



# Numbers in/for Policy Making: Uses and Abuses

*Science, Numbers and Politics,  
European Parliament Workshop,  
20-21 May 2019*

Åsa Önnersfors,  
Eurostat



**Did you know?**

The first statistical office in the world was created in Sweden in **1749**.

# What is Eurostat?

The statistical office of the European Union

Director General: Mariana Kotzeva

National statistical institutes + Eurostat =  
European Statistical System (ESS)



# What is Eurostat?

## Did you know?

Eurostat was created as a part of the European Coal and Steel Community in **1953**.

A part of the European Commission

Commissioner: Marianne Thyssen

Eurostat's role is to supply statistical evidence for monitoring EU policies

# Creating **TRUST** in official statistics?

- We need scientific and statistical data to promote evidence-based policy making.
- How can we make people trust in the facts and figures we deliver?
- Trust must be earned – we need to prove that we are **TRUSTWORTHY!**

# European Statistics Code of Practice

## Institutional environment

- Professional independence
- Mandate for data collection and access to data
- Adequacy of resources
- Commitment to quality
- Statistical confidentiality and data protection
- Impartiality and objectivity

## Statistical processes

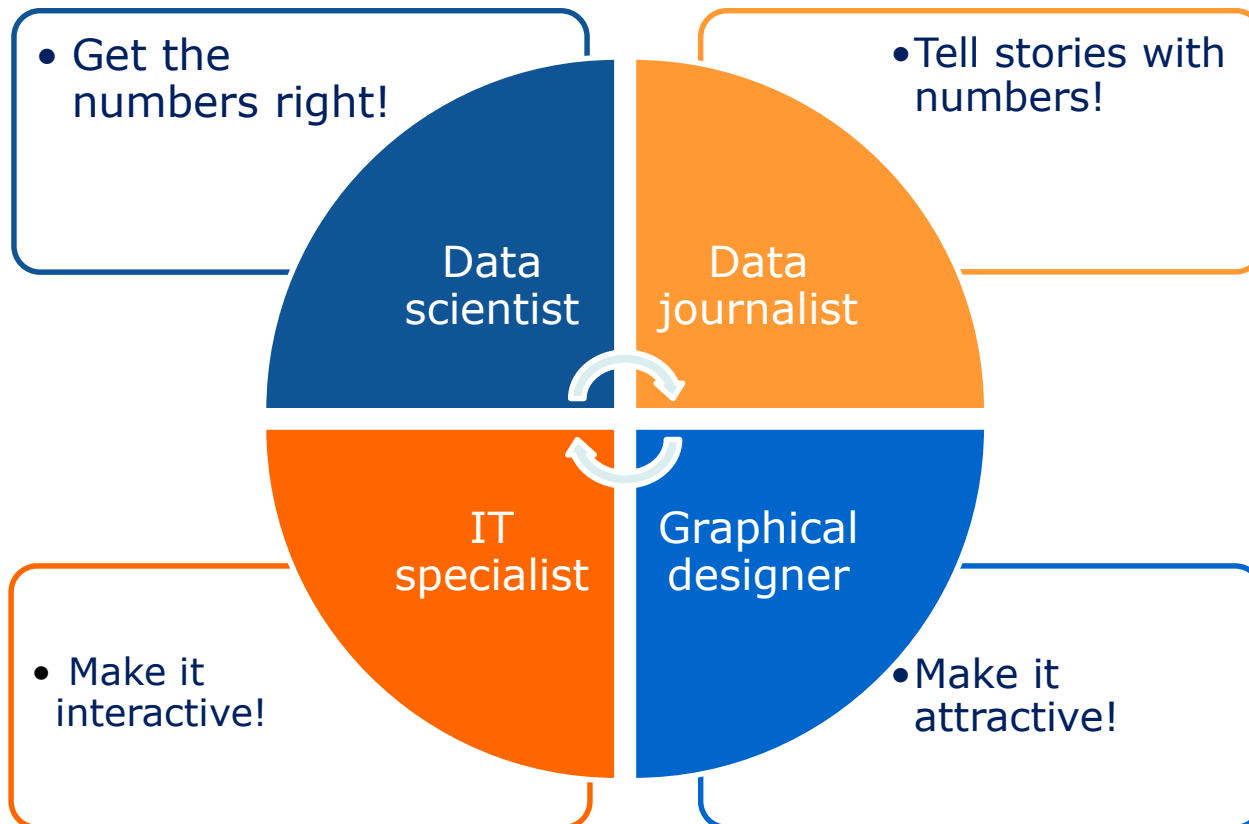
- Sound methodology
- Appropriate statistical procedures
- Non-excessive burden on respondents
- Cost effectiveness

## Statistical output

- Relevance
- Accuracy and reliability
- Timeliness and punctuality
- Coherence and comparability
- Accessibility and clarity

**OFFICIAL STATISTICS  
= QUALITY**

# Effective data communication – which skills are needed?



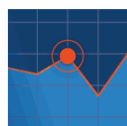
# Data communication tools at Eurostat



## VISUALISATION TOOLS



THEMES IN THE  
SPOTLIGHT



ECONOMIC  
TRENDS



MY CAPITAL IN A  
BUBBLE



MY COUNTRY IN A  
BUBBLE



GOVERNMENT  
EXPENDITURE



YOU IN THE EU



QUALITY OF LIFE



YOUNG  
EUROPEANS



LIVES OF THE  
ELDERLY



QUIZ



INFLATION  
ILLUSTRATED



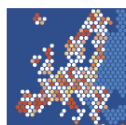
COUNTRY  
PROFILES



MY REGION



STATISTICAL  
ATLAS



REGIONS & CITIES  
ILLUSTRATED

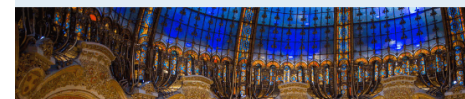
The life of women  
and men  
in Europe

A STATISTICAL PORTRAIT 2018 edition



The European economy  
since the start  
of the millennium

A STATISTICAL PORTRAIT 2018  
edition



Shedding light on  
energy in the EU

A GUIDED TOUR OF ENERGY STATISTICS 2018 edition



Digital economy & society in the EU

A BROWSE THROUGH OUR ONLINE WORLD IN FIGURES 2018 edition



# Key figures on Europe

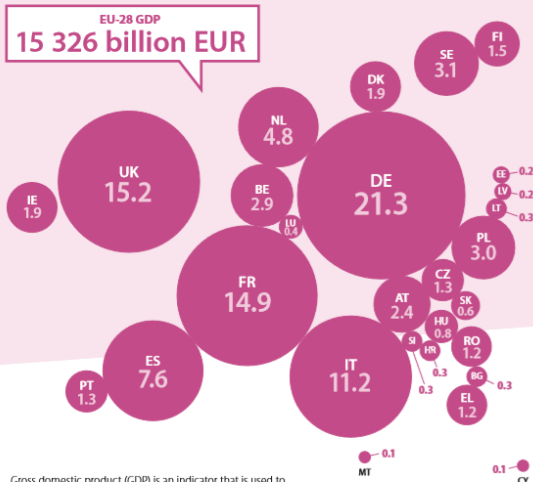


European  
Commission

## Economy and finance

### GDP

(% share of EU-28, 2017)



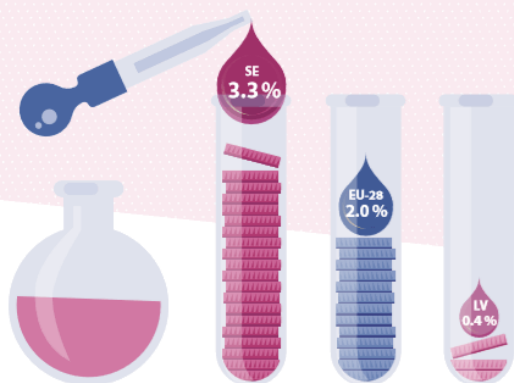
Gross domestic product (GDP) is an indicator that is used to measure the size and performance of an economy; it provides information on the goods and services produced during a given

Source: Eurostat (online data code: [nama\\_10\\_gdp](#))

## Research and development

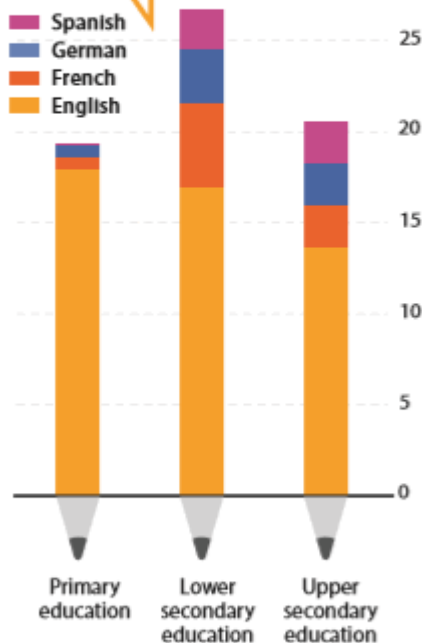
### Gross domestic expenditure on R & D

(% relative to GDP, 2016)



**48.6 million**  
EU-28 pupils study English

Spanish  
German  
French  
English

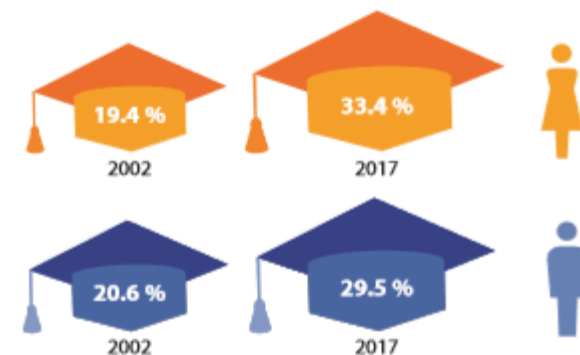


Note: a pupil/student may study more than one language (and would therefore be included more than once).

Source: Eurostat (online data code: [educ\\_uoe\\_lang01](#))

## Tertiary educational attainment

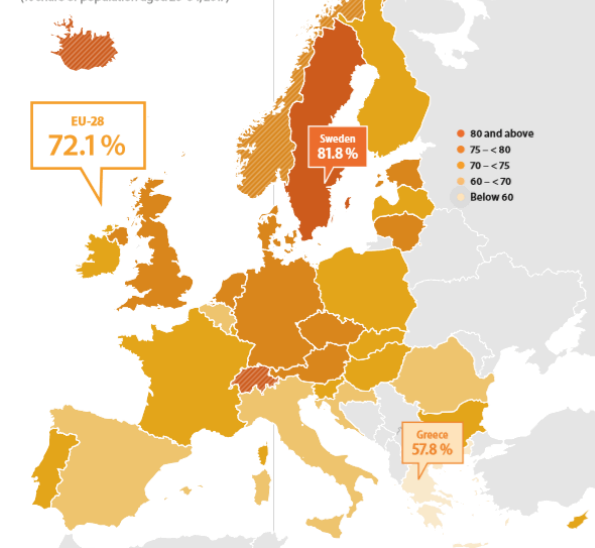
(% share of women/men aged 25-64, EU-28, 2002 and 2017)



Source: Eurostat (online data code: [edat\\_lfse\\_03](#))

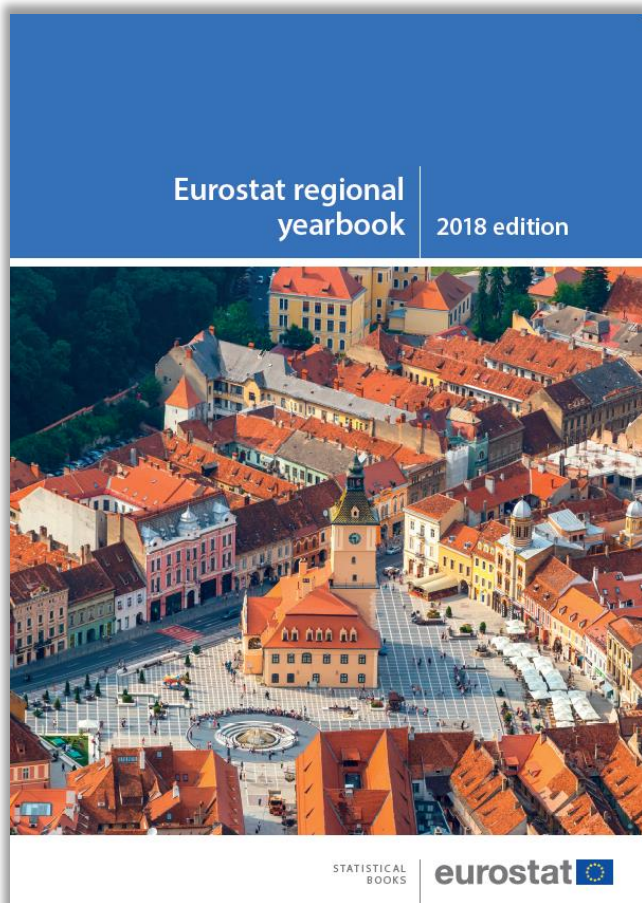
### Employment rate

(% share of population aged 20-64, 2017)





# Eurostat data for regions and cities



Detailed report on a wide range of socio-economic indicators at regional and local level in the EU, EFTA and candidate countries.

**1** Regional policies and  
European Commission  
priorities



**2** Population



**3** Health



**4** Education and training



**5** Labour market



**6** Economy



**7** Structural  
business statistics



**8** Research and innovation



**9** Digital economy  
and society



**10** Tourism



**11** Transport



**12** Agriculture



**13** Focus on  
European cities



**14** Focus on regional  
typologies



# Employment rate, by NUTS 2 regions, 2017

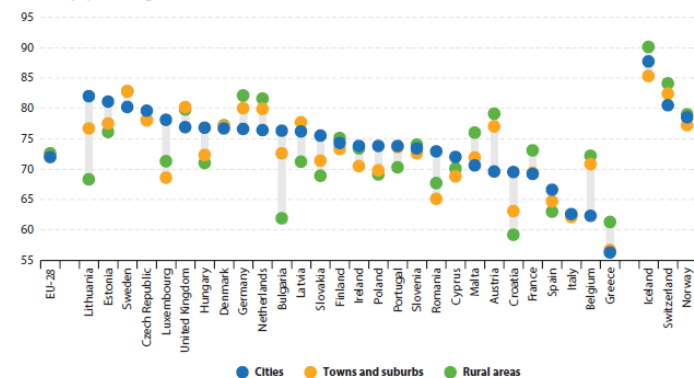
(%, share of population aged 20-64)

**TOP 5 REGIONS IN THE EU  
EMPLOYMENT RATE, 2017**  
(% share of population aged 20-64)



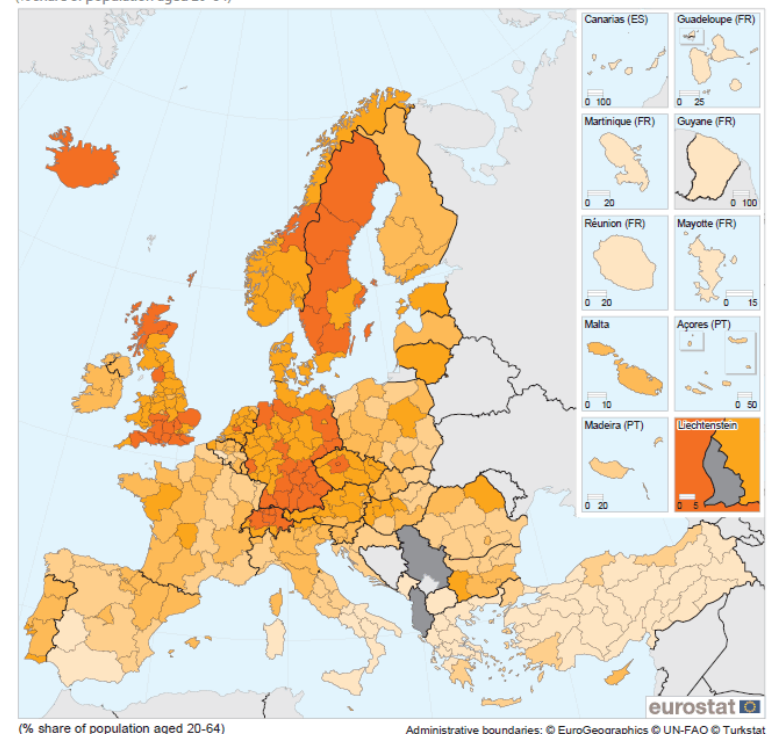
eurostat

**Figure 5.1: Employment rate, by degree of urbanisation, 2017**  
(% share of population aged 20-64)



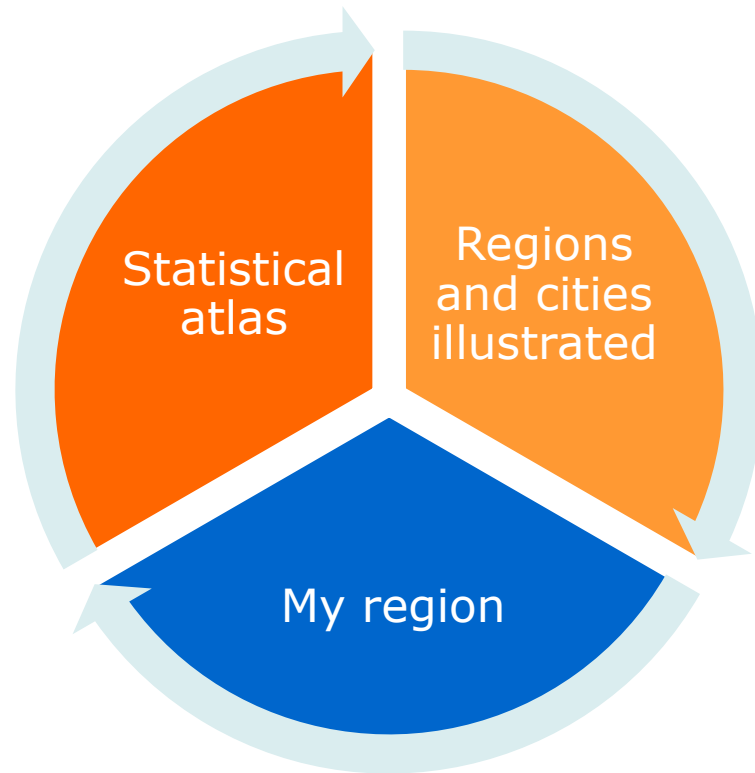
Note: ranked on cities.  
Source: Eurostat (online data code: lfst\_r\_argau)

**Map 5.1: Employment rate, by NUTS 2 regions, 2017**  
(% share of population aged 20-64)



Source: Eurostat (online data codes: lfst\_r\_102emprt and lfst\_102emp\_a)

# Eurostat data visualisation tools





## Did you know?

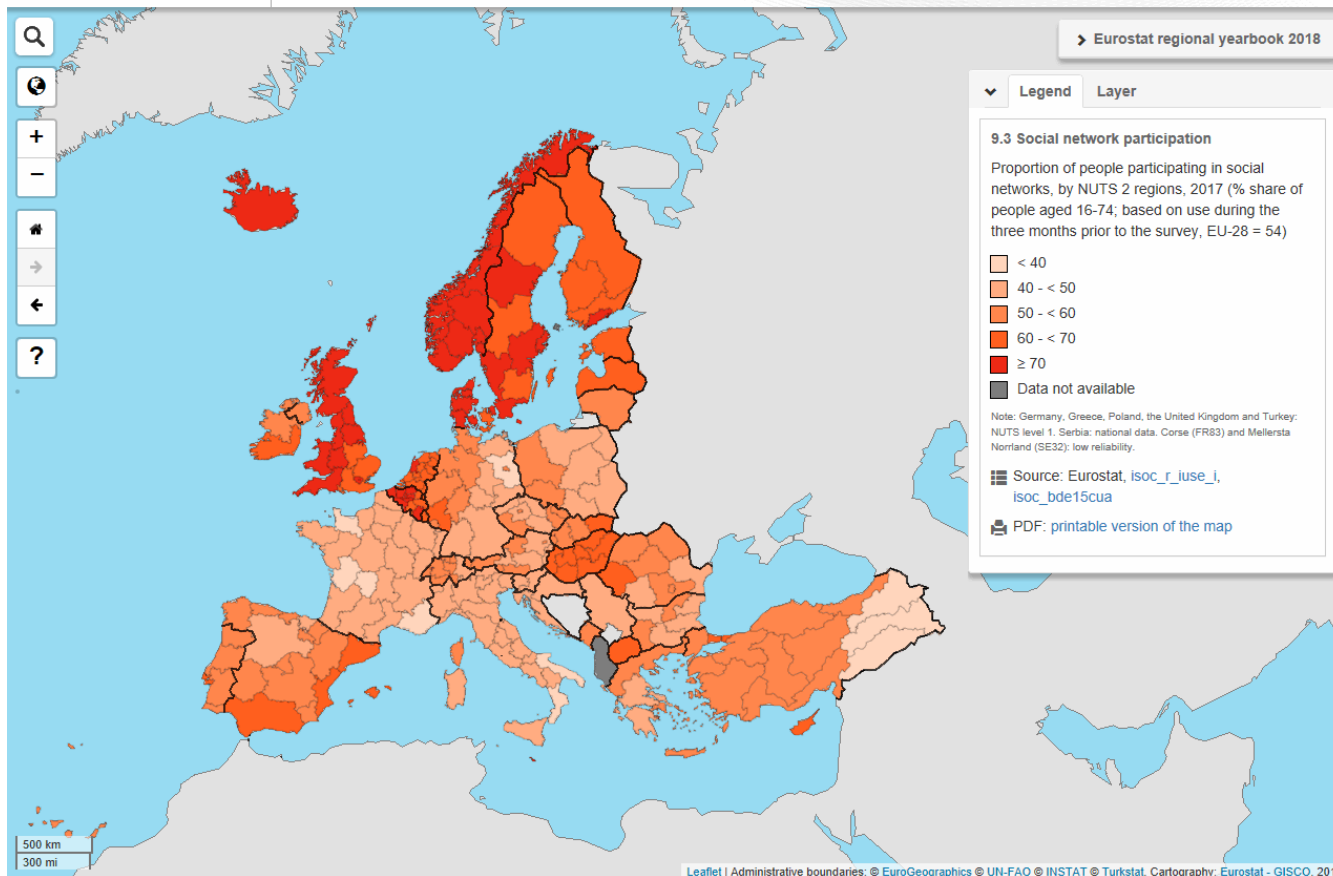
4 viewers in one:  
Regional yearbook, NUTS  
and territorial typologies,  
LUCAS and Population  
and housing census.

# Statistical atlas

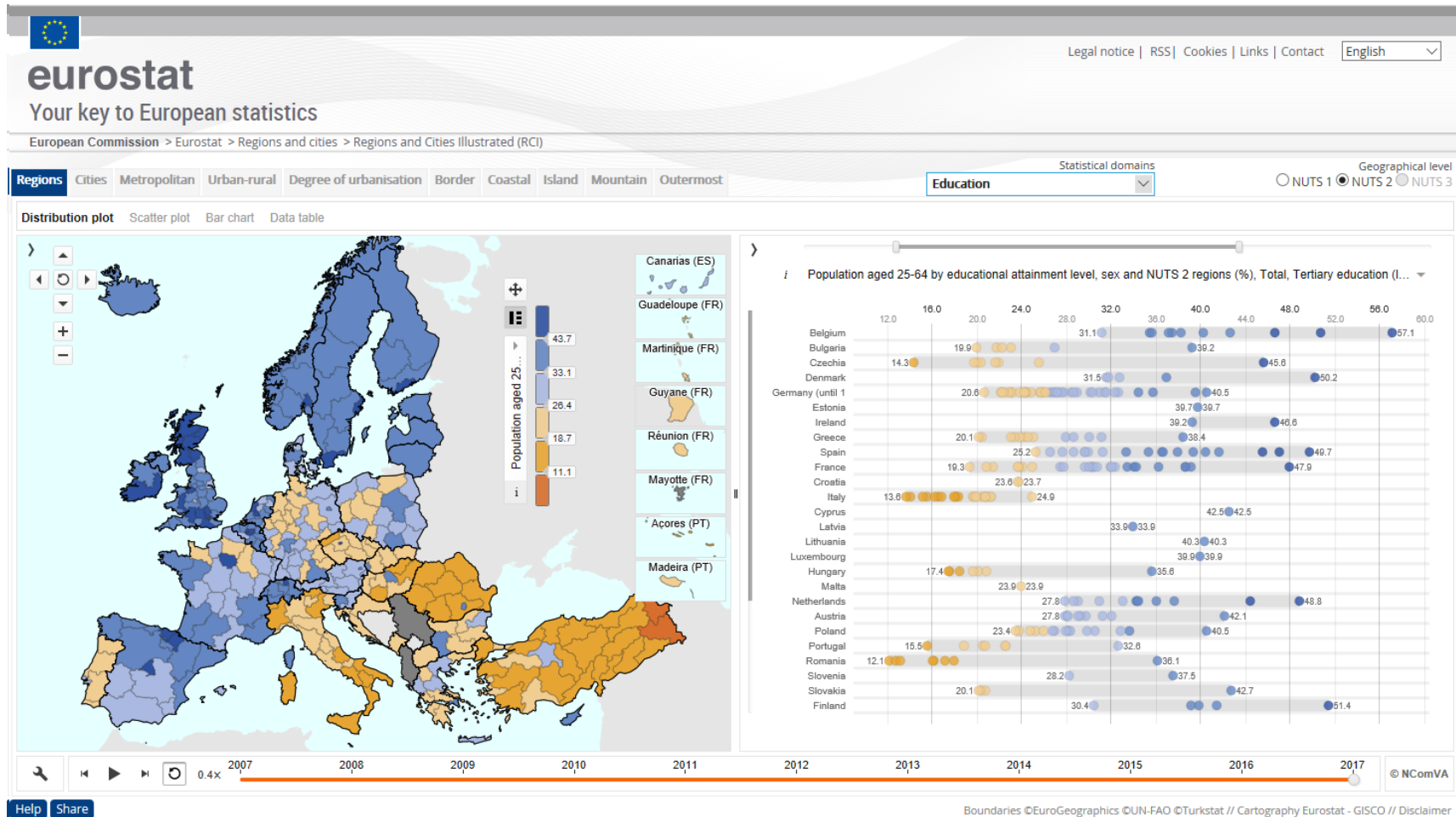
[Legal notice](#) | [Cookies](#) | [Contact](#) | [Search](#)

eurostat 

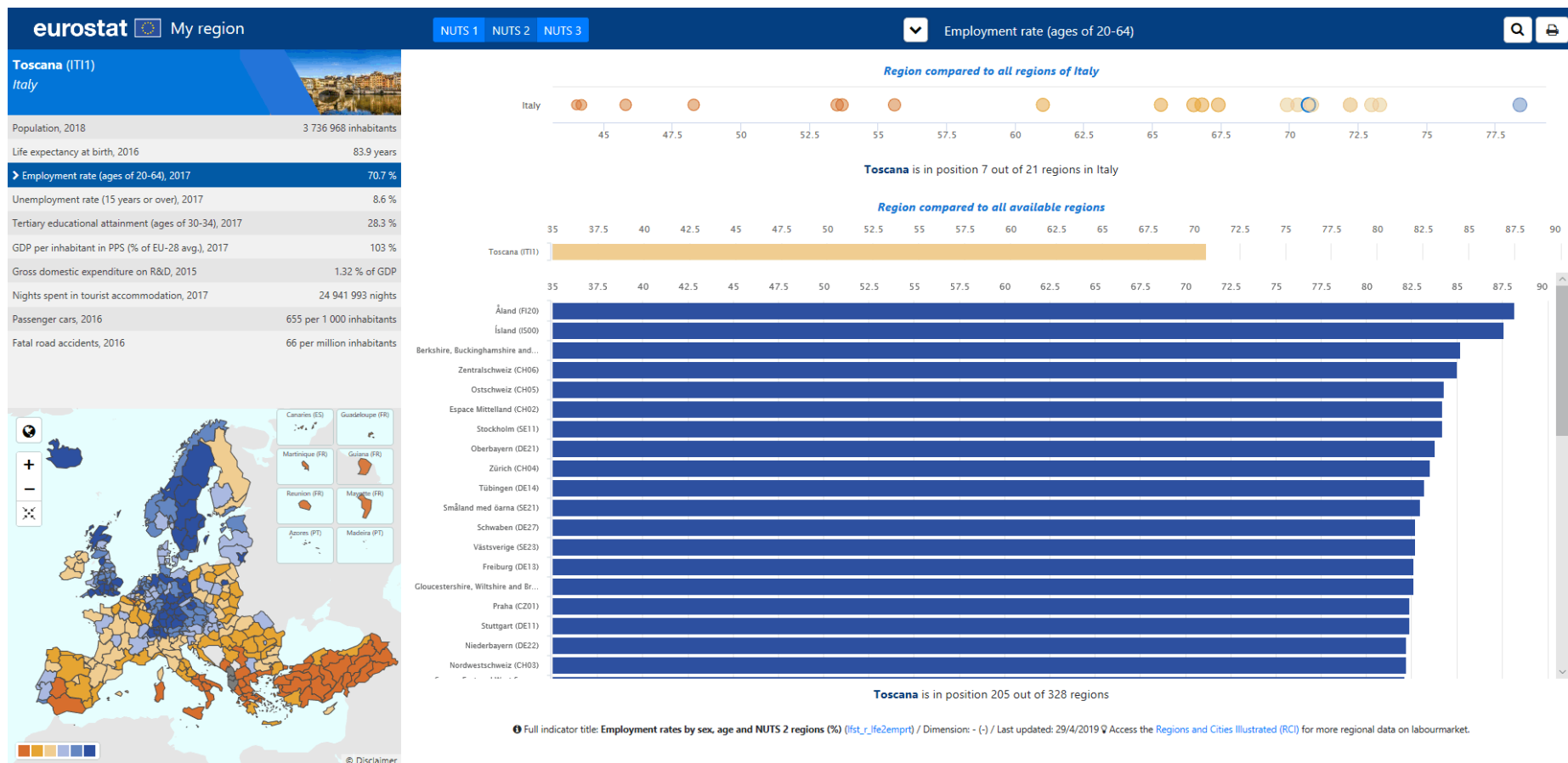
Statistical Atlas  
Eurostat regional yearbook 2018



# Regions and cities illustrated



# My region



## Question & Answer session:

- Best practice for creating statistical maps and graphs?
- Often misunderstood statistical indicators?
- Eurostat communication policy – still room for improvement?
- How is Eurostat defining NUTS regions, cities and territorial typologies?





# Thank you for your attention!

Contact me: [asa.onnerfors@ec.europa.eu](mailto:asa.onnerfors@ec.europa.eu)



# Eurostat regional yearbook: publication process

## **January – February:**

Detailed chapter planning in close cooperation with Eurostat units.

## **March - April:**

Downloading data from Eurobase, map and graph production. Text writing.

## **May - June:**

Consultation on draft content, approval of online version in Statistics Explained.

## **July - September:**

Translation, layout and printing.

## **September:**

News release on the Eurostat website, maps released in the Statistical Atlas.

## **October:**

Presentation at the *European week of regions and cities*.

# Telling stories with numbers

## ***Please do:***

- *Use infographic icons to reinforce the topic.*
- *Include national or EU average to compare.*
- *Rank by values.*
- *Use clear labelling and annotations to explain.*

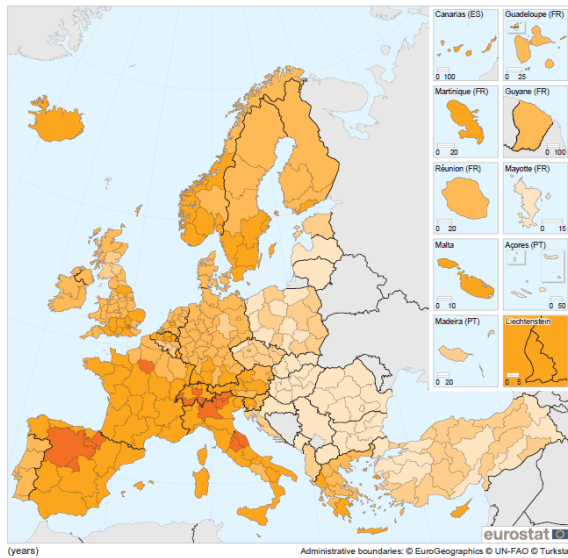
## ***Please don't:***

- *Overload with too much information.*
- *Don't cut the axis without indicating.*
- *Don't use abbreviations.*
- *Don't use too many colours.*

**Remember: make grey your best friend.**

# Statistical maps, some examples:

**Map 2.1:** Life expectancy at birth, by NUTS 2 regions, 2016  
(years)

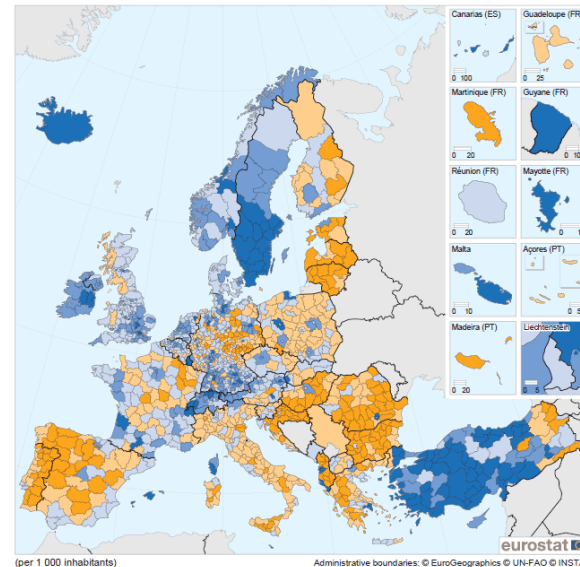


Administrative boundaries: © EuroGeographics © UN-FAO © Turstat  
Cartography: Eurostat — GISCO, 04/2018

EU-28 = 81.0  
< 78  
78 - < 80  
80 - < 82  
82 - < 84  
≥ 84  
Data not available

Note: Albania and Serbia, national data, Mayotte (FRA); 2015, EU-28 estimate.  
Source: Eurostat (online data codes: demo\_r\_mileexp and demo\_mileexp)

**Map 2.5:** Crude rate of total population change, by NUTS 3 regions, 2016  
(per 1 000 inhabitants)

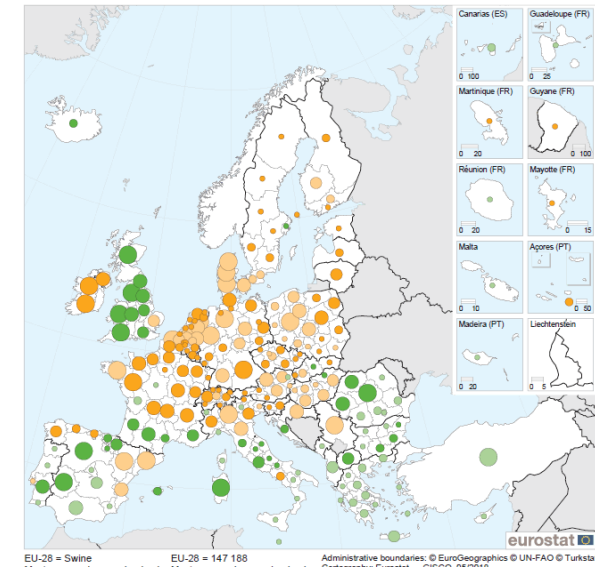


Administrative boundaries: © EuroGeographics © UN-FAO © INSTAT  
© Turstat  
Cartography: Eurostat — GISCO, 04/2018

EU-28 = 2.4  
< -6  
-6 - < 0  
0 - < 6  
6 - < 12  
≥ 12  
Data not available

Note: Serbia, national data, EU-28 and United Kingdom: estimates, France: provisional.  
Source: Eurostat (online data codes: demo\_r\_ginc1 and demo\_ginc)

**Map 12.4:** Relative livestock specialisation and head of livestock, by NUTS 2 regions, 2016  
(based on % share of livestock in the EU-28)



Administrative boundaries: © EuroGeographics © UN-FAO © Turstat  
Cartography: Eurostat — GISCO, 06/2018

EU-28 = Swine  
Most commonly reared animal type relative to EU-28 average  
(thousand head)  
○ < 250  
○ 250 - < 500  
○ 500 - < 1 000  
○ 1 000 - < 2 000  
○ ≥ 2 000

Note: the colour of each circle denotes the most commonly reared animal for each region (based on a specialisation ratio relative to the EU-28 average), while the size of each circle represents the number of head for most commonly reared animal type relative to the EU-28 average. Germany and the United Kingdom: NUTS level 1, Albania, Serbia and Turkey: national data, EU-28: Cyprus, sheep and goats, 2015. Inland goats, 2014. Eurostat estimates for sheep and goats (made for the purpose of this publication). France, Cyprus, Portugal, Montenegro, Albania and Turkey: provisional.  
Source: Eurostat (online data codes: agr\_r\_animal, apro\_mt\_local, apro\_mt\_lgpc, apro\_mt\_isheep and apro\_mt\_lgsoat)

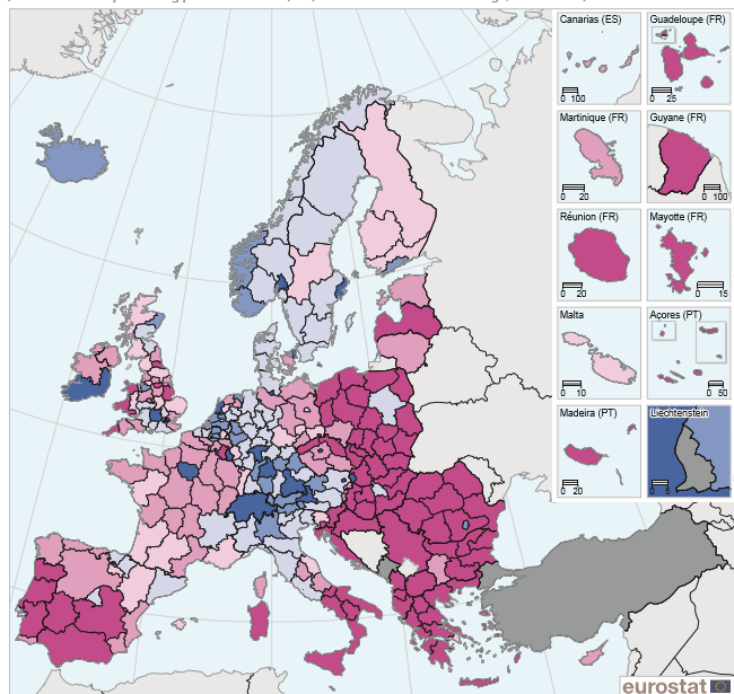
Sequential colours

Diverging colours

Proportional circles

## GDP per inhabitant, 2016

**Map 6.1:** Gross domestic product (GDP) per inhabitant, by NUTS 2 regions, 2016  
(based on data in purchasing power standards (PPS) in relation to the EU-28 average, EU-28 = 100)



(based on data in purchasing power standards (PPS)  
in relation to the EU-28 average, EU-28 = 100)

EU-28 = 100  
 < 75  
 75 - < 90  
 90 - < 100  
 100 - < 125  
 125 - < 150  
 ≥ 150  
 Data not available

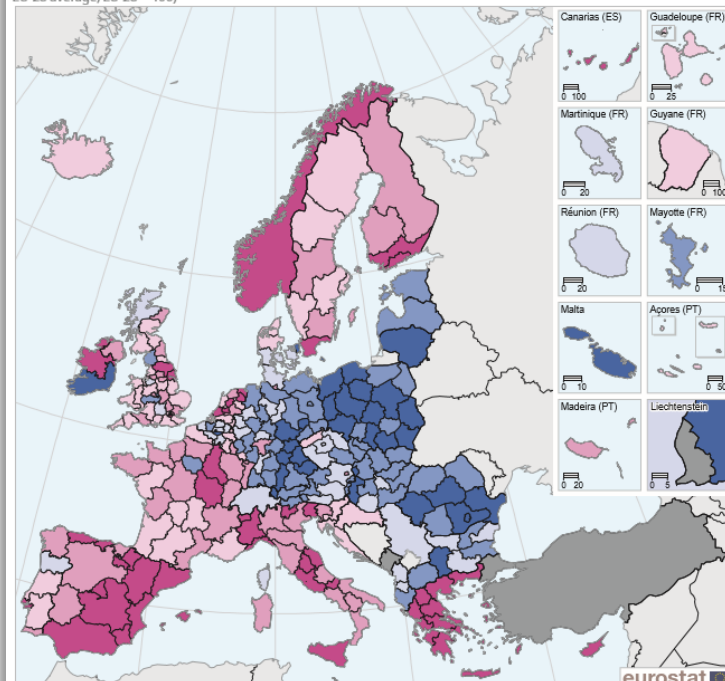
Administrative boundaries: © EuroGeographics © UN-FAO © INSTAT  
 © Turkstat  
 Cartography: Eurostat — GISCO, 04/2018

0 200 400 600 800 km

Note: Norway, 2015. Former Yugoslav Republic of Macedonia and Albania: 2014. Switzerland and Serbia: national data. Switzerland: provisional.  
 Source: Eurostat (online data codes: nama\_10r\_2gdp, nama\_30\_gdp, nama\_10r\_3popgdp and nama\_30\_pe)

## Change in GDP per inhabitant, 2007-2016

**Map 6.2:** Change of gross domestic product (GDP) per inhabitant, by NUTS 2 regions, 2007-2016  
(percentage points difference for 2016 minus 2007; based on data in purchasing power standards (PPS) in relation to the EU-28 average, EU-28 = 100)



(percentage points difference for 2016 minus 2007;  
based on data in purchasing power standards (PPS) in  
relation to the EU-28 average, EU-28 = 100)

EU-28 = 0  
 < -10  
 -10 - < -5  
 -5 - < 0  
 0 - < 5  
 5 - < 10  
 ≥ 10  
 Data not available

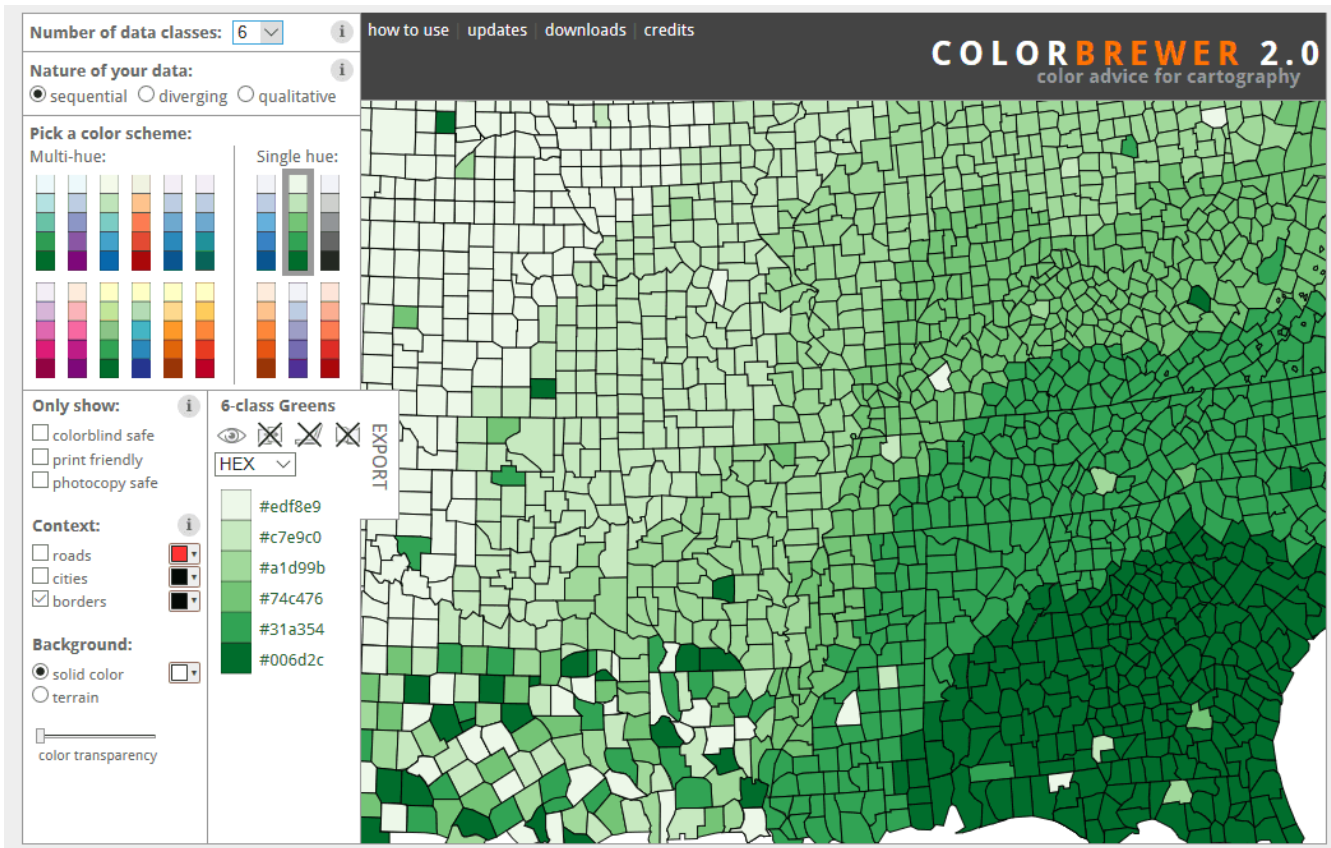
Administrative boundaries: © EuroGeographics © UN-FAO © INSTAT  
 © Turkstat  
 Cartography: Eurostat — GISCO, 04/2018

0 200 400 600 800 km

Note: Albania, 2008-2014. Norway, Switzerland and Serbia: national data. Switzerland: provisional. Bulgaria, Germany and Romania: break in series.  
 Source: Eurostat (online data codes: nama\_10r\_2gdp, nama\_30\_gdp, nama\_10r\_3popgdp and nama\_30\_pe)



# ColorBrewer: colour advice for cartography



The screenshot displays the ColorBrewer 2.0 web application interface. The top navigation bar includes links for "how to use", "updates", "downloads", and "credits". The main title "COLORBREWER 2.0" is prominently displayed, with the subtitle "color advice for cartography" below it.

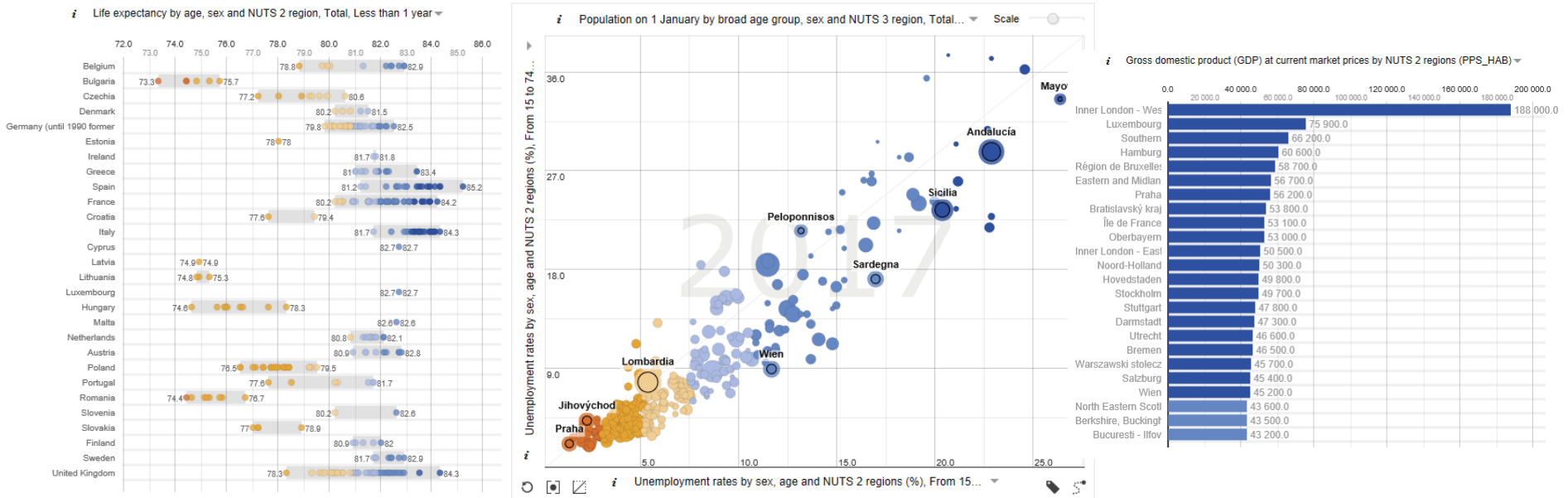
The interface is divided into several sections:

- Number of data classes:** Set to 6.
- Nature of your data:** Radio buttons for "sequential" (selected), "diverging", and "qualitative".
- Pick a color scheme:** Two columns of color swatches for "Multi-hue" and "Single hue".
- Only show:** Checkboxes for "colorblind safe", "print friendly", and "photocopy safe".
- Context:** Checkboxes for "roads", "cities", and "borders" (checked).
- Background:** Radio buttons for "solid color" (selected) and "terrain". A "color transparency" slider is also present.
- 6-class Greens:** A list of six color swatches with their corresponding hex codes: #edf8e9, #c7e9c0, #a1d99b, #74c476, #31a354, and #006d2c.
- EXPORT:** A button to export the selected color scheme.

The main map area shows a map of Europe with a 6-class green sequential color scheme applied to the landmasses. The colors range from light green to dark green, representing different data classes.

At the bottom, the copyright notice reads: "© Cynthia Brewer, Mark Harrower and The Pennsylvania State University". Below this, there are links for "Source code and feedback", "Back to Flash version", and "Back to ColorBrewer 1.0". The "axismaps" logo is visible in the bottom right corner.

# Graphs suitable for regional datasets:



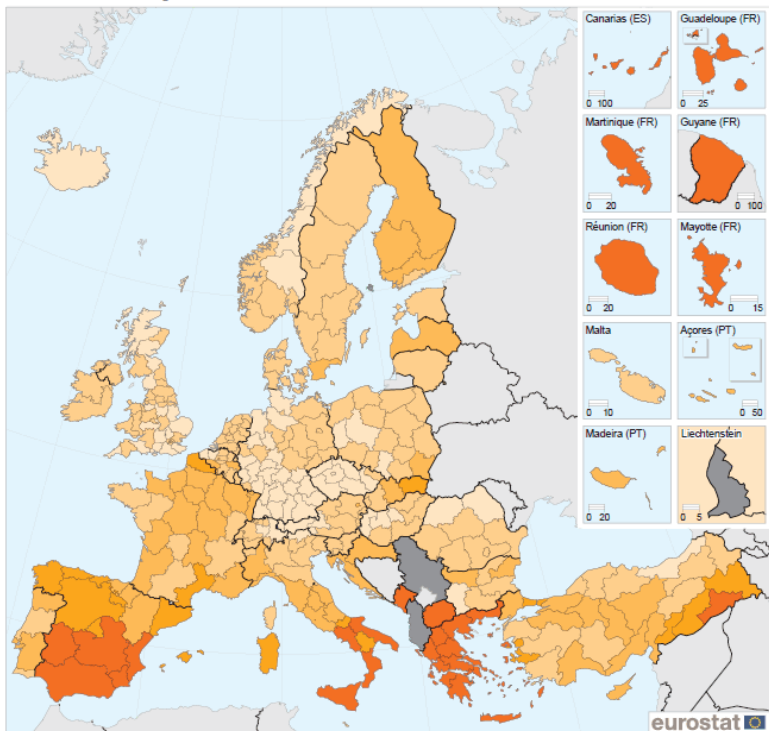
Distribution plot

Scatter plot

Bar graph ranking

# Unemployment rate: often misunderstood

Map 5.3: Unemployment rate, by NUTS 2 regions, 2017  
(% share of labour force aged 15-74)



(% share of labour force aged 15-74)

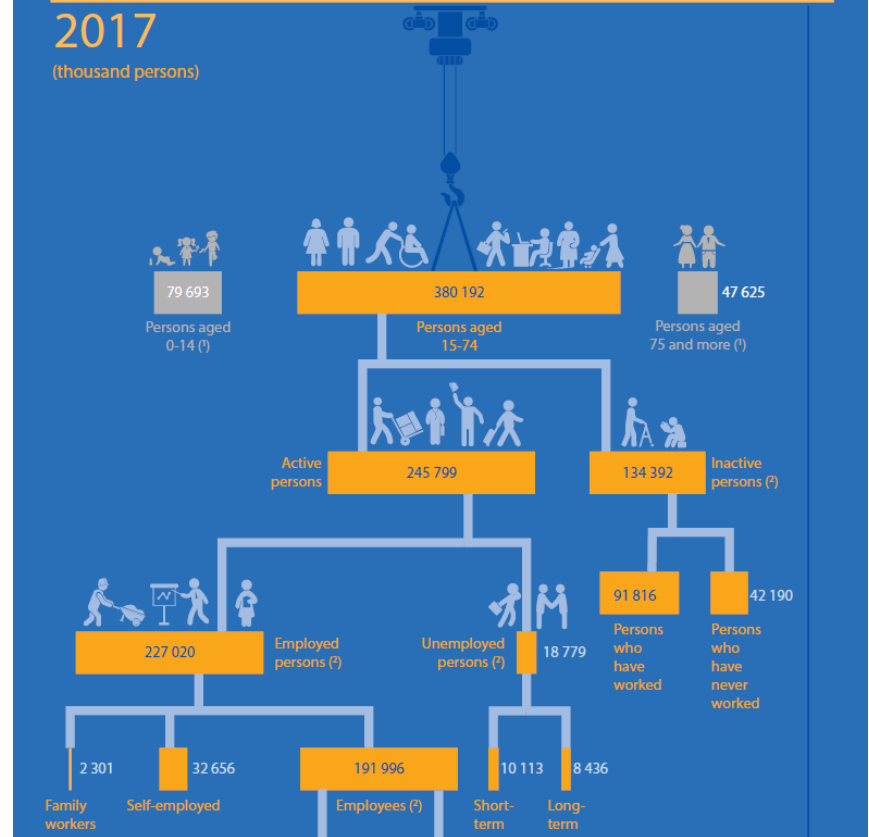
Administrative boundaries: © EuroGeographics © UN-FAO © Turkstat  
Cartography: Eurostat — GISCO, 04/2018

0 200 400 600 800 km

## Labour force composition, EU-28

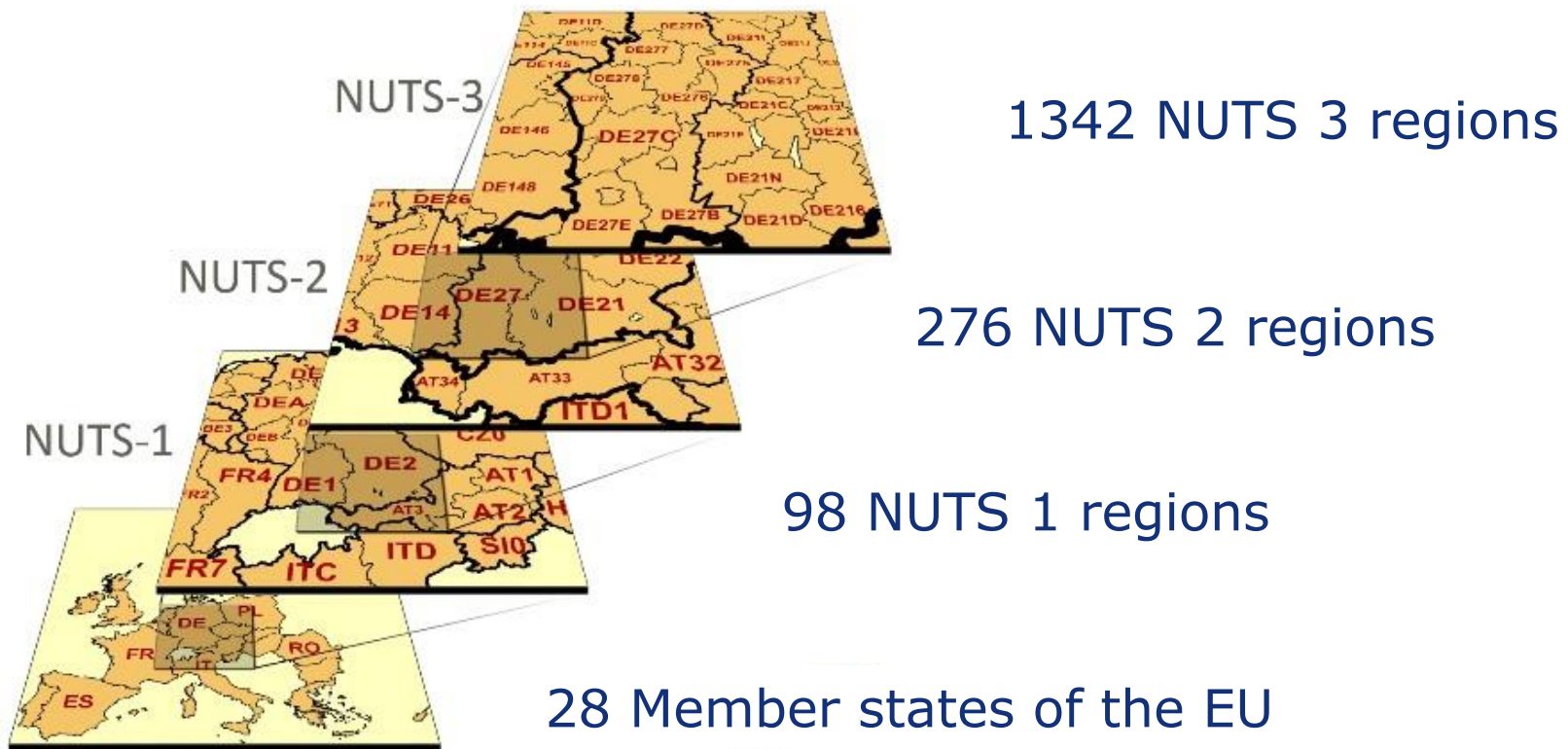
2017

(thousand persons)



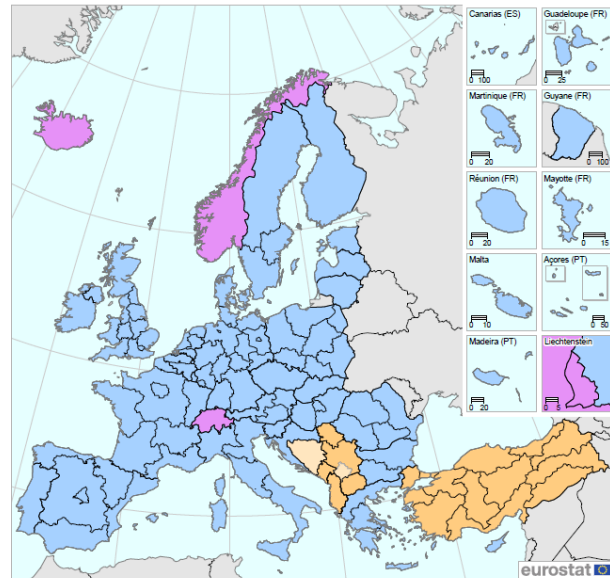


# Nomenclature of territorial units for statistics = NUTS



# The NUTS classification:

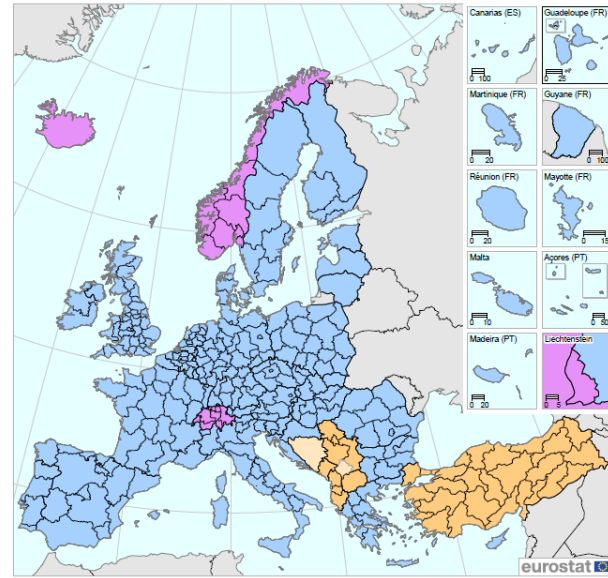
NUTS 1 regions in the European Union (EU-28), with corresponding statistical regions in EFTA countries, candidate countries and potential candidates



Administrative boundaries: © EuroGeographics © UN-FAO © TURKSTAT  
Cartography: Eurostat - GISCO, 03/2018

Member States of the European Union (EU-28)  
EFTA countries  
Candidate countries  
Potential candidates

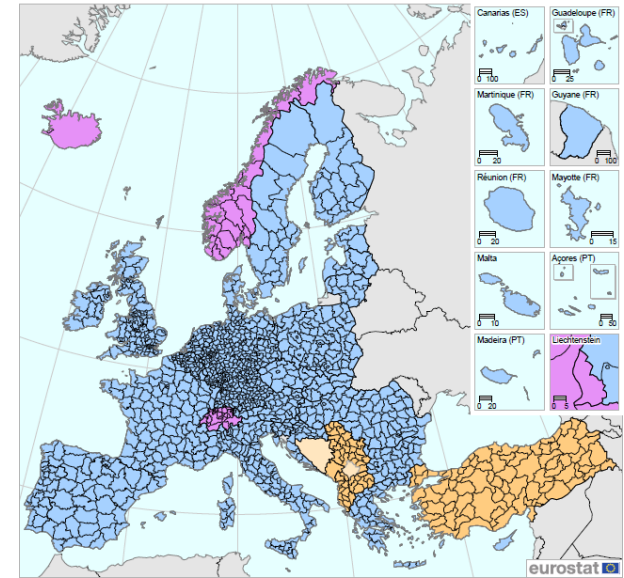
NUTS 2 regions in the European Union (EU-28), with corresponding statistical regions in EFTA countries, candidate countries and potential candidates



Administrative boundaries: © EuroGeographics © UN-FAO © INSTAT  
© TURKSTAT  
Cartography: Eurostat - GISCO, 03/2018

Member States of the European Union (EU-28)  
EFTA countries  
Candidate countries  
Potential candidates

NUTS 3 regions in the European Union (EU-28), with corresponding statistical regions in EFTA countries, candidate countries and potential candidates



Administrative boundaries: © EuroGeographics © UN-FAO © INSTAT  
© TURKSTAT  
Cartography: Eurostat - GISCO, 03/2018

Member States of the European Union (EU-28)  
EFTA countries  
Candidate countries  
Potential candidates

NUTS 1 regions

NUTS 2 regions

NUTS 3 regions

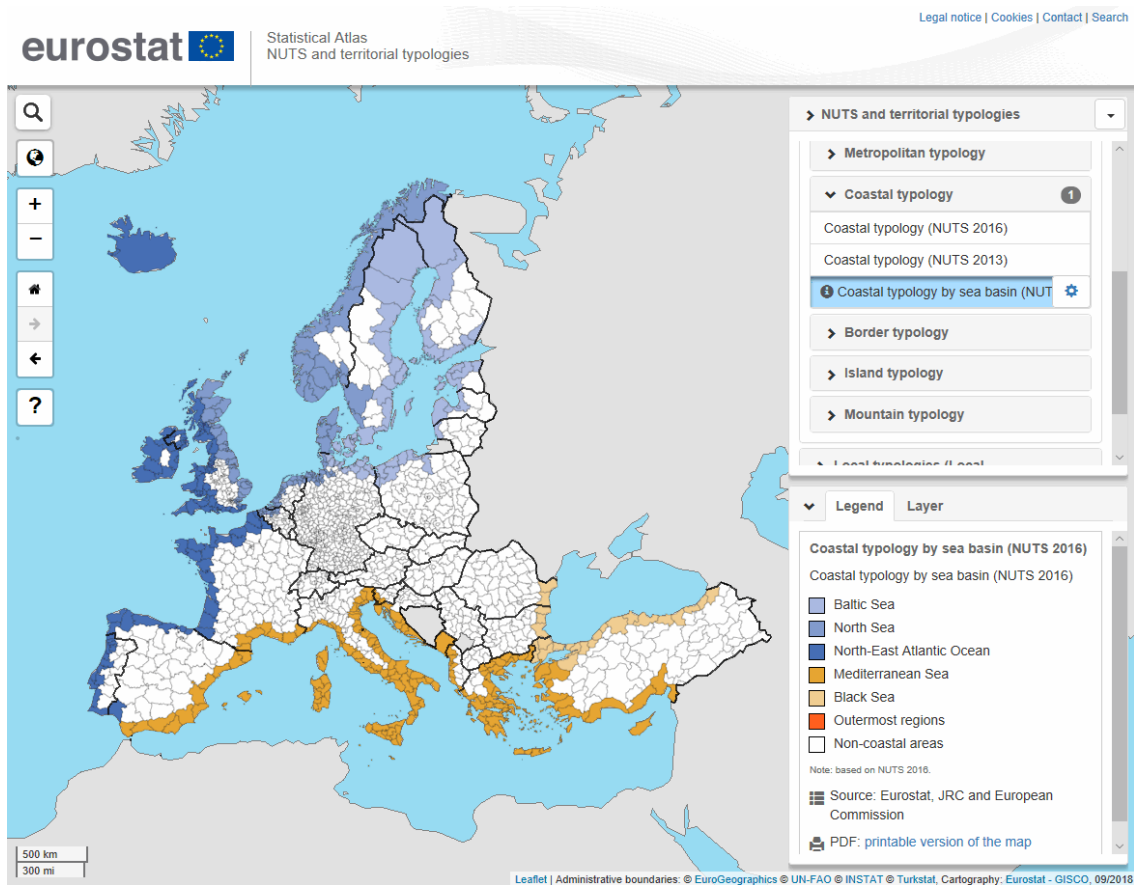
# Territorial typologies: manual and viewer

Methodological manual  
on territorial typologies 2018 edition



STATISTICAL  
BOOKS

eurostat 

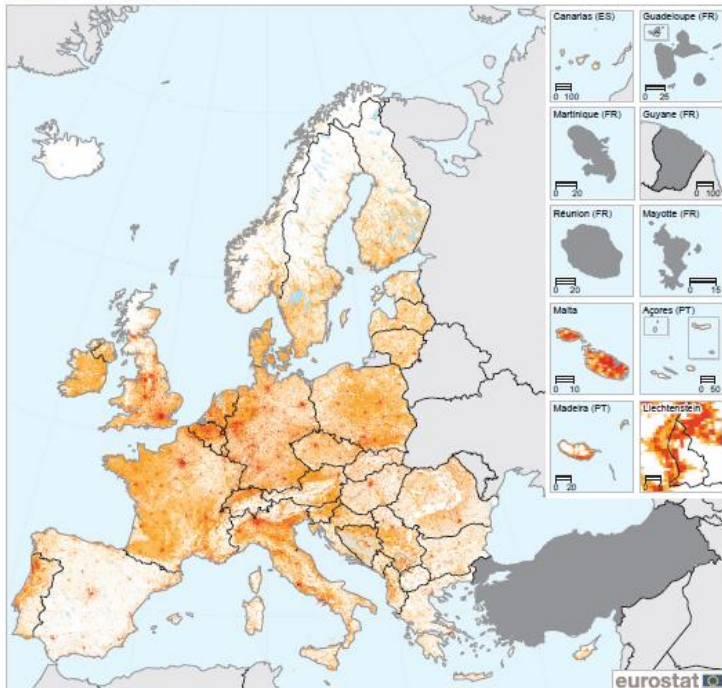




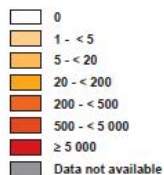
# Building blocks for territorial typologies:

## Population grid (inhabitants/km<sup>2</sup>)

**Map 2:** Population density based on the GEOSTAT population grid, 2011  
(number of inhabitants per km<sup>2</sup>)



number of inhabitants/km<sup>2</sup>



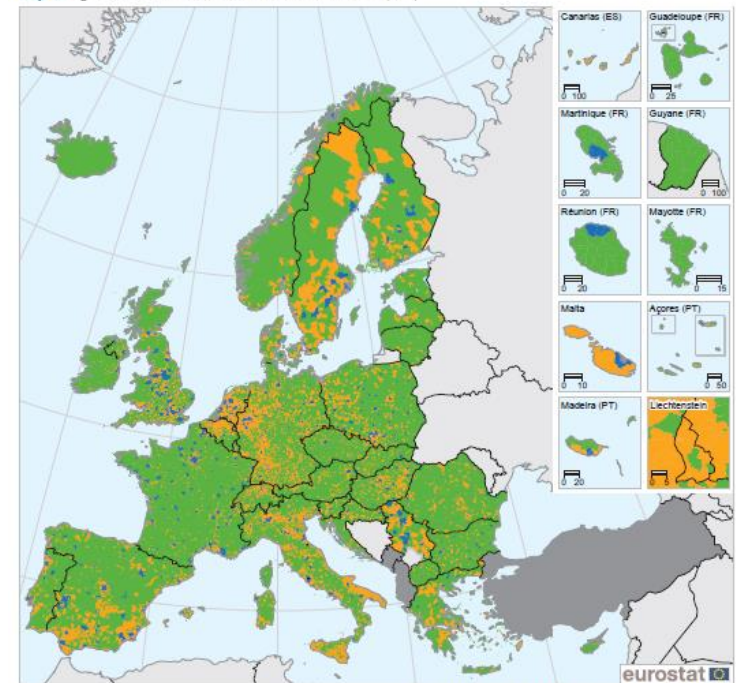
Administrative boundaries: © EuroGeographics © UN-FAO © Turkstat  
Cartography: Eurostat — GISCO, 05/2016



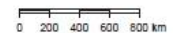
Source: JRC, Eurostat, GEOSTAT Population Grid 2011

## Local Administrative Units (LAU)

**Map 1:** Degree of urbanisation for local administrative units (LAU)



- Cities**  
(Densely populated areas: at least 50 % of the population lives in urban centres)
- Towns and suburbs**  
(Intermediate density areas: less than 50 % of the population lives in rural grid cells and less than 50 % of the population lives in urban centres)
- Rural areas**  
(Thinly populated areas: more than 50 % of the population lives in rural grid cells)
- Data not available**



Note: Based on population grid from 2011 and LAU 2016.  
Source: Eurostat, JRC and European Commission Directorate-General for Regional Policy

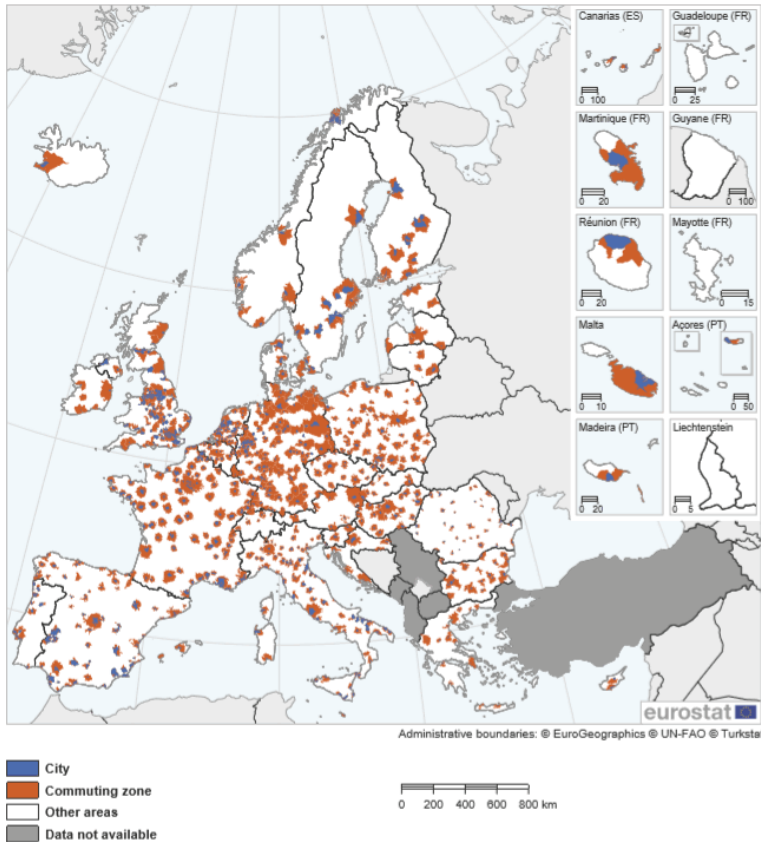


European  
Commission

# What is a city?

## Cities and commuting zones

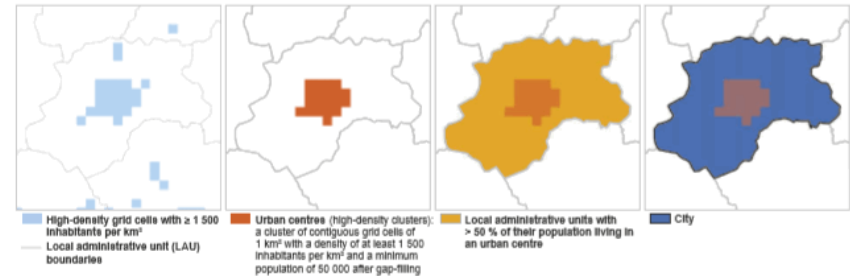
Map 3.3: Cities and commuting zones



Note: based on population grid from 2011 and IAU 2016.  
Source: Eurostat, JRC and European Commission, Directorate-General for Regional and Urban Policy

## Defining cities from population grid

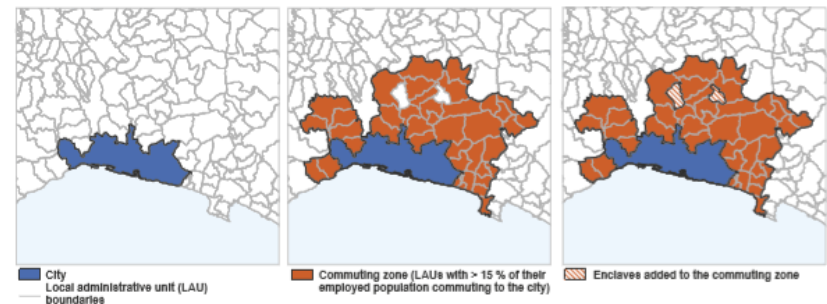
Figure 3.5: High-density grid cells, urban centres and city boundaries — an example for Braga



Source: Eurostat

## Defining a city and its commuting zone

Figure 3.3: A city and its commuting zone — an example for Genova



Source: Eurostat

# Territorial typologies – an overview

	Geographical level	Basic typologies	Urban typologies	Coastal typology	Border typology	Island typology	Mountain typology
Regional typologies:	NUTS 1 regions						
	NUTS 2 regions						
	NUTS 3 regions	Urban-rural typology	Metropolitan regions	Coastal regions	Border regions	Island regions	Mountain regions
Local typologies:	Local administrative units (LAU)	Degree of urbanisation	City definitions	Coastal areas			
Grid typologies:	Grid cells (1 km <sup>2</sup> )	Cluster types	Urban clusters and urban centres				

# Regions and cities on the Eurostat website:

- **Regions and cities – overview page:**  
<https://ec.europa.eu/eurostat/web/regions-and-cities>
- **Eurostat regional yearbook:**  
<https://ec.europa.eu/eurostat/publications/statistical-books/regional-yearbook>
- **Statistical atlas:** <http://ec.europa.eu/eurostat/statistical-atlas/gis/viewer/>
- **Regions and cities illustrated:**  
<https://ec.europa.eu/eurostat/cache/RCI/#?vis=nuts2.labourmarket&lang=en>
- **My region:**  
<https://ec.europa.eu/eurostat/cache/RCI/myregion/#?reg=BE10&ind=>

## Data visualisation references:

- **ColorBrewer – color advice for cartography:**  
<http://colorbrewer2.org/#type=sequential&scheme=BuGn&n=3>
- **Your Friendly Guide to Colours in Data Visualisation:**  
<https://blog.datawrapper.de/colorguide/>
- **Visual Vocabulary – Designing with data:** <https://ft-interactive.github.io/visual-vocabulary/>
- **Dataviz Project** (help to pick the right data visualisation):  
<https://datavizproject.com/>
- **Data Visualization Checklist:**  
[https://datavizchecklist.stephanieevergreen.com/assets/DataVizChecklist\\_Feb2018.pdf](https://datavizchecklist.stephanieevergreen.com/assets/DataVizChecklist_Feb2018.pdf)
- **EU Open data portal – Visualisation catalogue:**  
<https://data.europa.eu/euodp/en/visualisation-home>