Project data and GIS Methodology & Development

GIS Methodology

Jointly for our common future

Donauregionen+

Geodatabase Structure

Preliminary version
(22.11.2010)

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GIS Methodology

GIS geographic data for project outputs elaboration should be created with following properties:

- Relevant coordinate system
- ESRI – Data format
- xBase file format convention attributes
- Software ArcGIS (recommended) or ArcView GIS from ESRI

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Workshop 7, Bratislava, 24. – 25.11.2010

GIS Methodology

GIS geographic data for project outputs elaboration should be created in the following Coordinate systems:

- **National coordinate system with corresponding PRJ file with National to WGS 1984 / ETRS 1989 Transformation parameters (see Methodology, Appendix A)**
- ETRS 1989 (European Plate Coordinate System)
- WGS 1984 (World Geodetic System)

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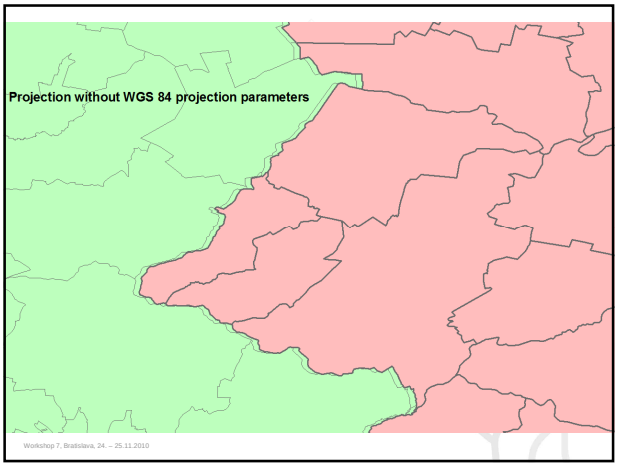

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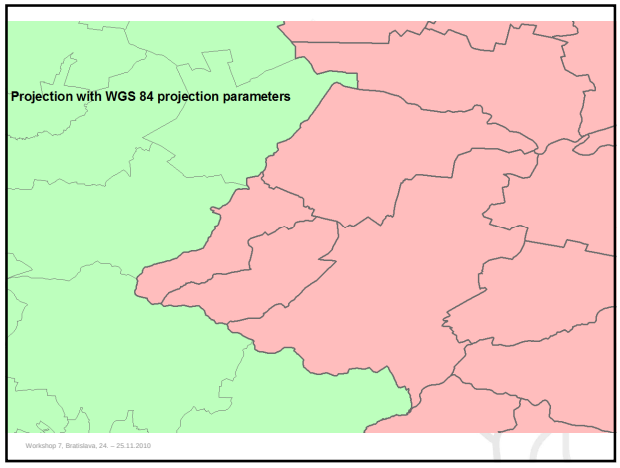

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National Coordinate Systems – Not Completed

List of National Coordinate Systems with Geodetic Datum Transformation Parameters from / to ETRS-89 and WGS-84:

Country	Projection Coordinate System	Ellipsoid (Spheroid)	Projection Name	Transformation Parameters Name	dX	dY	dZ	rX	rY	rZ	S
Bulgaria	Pulkovo 1942 GK Zone 4 and / or Pulkovo 1942 GK Zone 5	Krasovsky 1940	Gauss-Krüger	Pulkovo 1942 to ETRS 1989	24.000000	-123.000000	-94.000000	-0.020000	0.250000	0.130000	1.100000000000
				Pulkovo 1942 to WGS 1984 (3)	28.000000	-121.000000	-77.000000	–	–	–	–
Croatia	MGI Balkans 5 and / or MGI Balkans 6	Bessel 1841	Transverse Mercator	MGI to ETRS 1989 (2)	551.700000	162.900000	467.900000	6.040000	1.960000	-11.380000	-4.820000000000
				MGI to WGS 1984	682.000000	-203.000000	480.000000	–	–	–	–
Hungary	Hungarian 1967 Egységes Országos Vetület	GRS 1967	Hotine Oblique Mercator Azimuth Center	Hungarian 1972 to ETRS 1989 (1)	56.000000	-75.770000	-15.310000	0.370000	0.280000	0.210000	1.010000000000
				Hungarian 1972 to WGS 1984 (2)	57.010000	-69.970000	-9.290000	–	–	–	–
Moldova	MoldRef 1999	GRS 1980	Transverse Mercator	None	–	–	–	–	–	–	–
				ETRS 1989 to WGS 1984	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000000000
Romania	Stereo 1970	Krasovsky 1940	Double Stereographic	User Defined - russian Krasovsky	?	?	?	?	?	?	?
				Dealul Piscului 1970 to WGS 1984 (2)	28.000000	-121.000000	-77.000000	–	–	–	–
Serbia	MGI Balkans 7	Bessel 1841	Transverse Mercator	MGI to ETRS 1989 (2)	551.700000	162.900000	467.900000	6.040000	1.960000	-11.380000	-4.820000000000
				User Defined Geocentric Translation	696.455000	-198.622000	484.883000	–	–	–	–
Slovakia	S-JTSK Křovák East-North	Bessel 1841	Křovák	S-JTSK to ETRS 1989 (1)	570.837890	85.682641	462.846730	4.998450	1.586707	5.261110	3.561025600000
				S-JTSK to WGS 1984 (NGA)	589.000000	76.000000	480.000000	–	–	–	–
Ukraine	Pulkovo 1942 3 Degree GK Zone 10	Krasovsky 1940	Gauss-Krüger	Pulkovo 1942 to ETRS 1989	24.000000	-123.000000	-94.000000	-0.020000	0.250000	0.130000	1.100000000000
				Pulkovo 1942 to WGS 1984	28.000000	-130.000000	-95.000000	–	–	–	–
European Union	ETRS 1989 LAEA	GRS 1980	Lambert Azimuthal Equal Area	ETRS 1989 to WGS 1984	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000000000
	ETRS 1989 LCC		Lambert Conformal Conic	ETRS 1989 to WGS 1984	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000000000
World	WGS 1984	GRS 1980	–	ETRS 1989 to WGS 1984	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000000000

dX, dY, dZ – Shift along X, Y and Z axis in meters
rX, rY, rZ – Rotation around X, Y and Z axis in seconds
S – Scale Difference in ppm (parts per million)

Valid transformation parameters
Probably correct parameters (tested) to be varified
Missing parameters to be discovered, tested and verified

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GIS Methodology

GIS geographic data for project outputs elaboration should be created in the following data formats:

- **ESRI – Personal Geodatabase**
- **ESRI – Shapefile (i.e. DBF, SHP, SHX, PRJ, CPG files)**

- ESRI – File Geodatabase
- ESRI – ArcInfo coverage
- ESRI – PC ArcInfo coverage

- **File Names written in ASCII alphanumeric characters (A – Z, a – z, 0 – 9 and "_")** in English language

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GIS Methodology

GIS geographic and/or attribute data should be created in the **xBase file format convention** in English language:

- **Field Name**:
  - Only upper alphanumeric characters (A – Z, 0 – 9 and "_")
  - Maximum name length 10 characters (i.e. NUTS4_NAME)
  - Does not begin with number (i.e. 2_ND)
- **Data Codepage**:
  - Windows 1250 Central European (HR, HU, MD, RO, RS, SK)
  - Windows 1251 Cyrillic (BG, UA)
  - Cyrillic names should be written also in Latin transcription

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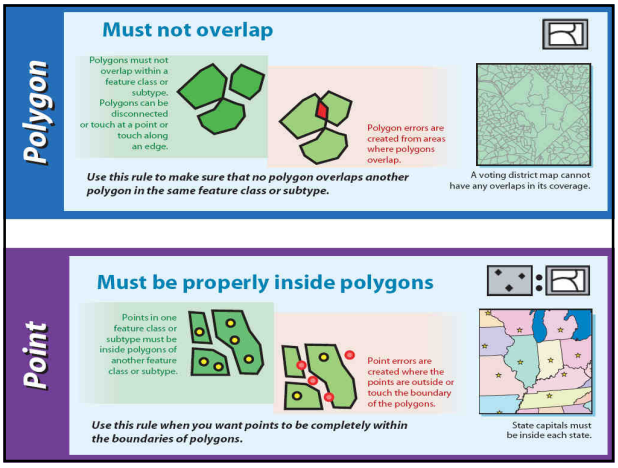
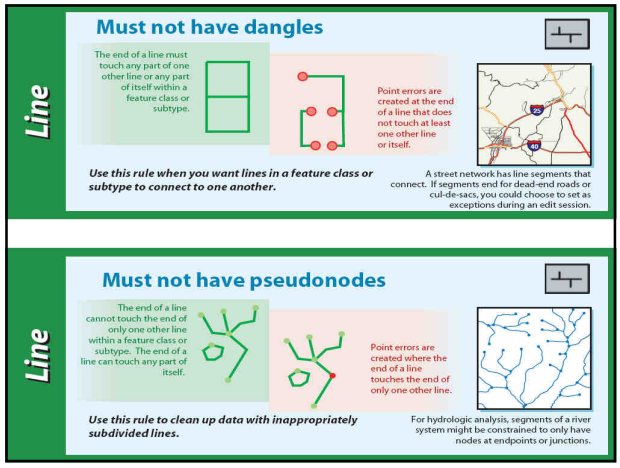
GIS Methodology

GIS data should be produced (finalized) in ArcGIS or ArcView:

- **Correct topology:**
  - No overlap or gaps for polygon data
  - No useless dangle or pseudo nodes for polyline data
  - No duplicate for point data
  - If possible done by defining ArcGIS topology rules

- Project formats:
  - **MXD project format for ArcGIS version 9.2 and higher**
  - APR project format for ArcView GIS version 3.2 and higher





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Geodatabase Structure

http://dplus.infoprojekt.sk/Methodology/WP3GIS/32GISdevelopment.aspx

Current GIS Data Situation

Current Layer Status:

- **O.K.** – GIS Layer and Attribute Data looks to be elaborated according project methodology
- **Available** – GIS Layer looks to be O.K. but Attribute Data are still missing or not elaborated according methodology
- **Derivable** – GIS Layer and / or Attribute Data can be derived from other layer which is O.K. or available
- **Missing** – GIS Layer and Attribute Data are still missing
- **N/A** – GIS Layer and / or Attribute Data are not available for project partner country

General Scheme / Layer	Select	Select	Select	Select	Select	Select	Select	Select
Datum Transformation Parameters	**BG**	**HU**	**HR**	**MD**	**RO**	**RS**	**SK**	**UA**
WGS 1984	O.K.	O.K.	O.K.	O.K.	O.K.	O.K.	O.K.	missing
ETRS 1989	O.K.	O.K.	O.K.	O.K.	missing	O.K.	O.K.	missing
Settlement Structure	**BG**	**HU**	**HR**	**MD**	**RO**	**RS**	**SK**	**UA**
NUTS0	available	available	derivable	O.K.	O.K.	available	O.K.	derivable
NUTS0 Boundary	available	available	derivable	O.K.	O.K.	available	O.K.	derivable
NUTS1	available	available	derivable	N/A	O.K.	available	O.K.	derivable
NUTS1 Boundary	available	available	derivable	N/A	O.K.	available	O.K.	derivable
NUTS2	available	available	derivable	N/A	O.K.	available	O.K.	derivable
NUTS2 Boundary	available	available	derivable	N/A	O.K.	available	O.K.	derivable
NUTS3	available	available	derivable	O.K.	O.K.	available	O.K.	N/A
NUTS3 Boundary	available	available	derivable	O.K.	O.K.	available	O.K.	N/A
LAU1	available	available	derivable	O.K.	N/A	available	O.K.	available
LAU1 Boundary	available	available	derivable	O.K.	N/A	available	O.K.	derivable
LAU2	available	available	available	O.K.	O.K.	available	O.K.	N/A
LAU2 Boundary	available	available	derivable	O.K.	O.K.	available	O.K.	N/A
LAU2 Centres	available	available	missing	O.K.	O.K.	available	O.K.	N/A

Transport	BG	HU	HR	MD	RO	RS	SK	UA
Road	available	available	available	O.K.	available	available	available	available
Railway	available	available	available	O.K.	available	available	O.K.	available
Waterway / River	available	available	available	O.K.	available	available	O.K.	missing
Bicycle Route	missing	missing	missing	missing	missing	available	O.K.	missing
Airport	available	available	missing	O.K.	available	available	O.K.	missing
Port	available	available	missing	O.K.	available	available	O.K.	missing
Terminal	available	available	missing	O.K.	available	available	O.K.	missing
Border Crossing	available	available	available	O.K.	available	available	O.K.	missing
Technical Infrastructure	**BG**	**HU**	**HR**	**MD**	**RO**	**RS**	**SK**	**UA**
Power Plant	available	available	missing	O.K.	available	available	O.K.	missing
Power Station	available	available	available	O.K.	available	available	O.K.	missing
Powerline	available	available	available	O.K.	available	available	O.K.	missing
Gas Facility	available	available	available	missing	available	missing	O.K.	missing
Gas Pipeline	available	available	available	available	available	available	O.K.	missing
Gas Production Region	N/A	available	N/A	N/A	N/A	N/A	N/A	missing
Refinery	available	available	missing	available	missing	available	O.K.	missing
Oil Pipeline	N/A	available	available	missing	missing	available	O.K.	missing
Oil Deposit Region	missing	missing	missing	available	available	missing	O.K.	missing
Water Facility	available	available	available	missing	available	missing	O.K.	missing
Water Pipeline	available	available	available	missing	available	missing	O.K.	missing
Sewage Treatment Plant	available	available	missing	missing	available	missing	O.K.	missing
Sewer Pipeline	missing	available	missing	missing	missing	missing	O.K.	missing
Flood Protection	available	available	available	available	available	available	O.K.	missing
Flood Risk Area	available	available	available	missing	available	available	available	missing
Telecommunication Facility	available	available	missing	missing	available	available	O.K.	missing
Telecommunication Network	available	available	missing	missing	available	available	O.K.	missing

Nature Conditions	BG	HU	HR	MD	RO	RS	SK	UA
Natura2000	O.K.	O.K.	O.K.	N/A	O.K.	N/A	O.K.	N/A
Nature Protected Area	available	available	available	available	available	available	O.K.	missing
Ramsar Wetland	available	available	missing	available	available	available	O.K.	missing
World Heritage Site	available	available	N/A	N/A	available	N/A	N/A	N/A
Man and Biosphere Reserve	available	available	N/A	N/A	available	N/A	N/A	missing
CORINE Land Cover	O.K.	O.K.	O.K.	O.K.	O.K.	N/A	O.K.	N/A
Landfill	available	available	available	N/A	available	missing	O.K.	missing
Waste Incinerator	available	available	missing	N/A	available	missing	available	missing
Pollution	missing	available	missing	missing	available	missing	available	missing
Water Source	missing	missing	available	available	available	missing	available	missing
Water Protection Area	missing	missing	available	missing	missing	missing	O.K.	missing
Hygienic Protection Zone	missing	missing	missing	missing	missing	missing	O.K.	missing
Pound Lock	missing	missing	missing	N/A	missing	missing	O.K.	missing
Spa	missing	missing	missing	missing	available	available	O.K.	missing
Seismic Area	missing	missing	missing	missing	missing	missing	O.K.	missing
Settlement	missing	available	missing	available	missing	available	O.K.	available
Forest	missing	available	missing	available	missing	available	O.K.	missing
Water Area	available	available	missing	available	missing	available	O.K.	available
Economy	**BG**	**HU**	**HR**	**MD**	**RO**	**RS**	**SK**	**UA**
-	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

TABULAR DATA FOR NUTS3, CBR AND COUNTRIES

Non geographical data for project elaboration should be created with following properties:

- Organization of relevant non graphical data in the tables
- Stored in xBase (DBF), Excel (XLS) or Access (MDB) format
- xBase file format convention of attribute (field) names
- Tables contain necessary data for all defined time horizons
- Data selection by information stored in the field **YEAR**
- Calculation of NUTS3 and / or Cross Border Regions
- Geographical analysis and producing of maps and schemes

NUTS 3 Transport Indicators – Table data structure (Proposal)

Field Name	Field Type	Field Length	Field Description
NUTS3	Character	5	NUTS 3 code according Eurostat
NUTS3_NAME	Character	32	NUTS 3 name according Eurostat
MW_LENGTH	Numeric	6.1	Length of motorways in km
EW_LENGTH	Numeric	6.1	Length of expressways in km
R1C_LENGTH	Numeric	6.1	Length of 1st class roads in km
R2C_LENGTH	Numeric	6.1	Length of 2nd class roads in km
ME_SHARE	Numeric	5.3	Share of motorways and expressways in km/km
ME_DENSITY	Numeric	5.3	Density of motorways and expressways in km/km²
RI_LENGTH	Numeric	6.1	Length of railways of international importance in km
RW_LENGTH	Numeric	6.1	Length of national and regional importance railways in km
RI_SHARE	Numeric	5.3	Share of international importance railways in km/km
RI_DENSITY	Numeric	5.3	Density of international importance railways in km/km²
PT_PASSEN	Numeric	7	Count of passengers transported by ports
PT_FREIGHT	Numeric	7	Amount of freight transferred by ports in tons
PT_INHABIT	Numeric	7	Count of inhabitants living within 60 km from ports
PT_P_1000	Numeric	7.2	Share of passengers per 1 000 inhabitants
PT_F_1000	Numeric	7.2	Share of transferred freight per 1 000 inhabitants
PT_ACCESS	Numeric	6.2	Share of inhabitants living within 60 km from ports
AP_PASSEN	Numeric	7	Count of passengers transported by airports
AP_FREIGHT	Numeric	7	Amount of freight transferred by airports in tons
AP_INHABIT	Numeric	7	Count of inhabitants living within 80 km from airports
AP_P_1000	Numeric	7.2	Share of passengers per 1 000 inhabitants
AP_F_1000	Numeric	7.2	Share of transferred freight per 1 000 inhabitants
AP_ACCESS	Numeric	6.2	Share of inhabitants living within 80 km from airports
TEN_LENGTH	Numeric	6.1	Length of TEN-T Corridors
TEN_DENSIT	Numeric	5.3	Density of TEN-T Corridors
YEAR	Numeric	4	Year (time horizon) of data validity

The specification of GS Transport and Technical Infrastructure attribute data is under the responsibility of Serbian partner.

NUTS	NUTS Name	Area in km²	Length of roads 2008				Indicators 2008		Year
			MW	EW	1st class	2nd class	Share	Density	
SK0100	Bratislava	367.064883	59.179	0.000	61.455	66.157	0.317	0.161	2008
SK0106	Malacky	952.530796	34.581	0.000	35.385	88.390	0.218	0.036	2008
SK0107	Pezinok	375.392900	0.000	0.000	0.000	58.001	0.000	0.000	2008
SK0108	Senec	359.878540	22.799	0.000	42.952	29.299	0.240	0.063	2008
SK010	**Bratislavský kraj**	**2054.867119**	**116.559**	**0.000**	**139.792**	**241.847**	**0.234**	**0.057**	**2008**
SK0211	Dunajská Streda	1075.140520	0.000	0.000	60.505	133.901	0.000	0.000	2008
SK0212	Galanta	640.791275	0.000	15.410	42.018	76.821	0.115	0.024	2008
SK0213	Hlohovec	268.536127	14.638	0.000	11.510	56.964	0.176	0.055	2008
SK0214	Piešťany	380.844797	19.703	0.000	17.024	73.904	0.178	0.052	2008
SK0215	Senica	678.364744	14.122	0.000	40.451	96.801	0.093	0.021	2008
SK0216	Skalica	355.969396	0.976	0.000	38.394	24.896	0.015	0.003	2008
SK0217	Trnava	740.682559	17.873	10.491	53.261	68.876	0.188	0.038	2008
SK021	**Trnavský kraj**	**4140.329418**	**67.312**	**25.901**	**263.163**	**532.163**	**0.105**	**0.023**	**2008**
SK0231	Komárno	1099.445649	0.000	0.000	86.820	83.193	0.000	0.000	2008
SK0232	Levice	1549.550246	0.000	0.000	157.255	100.721	0.000	0.000	2008
SK0233	Nitra	871.142488	0.000	18.825	72.163	54.947	0.129	0.022	2008
SK0234	Nové Zámky	1344.883079	0.000	0.000	110.924	140.105	0.000	0.000	2008
SK0235	Šaľa	354.188520	0.000	0.000	14.767	34.100	0.000	0.000	2008
SK0236	Topoľčany	597.813705	0.000	0.000	26.774	58.267	0.000	0.000	2008
SK0237	Zlaté Moravce	521.226947	0.000	2.679	24.861	27.828	0.048	0.005	2008
SK023	**Nitriansky kraj**	**6338.250634**	**0.000**	**21.504**	**493.564**	**499.161**	**0.021**	**0.003**	**2008**
SK	**All Regions**	**12533.447171**	**183.871**	**47.405**	**896.519**	**1273.171**	**0.096**	**0.018**	**2008**

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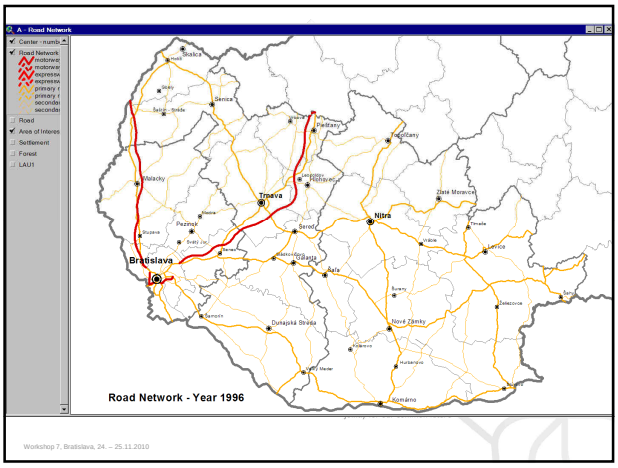

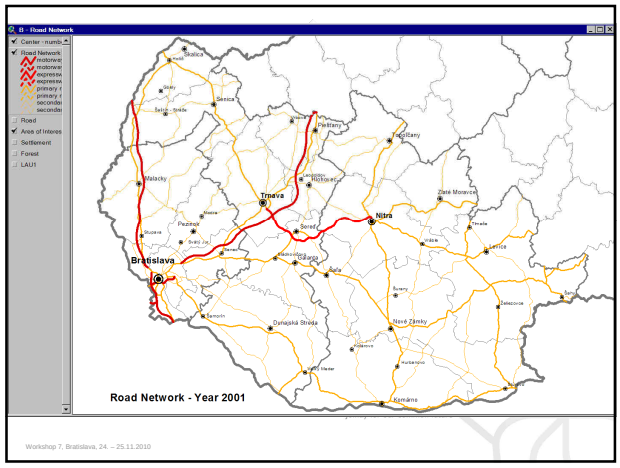

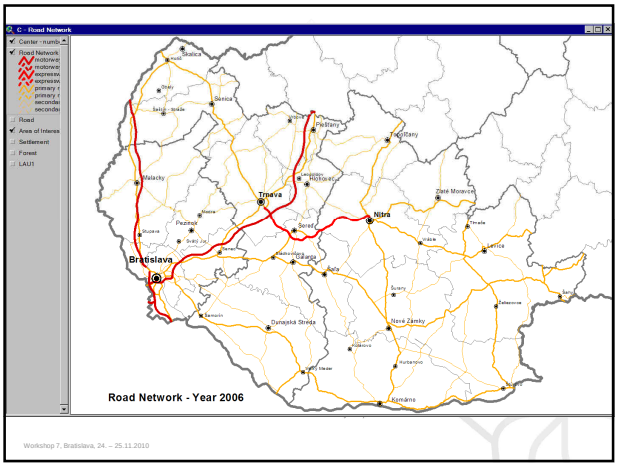

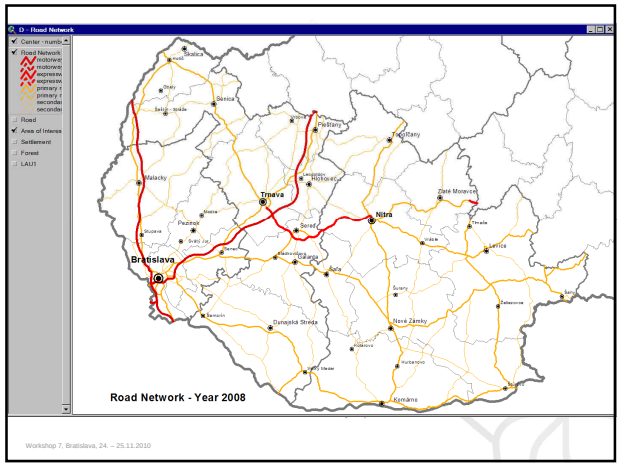

NUTS	NUTS Name	Area in km²	Length of roads 1996				Indicators 1996		Year
			MW	EW	1st class	2nd class	Share	Density	
SK010	Bratislavský kraj	2054.867119	78.046	0.000	139.792	241.423	0.170	0.038	1996
SK021	Trnavský kraj	4140.329418	67.312	0.000	281.794	532.163	0.076	0.016	1996
SK023	Nitriansky kraj	6338.250634	0.000	0.000	515.068	499.161	0.000	0.000	1996
SK	All Regions	12533.447171	145.358	0.000	936.654	1272.747	0.062	0.012	1996

NUTS	NUTS Name	Area in km²	Length of roads 2001				Indicators 2001		Year
			MW	EW	1st class	2nd class	Share	Density	
SK010	Bratislavský kraj	2054.867119	96.235	0.000	139.792	241.847	0.201	0.047	2001
SK021	Trnavský kraj	4140.329418	67.312	25.901	263.163	532.163	0.105	0.023	2001
SK023	Nitriansky kraj	6338.250634	0.000	18.825	496.243	499.161	0.019	0.003	2001
SK	All Regions	12533.447171	163.547	44.726	899.198	1273.171	0.087	0.017	2001

NUTS	NUTS Name	Area in km²	Length of roads 2006				Indicators 2006		Year
			MW	EW	1st class	2nd class	Share	Density	
SK010	Bratislavský kraj	2054.867119	104.164	0.000	139.792	241.847	0.214	0.051	2006
SK021	Trnavský kraj	4140.329418	67.312	25.901	263.163	532.163	0.105	0.023	2006
SK023	Nitriansky kraj	6338.250634	0.000	18.825	496.243	499.161	0.019	0.003	2006
SK	All Regions	12533.447171	171.476	44.726	899.198	1273.171	0.091	0.017	2006

NUTS	NUTS Name	Area in km²	Length of roads 2008				Indicators 2008		Year
			MW	EW	1st class	2nd class	Share	Density	
SK010	Bratislavský kraj	2054.867119	116.559	0.000	139.792	241.847	0.234	0.057	2008
SK021	Trnavský kraj	4140.329418	67.312	25.901	263.163	532.163	0.105	0.023	2008
SK023	Nitriansky kraj	6338.250634	0.000	21.504	493.564	499.161	0.021	0.003	2008
SK	All Regions	12533.447171	183.871	47.405	896.519	1273.171	0.096	0.018	2008

NUTS 3 Technical Infrastructure Indicators – Table data structure (Proposal)

Field Name	Field Type	Field Length	Field Description
NUTS3	Character	5	NUTS 3 code according Eurostat
NUTS3_NAME	Character	32	NUTS 3 name according Eurostat
EE_DWELL	Numeric	7	Count of dwellings connected to electric energy
EE_SUPPLY	Numeric	6.2	Share of dwellings connected to electric energy per cent
NG_DWELL	Numeric	7	Count of dwellings connected to natural gas
NG_SUPPLY	Numeric	6.2	Share of dwellings connected to natural gas per cent
DW_DWELL	Numeric	7	Count of dwellings connected to drinking water
DW_SUPPLY	Numeric	6.2	Share of dwellings connected to drinking water per cent
WW_DWELL	Numeric	7	Count of dwellings connected to waste water treatment
WW_TREATM	Numeric	6.2	Share of dwellings connected to waste water treatment per cent
BI_DWELL	Numeric	7	Count of dwellings connected to broadband internet
BI_CONNECT	Numeric	6.2	Share of dwellings connected to broadband internet per cent
RE_CAPACIT	Numeric	7	Capacity of regional renewable energy sources in MW
RE_1000	Numeric	6.2	Capacity of regional renewable energy sources in MW per 1 000 inhabitants
YEAR	Numeric	4	Year (time horizon) of data validity

The specification of GS Transport and Technical Infrastructure attribute data is under the responsibility of Serbian partner.

NUTS 3 Nature Condition Indicators – Table data structure (Proposal)

Field Name	Field Type	Field Length	Field Description
NUTS3	Character	5	NUTS 3 code according Eurostat
NUTS3_NAME	Character	32	NUTS 3 name according Eurostat
WSS1	Numeric	2	Count of water sampling sites of 1st water quality class
WSS2	Numeric	2	Count of water sampling sites of 2nd water quality class
WSS3	Numeric	2	Count of water sampling sites of 3rd water quality class
WSS4	Numeric	2	Count of water sampling sites of 4th water quality class
WSS5	Numeric	2	Count of water sampling sites of 5th water quality class
WPI	Numeric	5.3	Water pollution index
SO2	Numeric	7	Atmosphere pollution SO_2 in tons
SO2_1000	Numeric	6.2	Atmosphere pollution SO_2 in tons per 1 000 inhabitants
NOX	Numeric	7	Atmosphere pollution NO_x in tons
NOX_1000	Numeric	6.2	Atmosphere pollution NO_x in tons per 1 000 inhabitants
PM10	Numeric	7	Atmosphere pollution ash in tons
PM10_1000	Numeric	6.2	Atmosphere pollution ash in tons per 1 000 inhabitants
CO	Numeric	7	Atmosphere pollution CO in tons
CO_1000	Numeric	6.2	Atmosphere pollution CO in tons per 1 000 inhabitants
LFCAPACITY	Numeric	7	Capacity of landfills in tons
LFCAP_1000	Numeric	6.2	Capacity of landfills in tons per 1 000 inhabitants
YEAR	Numeric	4	Year (time horizon) of data validity

The specification of GS Transport and Technical Infrastructure attribute data is under the responsibility of Slovak partner.

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TABULAR DATA FOR NUTS3
Tasks and Responsibility

The definition of non geographical tabular data structure is under the responsibility of each GS responsible partner

Missing definition of the following NUTS3 tabular data structure:
- Human Resources & Settlement Structure (Bulgaria)
- Economy (Hungary)

The elaboration of all tabular data for NUTS3 regions are in the responsibility of each (national) project partners

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Donauregionen+

Geodatabase Structure

We are still waiting to your cooperation, recommendations, comments, notes, questions and of course help...

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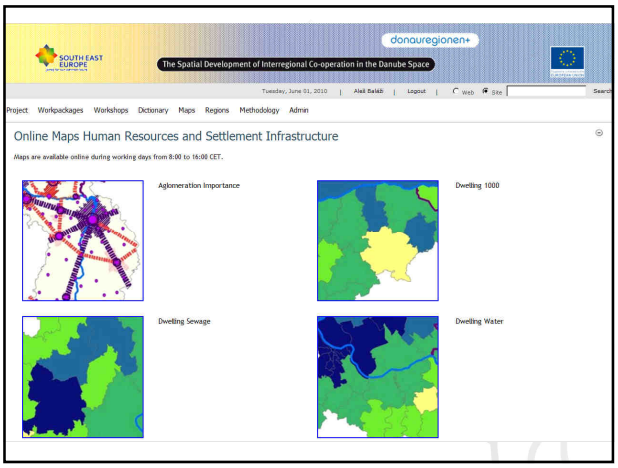
Portal & GIS Server

Upgrade on ArcGIS Server 10.0 basis

- **Project web**: www.donauregionen.net
- **GIS Server**: gis.donauregionen.net
- **Project portal**: dplus.infoprojekt.sk

- Portal & GIS Server are under construction – Work and Test mode
- Maps are available online during working days from 8:00 to 16:00 CET
- Number of maps: currently **20 maps**



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Thank you for your attention

Have a nice day...

Jointly for our common future