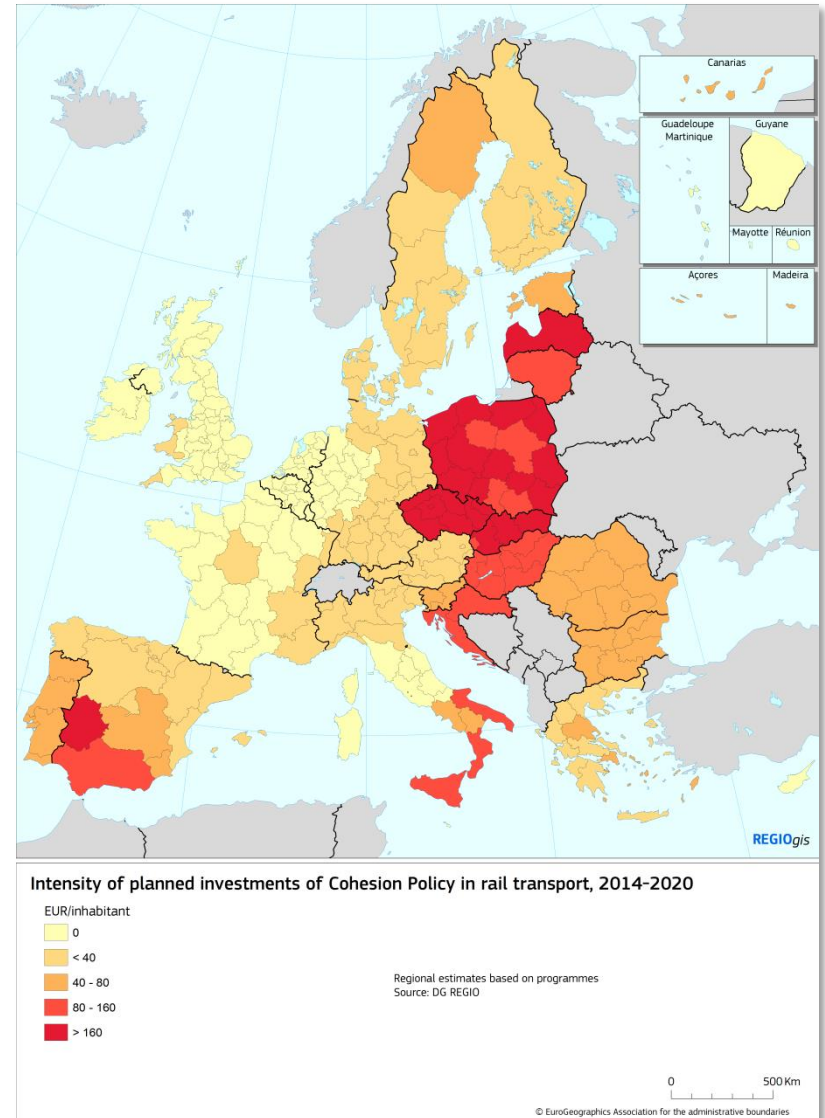


# From rail timetables to regional and urban indicators on rail passenger services

Hugo Poelman  
Linde Ackermans  
European Commission  
DG Regional and Urban Policy  
Analysis Unit - GIS team

# Policy context

- EU Cohesion Policy
  - Cohesion Policy rail investments 2014-2020: almost 19 bn EUR
  - Mostly programmed in less developed regions
- Enhanced harmonised context indicators on network and its use



# Problem statement

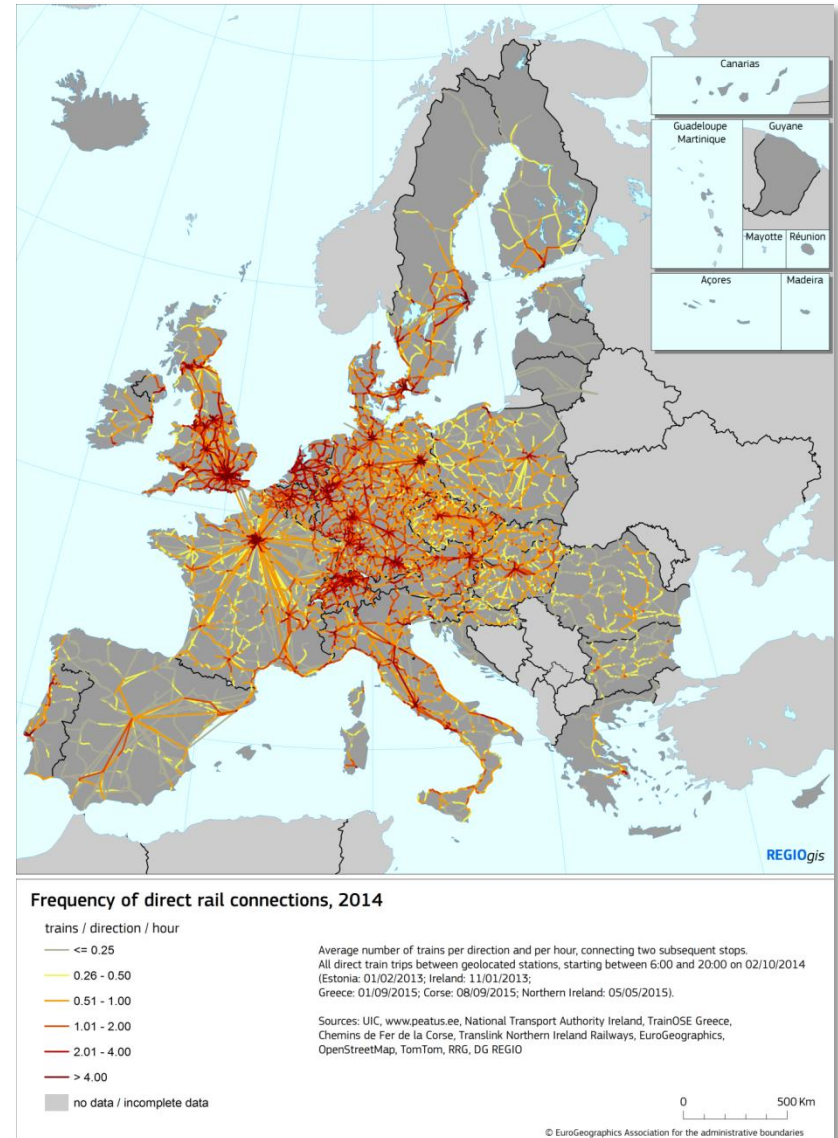
- Essential rail infrastructure endowment data available at national and regional level
- But what about the use and performance of this network?
  - Major data challenges to overcome (data availability, openness, harmonisation, transformation)
  - Develop indicators on the actual use of the network: frequency, speed
  - Special focus on regional dimension
  - Assess accessibility of cities and performance of cross-border connections

# Scope of the analysis

- Regular rail passenger services in 2014
  - Covering the EU plus Switzerland
  - All services leaving between 6:00 and 20:00 on an ordinary weekday from any station in the area (= more than 31000 stations)
  - Timetable data provided by UIC and retrieved from additional individual railway operators

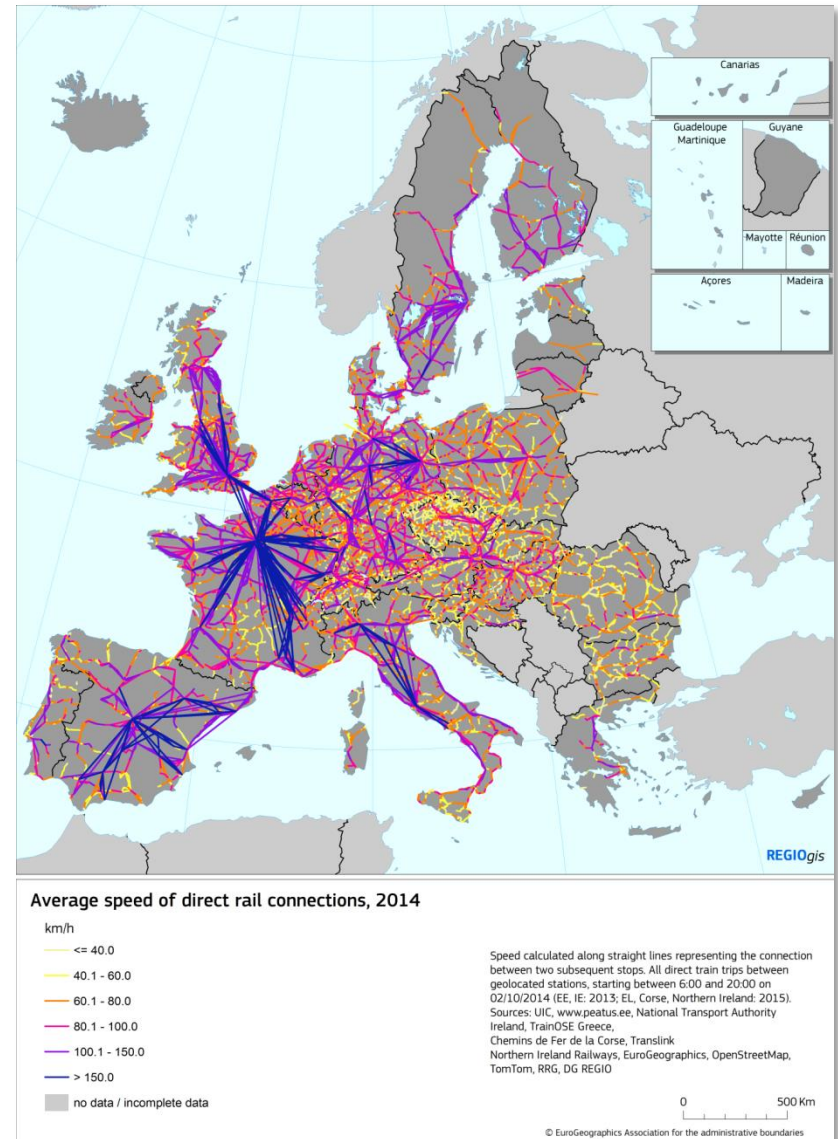
# Frequency of services

- Average number of trains per direction and per hour
- Connecting two subsequent stops
- Map shows connections between pairs of stations, not actual railway lines



# Average speed of connections

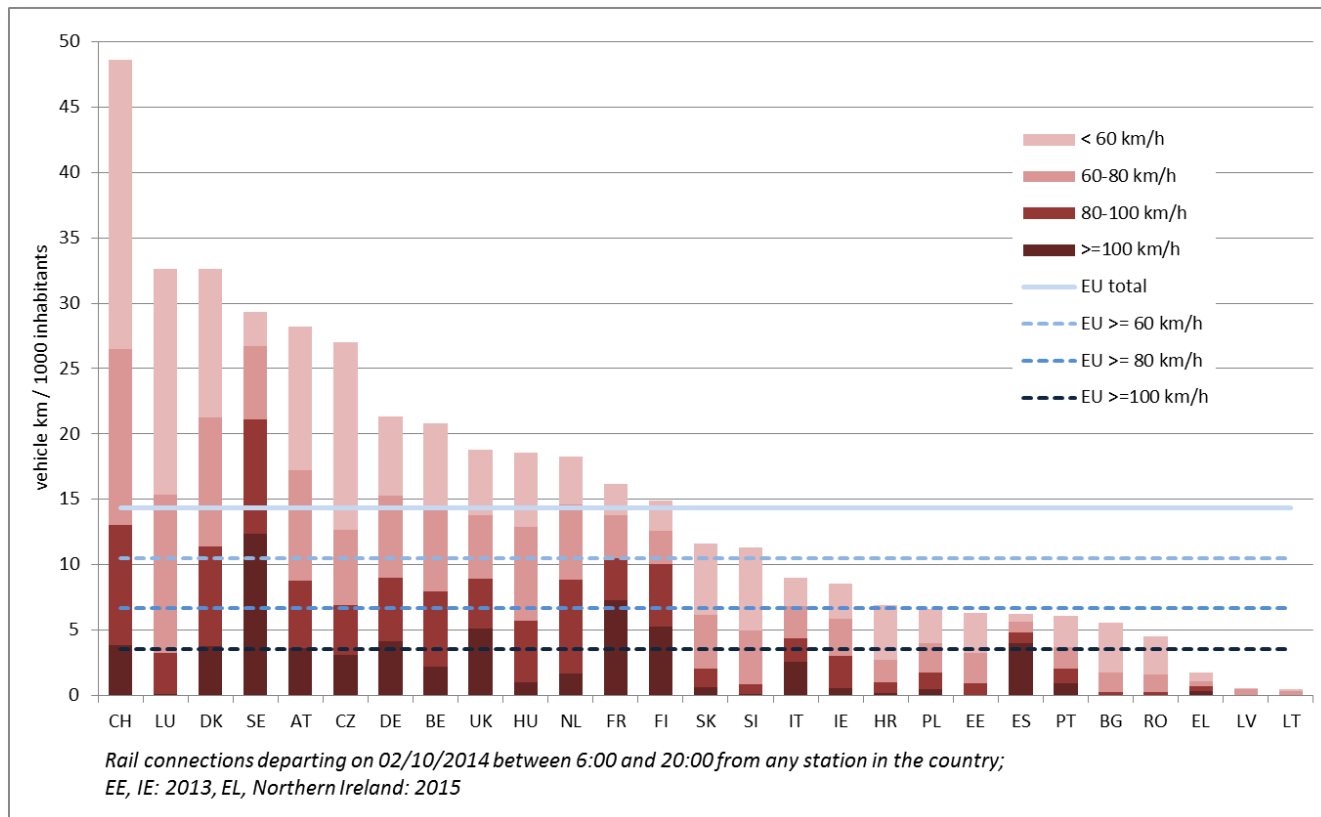
- Average speed of the connections calculated along straight lines linking two subsequent stations
- High-speed infrastructure
- Geographical constraints
- Infrastructure limitations



# Frequency and speed by country or region

- Location of all stops, relative to their country or region
- All departing services are aggregated by country or by region
  - Total straight-line length of all direct trips starting in any station of the region (vehicle km)
  - Total travel time of these trips
  - Average speed
  - Services intensity, dividing sum of vehicle kilometers by regional population

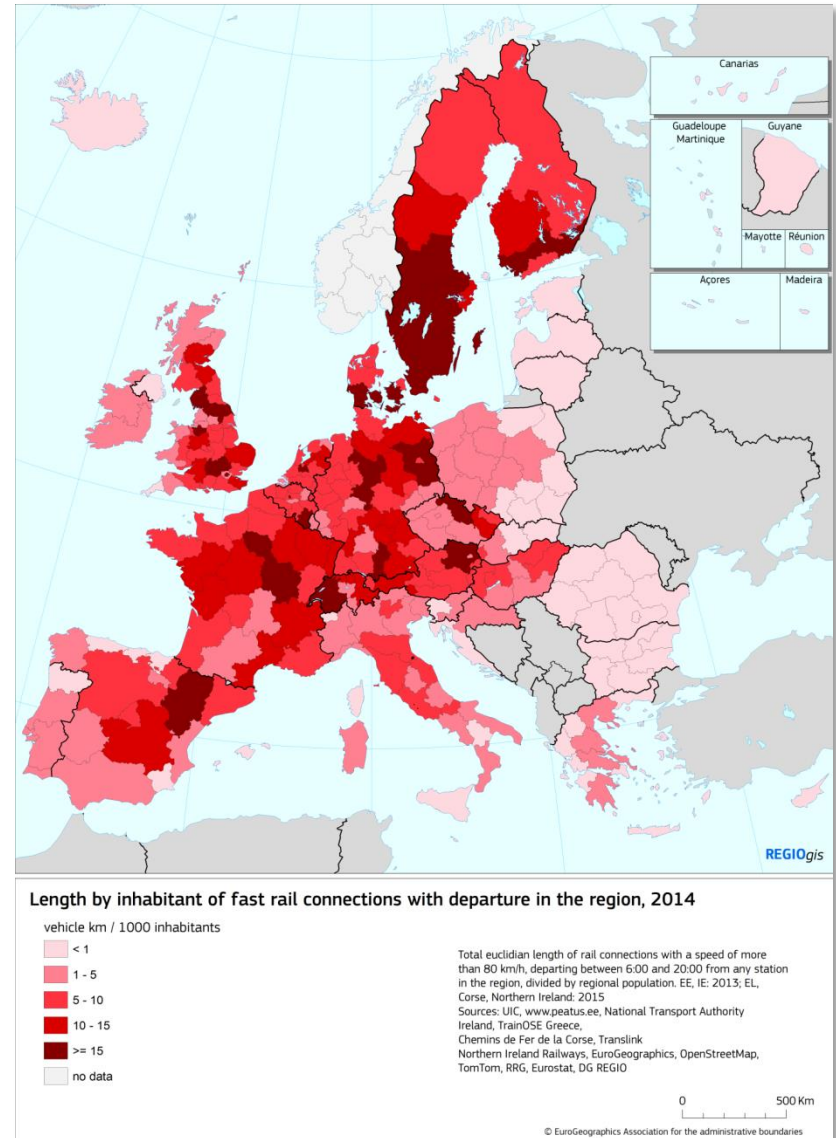
# Aggregated length of all connections departing in the country, by speed category





# Fast connections by region

- Vehicle km per inhabitant of connections with a speed of more than 80 km/h
- All connections departing in the region
- Some of the high values relate to relatively low population density
- Performance issues in eastern and southern regions

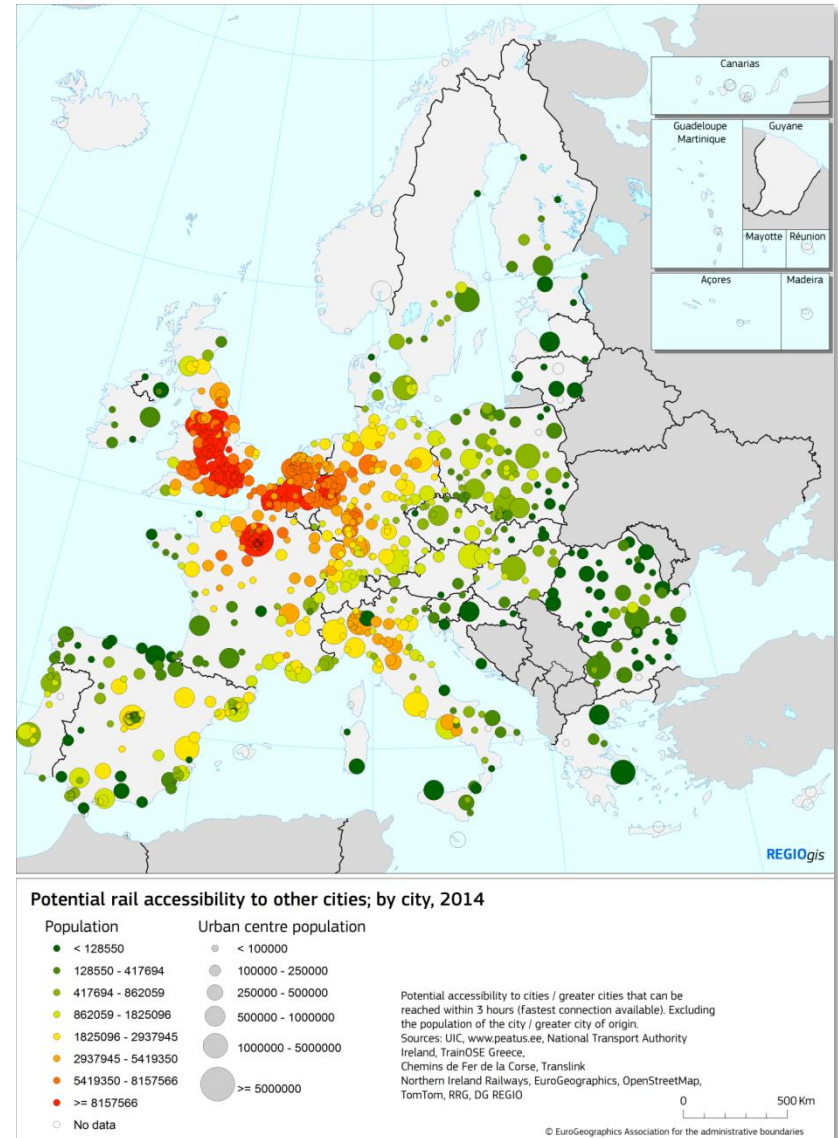


# From timetable data to accessibility

- Assess the accessibility between all cities in Europe (EC/OECD city definition)
- Taking into account trips relevant for day-time travel: maximum travel time of 3 hours
- For each pair of cities: total travel time (including waiting times and transfer times) for travels starting between 7:00 and 9:00
- Calculation repeated every 15 minutes to take into account frequency of services

# Accessibility of cities

- Total population of other cities that can be reached within a reasonable travel time
  - Taking into account total travel time
  - Inverse-(time)distance weighted
  - Only destinations relevant for a day-time trip



# Short-distance connections

- Connections between cities < 100 km away
- Variety of average speed inside countries
  - Geographical obstacles
  - Infrastructure challenges
  - Differences in performance of network use
  - In countries with more than 100 domestic city connections: speed varies between 47.3 km/h in Poland and 63.3 km/h in the Netherlands
- Cross-border connections mostly slower than domestic connections (45.8 km/h versus 59.4 km/h)
  - Waiting times?
  - Lack of coordination of schedules?

# Conclusion

- Timetable analysis allows for **harmonised metrics** on network use
- Highlights extreme diversity in terms of services performance
- **Simplifications** were needed due to limited data integration
- Method can be applied to **other territories** if adequate timetable information is available
- Enhanced **interoperability of data models**, including actual network layout, will create new opportunities for a more in-depth analysis of network use