

# // ESPON FUORE - Functional Urban Areas and Regions in Europe

// <https://www.espon.eu/functional-urban-areas-tool>



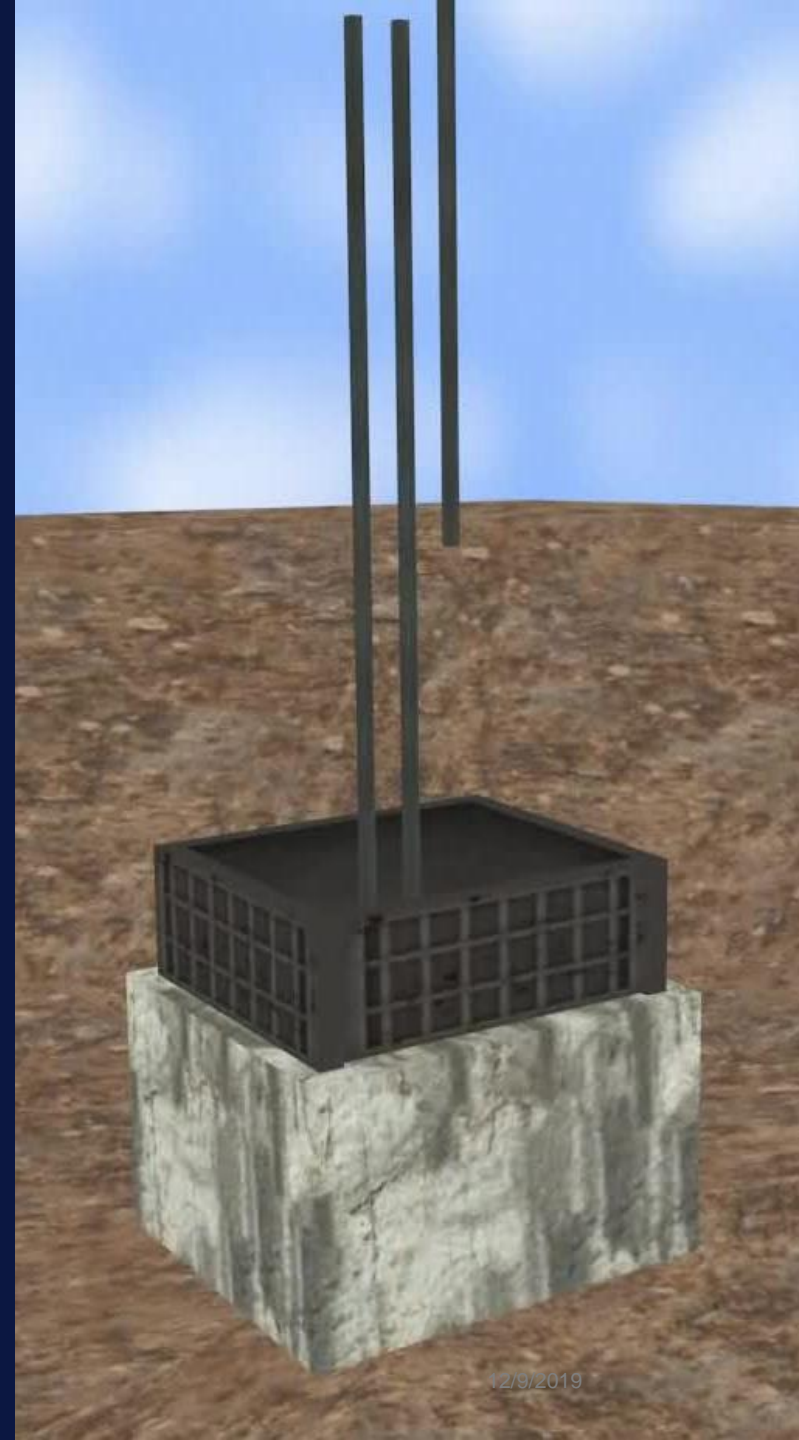
Roger Milego, UAB - Autonomous University of Barcelona

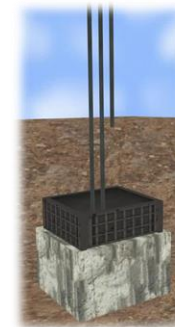
ESPON Seminar // State of the European Territory - Digital Innovation Paving the Way for Territorial Cohesion // 27 November 2019 // Helsinki, Finland

*Networking on New and Ongoing ESPON Activities*

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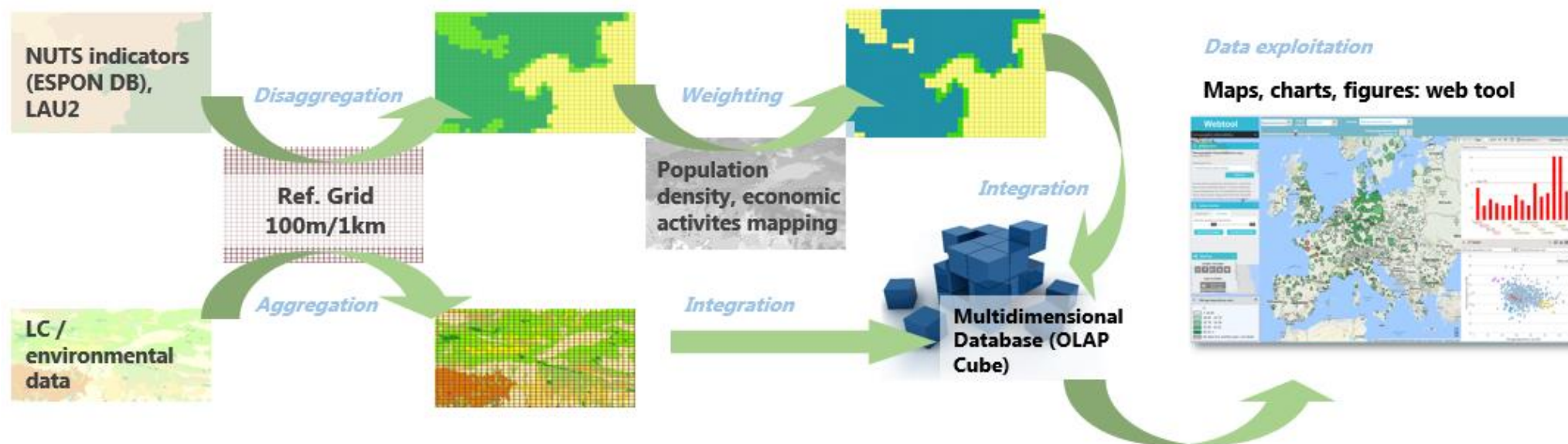
# Background





# Background

- Former ESPON OLAP Cubes, developed within ESPON M4D



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# Objectives



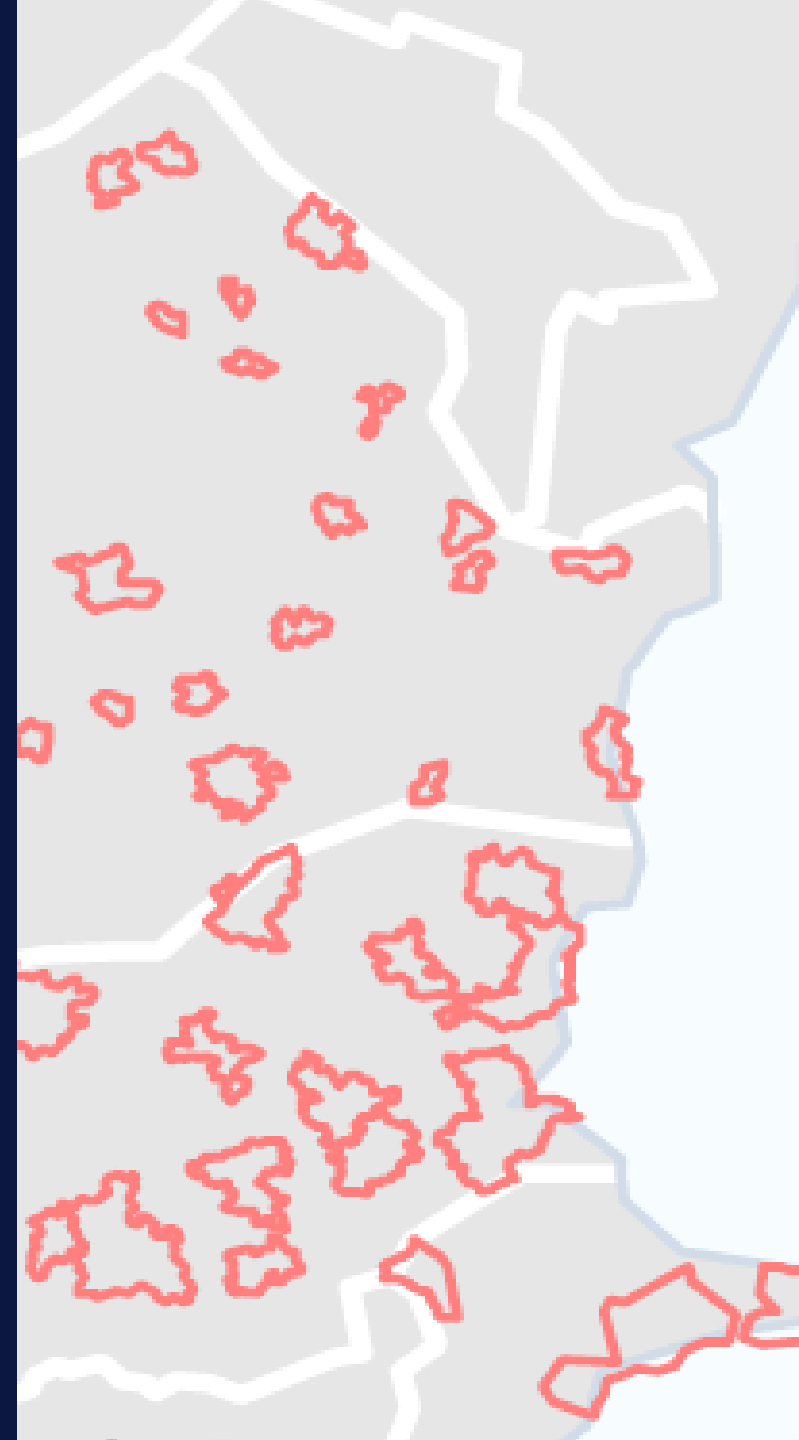


# Objectives

- Building an updated ESPON OLAP Cube (named in this project **ESPON Spatial Multidimensional Database** or ESPON SMD) with estimated indicators for **FUAs** and other **functional regions**.
- Developing a **Web Tool** to exploit the new ESPON SMD and facilitate the **analysis** of the data and **benchmarking** of the different functional regions

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## Selected functional regions





# Nine functional regions

- **TERCET Functional Urban Areas (FUA)**
  - **TERCET Coasts**
  - **Eurostat's Maritime Service Areas (MSA) Coasts**
  - **Mountains**
  - **Islands**
  - **Sparsely Populated Areas (SPA)**
  - **Border "narrow" (45 min)**
  - **Border "large" (90 min)**
  - **Green Infrastructure potential areas**
- **ESPON GEOSPECS**
- **ESPON GRETA**

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# Methodology







# Data sources

- **Indicators:** ESPON Base indicators (demography, employment, education, economy, energy, society, R&D, ITS).
- **Data integrator:** ER Grid 1 km<sup>2</sup> for Europe + *Ad hoc* grid for Outermost regions.
- **Ancillary datasets:**
  - European Settlement Map (ESM) 10m (JRC)
  - CLC-R (refined) 100m (JRC)
  - Statistical classification of economic activities in the European Community (NACE) (ESPON GEOSPECS, from NSI sources)



# Disaggregation/estimation at 1 km<sup>2</sup>

Indicator type	ancillary dataset	CLC classes	weights
Demographic, Education, ITS	ESM	Rural, urban, others; class 1	Batista & Poelman 2016
Employment, Society	NACE total population	Main activity sectors; class 2	Eurostat
Economy, R&D	NACE by type of activity	Main activity sectors; class 2	OCDE
Energy	NACE by type of activity	Main activity sectors, Eurostat, GHG emissions; class 2 and 3, respectively	EEA Report No 8/2017; Eurostats

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# Web Data Analysis Tool



# Online estimation of indicators by functional region

- **Embedded** in the ESPON FUORE web tool.
- Advanced users will be able to **upload** a NUTS indicator and obtain an **estimation** at **functional region level**.
- Possibility to choose between different **weighting matrices**.
- **Preview** of results on **chart** and **map**
- Results eventually shown in the **web tool**.



# Web Data Analysis Tool preview

```
File Edit View Insert Cell Kernel Widgets Trusted Python 3
```

```
In [5]: # fua = fua.drop(['shape_leng', 'shape_area', 'analytical', 'overlappin', 'index', 'gid', 'id'], axis=1)
```

```
In [6]: def f(x):  
        return x  
  
        country = interactive(f, x = countries)
```

```
In [7]: display(country)
```

x CH

```
In [20]: fua_selected = fua.loc[fua['cntr'] == country.result]
```

```
In [21]: ## Do some data cleaning to allow fua plot  
fua_t = fua.loc[fua['cntr'] == country.result].T  
# fua_plot = pd.DataFrame(fua_t.rename(columns=fua_t.loc['name']).drop(['objectid', 'fua_code_x', 'fua_code_y', 'geom', ''])  
fua_plot = pd.DataFrame(fua_t.rename(columns=fua_t.loc['fua_name']).drop(['objectid', 'id', 'fua_ind', 'parent_id', 'fua_'])  
fua_plot['year'] = fua_plot.index  
# fua_plot['year'] = fua_plot['year'].str.replace('fua_', '').astype(int)  
fua_plot['year'] = fua_plot['year'].astype(int)
```

```
In [24]: cities = list(fua_selected.fua_name)  
city = interactive(f, x= cities)
```

### Chose the city

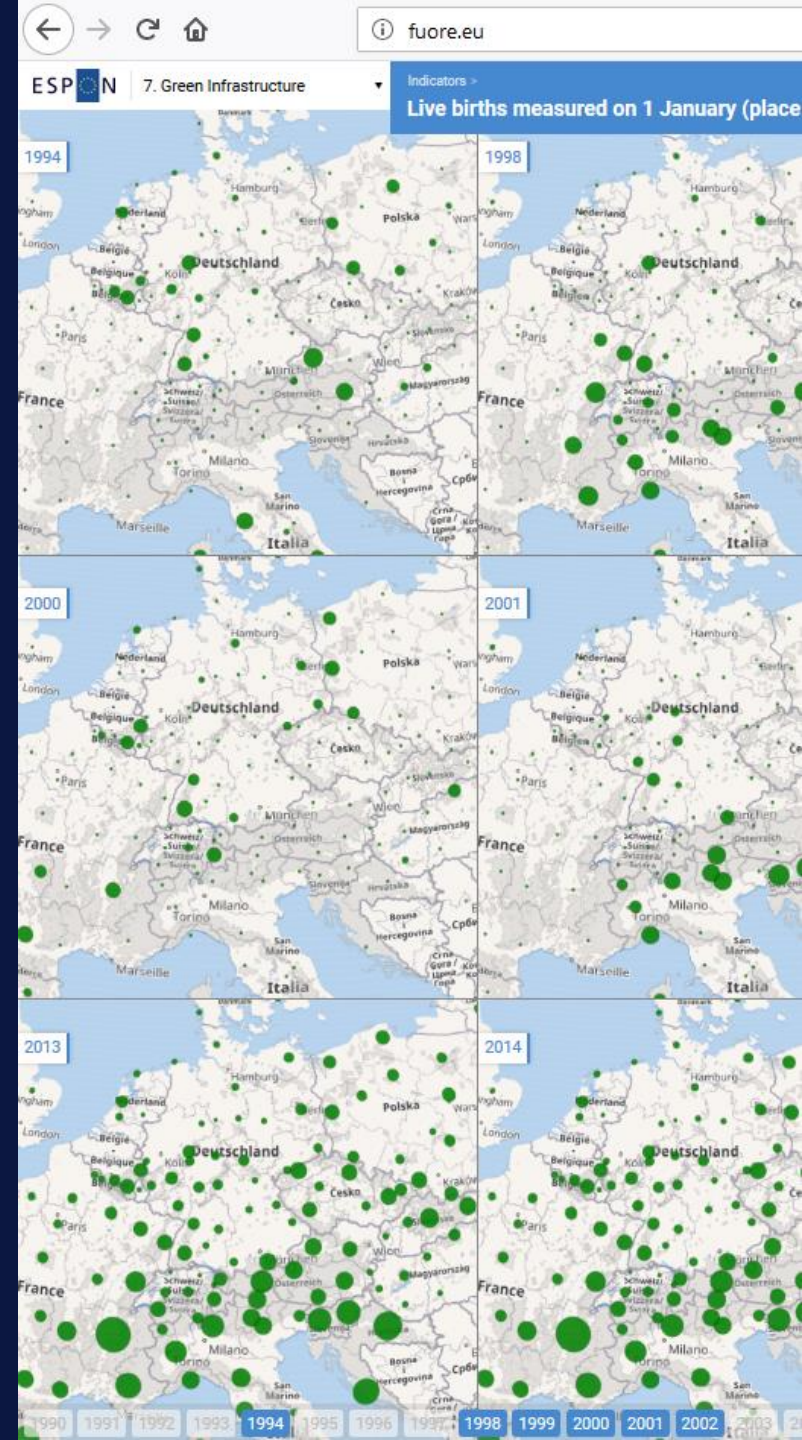
```
In [25]: widg = widgets.SelectMultiple(  
        options=cities,  
        value=[cities[1]],  
        rows=len(cities),  
        description='FUA',  
        disabled=False)  
  
# list(fua_plot.drop(['year'], axis = 1).columns.values)
```

```
In [26]: #ignore this  
def iteration(my_list, r):
```

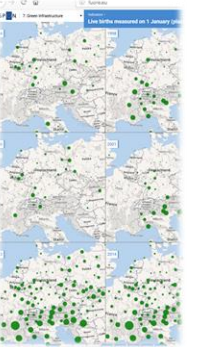
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# The web tool

<http://fuore.eu/>



# ESPON FUORE web tool (<http://fuore.eu/>)

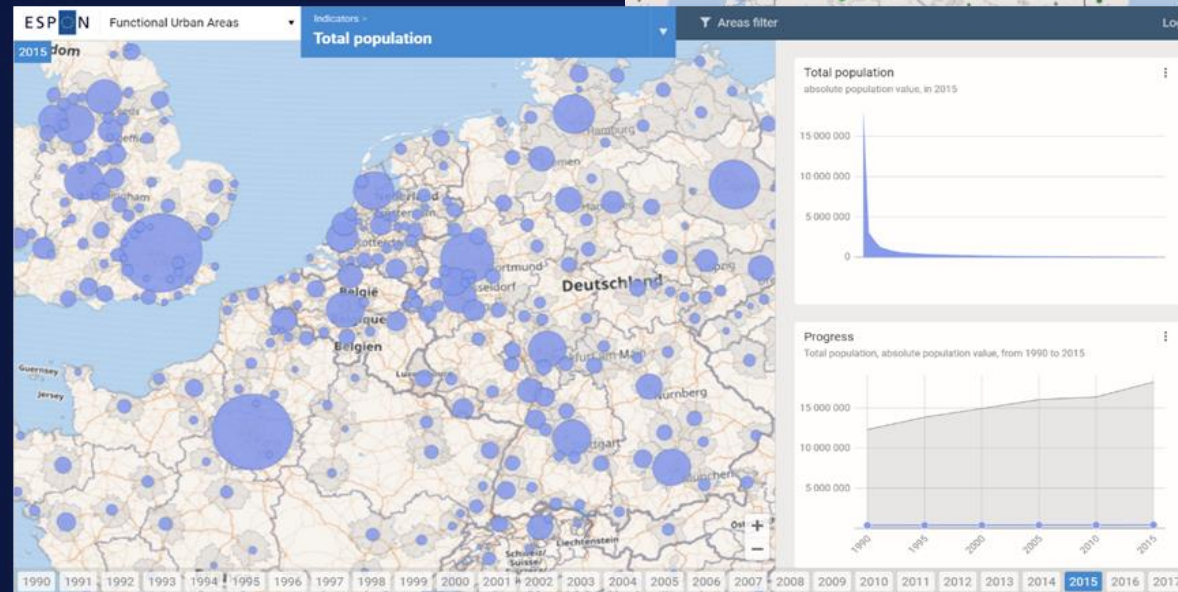
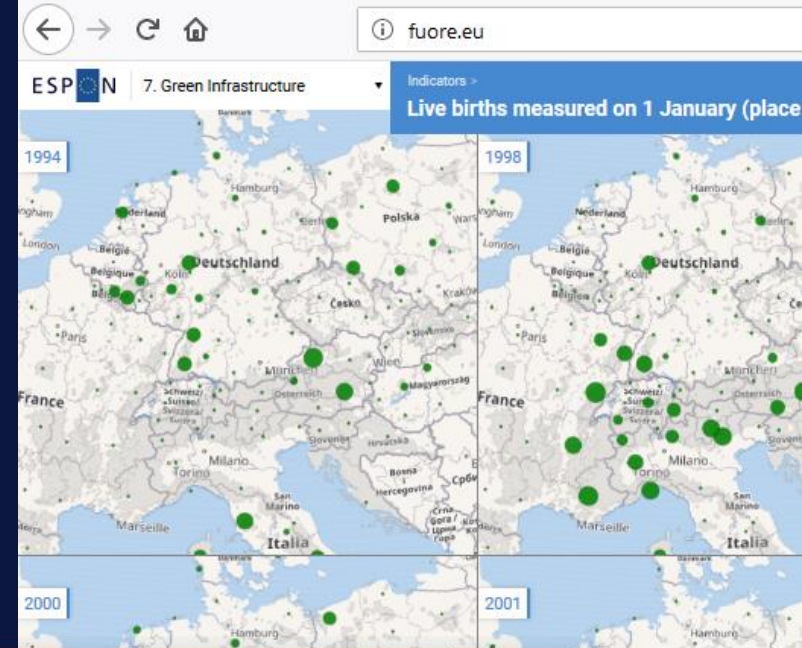


- One of the **main results** of the project.
- **Presents the indicators dissagregated at the level of functional regions.**
- **Interactive** web tool of interlinked **maps** and **charts**, allowing the users **analysis** and benchmarking of functional regions
- Currently in its ***beta (draft final) version***. *Final version in April 2020.*
- **Open source components based – no additional licenses needed**

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## Main features of the web tool

<http://fuore.eu/>





# Landing page

- Info about the project
- Selection of functional region of interest
- Link to ESPON project website
- Guidelines on how to use the tool will be added
- Link to Web Analytical Toolbox (for user-driven disaggregation of indicators)

**ESPON** **Functional Urban Areas and Other Regions - Analytical Tool**

This web tool is the main outcome of the ESPON FUORE project. It presents the data, indicators and knowledge related to Functional Urban Areas and Regions in Europe and provides an unique opportunity to analyze the current situation and recent trends in functional regions in Europe. The tool offers a wide range of analytical functionalities, including advanced filtering and benchmarking via interactive maps and graphs

Policy decisions and actions reach beyond administrative borders. This means geographies for policy making are not aligned with the geographies affected. Policy-making using functional areas should overcome these challenges. In order to improve the relevance, efficiency and effectiveness of the policy making and implementation process regarding functional areas, it is essential to have data, indicators and analytical tools that can help to better understand the drivers for growth and facilitate policy debates at various levels.

Please note that this is the alpha version of the webtool, so it will be further developed. Also, the figures presented are currently under validation. Therefore, they should be considered as draft results of the project and may be further adjusted.

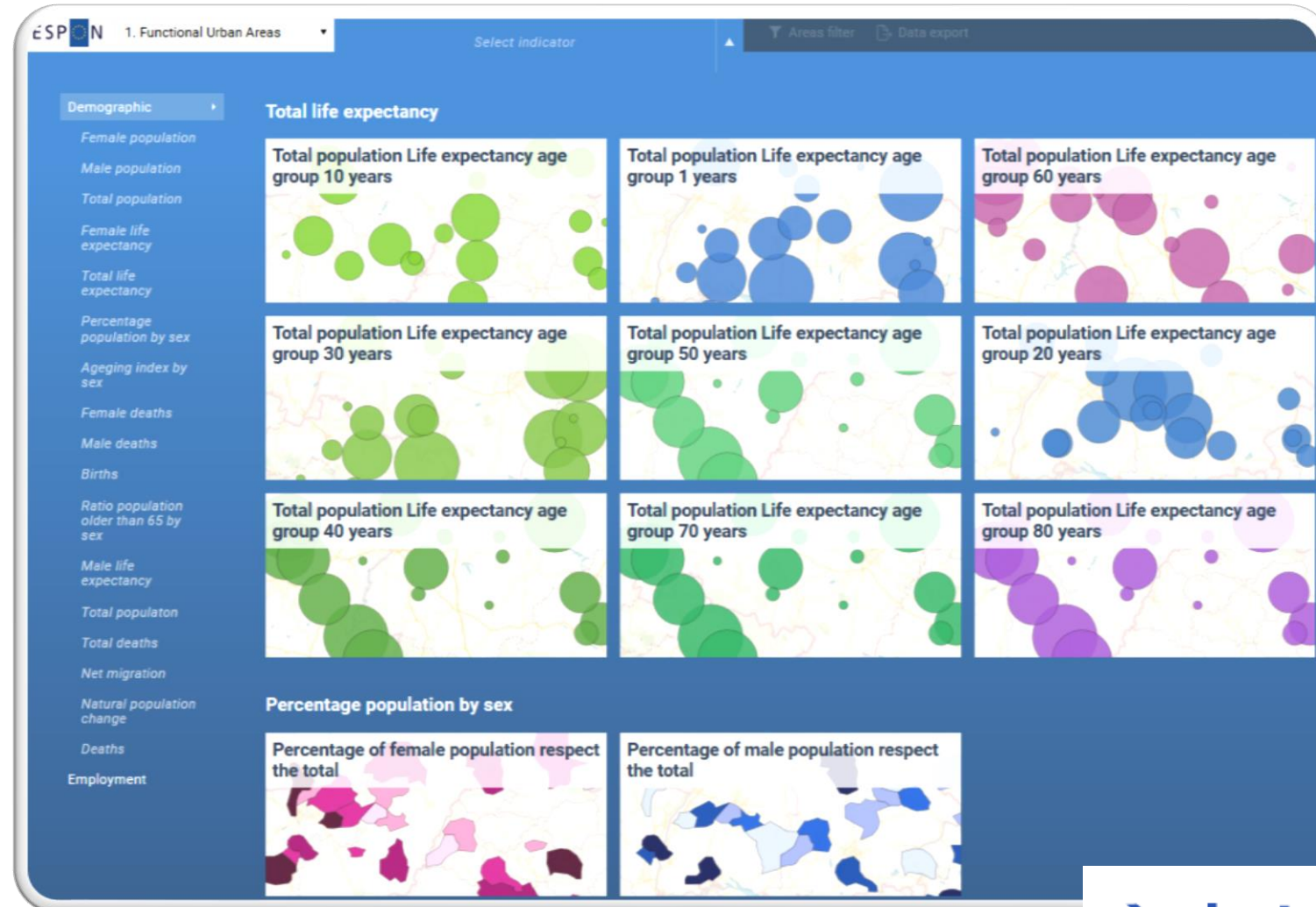
[Project information](#) [Custom disaggregation](#)

<b>1. Functional Urban Areas</b> Functional Eurostat-OCDE based on commuting movements	<b>2. Border 'large' (90 minutes)</b> Functional Time-distance to a line: contiguous to border or 50% area with 90min driving accessibility to border	<b>3. Border 'narrow' (45 minutes)</b> Functional Time-distance to a line: contiguous to border or 50% area with 45min driving accessibility to border
<b>4. Green Infrastructure</b> Morphologic Green Infrastructure Potential Network, calculated by ESPON BRETA	<b>5. Islands</b> Morphologic Totally surrounded by sea islands with a fixed link to continent have been excluded	<b>6. Coasts I</b> Morphologic Contiguous to coast or 50% are within 10km buffer to coast
<b>7. Coasts II</b> Functional Area that can be reached within a given travelling from a location at the coast and using the existing transport network	<b>8. Mountains</b> Morphologic 50% covered by EEA mountain delineation Enclaves and Exclaves excluded	<b>9. Sparsely populated Areas</b> Functional Settlement pattern based on threshold of population potential

**gisat**

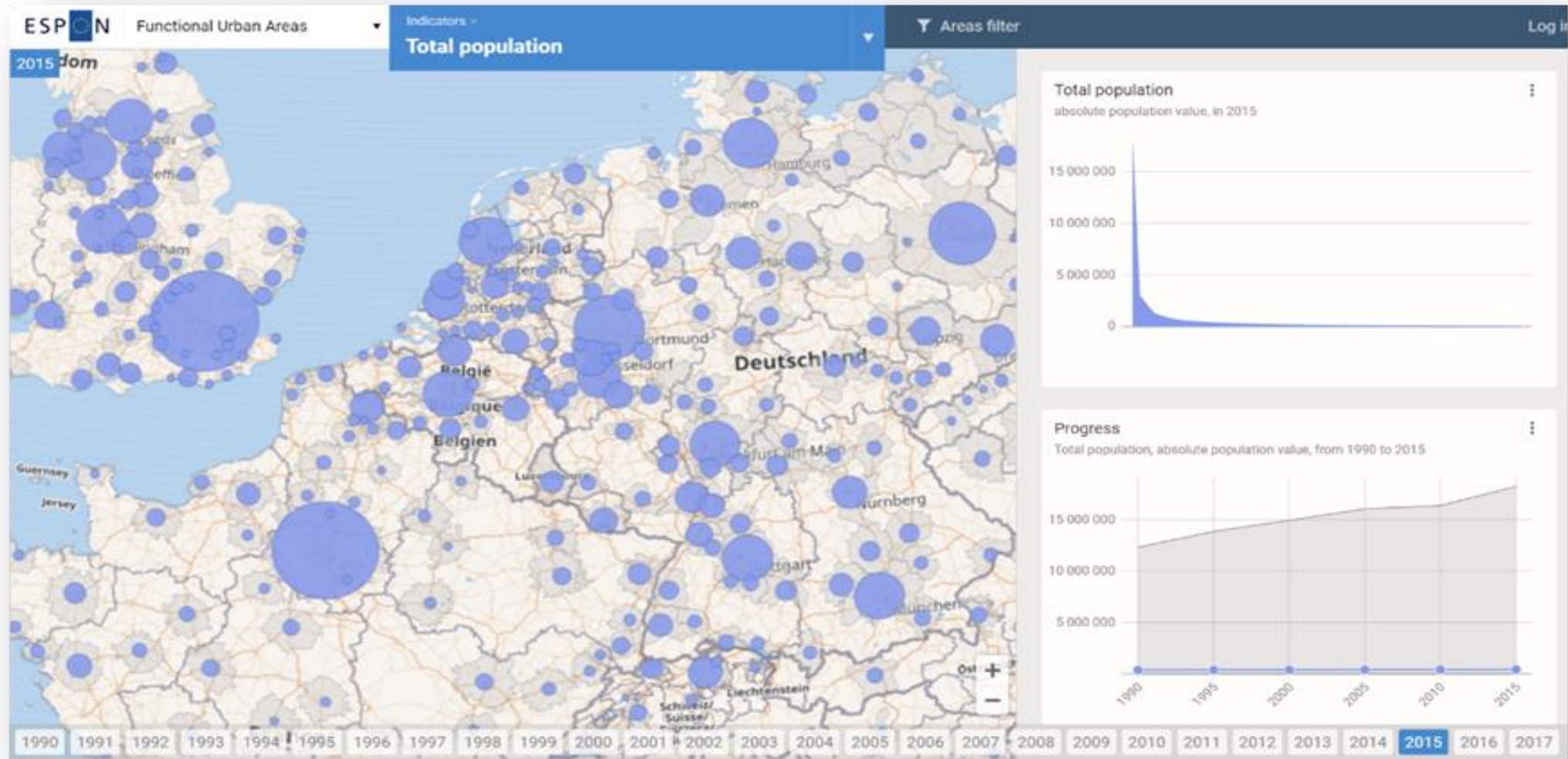
# Selection of indicator

- Categories and sub-categories
- Cartographic visualisation depends on the type of indicator (stock values x ratios)



# The Web Map View

- Interactive map window + interactive charts - fully synchronized



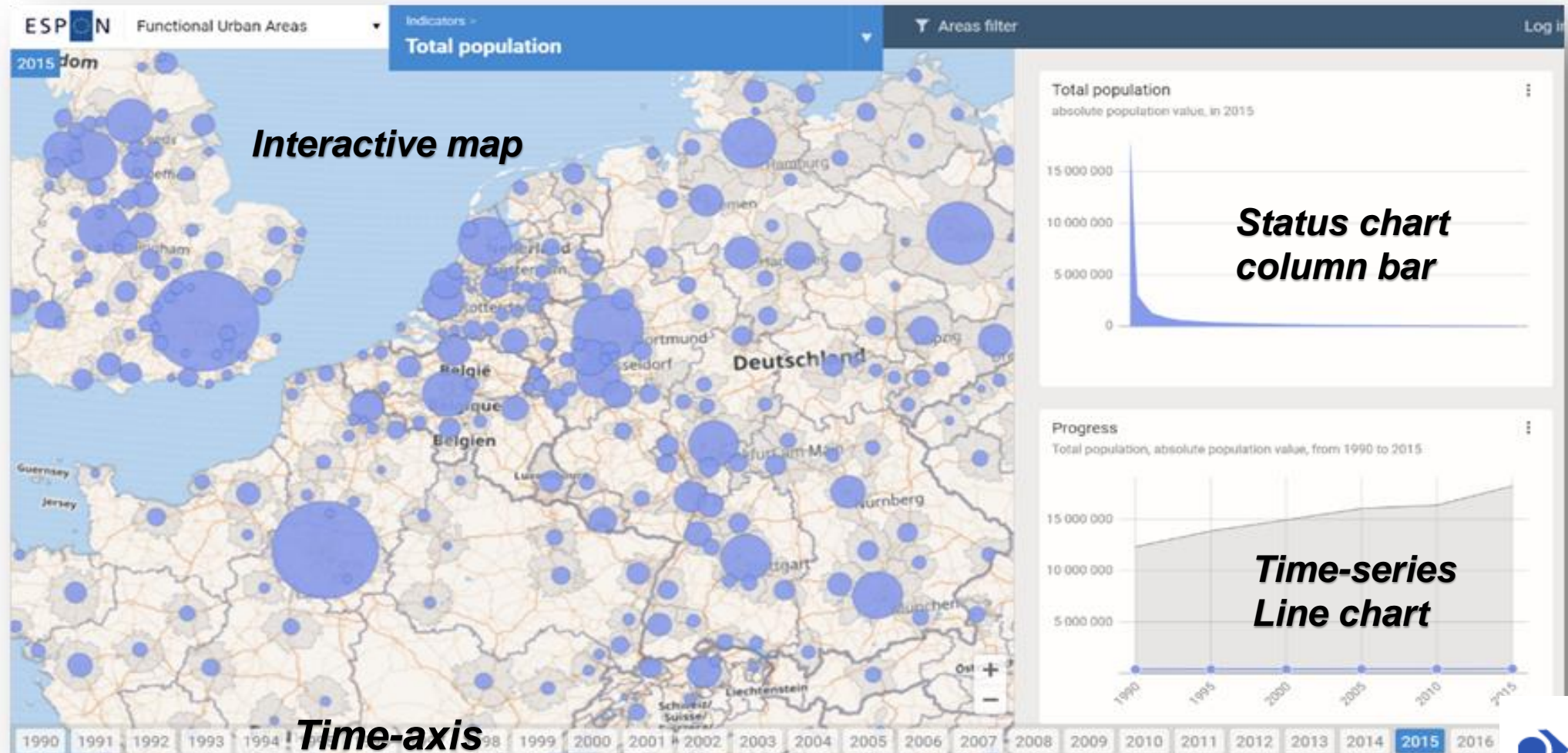
# The Web Map View

- Interactive map window + interactive charts - fully synchronized

*Selection of functional region*

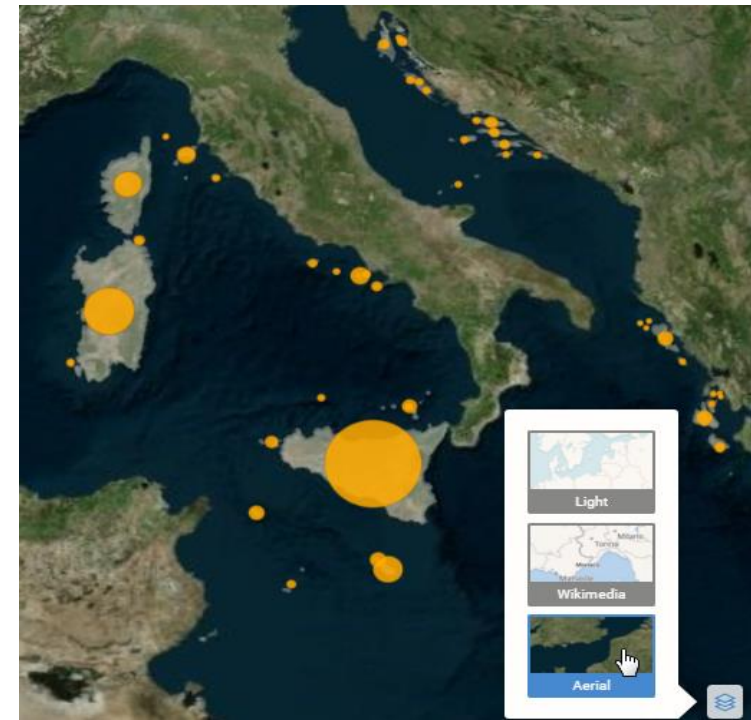
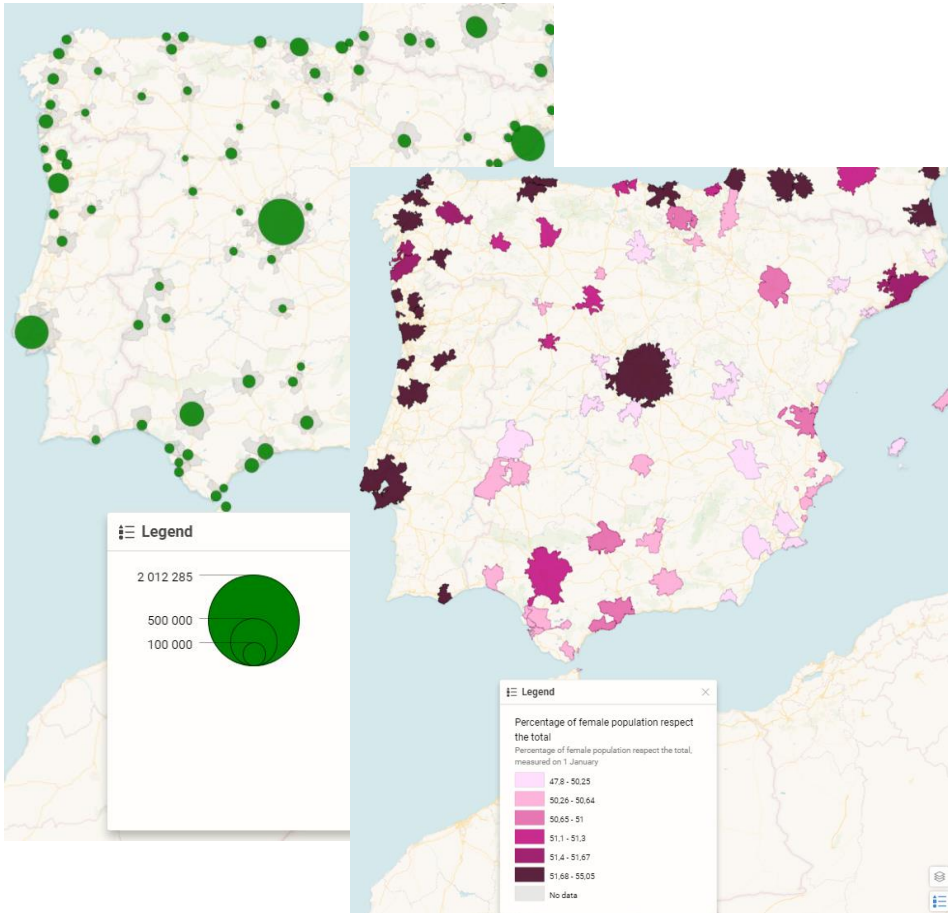
*Selection of indicator*

*Interactive charts*

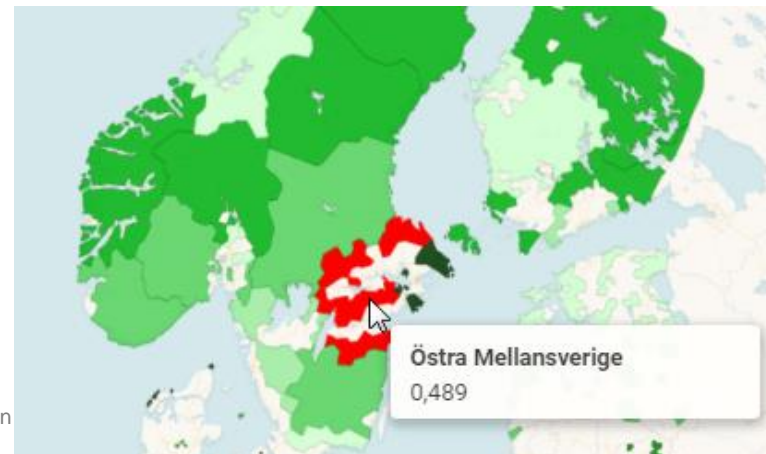


# Map options

- Dot chart for stocks
- Choropleth map for ratios



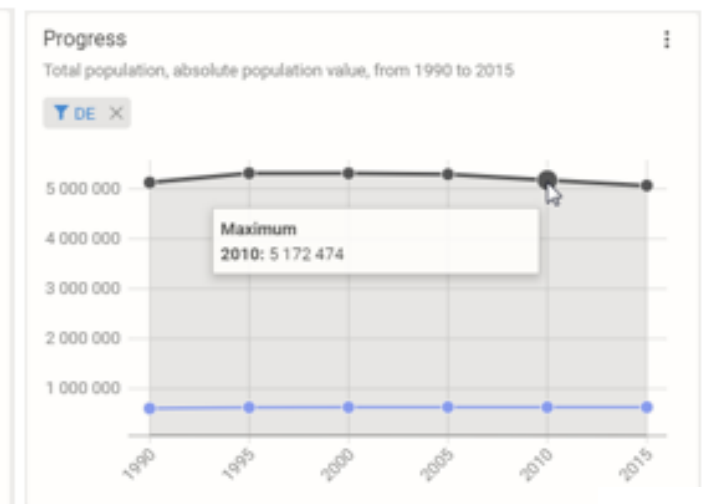
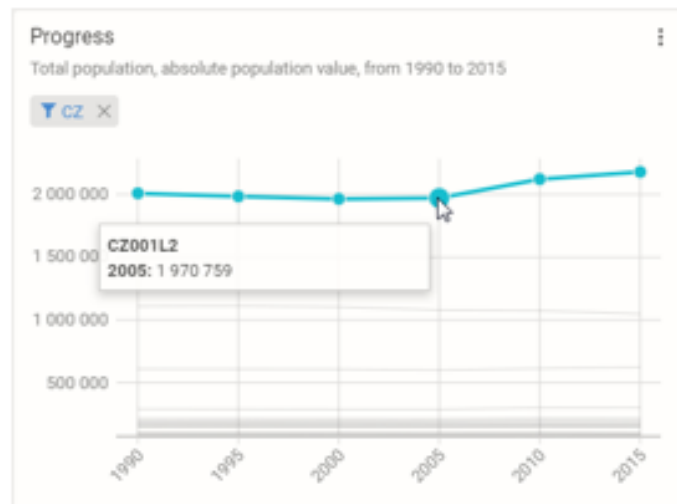
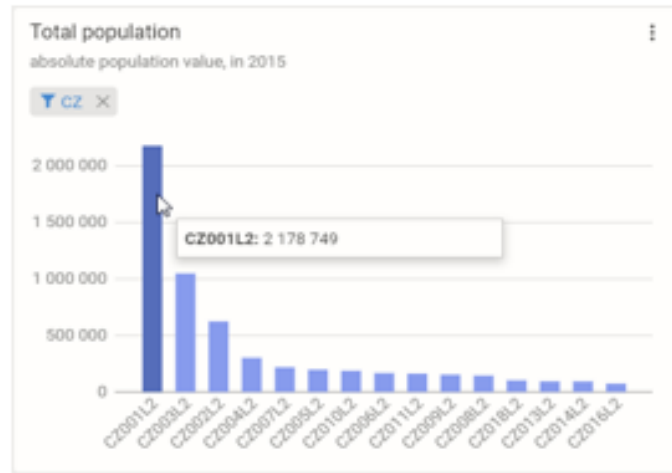
- Different types of background map are available (aerial, topographic, etc.)



- Querying analytical units in the map

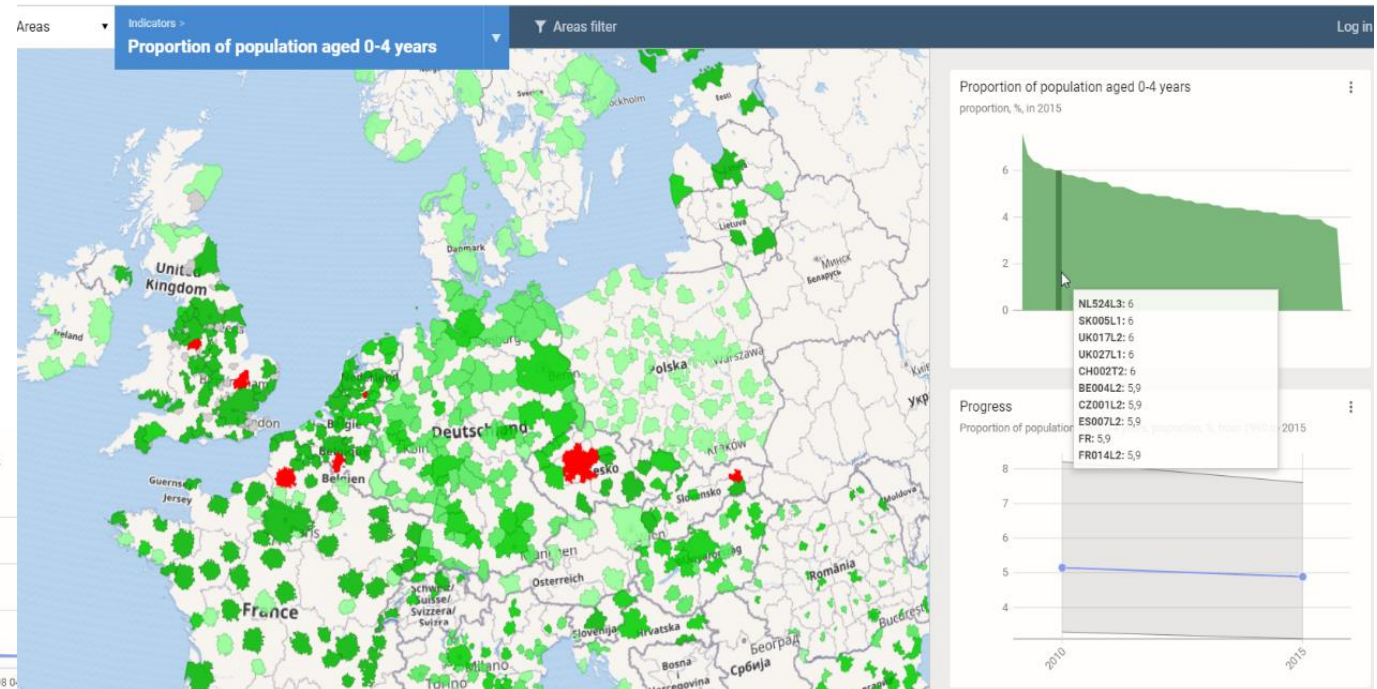
# Interactive charts

- Charts showing the values in cumulative way (groups, maxima, averages) or unit by unit
- Reporting units sorted in descending way by default

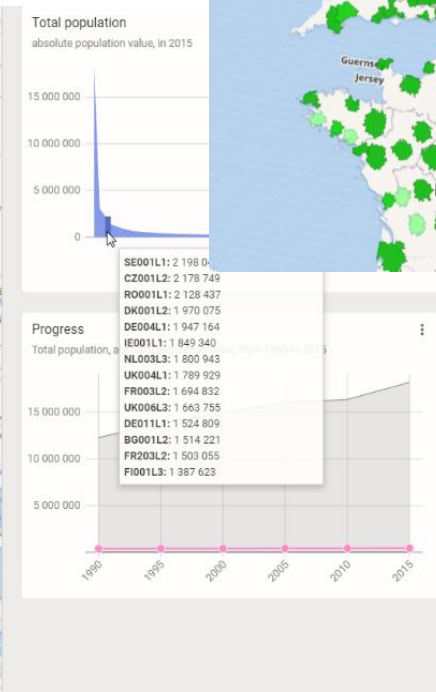
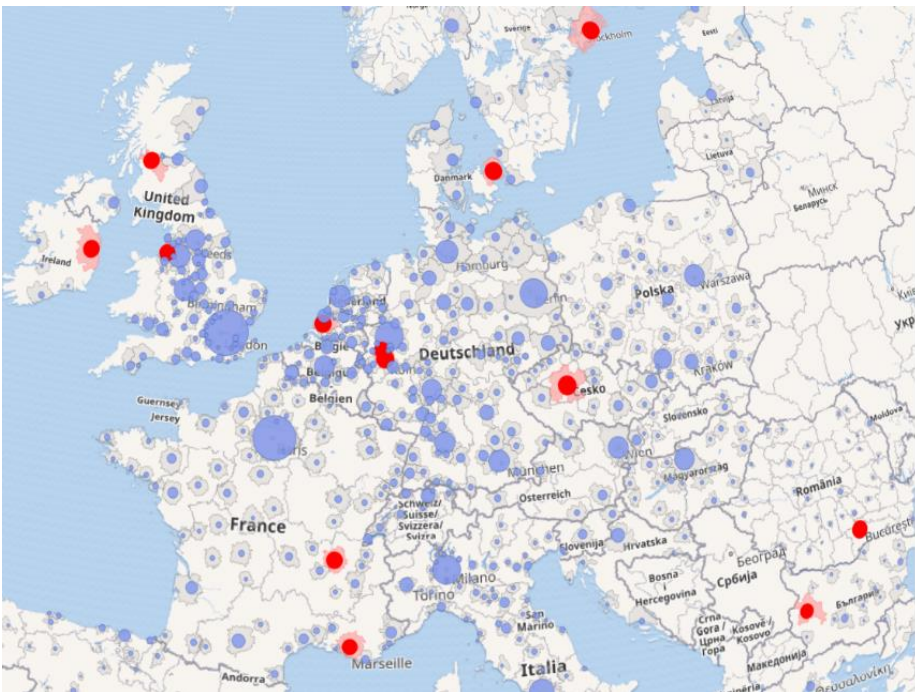


# Benchmarking, identification of „similar“ regions

- Select the unit in map window
- Select the unit in chart

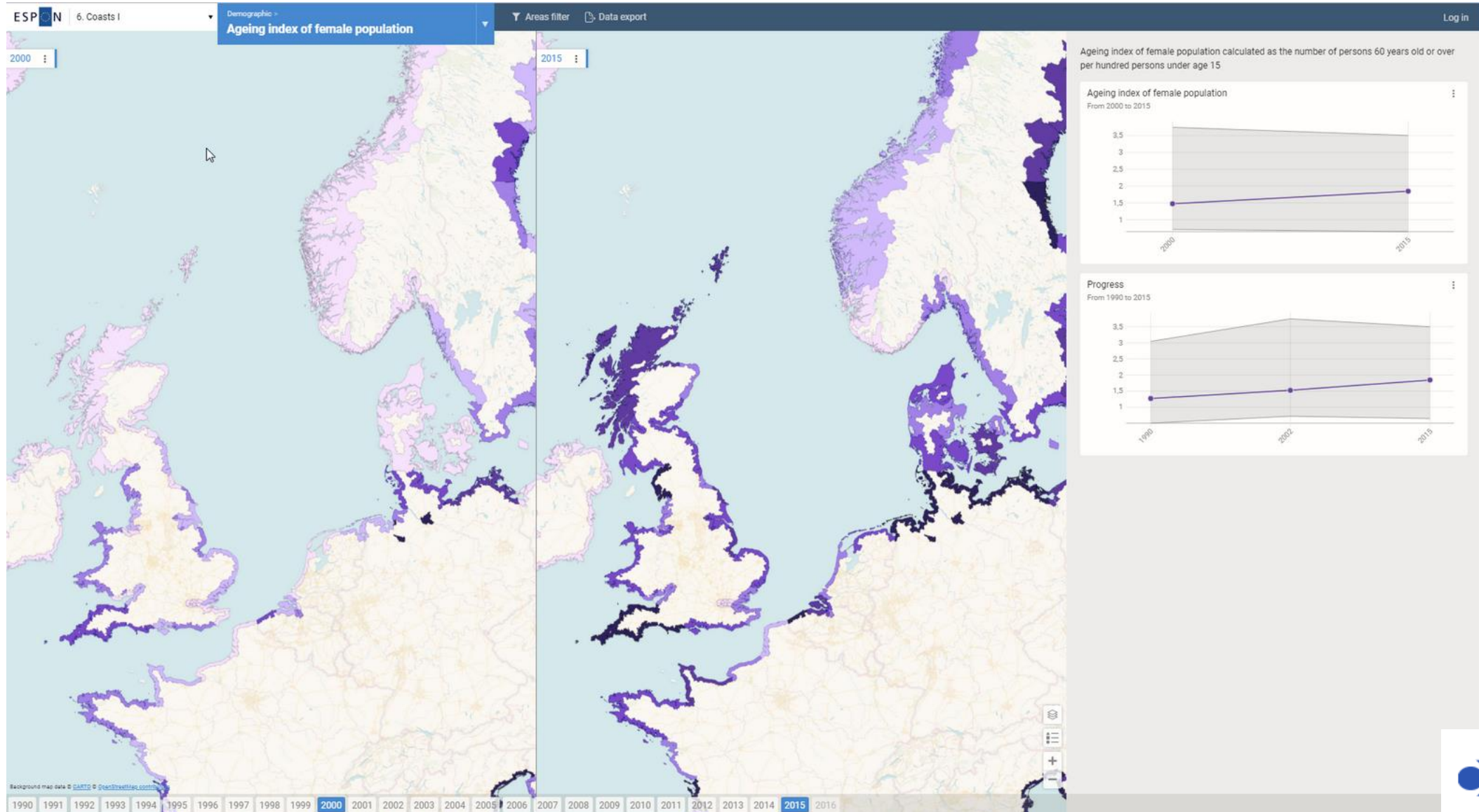


- Regions with similar values are highlighted



# Multi-temporal mode

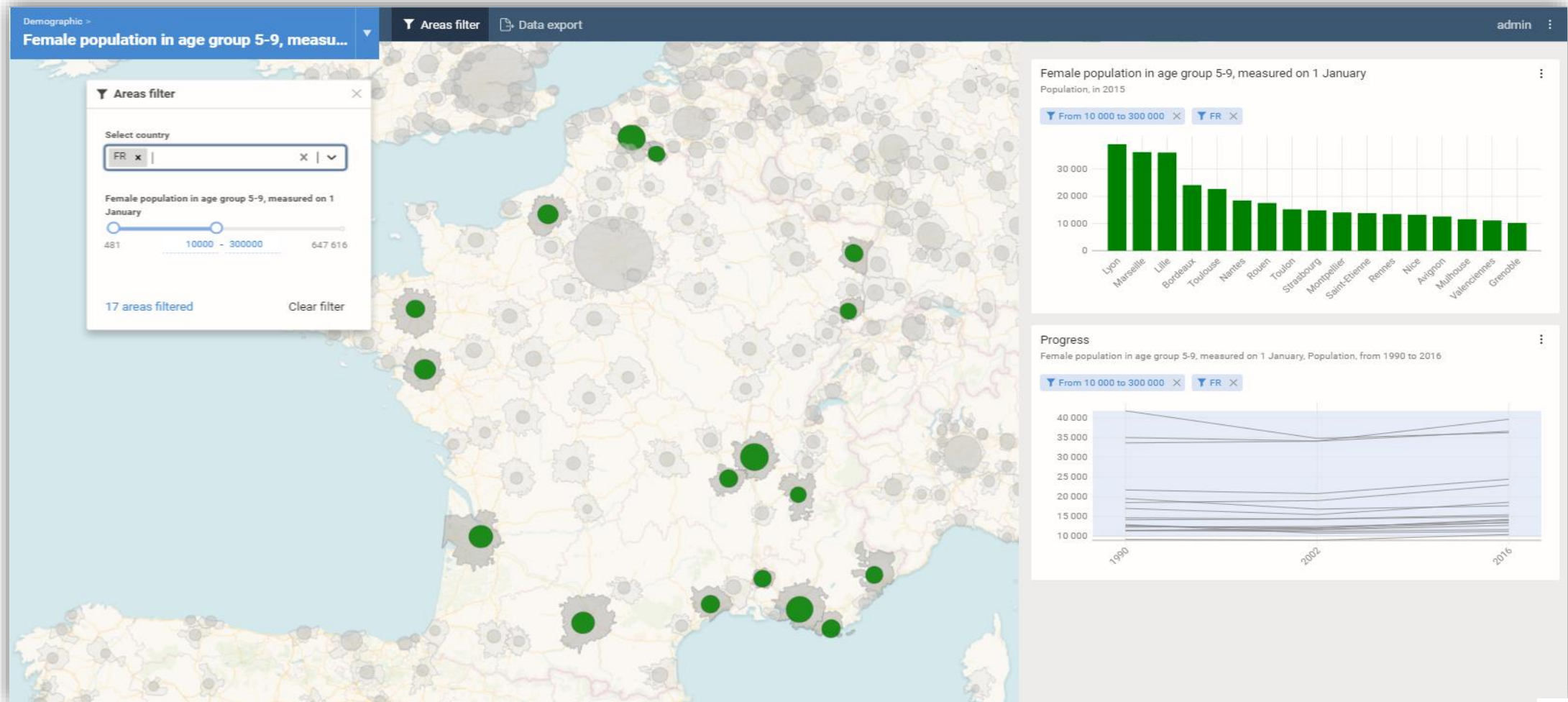
- Aging of female population for coastal regions, comparison for 2000 and 2015





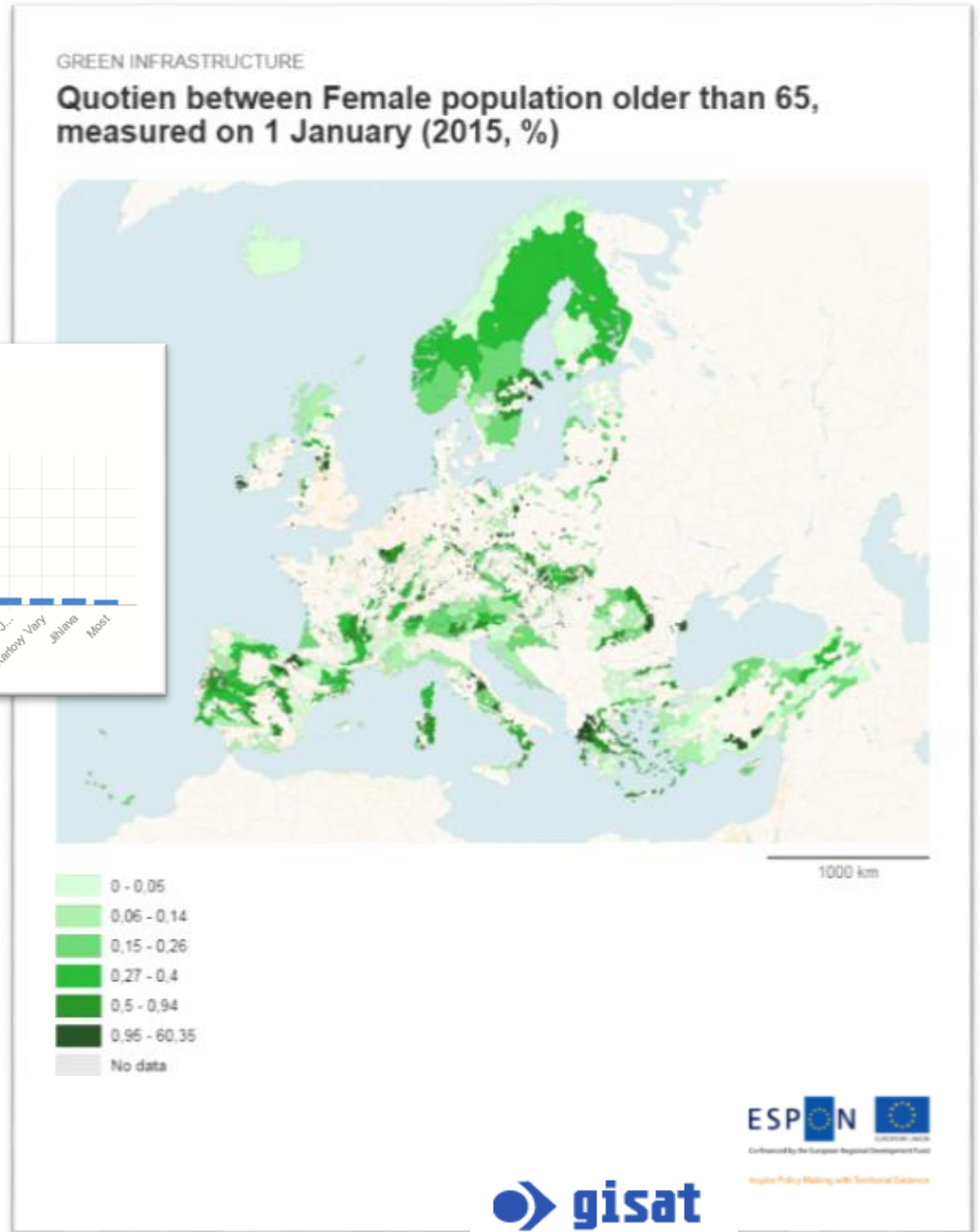
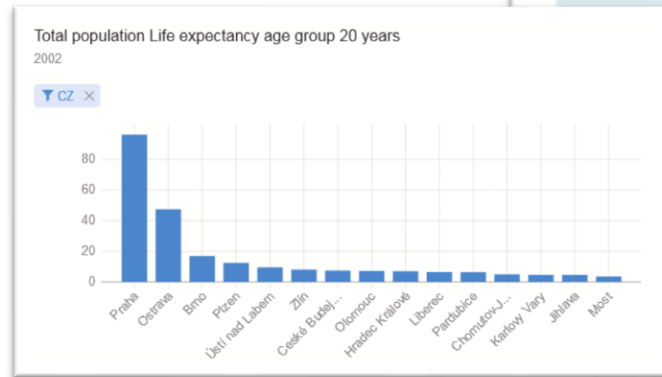
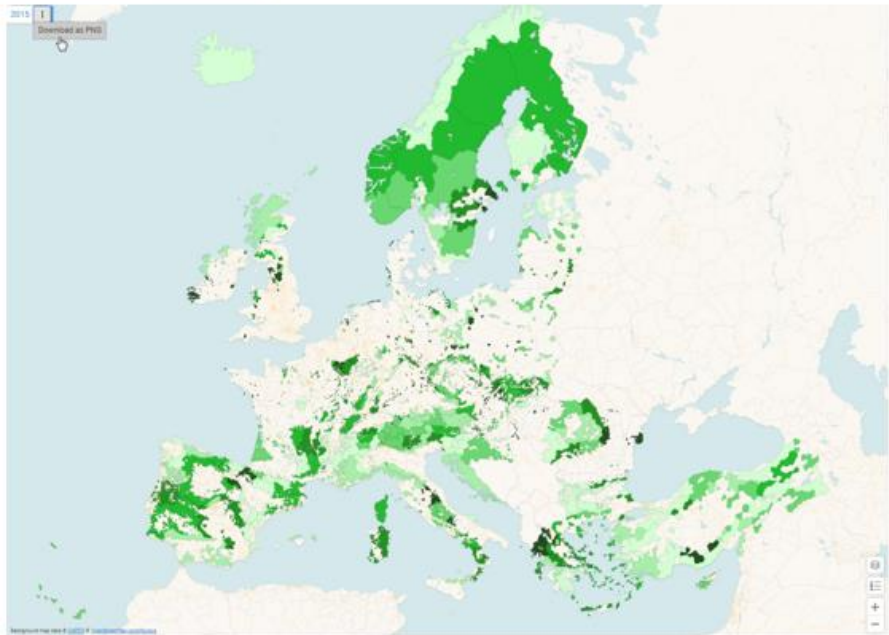
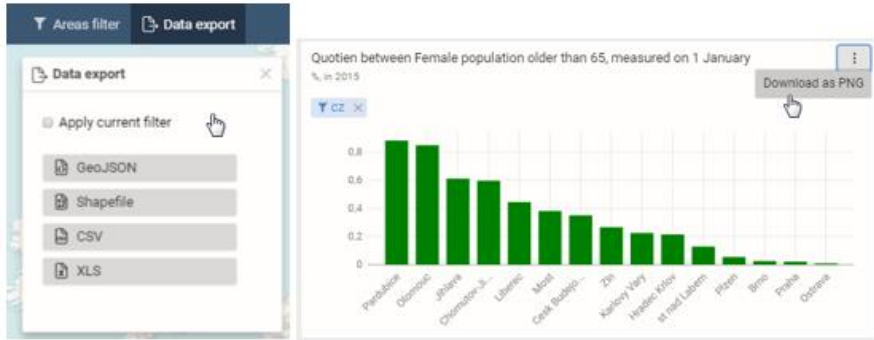
# Filtering Regions

- Filtering based on combination of country and values of indicator



# Exporting Functionalities

- Maps, charts and data content can be exported
- as PNG, GIS layers or tabular data





Co-financed by the European Regional Development Fund

Inspire Policy Making with Territorial Evidence

# Thank you!

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