

Challenges for the ESPON Database Development

Project ESPON DB 2013 (Priority 3)

Espon Seminar, Praha, 2009 June 3-4th



EUROPEAN UNION

Part-financed by the European Regional Development Fund

INVESTING IN YOUR FUTURE

Introduction - The information cube

Scale dimension:

- Local (1 to 10 km)
- Medium (10 to 1000 km)
- Global (1000 to 10 000 km)

Time dimension:

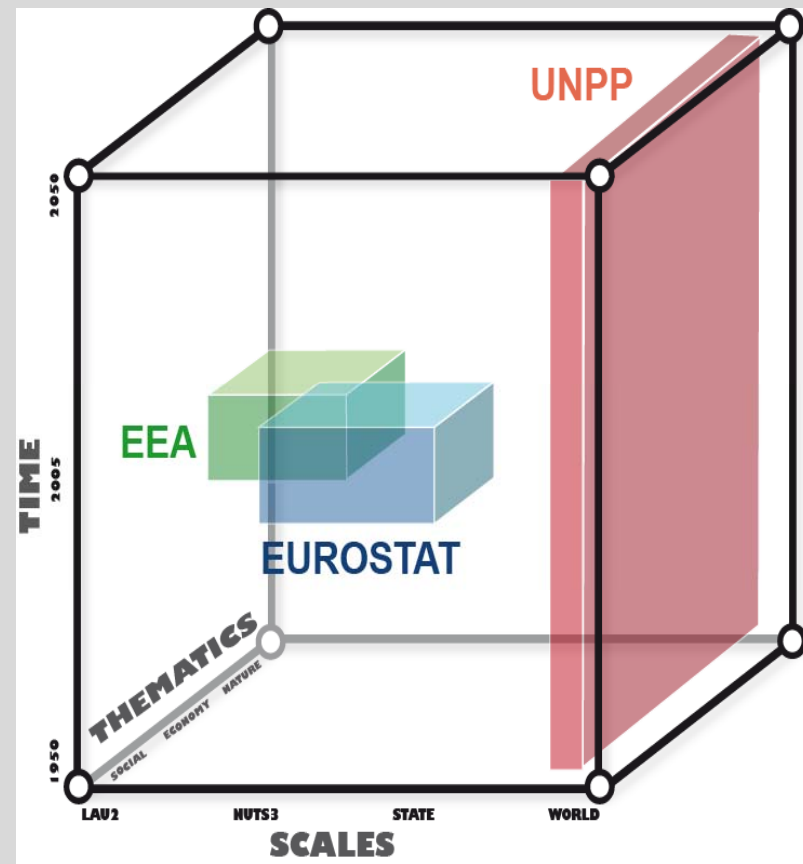
- Short term (1995-2015)
- Medium term (1980-2020)
- Long Term (1950 – 2050)

Thematic dimension :

- Economic competitiveness
- Sustainable environment
- Social cohesion

Geographical object :

- *Administrative units*
- *Grids*
- *Cities & Networks*



Introduction - The information cube of ESPON Database 2006

Scale dimension:

- Local (Zooms)
- **Medium (Nuts2 / Nuts3)**
- Global (Europe in the World)

Time dimension:

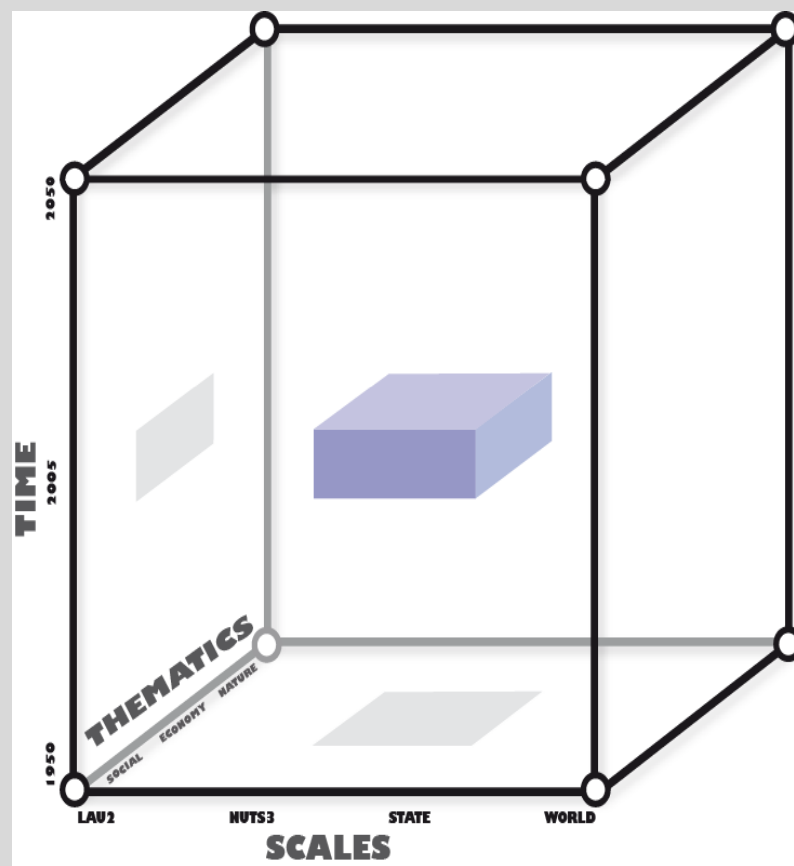
- **Short term (1995-2003)**
- Medium term (demography)
- Long term (Europe in the World)

Thematic dimension :

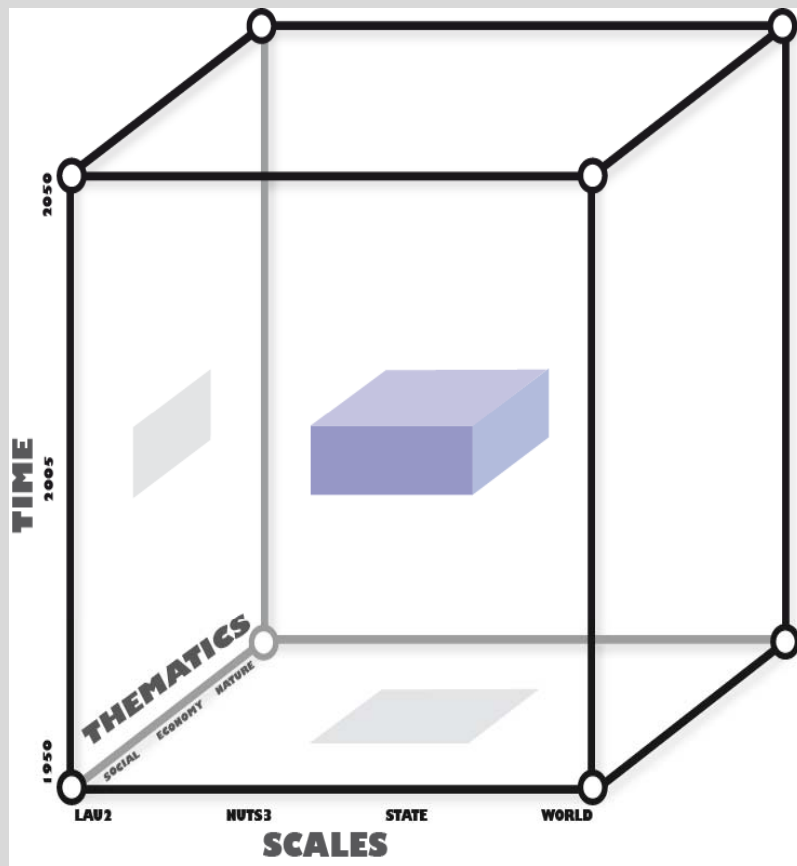
- **Economic competitiveness**
- Sustainable environment
- Social cohesion

Geographical object :

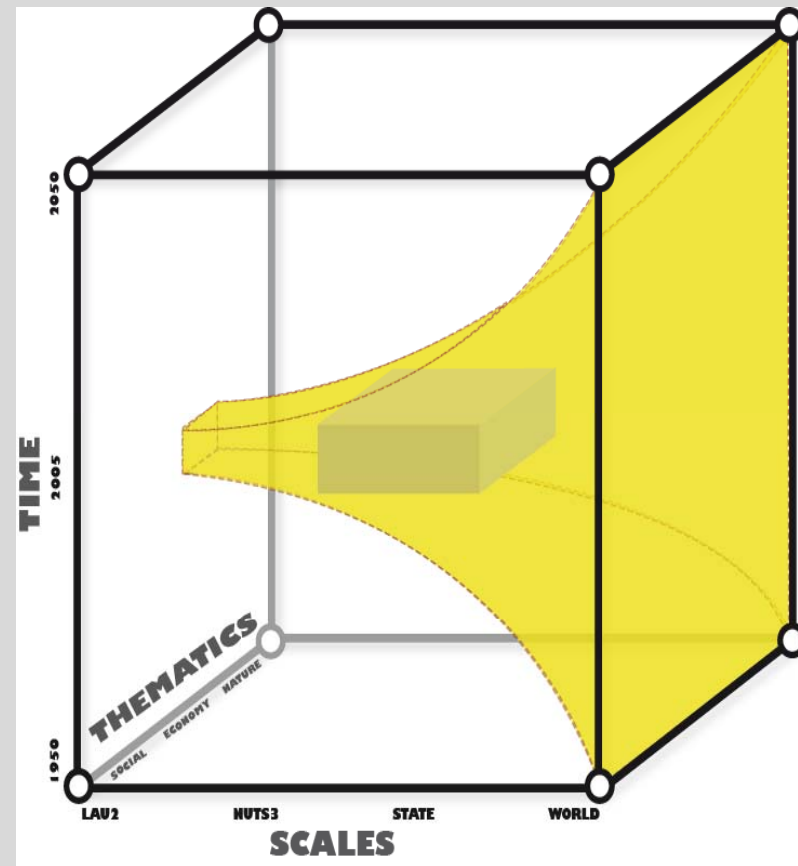
- **Administrative units**
- Cities & Networks
- Grids



Introduction - The expected information cube of ESPON Database 2013

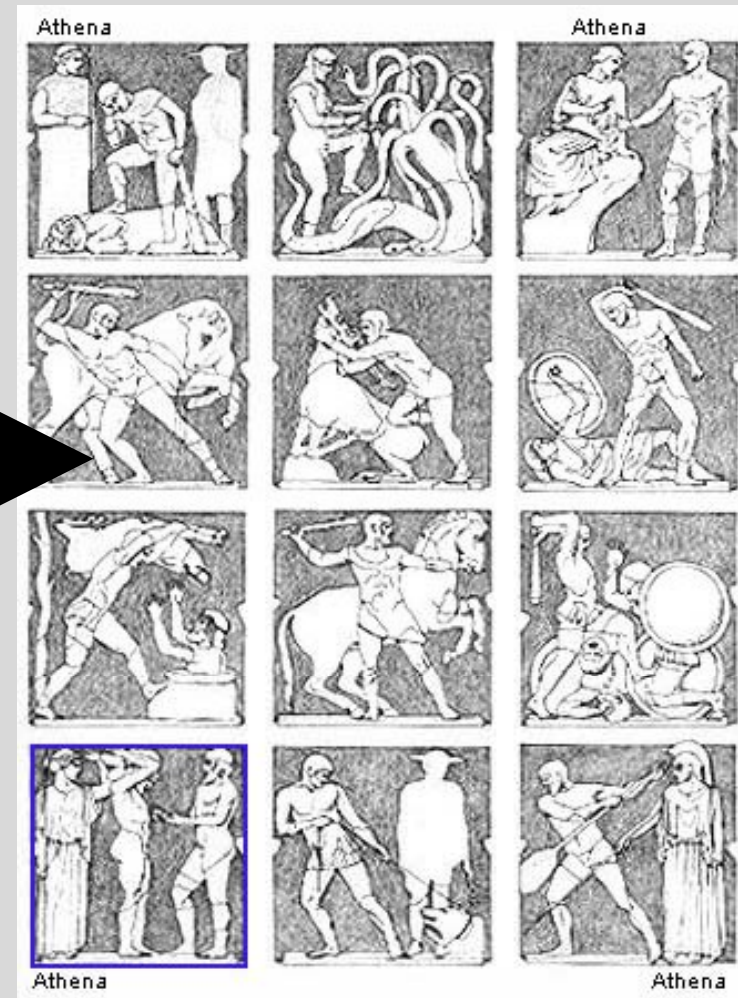
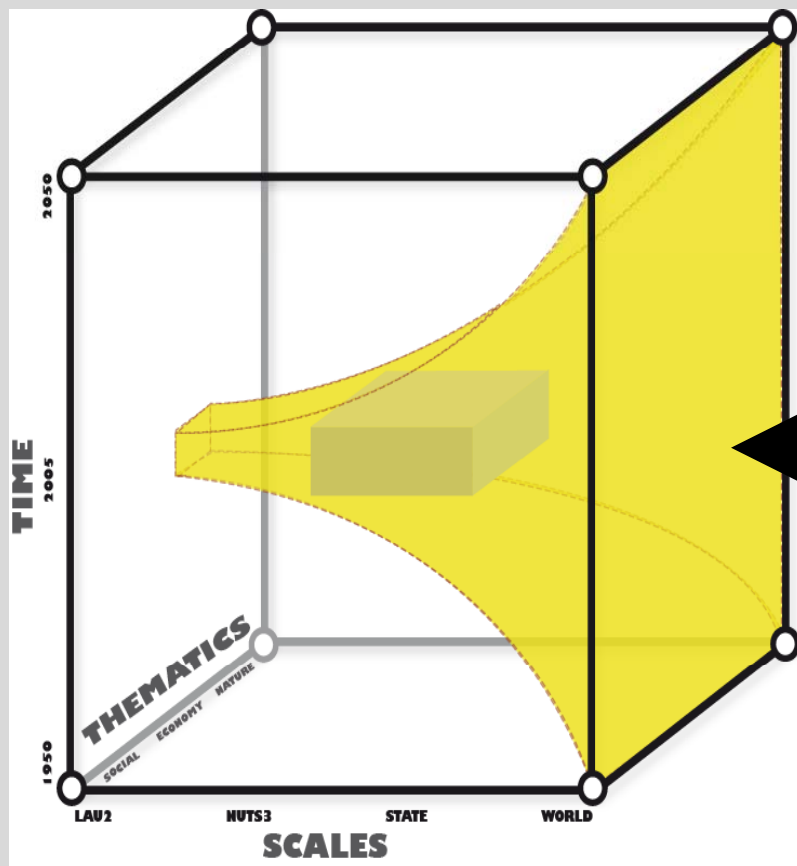


ESPON DB 2006



ESPON DB 2013 (!?)

Introduction – Information cube and challenges



Each improvement of ESPON DB should be considered as « a challenge »

Metopes of the Temple of Zeus at Olympia

Challenge 1 : Collection of basic regional data

Objectives : Collection of basic indicators in new NUTS 2006 territorial division derived from EUROSTAT & EEA

Situation : Estimations and computations of data sources are necessary to have complete datasets. Some datasets are now available, builded by ESPON DB 2013 project

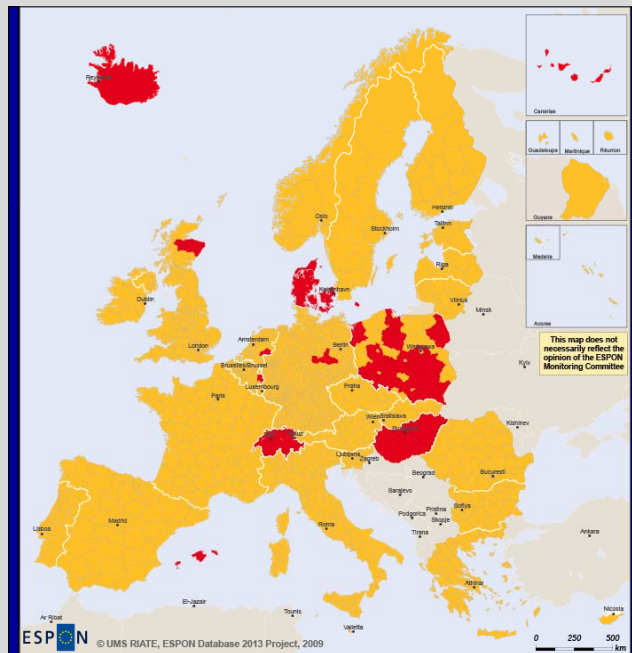
Next steps : Enlarging the integration to other geographical objects (cities, world, grids); integrate into the ESPON DB the datasets of TPG's.

Coord : RIATE

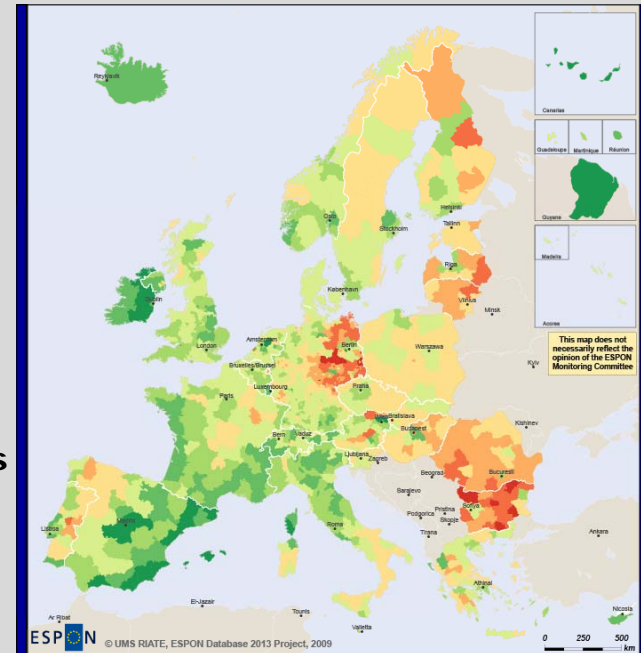


1.1 Total population

Data availability on Eurostat for total population 2000 and 2006 (NUTS3)



Population growth 2000-2006

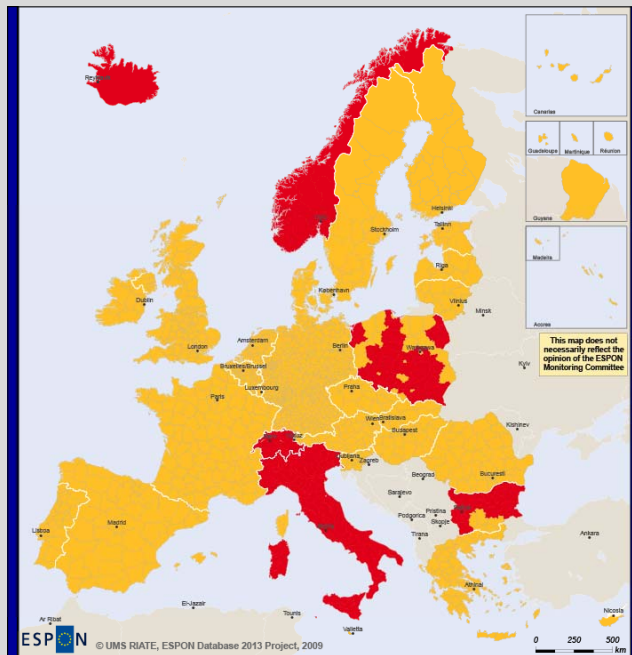


After Estimations

Full datasets available for NUTS0, 1, 2 and 3 from 2000 to 2006

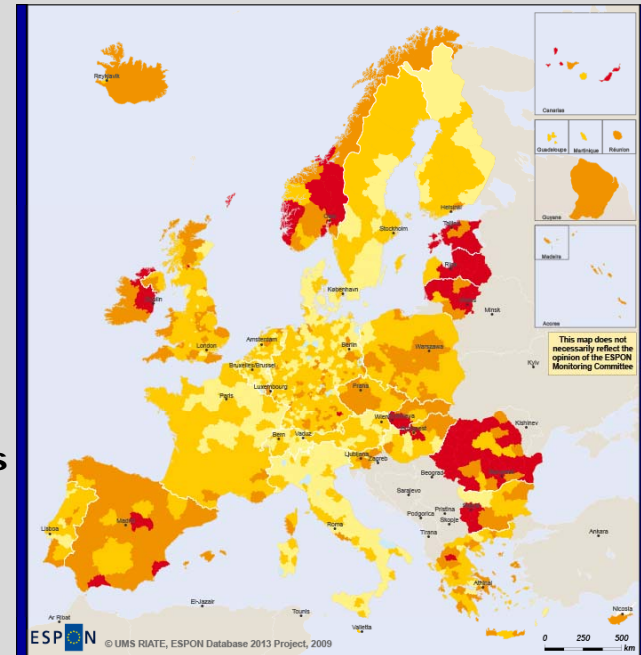
1.2 GDP (euros and PPS)

Data availability on Eurostat for GDP (pps) 2000 and 2005 (NUTS3)



Data available
 Missing value

GDP (pps) growth 2000-2005



Annual growth rate (%)

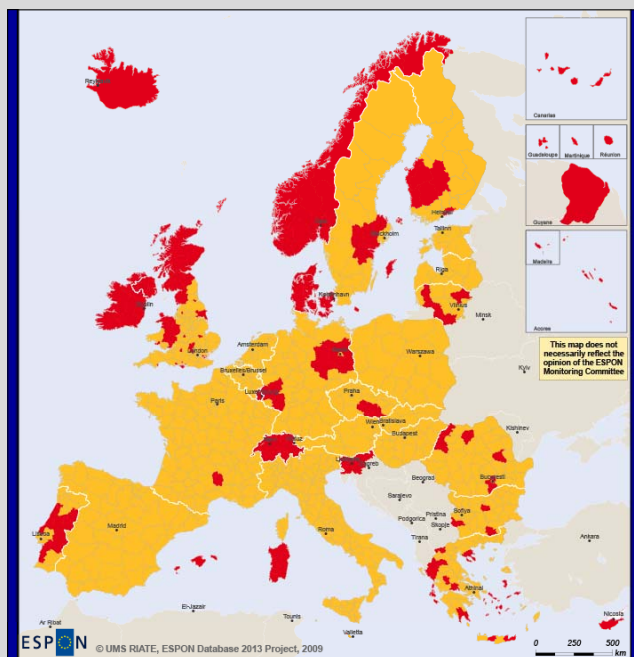
- 13.5
- 7.5
- 5
- 2.5
- 0
- 2.2


After Estimations

Full datasets available for NUTS0, 1, 2 and 3 from 2000 to 2005

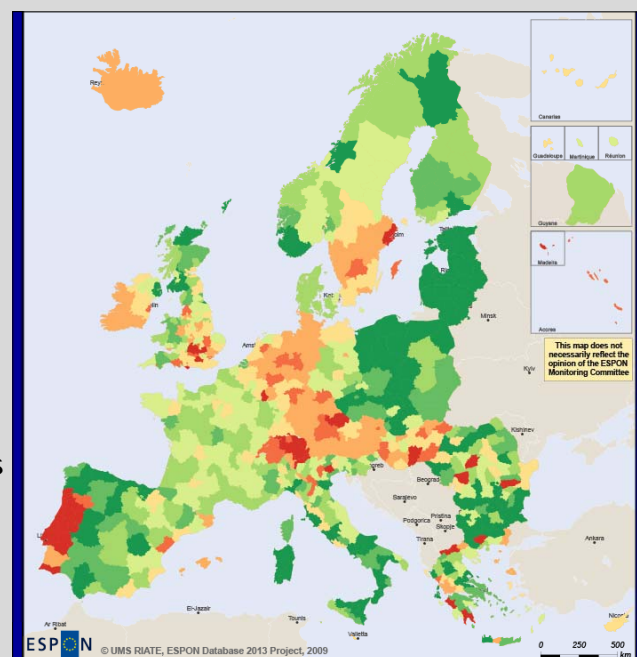
1.3 Active population and unemployed persons

Data availability on Eurostat for unemployed persons 2000 and 2007 (NUTS2-3)



After Estimations

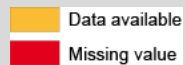
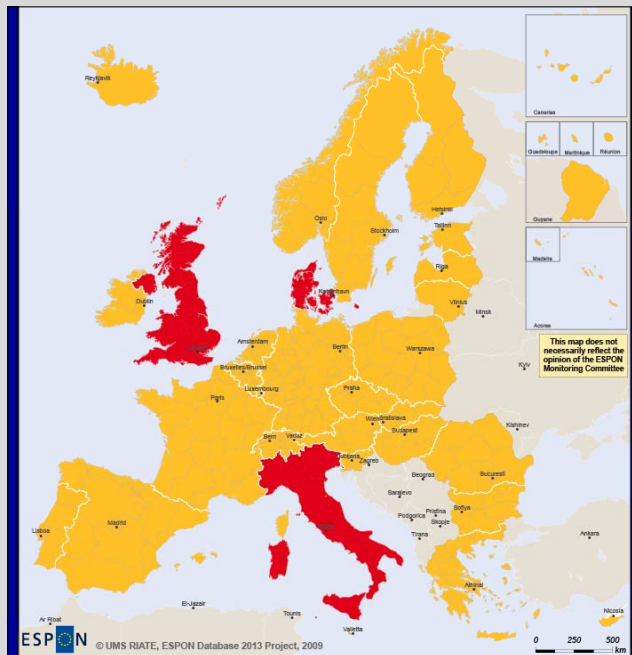
Unemployed persons growth 2000-2007



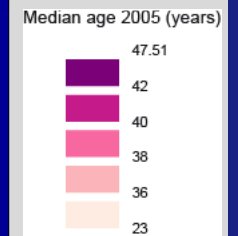
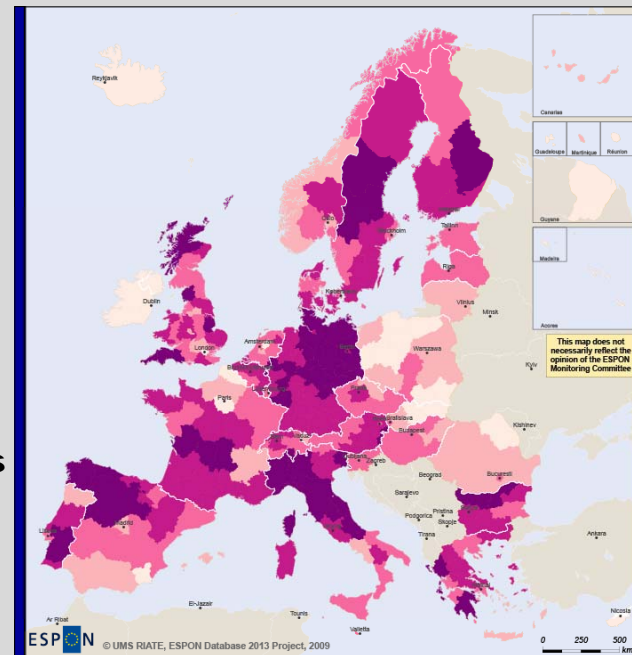
Full datasets available for NUTS0, 1, 2 and 2-3 from 2000 to 2007

1.4 Age pyramid

Data availability on Eurostat for the all age pyramid 2005 on Eurostat



Median age derived from the age pyramid 2005



After Estimations

Full dataset available for NUTS0, 1, 2 in 2005

1.5 How downloading these datasets ?

- By using the ESPON Database
- By contacting directly the ESPON DB Manager: manager@espondb.eu

Challenge 2 : Harmonisation of time series

Objectives : Harmonisation of time series for the period 1995-2006

Situation : non compatibility of NUTS1995, NUTS1999, NUTS2003, and NUTS2006 ...

Strategy : Collection of data at each period « as they are » and elaboration of harmonisation procedures.

Coord : IGEAT



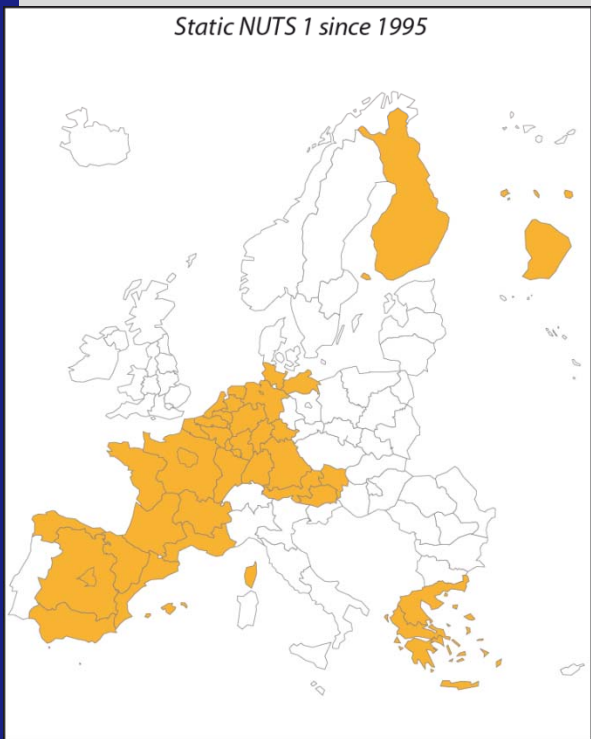
1 Semantic expertise of NUTS Changes : how nuts can change?

- As defined by the regulation (CE) N° 1059/2003 of 26 th , NUTS is composed by :
- Name, code, geometry and hierarchical level which can change over time.
- The evolution of NUTS is very complex : several changes can happen in the same time and at different level (systemic conception)

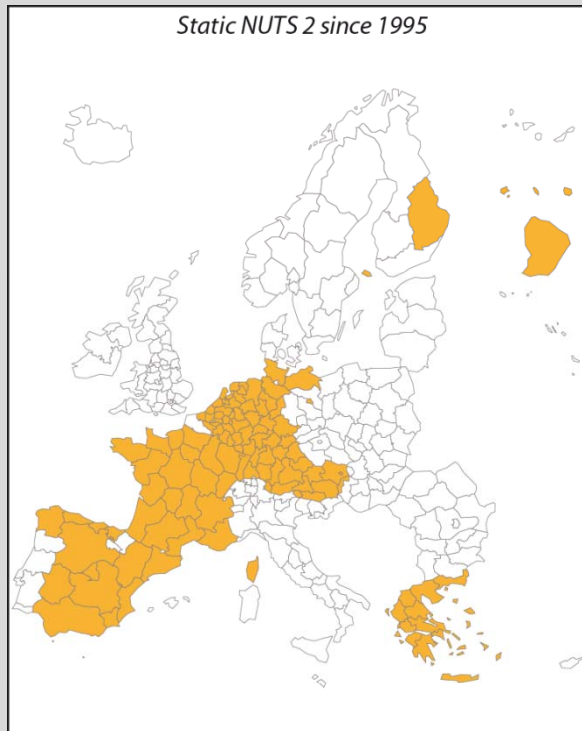
2 Overview of the extent of NUTS changes:

Static Nuts according to all criterion (name, code, geometry and hierarchical level) between 1995-2006

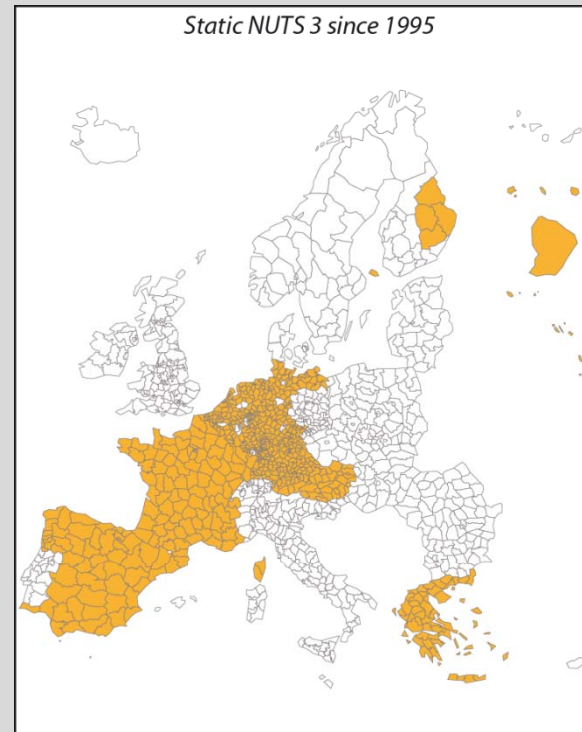
Static NUTS 1 since 1995



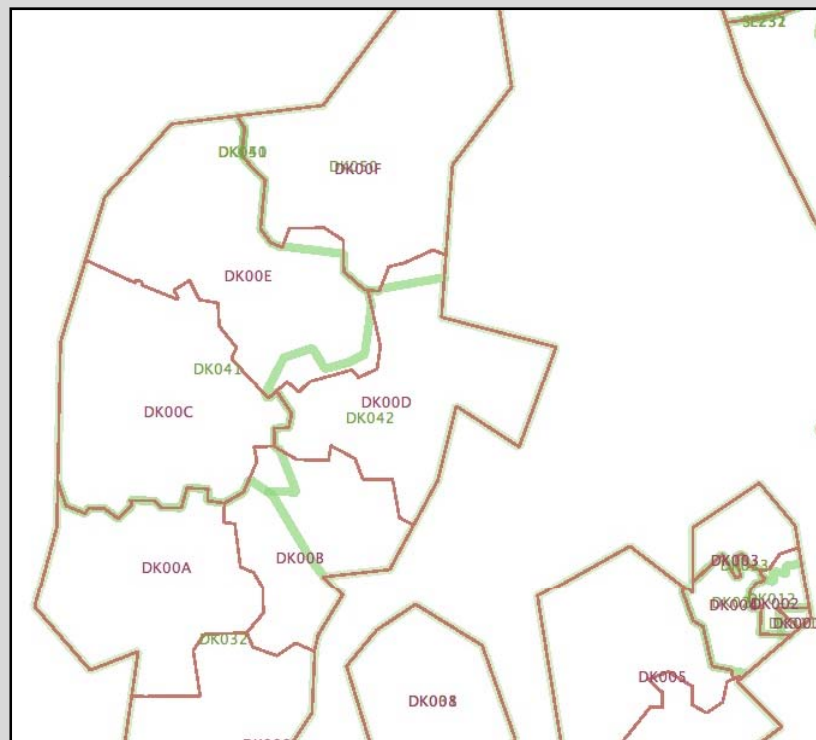
Static NUTS 2 since 1995



Static NUTS 3 since 1995

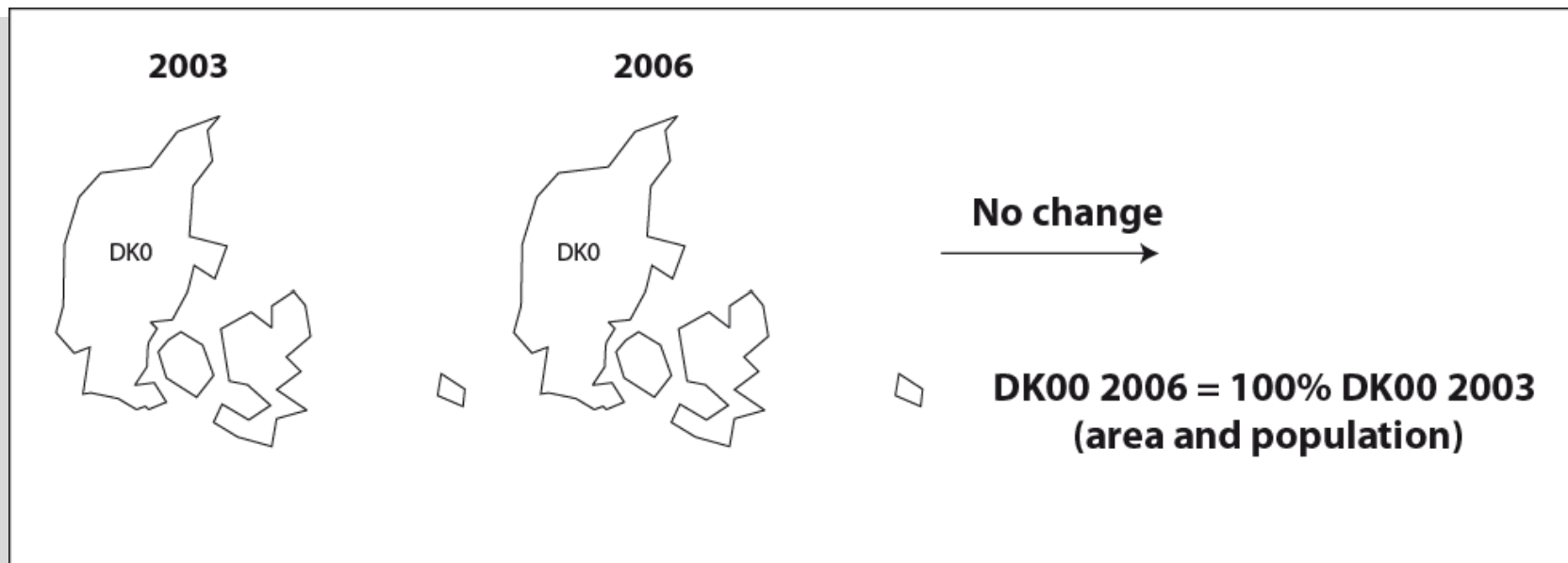


3 Example of case study analysis: the danish Nuts 2003-2006

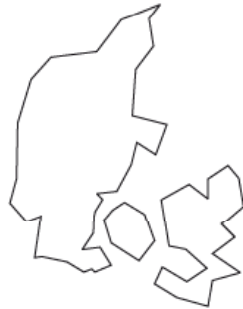


Lines in red show the nuts3 in 2003, lines in green show the nuts3 in 2006

NUTS1



2003



2006



Hierarchy : 2003 : NUTS0= NUTS1= NUTS2 # NUTS3

2006 : NUTS0 = NUTS1 # NUTS2 # NUTS3

Geometry : Split of DK00

Geonology

Semantic expertise

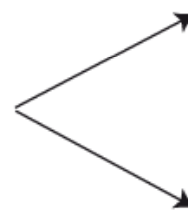
code 2006	% Geom	code 2003	NAME	Type of changes			entities life
				2006-2003	2003-1999	1999-1995	2006-2003
0		DK00	Danmark	Split	no	no	broken
DK01	4,2	DK00	Hovedstaden	Split	0	0	created
DK02	18,2	DK00	Sjælland	Split	0	0	created
DK03	26,9	DK00	Syddanmark	Split	0	0	created
DK04	36,3	DK00	Midtjylland	Split	0	0	created
DK05	14,4	DK00	Nordjylland	Split	0	0	created



2003



2006



**territorial
reorganization**

**complex change of
Geometry**

Geonology

Semantic expertise

code 2006	% Geom	code 2003	NAME	Type of changes			entities life			
				2006-2003	2003-1999	1999-1995	2006-2003			
		DK001	100	Københavns og Frederiksberg Kommuner	territorial reorganization	no	no	broken	stable	stable
		DK002	100	Københavns Amt	territorial reorganization	no	no	broken	stable	stable
		DK003	100	Frederiksborg Amt	territorial reorganization	no	no	broken	stable	stable
		DK004	100	Roskilde Amt	territorial reorganization	no	no	broken	stable	stable
		DK005	100	Vestsjællands Amt	territorial reorganization	no	no	broken	stable	stable
		DK006	100	Storstrøms Amt	territorial reorganization	no	no	broken	stable	stable
		DK007	100	Bornholms Amt	territorial reorganization	no	no	broken	stable	stable
		DK008	100	Fyns Amt	territorial reorganization	no	no	broken	stable	stable
		DK009	100	Sønderjyllands Amt	territorial reorganization	no	no	broken	stable	stable
		DK00A	100	Ribe Amt	territorial reorganization	no	no	broken	stable	stable
		DK00B	100	Vejle Amt	territorial reorganization	no	no	broken	stable	stable
		DK00C	100	Ringkøbing Amt	territorial reorganization	no	no	broken	stable	stable
		DK00D	100	Århus Amt	territorial reorganization	no	no	broken	stable	stable
		DK00E	100	Viborg Amt	territorial reorganization	no	no	broken	stable	stable
		DK00F	100	Nordjyllands Amt	territorial reorganization	no	no	broken	stable	stable
DK011	100	DK001	100	Byen København	territorial reorganization	0	0	created	not exist	not exist
DK011	7,7	DK002	7,7	Byen København	territorial reorganization	0	0	created	not exist	not exist
DK012	75,5	DK002	75,5	Københavns omegn	territorial reorganization	0	0	created	not exist	not exist
DK013	16,8	DK002	16,8	Nordsjælland	territorial reorganization	0	0	created	not exist	not exist
DK013	100	DK003	100	Nordsjælland	territorial reorganization	0	0	created	not exist	not exist
DK014	100	DK007	100	Bornholm	territorial reorganization	0	0	created	not exist	not exist
DK021	98,9	DK004	98,9	Østsjælland	territorial reorganization	0	0	created	not exist	not exist
DK022	1,7	DK004	1,7	Vest- og Sydjylland	territorial reorganization	0	0	created	not exist	not exist
DK022	100	DK005	100	Vest- og Sydjylland	territorial reorganization	0	0	created	not exist	not exist
DK022	100	DK006	100	Vest- og Sydjylland	territorial reorganization	0	0	created	not exist	not exist
DK031	100	DK008	100	Fyn	territorial reorganization	0	0	created	not exist	not exist
DK032	40	DK00B	40	Fyn	territorial reorganization	0	0	created	not exist	not exist
DK032	100	DK00A	100	Fyn	territorial reorganization	0	0	created	not exist	not exist
DK032	100	DK009	100	Syddjylland	territorial reorganization	0	0	created	not exist	not exist
DK041	11,1	DK00B	11,1	Vestjylland	territorial reorganization	0	0	created	not exist	not exist
DK041	100	DK00C	100	Vestjylland	territorial reorganization	0	0	created	not exist	not exist
DK041	91	DK00E	91	Vestjylland	territorial reorganization	0	0	created	not exist	not exist
DK042	48,9	DK00B	48,9	Østjylland	territorial reorganization	0	0	created	not exist	not exist
DK042	6,3	DK00E	6,3	Østjylland	territorial reorganization	0	0	created	not exist	not exist
DK042	95,6	DK00D	95,6	Østjylland	territorial reorganization	0	0	created	not exist	not exist
DK050	4,4	DK00D	4,4	Nordjylland	territorial reorganization	0	0	created	not exist	not exist
DK050	2,8	DK00E	2,8	Nordjylland	territorial reorganization	0	0	created	not exist	not exist
DK050	100	DK00F	100	Nordjylland	territorial reorganization	0	0	created	not exist	not exist

Challenge 3 : World / Regional data

Objectives : combine datasets at world level (by states) and datasets at European level (by NUTS regions)

Situation :

- 1) No direct compatibility between world data by states (UN) and EU data by Region (e.g. Eurostat)
- 2) No direct compatibility between world databases

Strategy :

- 1) Elaboration of tools for compatibility between NUTS and WUTS data (key question of state : NUTS0=WUTS5 ?)
- 2) Elaboration of tools to ensure comparibility between world databases

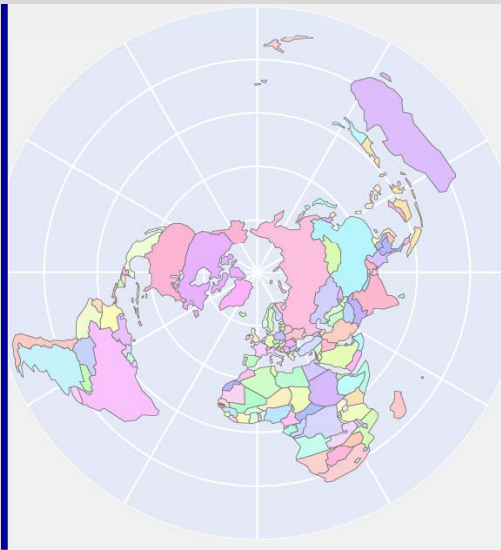


Coord : RIATE & UNEP

3.1 Heterogeneous world databases

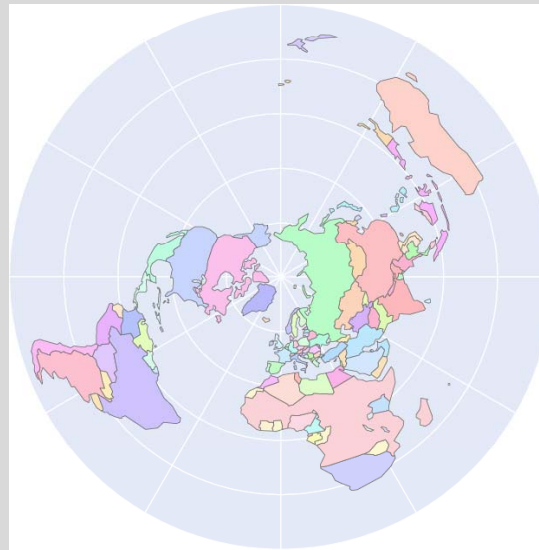
ESPON Europe in the World

168 units



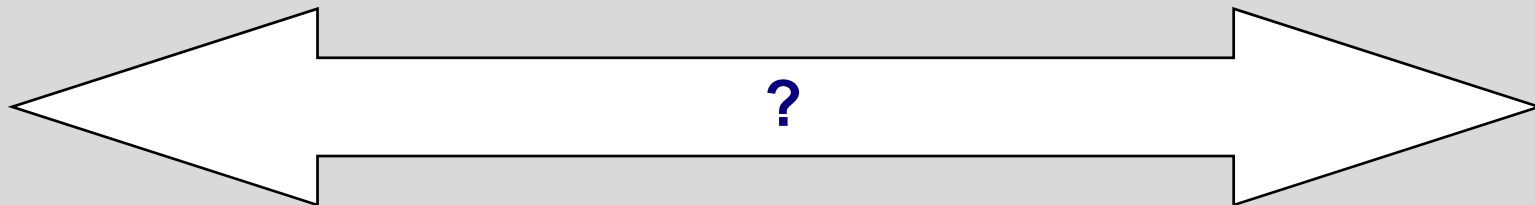
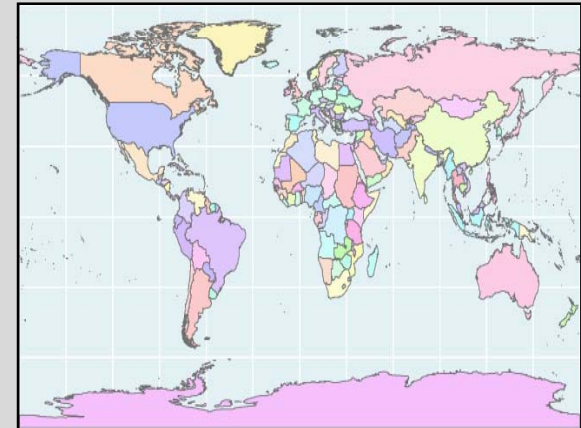
CHELEM

96 units



UNEP

237 units



3.2 Example of new structural data (IMF GDP estimations)

IMF World Economic Outlook

- 200 units (countries or territories)
- published 2 times / year (with forecast at t+5)
- Population, GDP, Balance, ...

Example : Prevision of GDP for year 2009 (in pps)

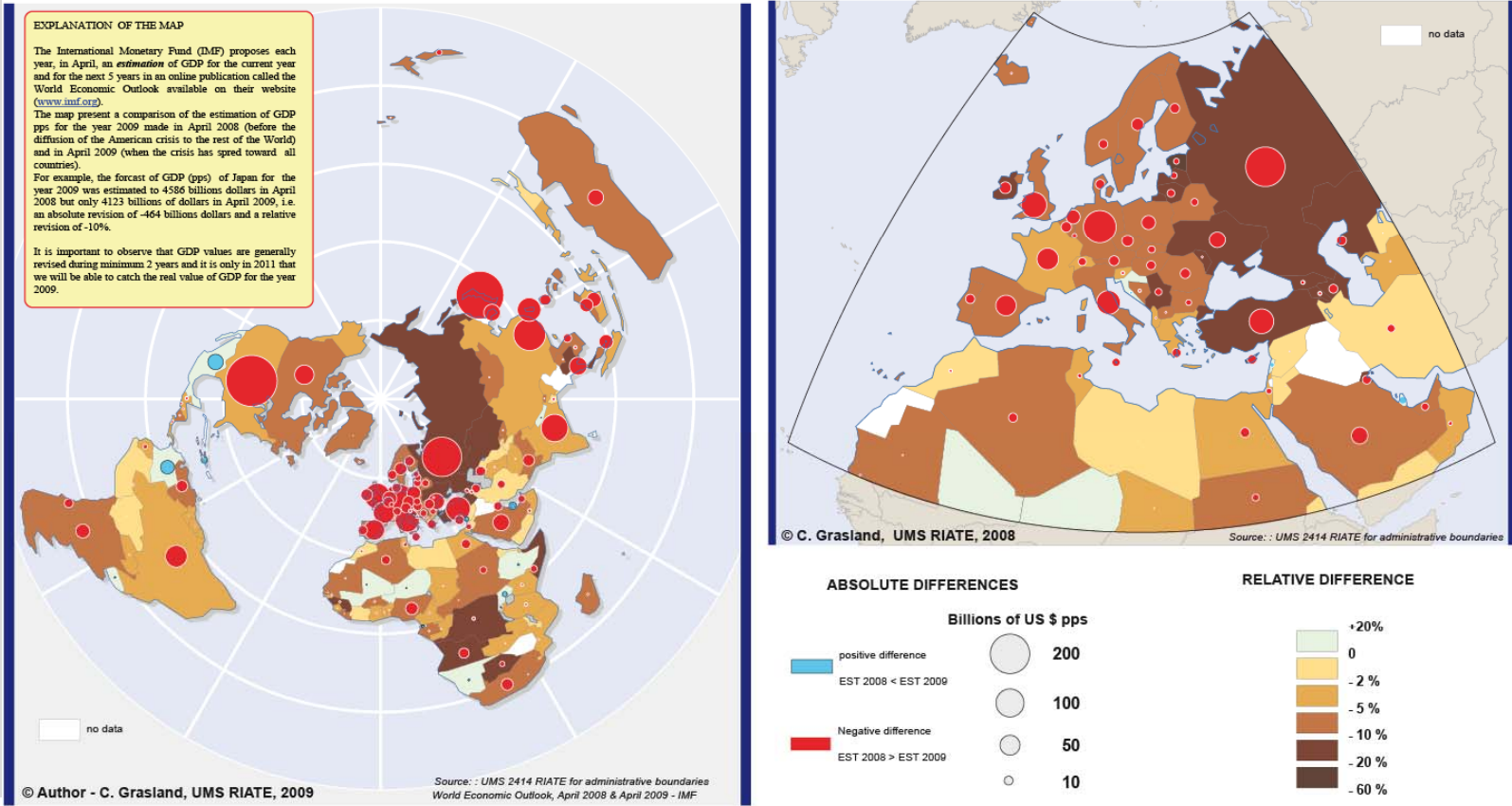
Country	Apr. 2008	Apr.2009	DIFABS	DIFREL
Malta	24	10	-14	-59%
Cyprus	41	23	-18	-43%
Estonia	31	25	-7	-21%
Latvia	43	34	-9	-20%
Lithuania	70	58	-12	-17%
Ireland	203	175	-28	-14%
Iceland	13	11	-1	-10%
Luxembourg	43	38	-4	-10%
Czech Republic	282	255	-27	-9%
Finland	201	183	-19	-9%

3.2 Example of new structural data (IMF GDP estimations)

4 000 BILLIONS DOLLARS, BABY !

DIFFERENCE BETWEEN ESTIMATION OF GDP FOR YEAR 2009 MADE BY IMF IN APRIL 2008 AND APRIL 2009

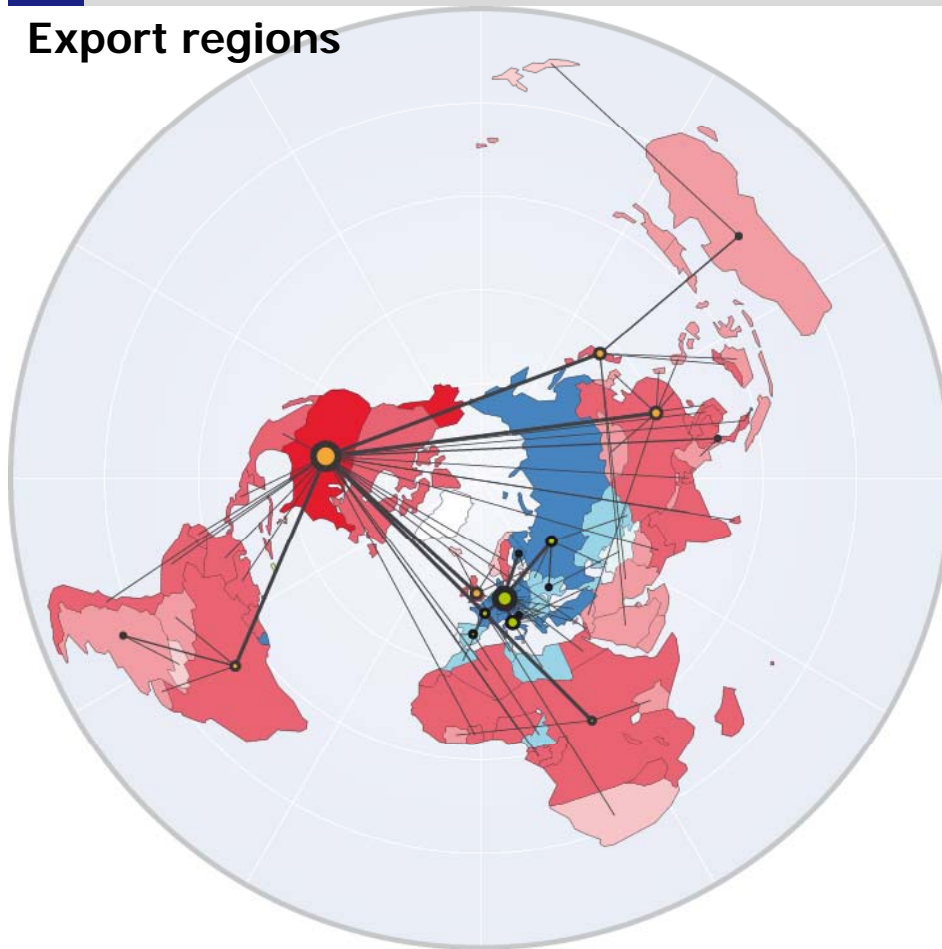
Source : World Economic Outlook, Apr. 2008 & Apr. 2009



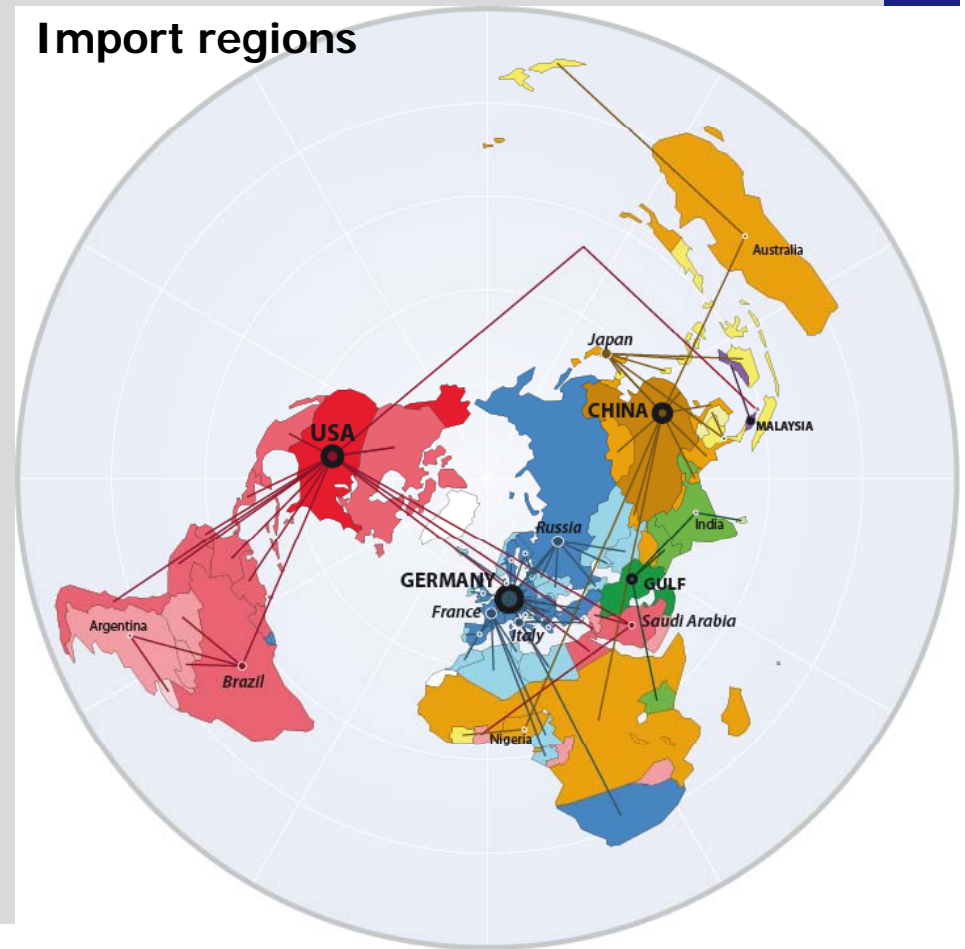
3.3 Example of new flow data (CHELEM)

Example : Dominant trade flows 2004-2006

Export regions



Import regions



Challenge 4 : Regional / Local data

Objectives : Develop case studies providing zoom on specific territories at local level (rural areas, cross border areas, intra-urban differentiation, ...).

Situation : no complete data + geometry available at LAU1 or LAU2 level.

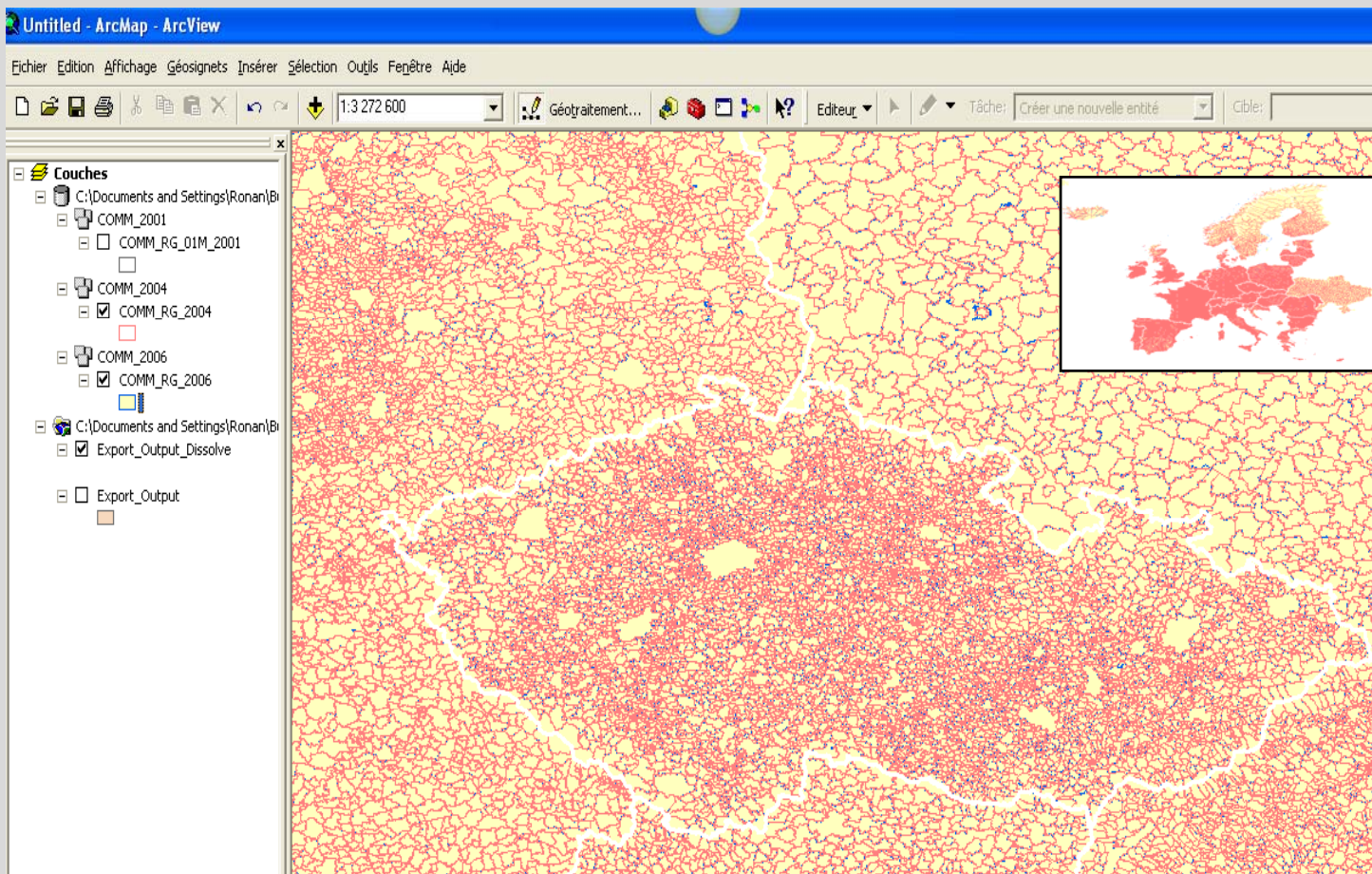
Strategy : Elaboration of coherent local sources (data + geometry) with Eurostat, Eurogeographics and national statistical institutes

Coord : TIGRIS



4.1. Harmonisation of geometries

Eurostat / GISCO: Administrative boundaries for municipalities in 2001, 2004 and 2006 for ESPON space + Ukraine, Moldavia, Croatia and Kosovo



4.2. Analysis of data availability

National Statistical Offices : example of the Czech Republic

The screenshot shows a Mozilla Firefox browser window displaying the website 'Basic data about municipalities' from the Czech Statistical Office (CZSO). The browser's address bar shows the URL: http://www.czso.cz/eng/redakce.nsf/i/basic_data_about_municipalities. The website has a navigation menu with categories like 'People and Society', 'Economy', 'Labour Market and Earnings', etc.

The main content area is titled 'BASIC DATA ABOUT MUNICIPALITIES' and lists 14 data categories:

1. Population by age and marital status
2. Population by age
3. Population by highest educational attainment
4. Population by nationality
5. Population by denomination
6. Population by economic activity
7. Economically active population by branch of economic ac
8. Commuters to work and schools
9. Households by type
10. Housing stock
11. Houses by the floor number and by basic amenities
12. Dwelling stock
13. Permanently occupied dwellings by legal reason of use
14. Dwellings by basic amenities and by housing level indic.

On the left side, there is a 'MOST VISITED' section with links like 'Basic Facts on CR', 'Census', 'Inflation rate', etc. Below that is a 'SELECTED FOR' section with links for 'Analysts', 'Entrepreneurs', 'Journalists', and 'Students'. At the bottom left, there are statistics: Population (10 467 542), Gross wages (25 381 CZK), CPI (1,8%), and GDP (0,7%).

An overlay window titled '62% de 1 fichier - Téléchargements' is open, showing a list of downloaded files:

File Name	Size	Time
sčítání Tab10-A.xls	1.9 Mo	3:12 PM
sčítání Tab9-A.xls	2.1 Mo	3:12 PM
sčítání Tab8-A.xls	1.6 Mo	3:12 PM
sčítání Tab7-A.xls	1.8 Mo	3:11 PM
sčítání Tab6-A.xls	1.9 Mo	3:10 PM
sčítání Tab5-A.xls	1.8 Mo	3:09 PM
sčítání Tab4-A.xls	1.9 Mo	3:08 PM
sčítání Tab3-A.xls	1.7 Mo	3:08 PM
sčítání Tab1-A.xls	2.0 Mo	3:06 PM

The download manager shows a progress bar for the selected file 'sčítání Tab6-A.xls' at 62% completion. The system tray at the bottom indicates 'Un téléchargement en cours (Temps restant : 30 secondes)'.

4.3. Download of statistical tables

National Statistical Offices : example of the Czech Republic

The screenshot displays a Microsoft Excel spreadsheet titled "7. Economically active population by branch of economic activity". The spreadsheet has columns for NUTS4 code, Municipality code, Municipality name, and Population. A yellow arrow points from the "Municipality code" column header to a file explorer window titled "CZ REP census municipalities". The file explorer shows a list of Excel files named "sčítání Tab7-A.xls" through "sčítání Tab14-A.xls", each corresponding to a municipality listed in the spreadsheet.

NUTS4	Municipality code	Municipality name	Population
CZ0110	554782	Praha-hlavní město	1
CZ0211	529303	Benešov	
CZ0211	532568	Bernartice	
CZ0211	530743	Bilkovice	
CZ0211	532380	Blažejovice	
CZ0211	532096	Borovnice	
CZ0211	532924	Bukovany	
CZ0211	529451	Bystřice	
CZ0211	532690	Ctiboř	
CZ0211	529478	Čakov	
CZ0211	529486	Čechtice	
CZ0211	529516	Čerčany	
CZ0211	529532	Červený Újezd	
CZ0211	529541	Český Šternberk	
CZ0211	529567	Čtyřkoly	
CZ0211	532746	Děkanovice	
CZ0211	529621	Divišov	
CZ0211	529648	Dolní Kralovice	
CZ0211	532151	Drahňovice	
CZ0211	532843	Dunice	
CZ0211	529702	Heřmaničky	
CZ0211	532932	Hradiště	
CZ0211	529737	Hulice	
CZ0211	529745	Hvězdonice	

4.4. Check of data/geometry compatibility

	A	B	C	D	E	F	G	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI
1	Iden	COMM_ID	SHAPE_LE	SHAPE_AF	NAME_AS	match	x	NUTS_CO	DGUR_CO	DGUR_AR	DGUR_AR	POPL_DENS		concatena	var1	var2	var3	var4	var5	var6
4828	CZ0412554	CZ0412554	2.18E-01	1.08E-03	Abertamy	6953	43	CZ041	C	OT	8,68	137,9	TRUE	CZ0412554	CZ0412	554979	Abertamy	1197	661	
4829	CZ0215531	CZ0215531	1.11E-01	3.28E-04	Adamov	5044	123	CZ020	C	OT	2,75	41,09	TRUE	CZ0215531	CZ0215	531367	Adamov	113	46	
4830	CZ0311535	CZ0311535	9.22E-02	1.47E-04	Adamov	5796	96	CZ031	B	OT	1,03	500	TRUE	CZ0311535	CZ0311	535826	Adamov	515	276	
4831	CZ0621581	CZ0621581	2.04E-01	5.12E-04	Adamov	9241	162	CZ062	B	OT	3,08	1613,63	TRUE	CZ0621581	CZ0621	581291	Adamov	4970	2542	
4832	CZ0523547	CZ0523547	2.88E-01	2.56E-03	Adršpach	7822	1	CZ052	C	OT	19,72	25,76	TRUE	CZ0523547	CZ0523	547786	Adršpach	508	300	
4833	CZ0534547	CZ0534547	2.18E-01	1.28E-03	Albrechtic	8393	162	CZ053	C	OT	10,07	49,15	TRUE	CZ0534547	CZ0534	547981	Albrechtic	495	271	
4834	CZ0813598	CZ0813598	1.95E-01	1.55E-03	Albrechtic	10729	2	CZ080	B	OT	12,69	320,8	TRUE	CZ0813598	CZ0813	598925	Albrechtic	4071	2017	
4835	CZ0524576	CZ0524576	1.72E-01	6.15E-04	Albrechtic	7902	143	CZ052	C	OT	5,23	189,29	TRUE	CZ0524576	CZ0524	576077	Albrechtic	990	446	
4836	CZ0314545	CZ0314545	4.57E-01	4.52E-03	Albrechtic	6033	89	CZ031	C	OT	36,72	21,97	TRUE	CZ0314545	CZ0314	549258	Albrechtic	807	408	
4860	CZ0524576	CZ0524576	1.76E-01	1.06E-03	Bacetin	7903	143						TRUE	CZ0512563	CZ0512	563528	Albrechtic	329	151	
4861	CZ0614590	CZ0614590	1.49E-01	6.45E-04	Bacice	8903	142						TRUE	CZ0814568	CZ0814	568741	Albrechtic	693	326	
4863	CZ0611546	CZ0611546	9.27E-02	3.88E-04	Backov	8504	125						TRUE	CZ0524576	CZ0524	576085	Bačetin	383	193	
4864	CZ0614544	CZ0614544	1.86E-01	8.08E-04	Backovice	8870	1						TRUE	CZ0614590	CZ0614	590282	Bačice	202	95	
4865	CZ0613561	CZ0613561	1.03E-01	5.70E-04	Bacovice	8817	116						TRUE	CZ0611546	CZ0611	546194	Bačkov	149	64	
4866	CZ0217535	CZ0217535	5.70E-01	3.44E-03	Bakov nac	5184	1						TRUE	CZ0611544	CZ0614	544833	Bačkovice	139	63	
4867	CZ0615595	CZ0615595	1.19E-01	6.47E-04	Baliny	9057	140						FALSE	CZ0211753	CZ0217	535427	Bakov nac	4544	2397	
4868	CZ0617555	CZ0617555	1.10E-01	4.50E-04	Balkova Lh	5255	88						FALSE	CZ0611595	CZ0615	595217	Baliny	124	53	
4873	CZ0521568	CZ0521568	1.20E-01	7.78E-04	Barchov	7607	128	CZ052	C	OT	5,92	43,41	FALSE	CZ0617563	CZ0317	563251	Balkova Lh	124	61	
4874	CZ0532574	CZ0532574	1.74E-01	5.33E-04	Barchov	8184	131	CZ053	C	OT	4,42	36,65	FALSE	CZ0533572	CZ0533	572560	Banín	304	145	
4875	CZ0214533	CZ0214533	3.21E-01	2.22E-03	Barchovico	4935	108	CZ020	C	OT	17,74	10,82	FALSE	CZ0722592	CZ0722	592021	Bánov	2081	1023	

Challenge 5 : Social / Environmental data

Objectives : Making easier the combination of socio-economic data (EUROSTAT) and environmental data (EEA)

Situation : Initiatives for grid harmonisation. Development of GRID<->NUTS tools

Strategy : Implementation of data exchange tools in ESPON DB. Networking with Eurostat/EEA/JRC on this topic (in the framework of INSPIRE).

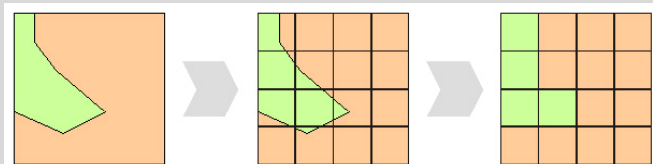
Coord : UAB (ETC-LUSI)



5.1 Description of challenge 5

Combining socio-economic data measured for administrative areas (NUTS level) and environmental data defined on a regular grid (CORINE Land Cover). Integration of data based on the 1km reference grid

1. Maximum area criteria:

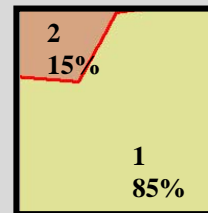


2. Proportional calculation

$$\text{Cell value} = \sum (V_i * \text{Share}_i)$$

V_i = Value of unit i

Share_i = Share of unit i within the cell



$$V1 * 0.85 + V2 * 0.15$$

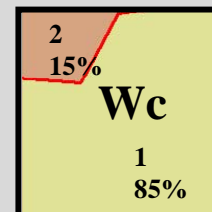
3. Proportional and weighted calculation

$$\text{Cell value} = Wc \sum (V_i * \text{Share}_i)$$

V_i = Value of unit i

Share_i = Share of unit i within the cell

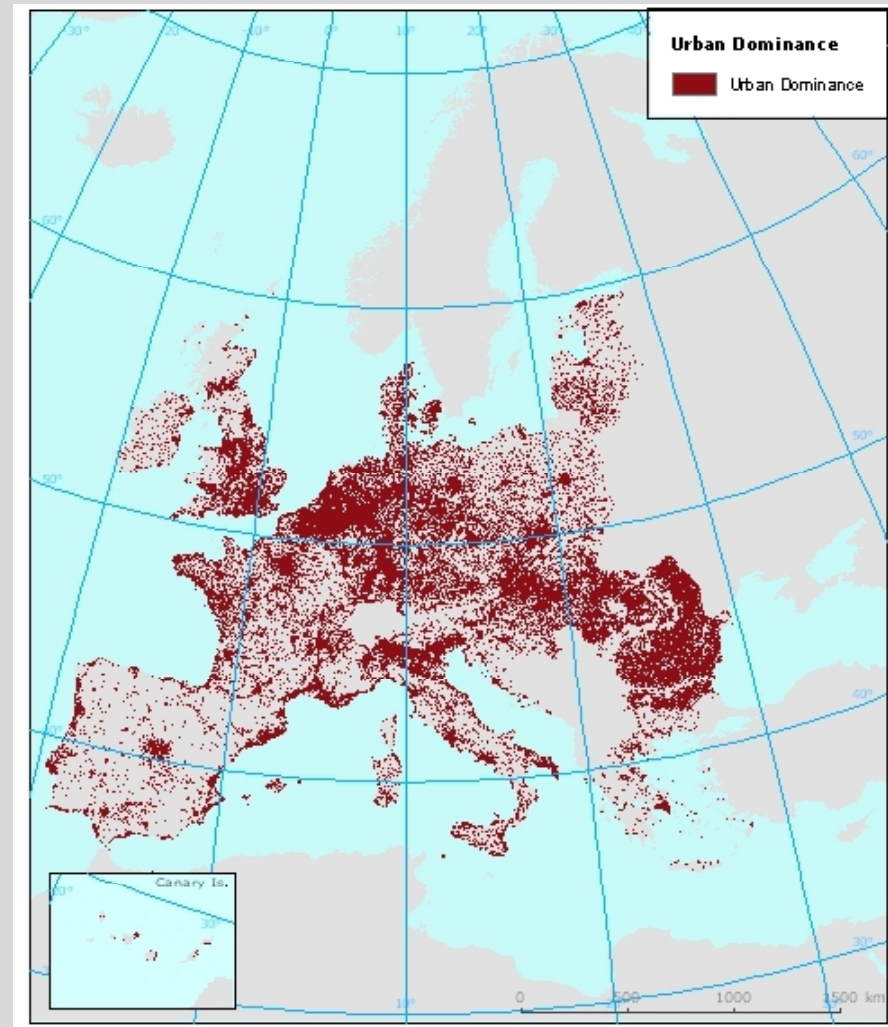
Wc = weight assigned to cell



$$Wc(V1 * 0.85 + V2 * 0.15)$$

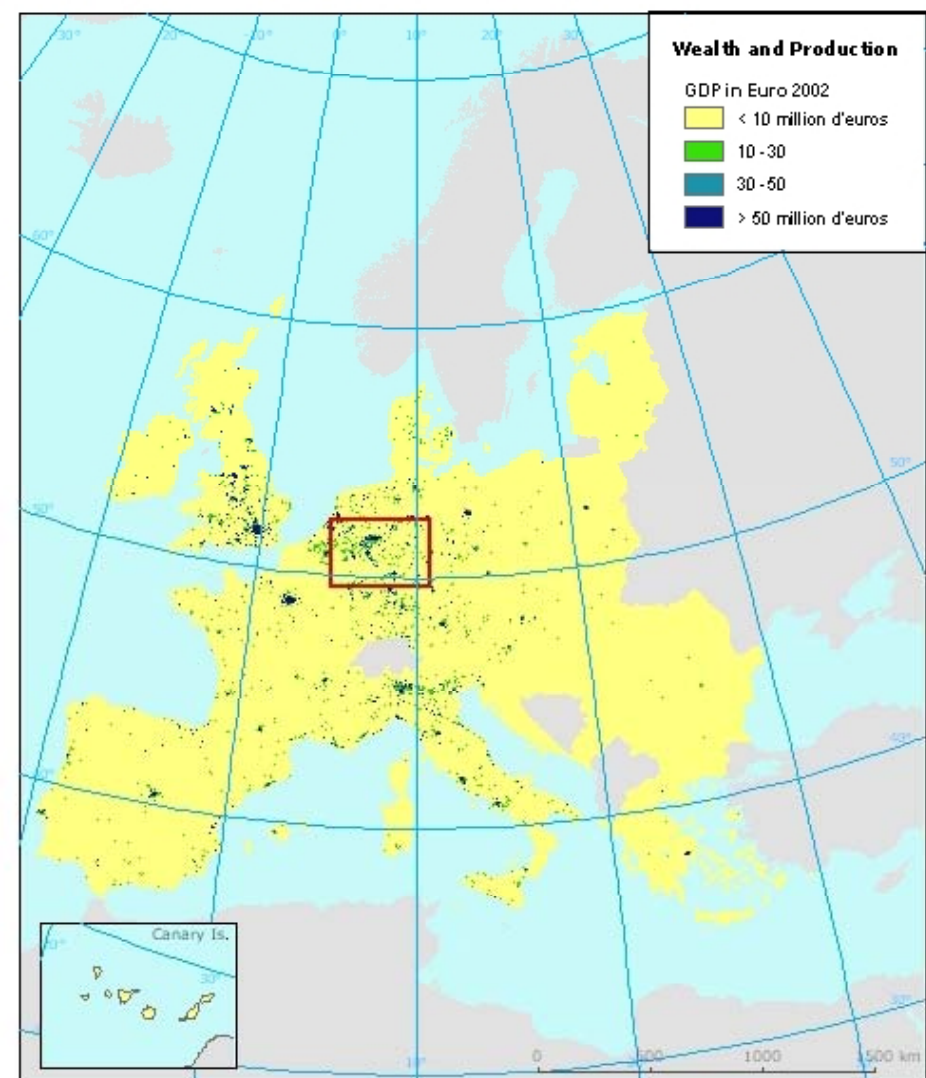
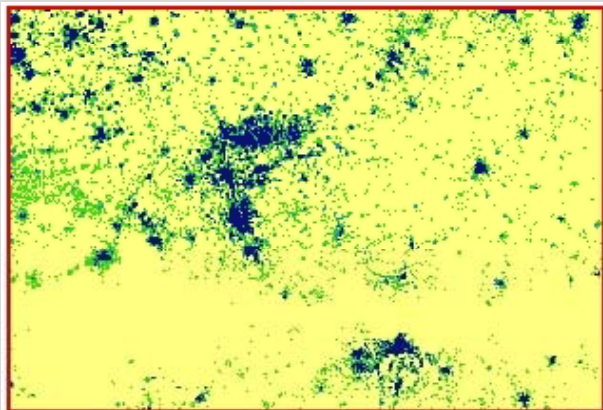
5.2 Corine Land Cover to GRID

- Urban Dominance: when the area of urban zones covers most of the cell area of the grid.
- Data Source: Urban Morphological Zones 2000 (EEA)



5.3 NUTS to GRID

- GDP in euro 2002 weighted by Population 2001
- Data sources: Wealth and Production NUTS level 3 (version 2003) (Eurostat), Population density 2001 (JRC)



Challenge 6 : Urban Data

Objectives :

Insure compatibility between the different definitions of cities and urban areas currently available

Situation:

Great diversity of definitions, difficulty to combine data from different sources

Strategy:

Storage of metadata, dictionary of cities with common codification, conceptual clarification (technical reports)



1 – Semantic expertise

- ❑ Urban objects are **complex geographical objects**
 - ❑ They are evolving through time in a geometric way implying an evolution of delineation
 - ❑ They are evolving through time in a semantic way implying to take into account a multiscalar perspective in their definition (agglomeration, commuting)
 - ➔ evolving sources for "measuring" the city

- ➔ Multiplicity of possible databases
- ➔ Heterogeneity of international databases
- ➔ Possible incoherence of temporal data bases

- ❑ An illustration: **Urban Audit LUZ (Larger Urban Zones)**
 - ❑ 2 reference years (UA 2001 and UA 2004): temporal coherence?
 - ❑ Spatial heterogeneity of the national definitions: spatial coherence?