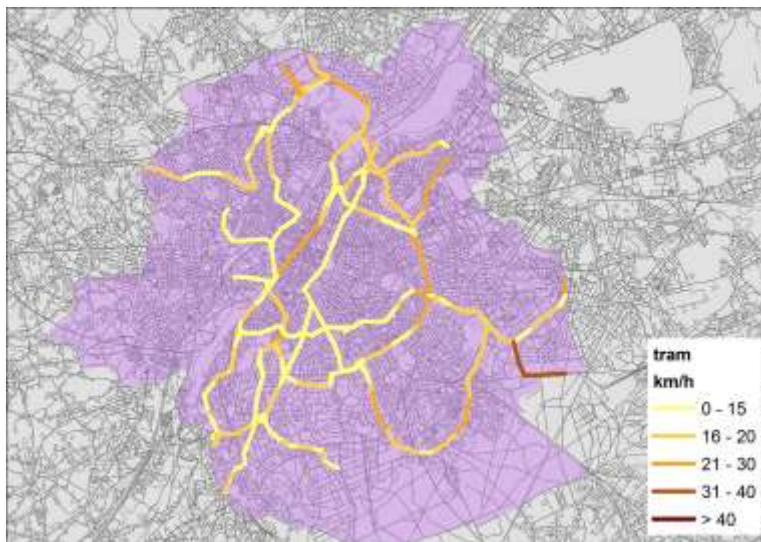employment)
(250x250 m cell
size)

Regional
and urban
Policy

Quantifying trip length and speed

- Timetable data combined with stop locations
- Connections between two stops represented by straight lines
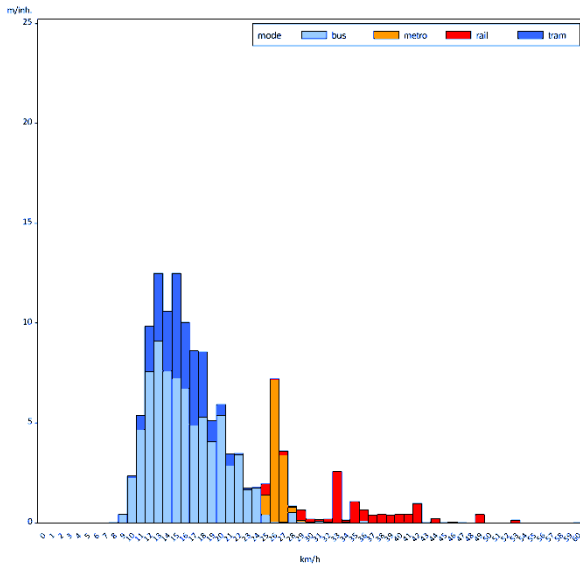- Average speed and frequency for each connection
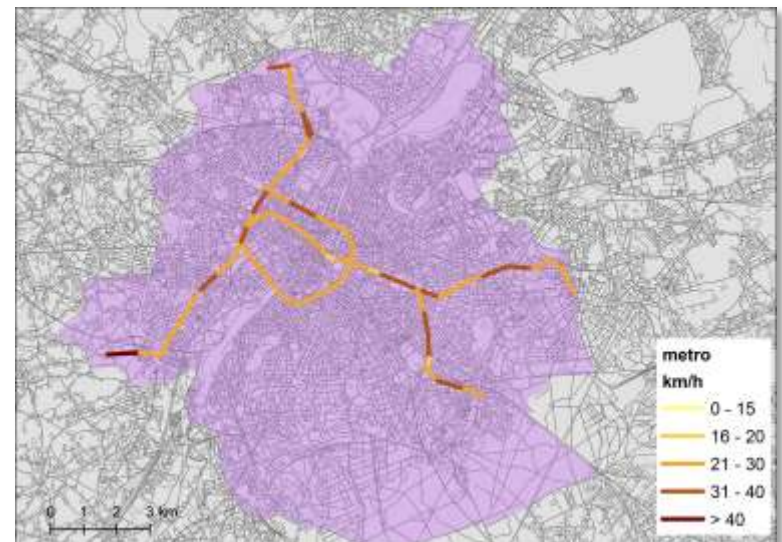
Brussels (city): average Euclidian speed by segment of the tram and the metro network

Trip length per inhabitant, by mode and average trip speed

- Intensity of the services, modal split and speed

Brussels

Dublin
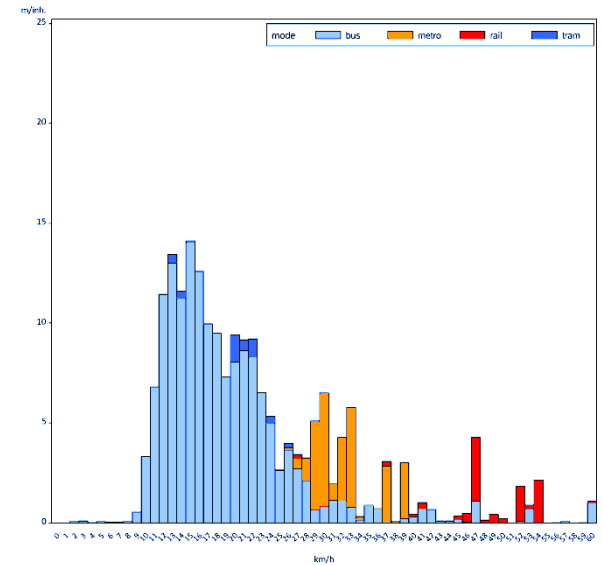
Stockholm

Summary indicators by urban centre

	large urban centres (>= 500,000 inh.)		medium-sized urban centres (200,000 - 500,000)	
	min	max	min	max
population without access to services (%)	3.7	23.8	3.9	24.1
median number of departures	7.4	28.3	3.5	20.2
modal split of length of all trips (%)				
tram	-	45.5	-	34.5
metro	-	15.7	-	-
train	-	19.0	0.5	8.2
bus	45.8	100.0	60.1	98.7
length of all trips, by inhabitant (m/inh.)	76.8	349.1	43.4	228.2
average trip speed (km/h)	13.5	24.8	15.0	21.1
tram	12.0	25.0	13.2	23.6
metro	24.6	42.4		
train	35.0	49.5	27.0	49.3
bus	13.5	23.1	13.6	19.8

Conclusion

- A harmonised way of assessing access to public transport and services' performance

- Gives an internationally comparable method of assessment

- Shows substantial differences in accessibility and network performance between cities

- Can be used to benchmark cities, to simulate the effect of planned investments or network performance enhancements

Challenges

- Timeliness and spatial resolution of population and employment distribution data

- A more harmonised implementation of public transport data standards

- Availability of open data (timetables), data licensing policy

- Linkeages between public transport data, INSPIRE data models and EU-wide rail data models (TAF/TAP, RINF)

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/

- Measuring access to public transport in European cities: http://ec.europa.eu/regional_policy/en/information/publications/ *-> type = working papers*

Questions ?

hugo.poelman@ec.europa.eu