

# Data needs and open source options for cross-border studies

## Experiences made during ULYSSES

Presenting author

Andreas Putlitz  
TU Dortmund

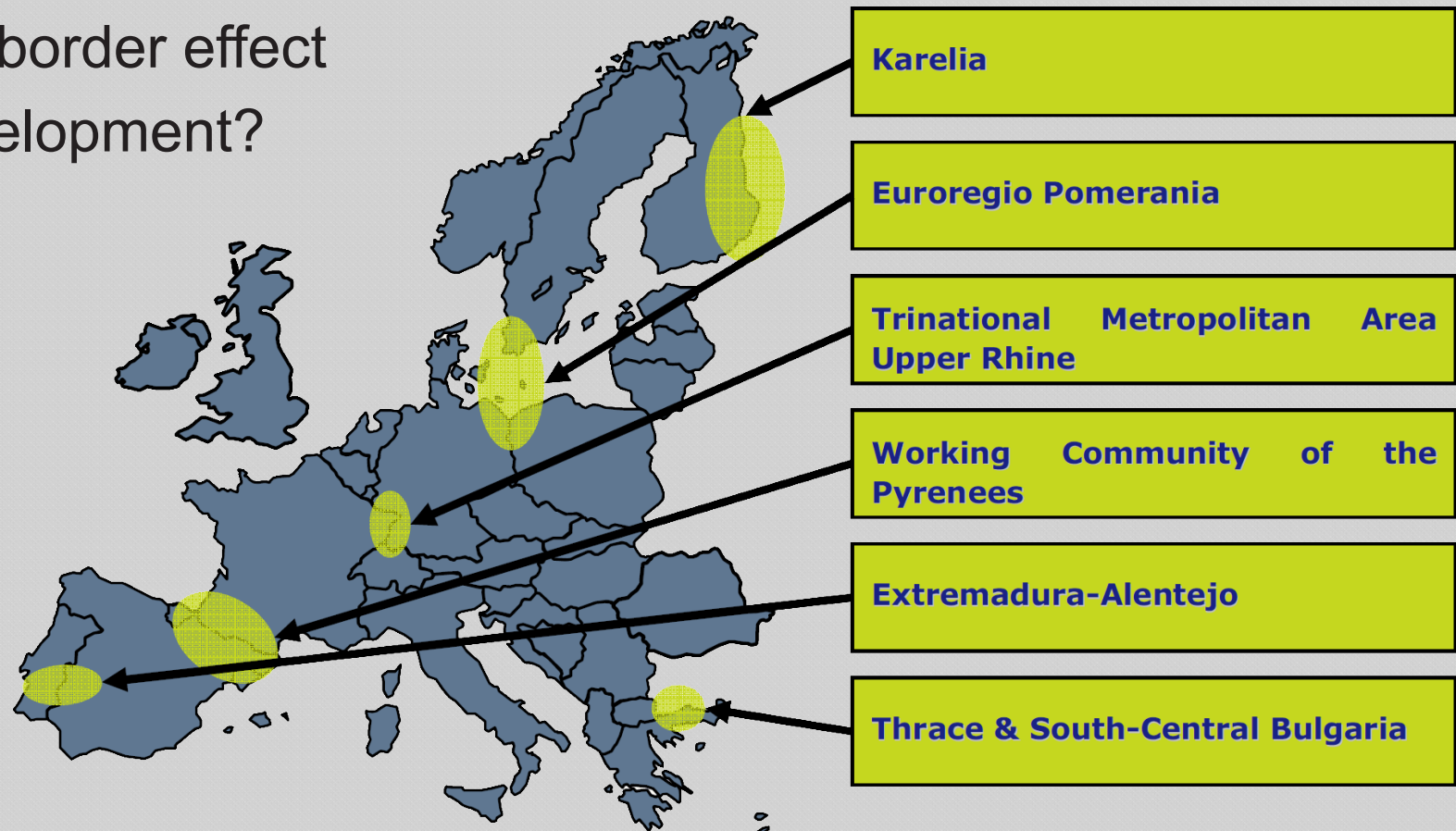
Author

Wolfgang Jung  
Karlsruhe Institute of Technology



# ULYSSES

- » Comparison of six cross-border regions
- » How does a border effect regional development?



## GOAL

- » Share and discuss practical experiences made in the course of ULYSSES

## TWO PARTS

1. What are the data needs for cross-border-studies in order to be locally useful?
2. How can open source data and tools contribute to fulfill these needs?

# **1. Lessons learned in ULYSSES**



## CHALLENGE “CROSS-BORDER”

- » small-scale
- » intra-regional
- » interlinking most interesting
- » data-foundation adequate?  
(NUTS-2/3 statistics)



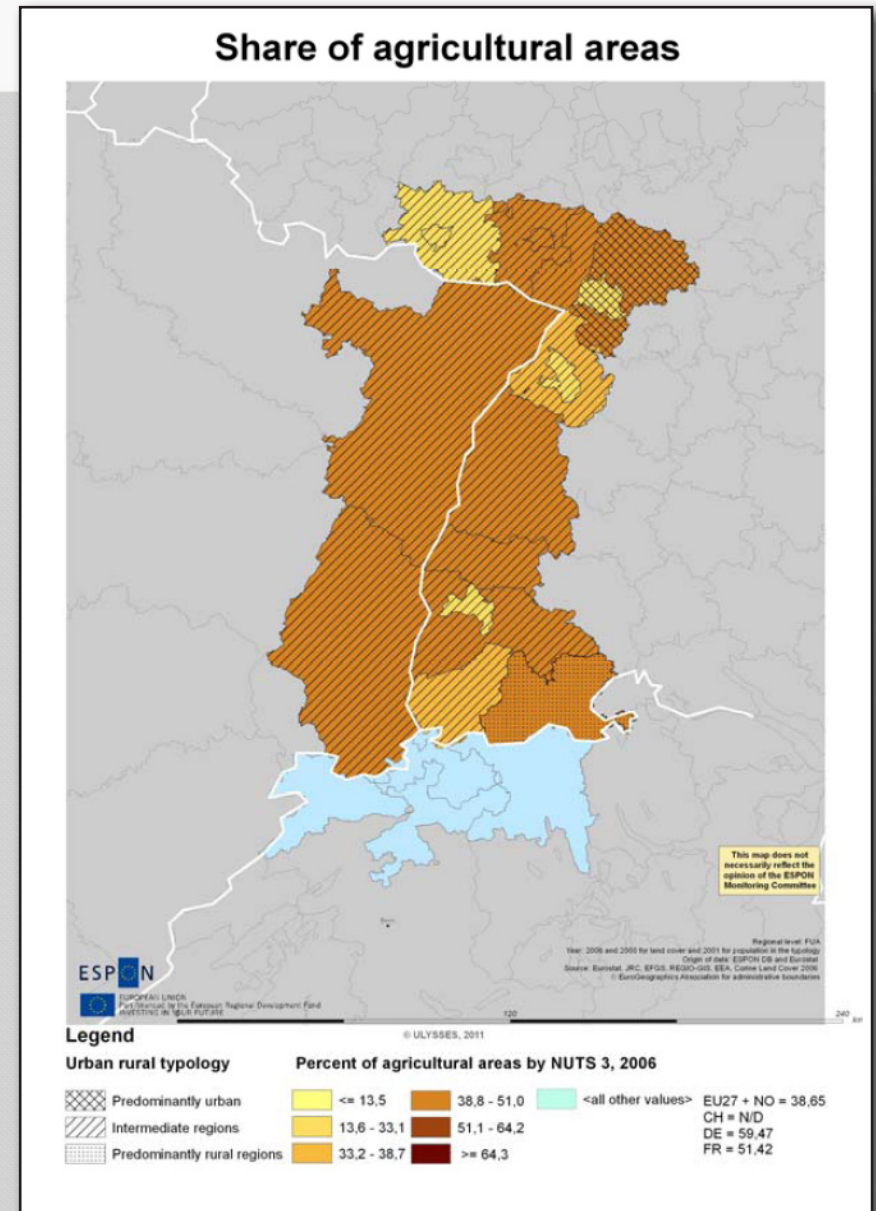
## FOUR LESSONS LEARNED



1. **availability & access**
2. **resolution**
3. **relationality**
4. **flexibility**

# AVAILABILITY

- » data sets largely incomplete
- » very few non-EU data
- » almost no LAU levels





## ACCESS

- » regional organisation for cross-border data existent
- » data not released due to property rights
- » even though stakeholders are indirect founders





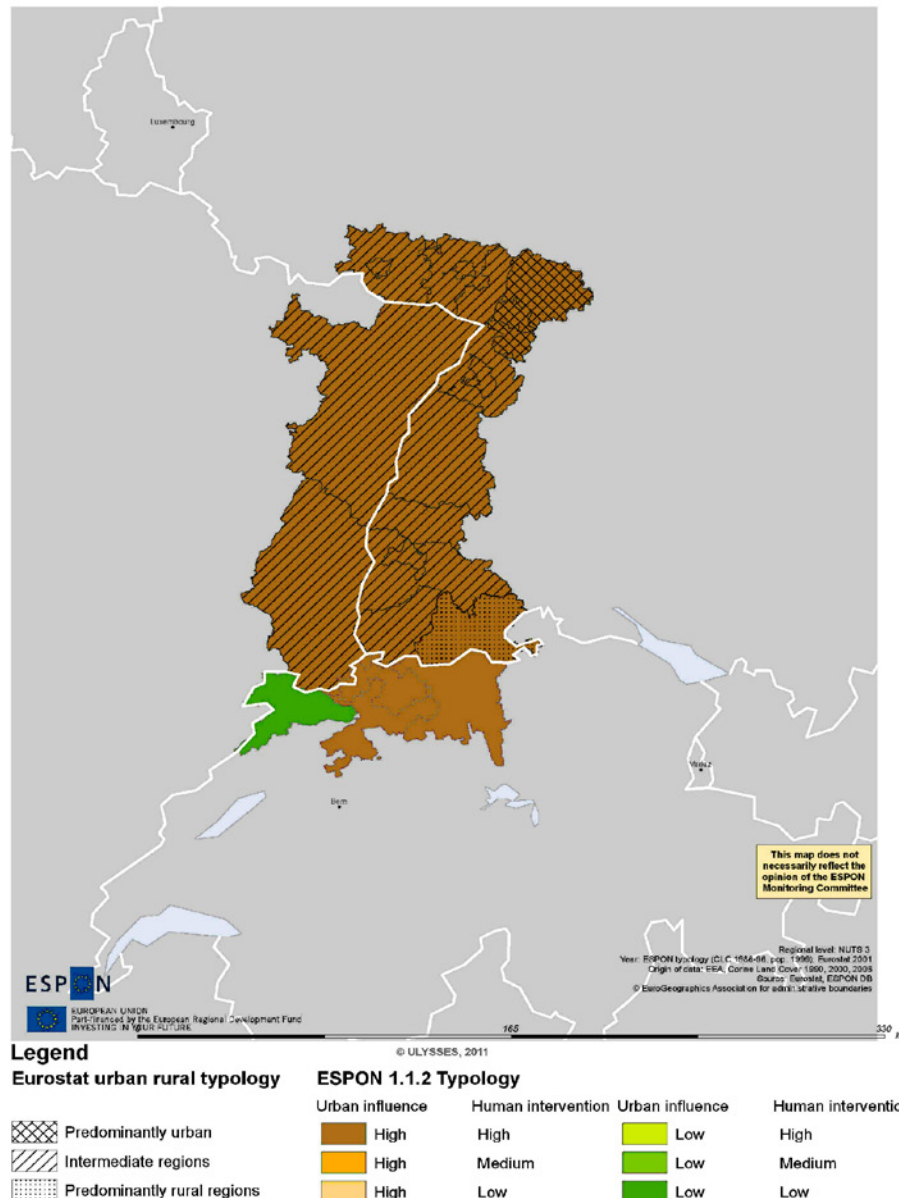
# 1<sup>ST</sup> LESSON



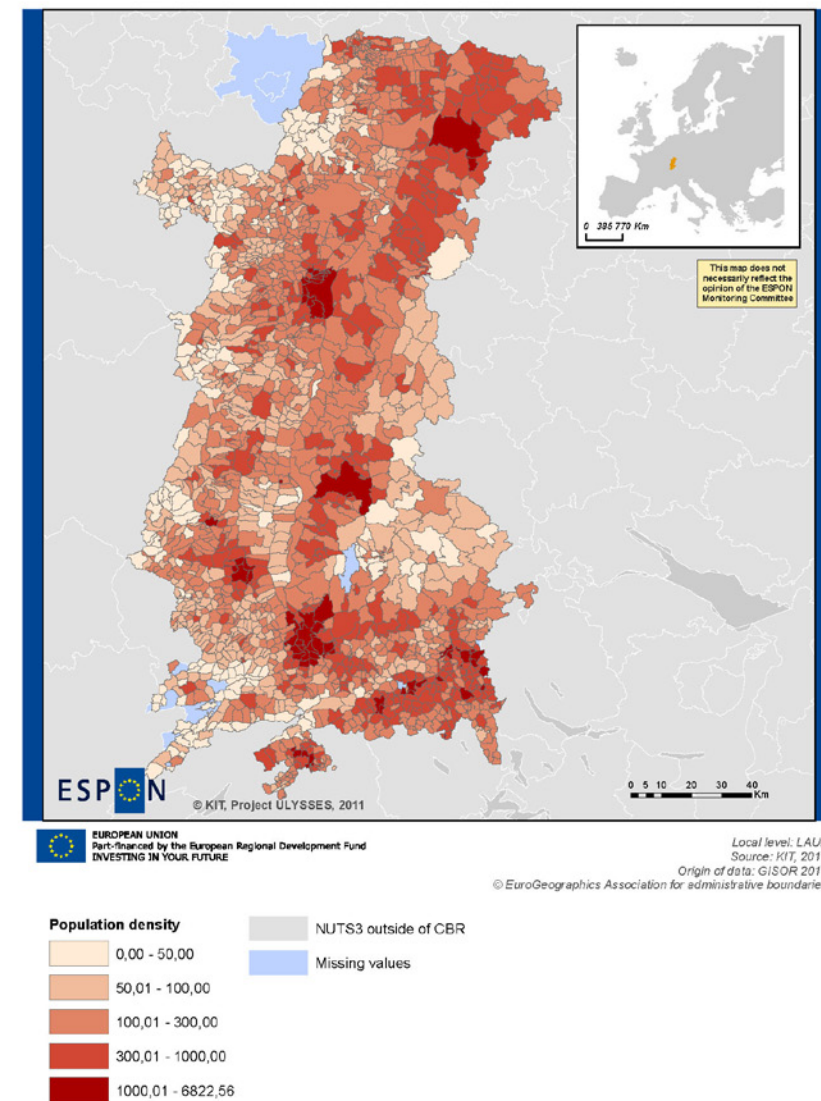
“Problems concerning data happen foremost due to lacking centralisation and complicated property rights.”

# RESOLUTION

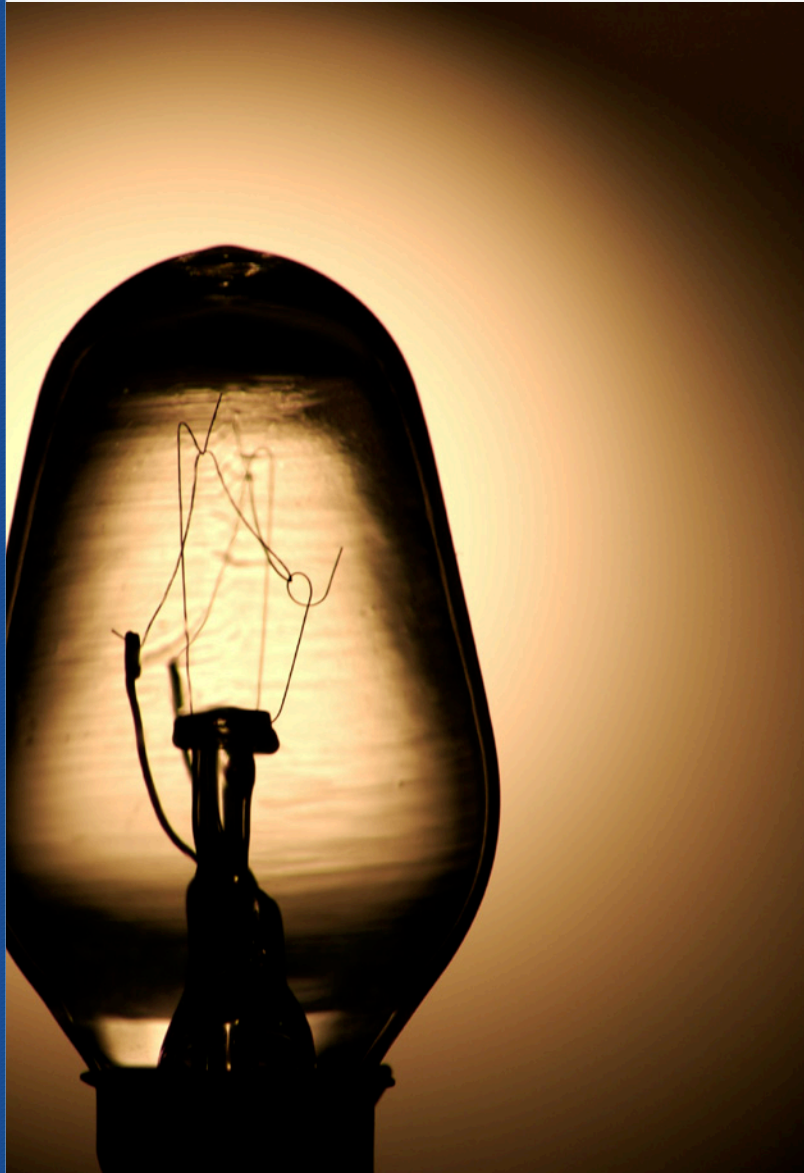
## ESPON 1.1.2 & Eurostat urban rural typologies



## Population density 2006



## 2<sup>ND</sup> LESSON



“Data is usually only available on NUTS3 level, with which you cannot investigate small-scale border effects.”



# RELATIONALITY

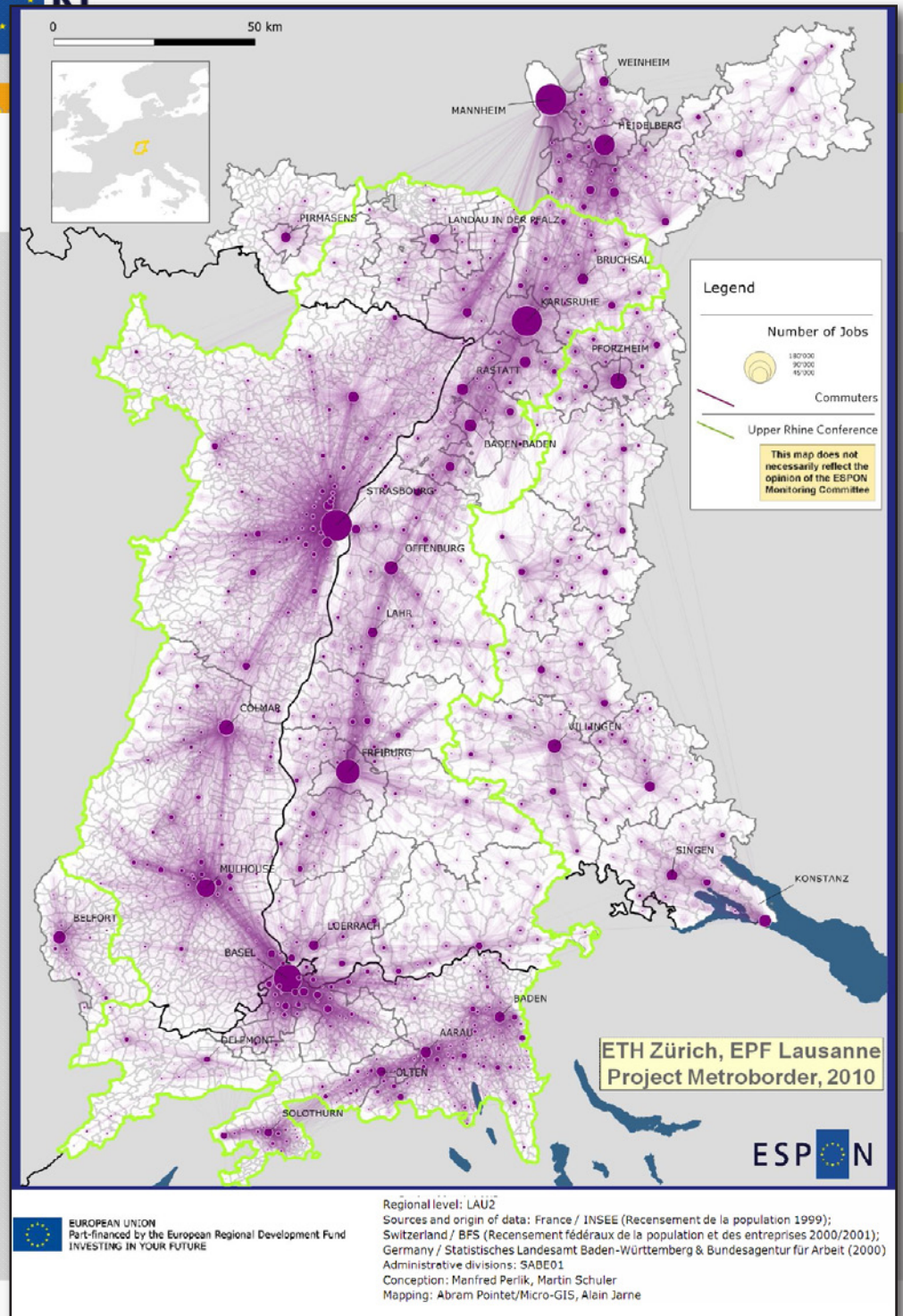
## STAKEHOLDER INTERESTS

- » commuting patterns
- » cross-border urban-rural relationships
- » redundant public services

# RELATIONALITY

## STAKEHOLDER INTERESTS

- » commuting patterns
- » cross-border urban-rural relationships
- » redundant public services



## 3<sup>RD</sup> LESSON



“The most interesting cross-border phenomena require relational data, which is usually not covered by traditional data sets.”

# **FLEXIBILITY**

## **THEMATICALLY**

- » allow for regional particularities

## **DATA FRAMEWORK**

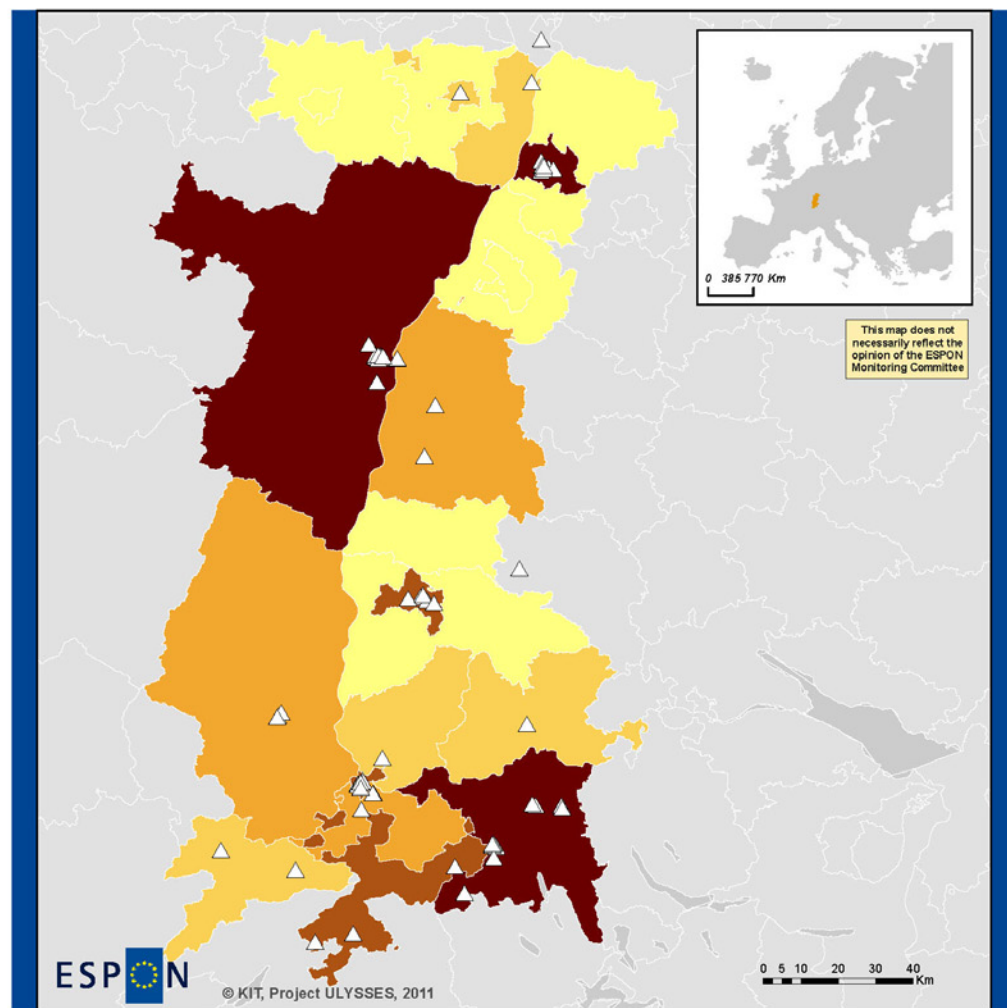
- » compatibility with unusual data

## **RULE OF THUMB**

- » particularity over comparability



## Number of higher educational institutions per NUTS3



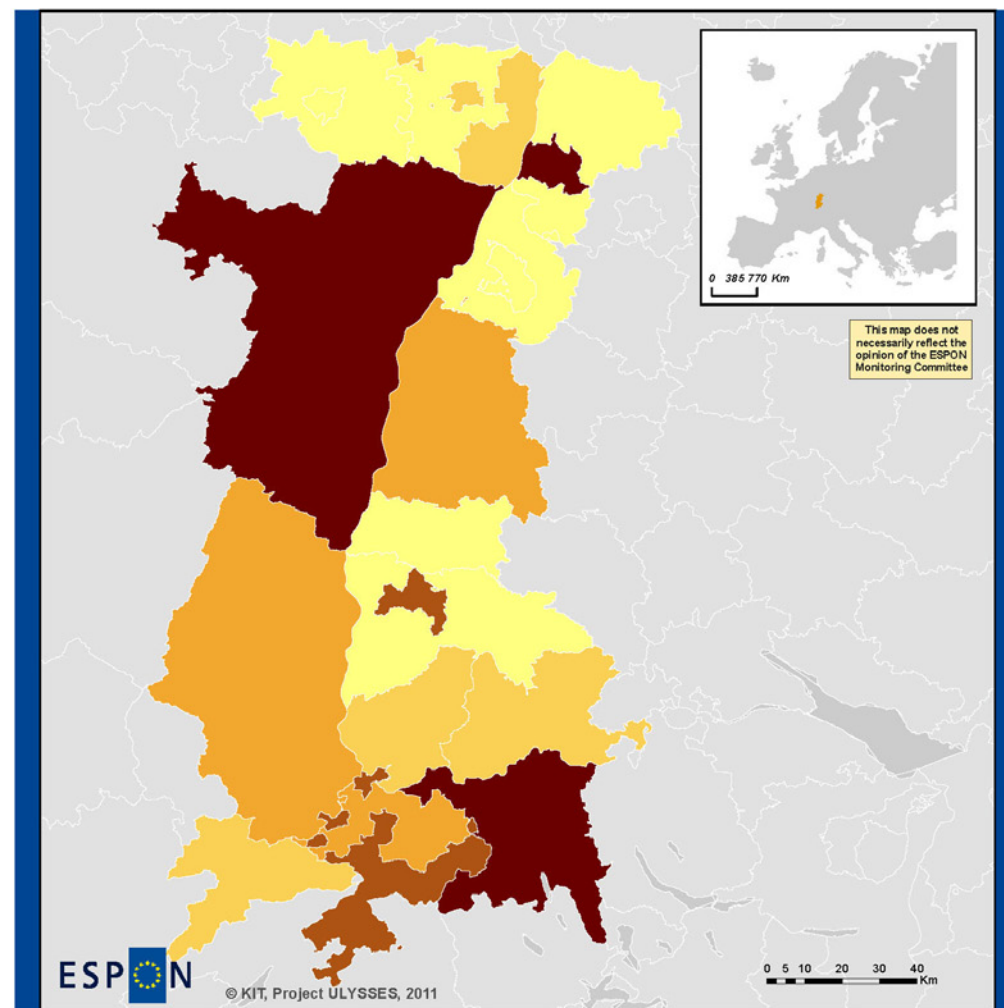
ESPON  
EUROPEAN UNION  
Part-financed by the European Regional Development Fund  
INVESTING IN YOUR FUTURE

Local level: NUTS3  
Source: KIT, 2011  
Origin of data: ESPON, Open Street Maps, Regio Basilensis  
© EuroGeographics Association for administrative boundaries

### Number of higher educational institutions

- 0
- 1 - 2
- 3 - 4
- 5 - 6
- 7 - 10

## Number of higher educational institutions per NUTS3



ESPON  
EUROPEAN UNION  
Part-financed by the European Regional Development Fund  
INVESTING IN YOUR FUTURE

Local level: NUTS3  
Source: KIT, 2011  
Origin of data: ESPON, Open Street Maps, Regio Basilensis  
© EuroGeographics Association for administrative boundaries

### Number of higher educational institutions

- 0
- 1 - 2
- 3 - 4
- 5 - 6
- 7 - 10

## 4<sup>TH</sup> LESSON



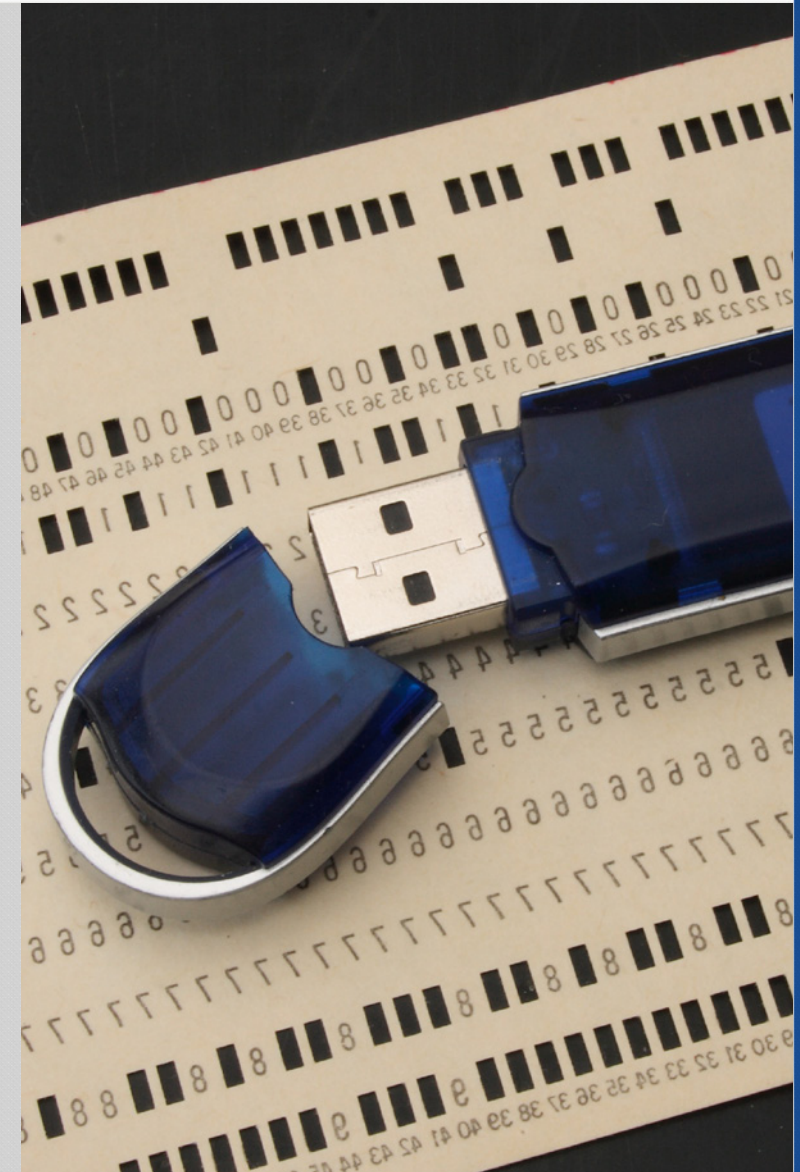
“Research and data frameworks should be flexible enough to allow for regional particularities and to integrate unusual data.”

## 2. Open source data and tools

# OPEN SOURCE DATA & TOOLS

## REGIONAL ACCESSIBILITY OF RESEARCH INSTITUTIONS

» cross-border clusters?

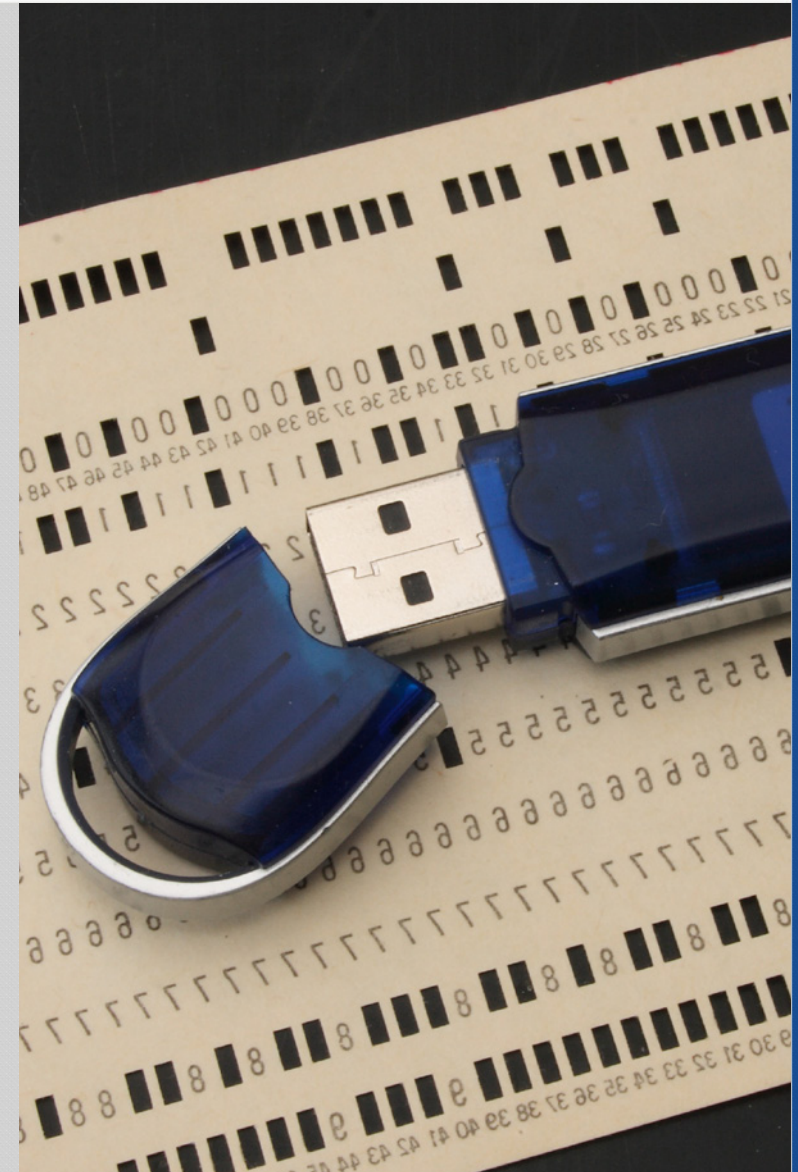




# OPEN SOURCE DATA & TOOLS

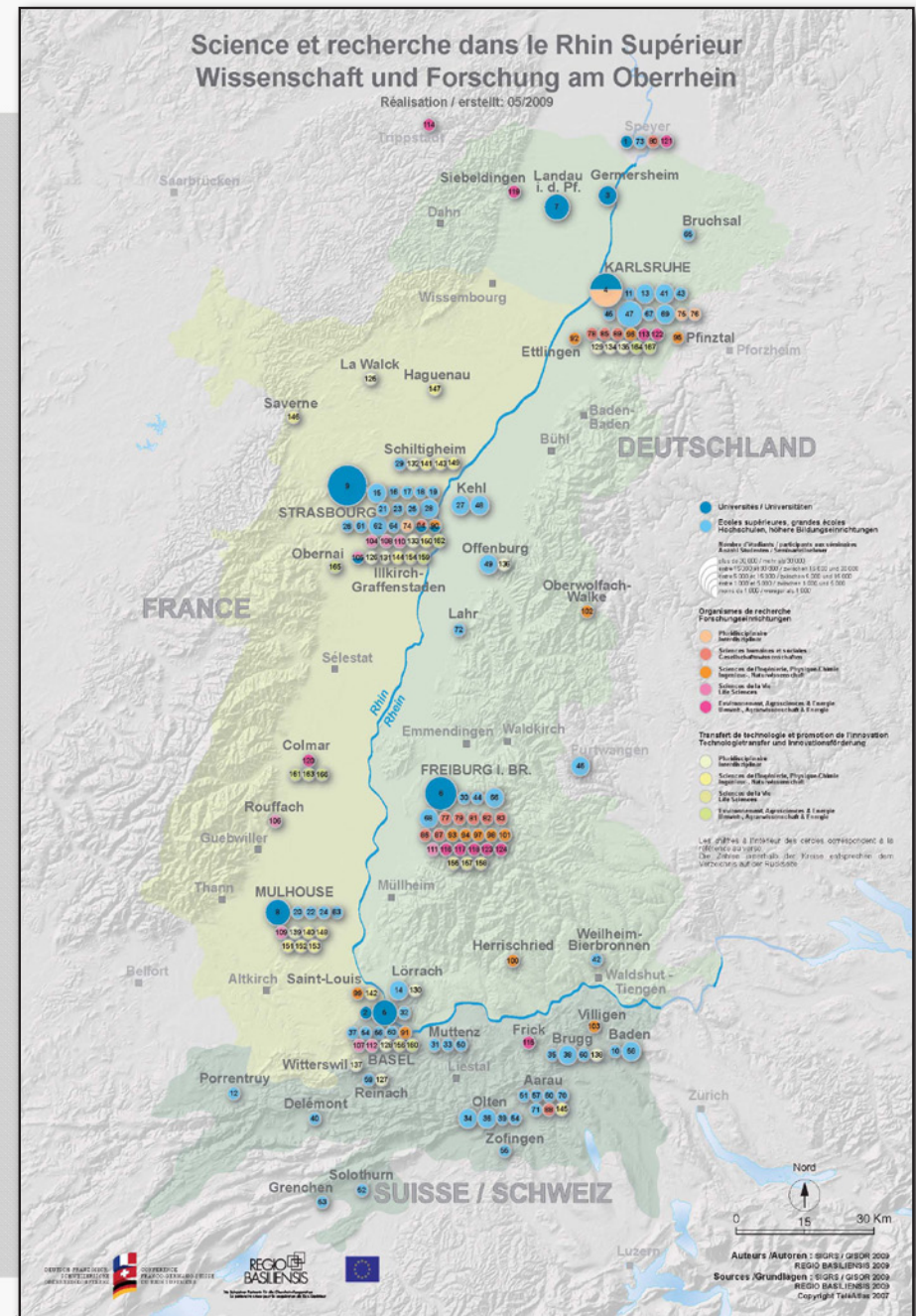
## REGIONAL ACCESSIBILITY OF RESEARCH INSTITUTIONS

- » cross-border clusters?
- 1. list of institutions
- 2. geo-reference using Google Maps
- 3. road network from Open Street Maps
- 4. accessibility with GRASS GIS



# GEO-REFERENCIATION

- » R&D institutions in the Upper Rhine region from a prior project
- » only names of institutions provided
- » georeferenciation with python script and Google Maps





```
#####
# Geocodierung und Visualisierung von Adressdaten mittels der GoogleAPI #
# Autor: Ronald Weberndorfer #
# Datum: 10.01.2011 #
# Infos: http://ourproject.org/moin/projects/openplanning/PythonGeocoder #
#####

# Lade benoetigte Module
import os, urllib, csv, shutil, webbrowser
from Tkinter import *

# erzeuge globale Variablen
global addr
addr = ""
global lat
lat = ""

# setze Pfad und Dateinamen
global pfad
pfad = "../prog_data/"
global data
data = pfad + "db.csv"
global data2
data2 = pfad + "db_2.csv"

# definiere Insert Funktion - Button Geocodieren
def Insert():
    global addr
    addr = text.get() #lade Inhalt des Textfeldes
    if addr == "": #pruefe Eingabe
        list.insert(0,0, "## Bitte geben sie eine Adresse ein! ## \n")
    else:
        ##### Geocoder Start #####
        url = ''
        if addr[0]=='(':
            center = addr.replace('(','').replace(',')','') # loesche Klammern aus addr
            global lat
            global lng
            lat,lng = center.split(',') # erzeuge 2 Variablen aus center
            url = 'http://maps.google.com/maps?q=%s+%s' % (lat,lng)
        else:
            # Encode query string into URL
```

76 Geocoder

Datei Hilfe

Bitte geben Sie eine Adresse oder WGS84-Koordinate (z.B: 47.5, 13.5):

Geocodieren

## Adresse wurde gespeichert! ##  
Ausgabe: Université du Luxembourg, Walferdange, Luxembourg  
Eingabe: Uni Lux

## Adresse wurde gespeichert! ##  
Ausgabe: Université du Luxembourg, Walferdange, Luxembourg  
Eingabe: Universite de Luxembourg

## Adresse wurde gespeichert! ##  
Ausgabe: Route de Diekirch, 7220 Walferdange, Luxembourg  
Eingabe: Route de Diekirch, Walferdange

Titel:

Inhalt:

Soll die grau hinterlegte Adresse mit Titel + Inhalt in der Datenbank gespeichert werden?

JA, Speichern

Soll das Output-HTML erzeugt werden?

JA, HTML Erzeugen

HTML Aufrufen

E16				
	A	B	C	D
1	1	Route de Diekirch, Walferdange	49.663.359	6.133.522
2	2	Universite de Luxembourg	49.815.262	5.962.466
3	3	Uni Lux	49.660.273	6.134.052

# Number of higher educational institutions per NUTS3

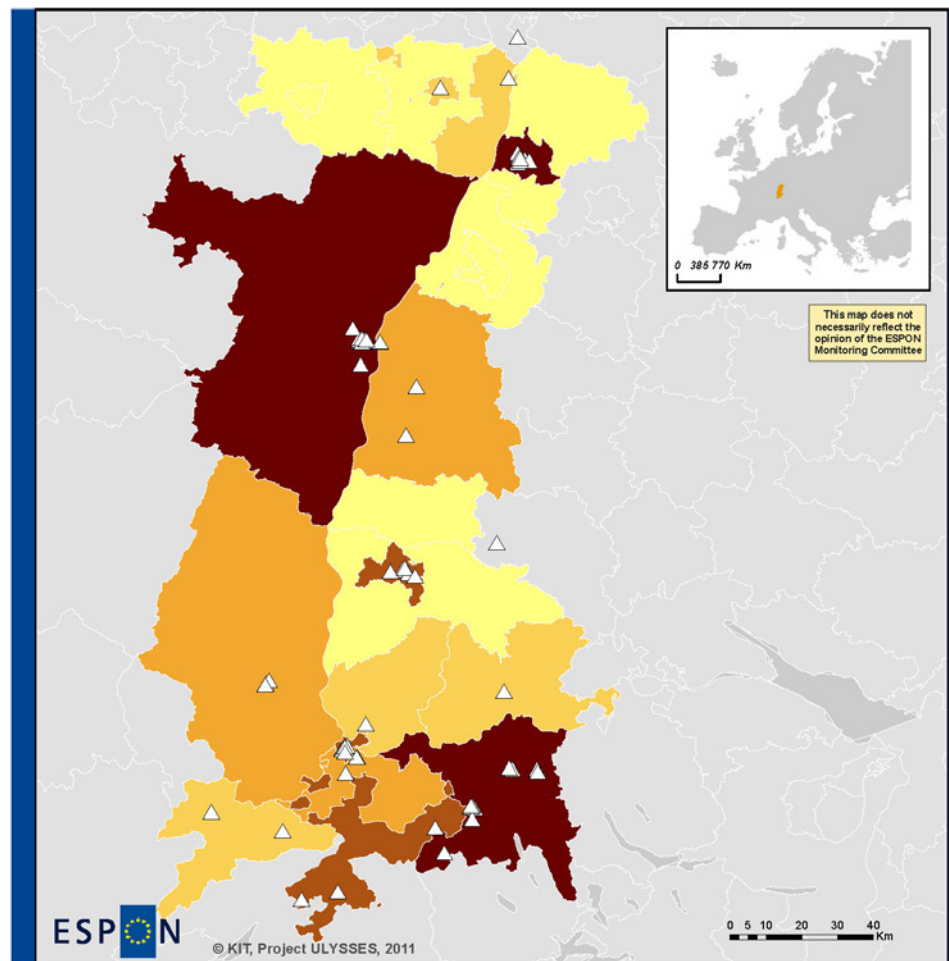
```
#####
# Geocodierung und Visualisierung von Adressen
# Autor: Ronald Weberndorfer
# Datum: 10.01.2011
# Infos: http://ourproject.org/moin/projects
#####

# Lade benoetigte Module
import os, urllib, csv, shutil, webbrowser
from Tkinter import *

# erzeuge globale Variablen
global addr
addr = ""
global lat
lat = ""

# setze Pfad und Dateinamen
global pfad
pfad = "../prog_data/"
global data
data = pfad + "db.csv"
global data2
data2 = pfad + "db_2.csv"

# definiere Insert Funktion - Button Geocodieren
def Insert():
    global addr
    addr = text.get() #lade Inhalt des Text
    if addr == "": #pruefe Eingabe
        list.insert(0,0, "## Bitte geben sie
    else:
        ##### Geocoder Start #####
        url = ''
        if addr[0]=='(':
            center = addr.replace('(','').rep
            global lat
            global lng
            lat,lng = center.split(',')
            url = 'http://maps.google.com/map
        else:
            # Encode query string into URL
```



EUROPEAN UNION  
Part-financed by the European Regional Development Fund  
INVESTING IN YOUR FUTURE

Local level: NUTS3  
Source: KIT, 2011

Origin of data: ESPON, Open Street Maps, Regio Basiliensis  
© EuroGeographics Association for administrative boundaries

## Number of higher educational institutions

- 0
- 1 - 2
- 3 - 4
- 5 - 6
- 7 - 10

E16		
	A	
1	1	Route de Die
2	2	Universite de
3	3	Uni Lux

WGS84-Koordinate (z.B: 47.5, 13.5):

Geocodieren

erdange, Luxembourg

erdange, Luxembourg

ange, Luxembourg

Inhalt in der Datenbank gespeichert werden?

Speichern

ML erzeugt werden?

Erzeugen

Aufrufen

e, Luxembourg
ange, Luxembourg
ange, Luxembourg

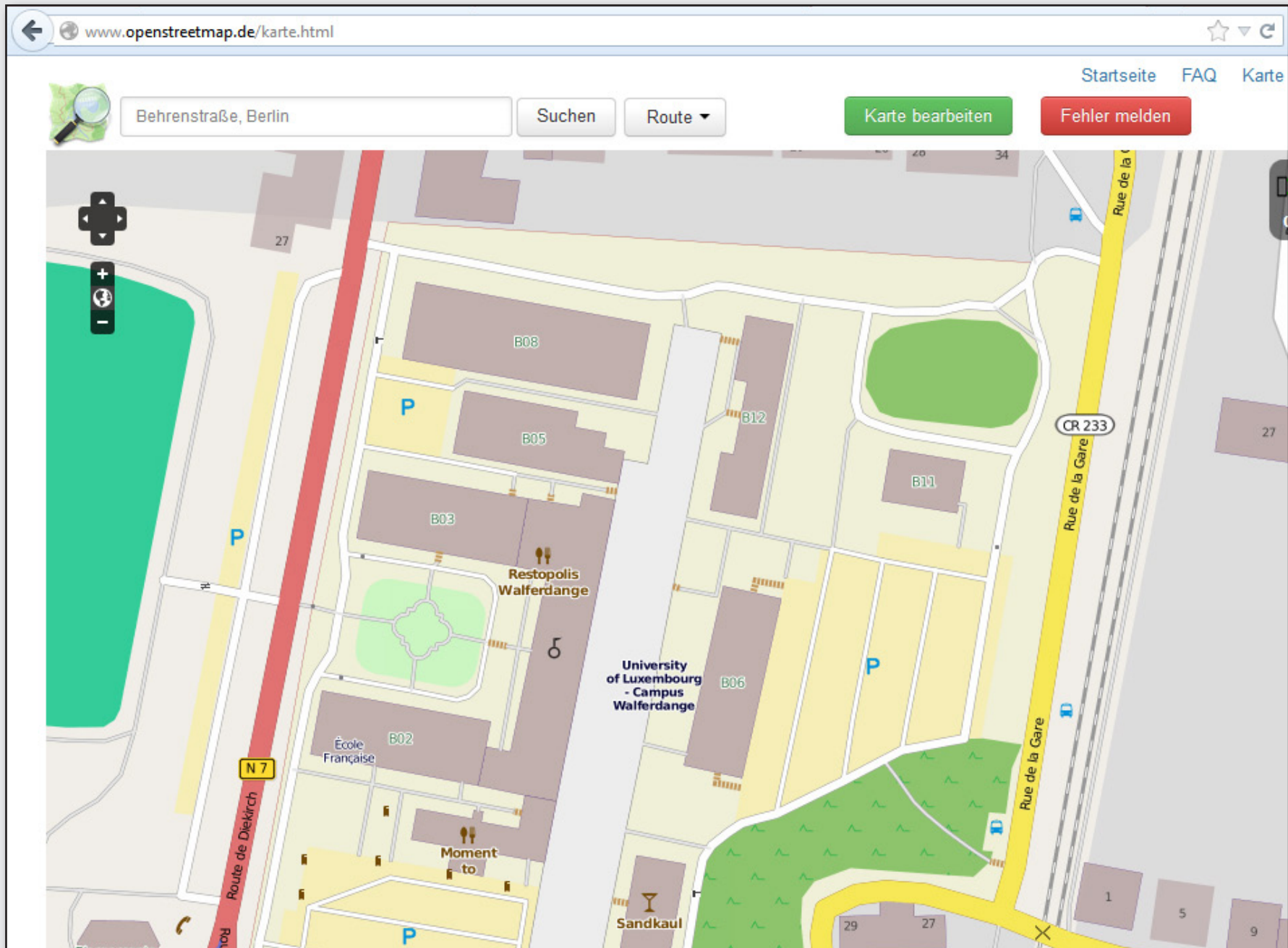


# ROAD NETWORK

## SOURCE: OPEN STREET MAPS

- » Open Data project
- » based on volunteer work
- » free of charge for non-commercial use

# OPEN STREET MAPS



# DOWNLOAD PACKAGES

download.geofabrik.de/europe.html

osm download packages

GEOFABRIK downloads

Download OpenStreetMap data for this region:

Europe

[one level up]

Commonly Used Formats

- [europe-latest.osm.pbf](#), suitable for Osmium, Osmosis, imposm, osm2pgsql, mkgmap, and others. This file was last modified 2 hours ago and contains all OSM data up to 2013-09-08T13:21:02Z. File size: 10.9 GB; MD5 sum: 90cb664cc9470b92ea02b2620bba6a50.
- [europe-latest.shp.zip](#) is not available for this region; try one of the sub-regions.

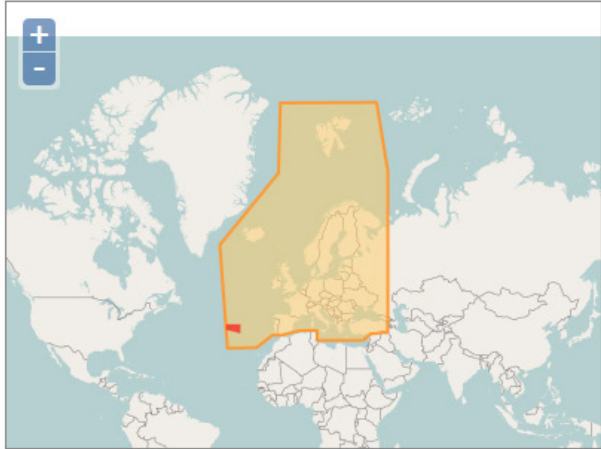
Other Formats and Auxiliary Files

- [europe-latest.osm.bz2](#), yields OSM XML when decompressed; use for programs that cannot process the .pbf format. This file was last modified 1 day ago. File size: 15.8 GB; MD5 sum: 2ff8f6eaaf4ec830d13950bb39823d13.
- [.poly file](#) that describes the extent of this region.
- [.osc.gz files](#) that contain all changes in this region, suitable e.g. for Osmosis updates
- [raw directory index](#) allowing you to see and download older files

Sub Regions

Click on the region name to see the overview page for that region, or select one of the file extension links for quick access.

Sub Region	Quick Links		
	.osm.pbf	.shp.zip	.osm.bz2
<a href="#">Albania</a>	<a href="#">[.osm.pbf]</a> (6.6 MB)	<a href="#">[.shp.zip]</a>	<a href="#">[.osm.bz2]</a>
<a href="#">Alps</a>	<a href="#">[.osm.pbf]</a> (1.3 GB)	✕	<a href="#">[.osm.bz2]</a>
<a href="#">Andorra</a>	<a href="#">[.osm.pbf]</a> (587 KB)	<a href="#">[.shp.zip]</a>	<a href="#">[.osm.bz2]</a>
<a href="#">Austria</a>	<a href="#">[.osm.pbf]</a> (292 MB)	<a href="#">[.shp.zip]</a>	<a href="#">[.osm.bz2]</a>
<a href="#">Azores</a>	<a href="#">[.osm.pbf]</a> (1.8 MB)	<a href="#">[.shp.zip]</a>	<a href="#">[.osm.bz2]</a>
<a href="#">Belarus</a>	<a href="#">[.osm.pbf]</a> (68 MB)	<a href="#">[.shp.zip]</a>	<a href="#">[.osm.bz2]</a>
<a href="#">Belgium</a>	<a href="#">[.osm.pbf]</a> (149 MB)	<a href="#">[.shp.zip]</a>	<a href="#">[.osm.bz2]</a>
<a href="#">Bosnia-Herzegovina</a>	<a href="#">[.osm.pbf]</a> (51 MB)	<a href="#">[.shp.zip]</a>	<a href="#">[.osm.bz2]</a>



Not what you were looking for? Geofabrik is a consulting and software development firm based in Karlsruhe, Germany specializing in OpenStreetMap services. We're happy to help you with data preparation, processing, server setup and the like. [Check out our web site](#) and contact us if we can be of service.

Nicht das Richtige dabei? Die Geofabrik ist ein auf OpenStreetMap spezialisiertes Beratungs- und



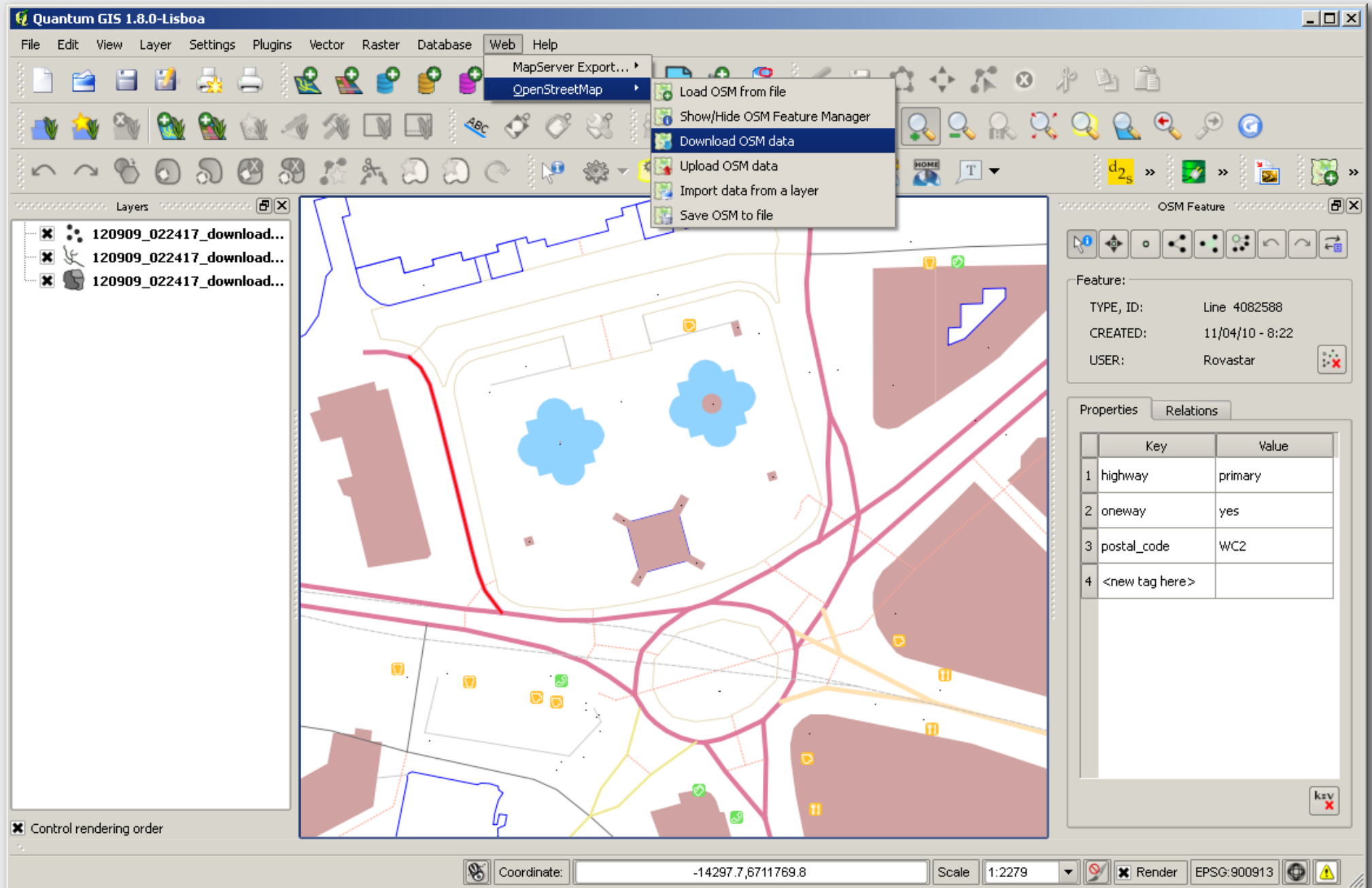
# DATA LAYERS IN OSM

	Autobahn		Industriegebiet
	Schnellstraße		Gewerbegebiet
	Schnellstraße		Heide
	Bundesstraße		See und Speichersee
	Bundesstraße		Landwirtschaft
	Landes-, Kreisstraße		Industriebrachfläche
	Landes-, Kreisstraße		Friedhof
	Unbefestigte Straße		Kleingartenanlage
	Wald-, Feldweg		Sportfeld
	Nebenweg		Sportzentrum
	Reitweg		Naturschutzgebiet
	Fahrradweg		Militärgebiet
	Fußweg		Schule und Universität
	Eisenbahn		Besonderes Gebäude
	Eisenbahn		Bahnhof
	U-Bahn		Gipfel und Bergspitze
	Kleinbahn und Straßenbahn		Gestrichelter Rand = Tunnel
	Seilbahn und Sitzlift		Dicker Rand = Brücke
	Start- und Landebahn und Rollbahn		Privater Zugang
	Flughafenvorfeld und Terminal		Eingeschänkter Zugang
	Landesgrenzen, sonstige Grenzen		Nur für Anrainer
	Forst		Straße im Bau
	Naturwald		
	Golfplatz		
	Park		
	Wohngebiet		
	Touristenattraktion		
	öffentliche Grünfläche und Wiese		
	Einkaufszentrum		





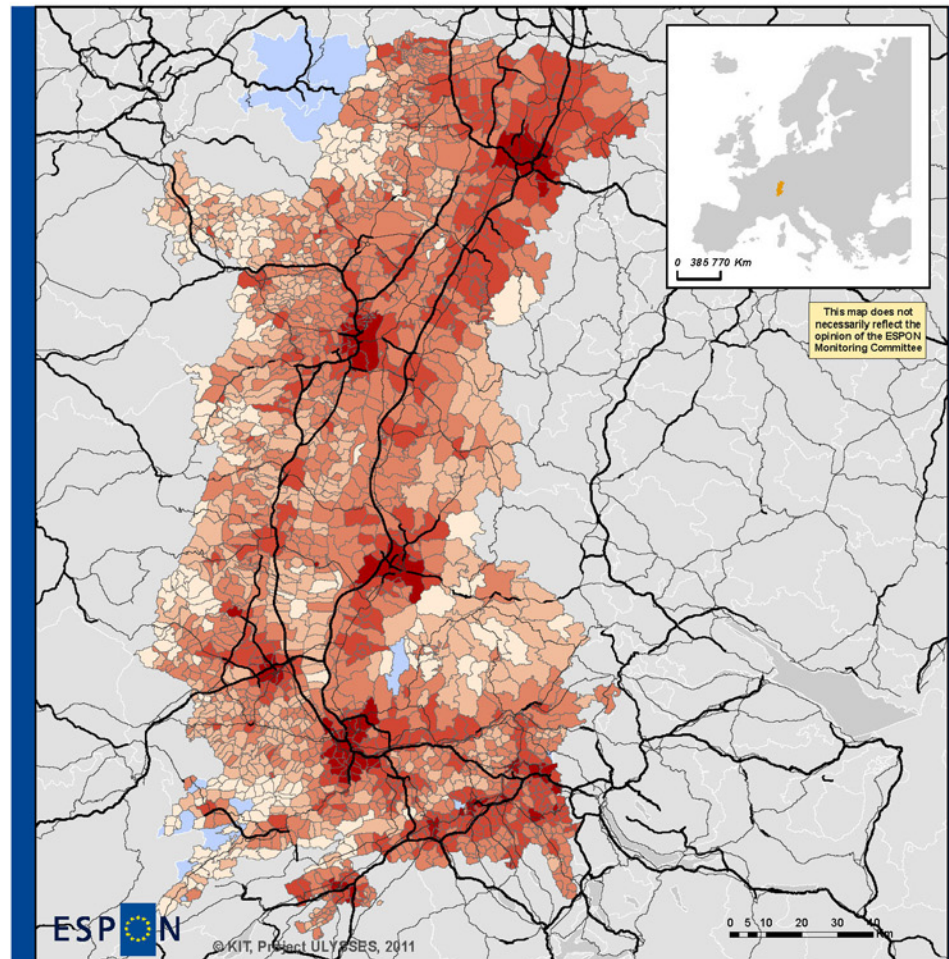
# QUANTUM GIS PLUG-IN (OPEN SOURCE)



# QUANTUM GIS



## Population density 2006 & road network



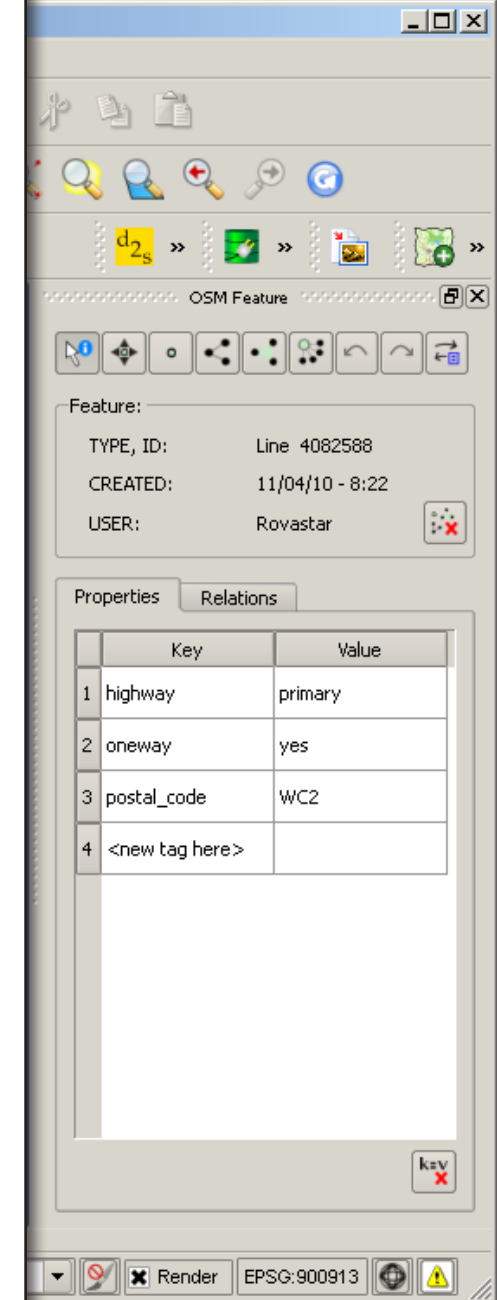
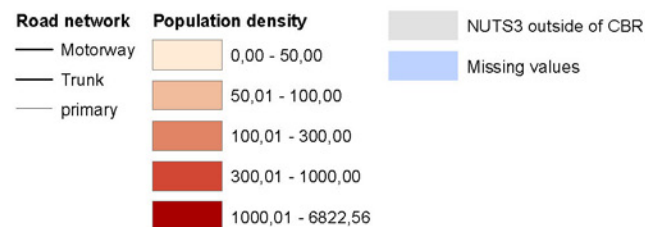
EUROPEAN UNION  
Part-financed by the European Regional Development Fund  
INVESTING IN YOUR FUTURE

Local level: LAU2

Source: KIT, 2011

Origin of data: GISOR 2011

© EuroGeographics Association for administrative boundaries



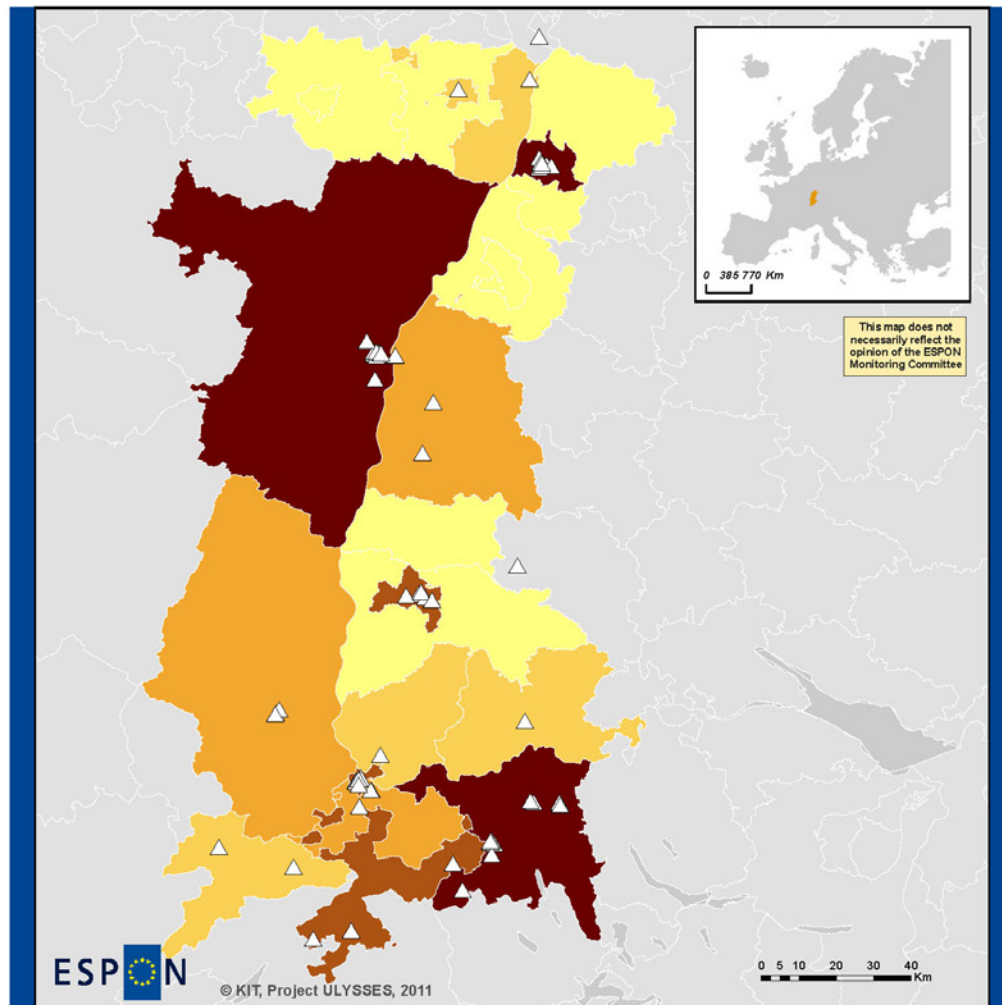
## ANALYSIS WITH GRASS GIS (OPEN SOURCE)

1. assume velocities by different types of roads
2. calculate values using “v.net.iso” command in GRASS GIS

Calculate values for every point of the region for the assumed time you would need in a car to reach the institution. Discount values in steps of 5 min down to 1 hour in a consinus curve from 100 to 0 points.

3. repeat calculation for every institution
4. sum up and divide by number of institutions

# Number of higher educational institutions per NUTS3




**EUROPEAN UNION**  
 Part-financed by the European Regional Development Fund  
 INVESTING IN YOUR FUTURE

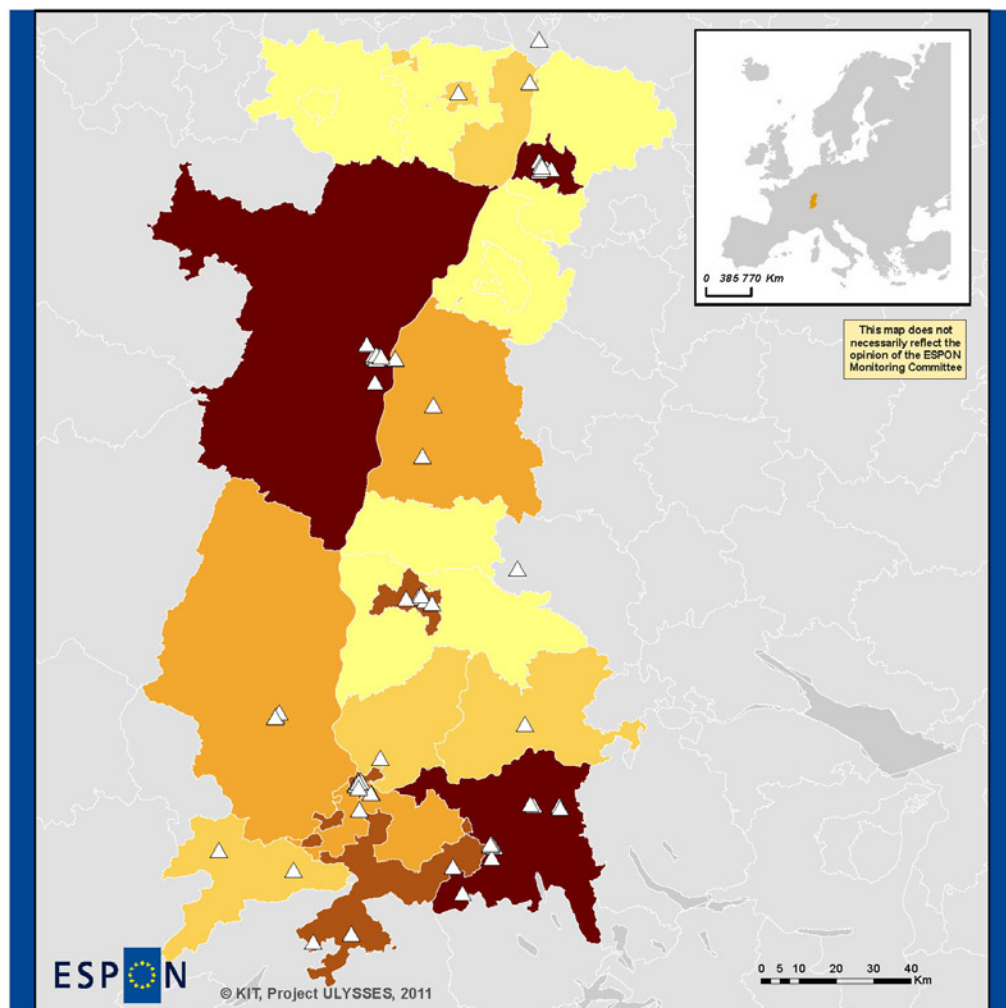
Local level: NUTS3  
 Source: KIT, 2011  
 Origin of data: ESPON, Open Street Maps, Regio Basilensis  
 © EuroGeographics Association for administrative boundaries

## Number of higher educational institutions

- 0
- 1 - 2
- 3 - 4
- 5 - 6
- 7 - 10



## Number of higher educational institutions per NUTS3



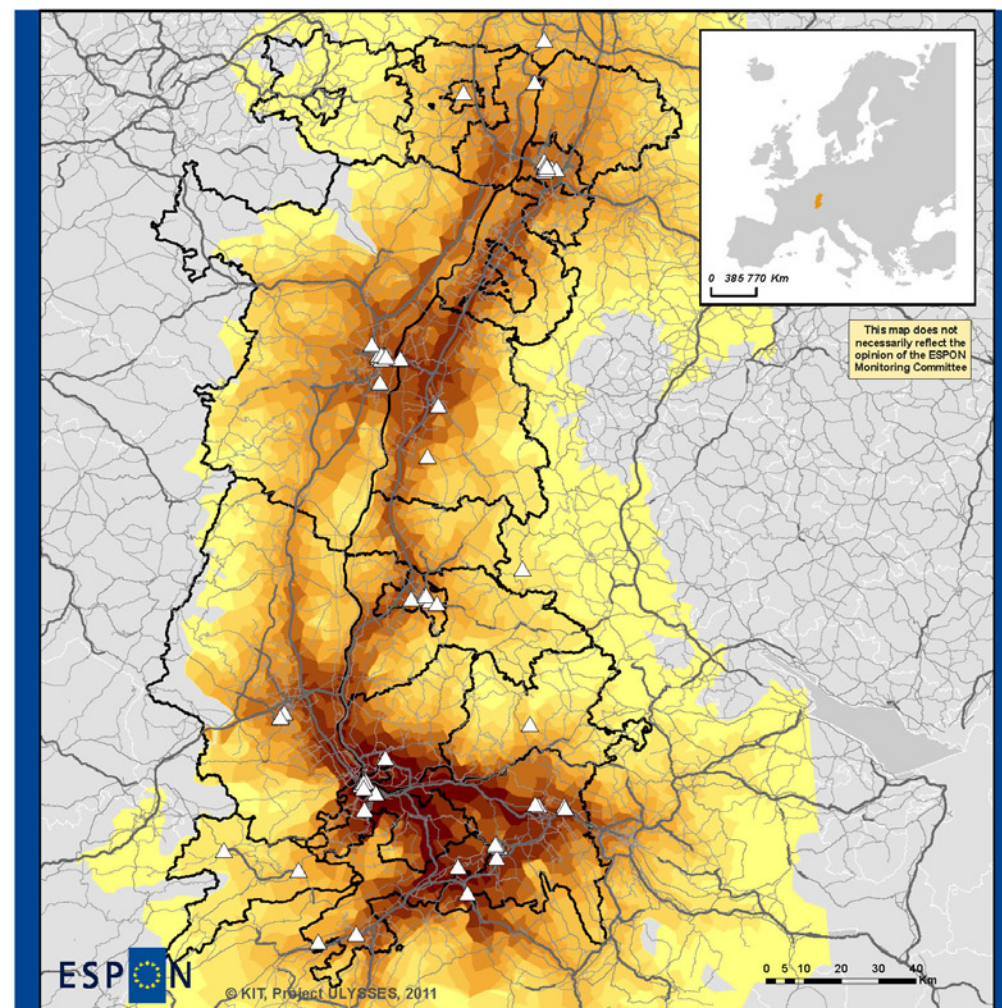
EUROPEAN UNION  
Part-financed by the European Regional Development Fund  
INVESTING IN YOUR FUTURE

Local level: NUTS3  
Source: KIT, 2011  
Origin of data: ESPON, Open Street Maps, Regio Basilensis  
© EuroGeographics Association for administrative boundaries

### Number of higher educational institutions

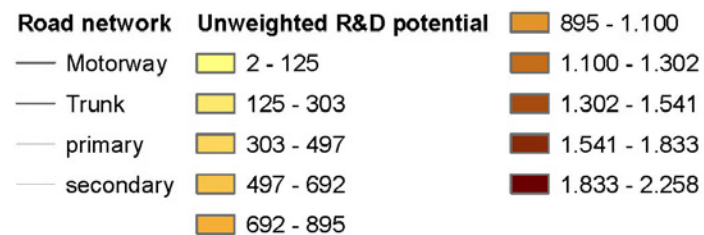


## Unweighted R&D potential of higher educational institutions



EUROPEAN UNION  
Part-financed by the European Regional Development Fund  
INVESTING IN YOUR FUTURE

Local level: NUTS3  
Source: KIT, 2011  
Origin of data: ESPON, Open Street Maps, Regio Basilensis  
© EuroGeographics Association for administrative boundaries



## OPEN SOURCE LESSONS



1. It is possible to carry out cross-border studies using free-of-charge Open Source data and tools.
2. This approach might even entail some advantages over traditional data.

# concluding remarks

# SUMMARY

## DATA NEEDS

1. availability & access
2. resolution
3. relationality
4. flexibility

## ALTERNATIVE SOURCES

- » open source is possible
- » and sometimes even better



# DATA FOUNDATION OF THE FUTURE?

- » a central European data portal
- » include or link to decentral data sets
- » LAU2 / relational data / points & lines / special topics
- » particularity over comparability

## DISCUSSION

**“How can policy be better integrated in the research to become more useful and used?”**

- » local stakeholders as experts for local needs
- » local scientists as experts for scientific approaches and data
- » More autonomy for the local research team to estimate stakeholder interests and corresponding data needs?

# THANK YOU !

Dipl.-Ing. Andreas Putlitz

[andreas.putlitz@tu-dortmund.de](mailto:andreas.putlitz@tu-dortmund.de)

TU Dortmund

Department for Spatial Planning

Institute for European Planning Cultures

[www.raumplanung.uni-dortmund.de/erp](http://www.raumplanung.uni-dortmund.de/erp)

## creative common sources

handshake - <http://www.flickr.com/photos/quimgil/756514748/>

light bulb - <http://www.flickr.com/photos/jnpoulos/382413887/>

one way - <http://www.flickr.com/photos/nooone/1795729648/>

data storage - <http://www.flickr.com/photos/ian-s/2152798588/>