SEVENTH FRAMEWORK PROGRAMME
THEME 6: Environment (including climate change)

Contract for: **Collaborative Project**

D.3.3.1

GIS data and maps on spatial, socio-economic development and impact indicators

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Table of Contents

1. Introduction

1.1 Purpose of the document

This document is the D.3.3.1 GIS data and maps on spatial, socio-economic development and impact indicators. The **aim of this document** is data collecting concerning space, mobility, heating and cooling demand, land use, type coverage and intensity, land prices, building volumes, socio-economic status, quantitative and qualitative indicators, population density, unemployment rate, education level.

The subset of first products of Task 3.3, are organised in GIS. Data collected so far in the case studies are available for use of the other WPs. Contact details or info for download are reported in the next sections.

1.2 Document Structure

Chapter 1 is the introduction of the document (current chapter) which includes: the purpose of the document, the document's organization, the list of definitions and acronyms used in this document, the list of applicable and referenced documents and the BRIDGE project overview.

Chapter 2 describes GIS data, maps and indicators in urban planning.

Chapter 3 specifies the GIS data, maps and indicators for the five BRIDGE case studies.

1.3 Definitions and Acronyms

Definitions

- *Improve mobility:* improve road infrastructure; minimize through-traffic in the city centre; reduce private-car dependency; improve public transport (i.e. railway); and provide alternative means (e.g. cycle-ways).
- *Improve air quality:* minimize emissions to comply with air quality standards, particularly for dust ($PM_{10}$and $PM_{2.5}$) and CO_2.
- *Improve energy efficiency*: and reduce consumption; improve insulation in old buildings (to minimize energy loss); improve insulation in the central heating infrastructure (i.e. pre-insulated pipes; and extend urban central heating and gas piping systems (to cater for detached houses and blocks of flats).
- *Controlled expansion of urban areas:* through local land use plans; provide better access to the city centre; improvement of local services; diversify the city centre functions; and enhancement of the public open space.
- *Improve water management*: through water permission requests for sustainable water use; maintain and improve the water quality; identify investments/projects that have the potential to negatively impact on water resources; and control development on floodplains/flooding areas.
- *Optimize energy consumption:* save energy and increase use of renewable energy sources.
- *Protect the water balance*: manage storm water to minimize flooding and to avoid water pollution through untreated surface runoff.
- *Enhance human well-being in the city*: improve attractiveness of housing, promote a spatial balance, and improve the public transport system.

Acronyms

CoP	Community of Practice
DSS	Decision Support System
GIS	Geographic Information System
SD	Sustainable Development
CoP	Community of Practice
n/a	not available

1.4 Document References

[R1] European Spatial Development Perspective adopted by the Ministers for Spatial Planning at the Potsdam Council on 10 and 11 May 1999

[R2] Indicators of sustainable development, edited by T. Borys, Environmental and Resources Economists Publisher, Białystok 2005.

[R3] The National Environmental Policy for 2009 – 2012 and Its 2016. http://www.mos.gov.pl/kategoria/1979_environmental_policy/

[R4] Quality of life on local level. An indicators-based study, edited by T. Borys, P. Rogala T. Brzozowski, M. Kusterka, T. Rycharski, United Nations Development Programme, Warszawa 2008.

[R5] Poland 2025. Long-term strategy of sustainable development. Warszawa 2000.

[R6] Environmental indicators, edited by T. Borys, Environmental and Resources Economists Publisher, Białystok 1999.

[R7] Sustainable development-programme for tomorrow, S. Kozłowski, Abrys Publisher, Poznań – Warszawa 2008.

[R8] Theory and practice of sustainable development, edited by A. Graczyk, EkoPress Publisher, Białystok-Wrocław 2007.

1.5 Project Overview

Urban metabolism considers a city as a system and distinguishes between energy and material flows. "Metabolic" studies are usually top-down approaches that assess the inputs and outputs of food, water, energy, etc. from a city, or that compare the metabolic process of several cities. In contrast, bottom-up approaches are based on quantitative estimates of urban metabolism components at local scale, considering the urban metabolism as the 3D exchange and transformation of energy and matter between a city and its environment. Recent advances in bio-physical sciences have led to new methods to estimate energy, water, carbon and pollutants fluxes. However, there is poor communication of new knowledge to end-users, such as planners, architects and engineers.

BRIDGE aims at illustrating the advantages of considering environmental issues in urban planning. BRIDGE will not perform a complete life cycle analysis or whole system urban metabolism, but rather focuses on specific metabolism components (energy, water, carbon, pollutants). BRIDGE's main goal is to develop a Decision Support System (DSS) which has the potential to propose modifications on the metabolism of urban systems towards sustainability.

BRIDGE is a joint effort of 14 Organizations from 11 EU countries. Helsinki, Athens, London, Firenze and Gliwice have been selected as case study cities. The project uses a "Community of Practice" approach, which means that local stakeholders and scientists of the BRIDGE meet on a regular basis to learn from each other. The end-users are therefore involved in the project from the beginning. The energy and water fluxes are measured and modelled at local scale. The fluxes of carbon and pollutants are modelled and their spatio-temporal distributions are estimated. These fluxes are simulated in a 3D context and also dynamically by using state-of-the-art numerical models, which normally simulate the complexity of the urban dynamical process exploiting the power and capabilities of modern computer platforms. The output of the above models lead to indicators which define the state of the urban environment. The end-users decide on the objectives that correspond to their needs and determine objectives' relative importance. Once the objectives have been determined, a set of associated criteria are developed to link the objectives with the indicators. BRIDGE integrate key environmental and socio-economic considerations into urban planning through Strategic Environmental Assessment. The BRIDGE DSS evaluates how planning alternatives can modify the physical flows of the above urban metabolism components. A Multi-criteria Decision Making approach has been adopted in BRIDGE DSS. To cope with the complexity of urban metabolism issues, the objectives measure the intensity of the interactions among the different elements in the system and its environment. The objectives are related to the fluxes of energy, water, carbon and pollutants in the case studies. The evaluation of the performance of each alternative is done in accordance with the developed scales for each criterion to measure the performance of individual alternatives.

Several studies have addressed urban metabolism issues, but few have integrated the development of numerical tools and methodologies for the analysis of fluxes between a city and its environment with its validation and application in terms of future development alternatives, based on environmental and socio-economic indicators for baseline and extreme situations. The innovation of BRIDGE lies in the development of a DSS integrating the bio-physical observations with socio-economic issues. It allows end-users to evaluate several urban planning alternatives based on their initial identification of planning objectives. In this way, sustainable planning strategies will be proposed based on quantitative assessments of energy, water, carbon and pollutants fluxes.

2. GIS data, maps and indicators in urban planning

2.1 GIS data and maps in urban planning

Within the frame of BRIDGE project GIS plays pivotal role. Primarily it is planned to employ GIS as a frame (or environment) for Decision Support System. In that system the role of GIS is integration and analysis of various datasets concerning specific area of interest and supplying the system in appropriate criteria values. GIS is planned to be used as a tool for data preparation for different models and for calculations of specific indexes. Eventually results of spatial analyses will be visualised by use of that technology.

Within the frame of the BRIDGE project specific modules are to be developed to facilitate a seamless communication between GIS and applied models.

GIS is also a communication platform for exchanging between scientists, local authorities and other stakeholders (general public).

The Town councils have following assignments: (a) management of municipal spatial policy; (b) land use planning; (c) creations of Master Development and Town Planning Scheme; (d) issuing of decisions concerning building development and land use. Town council activities concerning above mentioned assignments are supported by GIS.

Specifically GIS is used for optimisation of the spatial and resource as well as facilitation urban planning and decision making process. Specifically GIS is typically used for: (a) development of spatial database and elaboration of digital maps, which leads to facilitation of planning, updating tasks and work with use of interactive spatial database; (b) monitoring of urban planning completion; (c) facilitating of participation of stakeholders (local residents) in decision making process and so on.

To integrate natural elements and cycles into the urban tissue spatial urban planning goes beyond traditional land use planning to bring together and integrate policies and strategies. The outcome of spatial planning should support the expected developing objectives. The spatial planning should also guarantee that the solution is accepted by local society since they have to use the land. All these aforesaid aspect should be linked with GIS instruments. GIS supports planning and the public participation process with planning support systems. The key functions of GIS within spatial planning system could be divided into following aspects: Strategic and Operational (National and regional planning); Management (land use plans); Monitoring (administrative decision) and Communication (public information and promotion). Advances in GIS and supporting technologies have led to the development of decision support systems that facilitate the community planning process. Planning support systems can measure and compare performances of different planning scenarios, so effective use of GIS is crucial for the quality of proposed solutions. According to the ESDP the most important principle from the environmental point of view is the introducing of the ecosystems approach underlining the city as a complex system which is characterized by flows as continuous processes of change and development [R1].

2.2 Sustainable development indicators in urban planning

In the first stage of the project there were analyzed the available literature on sustainable development indicators [R2, R3, R4, R5, R6, R7, R8]. It was found about 556 indicators connected with environmental aspects of SD, 246 indicators connected with economic aspects of SD and 276 indicators connected with social aspects of SD. On the strength of this list and IETU's team experience there were chosen indicators suitable for the BRIDGE project. There were also checked the available indicators datasets that are based on the general statistic on the town Gliwice level (The Regional Statistical Office).

There were analyzed in details components connected with urban environments – three written in BRIDGE – energy, water and air quality (pollutants) and also others: mobility, land cover, greenery, infrastructures, economy, environmental management, population, social issues, sustainability. Basing on our experience and available literature we chose the indicators that best fit above mentioned components and that are connected with urban development. These indicators are objective statistical indicators (so-called hard indicators). The majority of them create indirect picture of objective quality of life in a city.

In the next stage of the project, after all the CoP Meetings will have taken place, it will be necessary to select relevant indicators capable of assessing them in a quantitative way in each of the case studies. The selection procedure will help to identify indicators that are both meaningful (capable of describing a particular aspect of sustainability) and measurable. Further determinants will be the modeling requirements and the specific data constraints. The selection of the indicators shall largely benefit from the input of the potential actors involved in the early stages of the project (i.e. members of the CoP).

One of the basic goals of indicators developed in the BRIDGE project is to show the progress of each city in the path of sustainable urban development. Indicators are to show the existing problems that are still to overcome. The criteria considered in the process of indicators' selection are as follows:

- assessment of indicators' availability/accessibility on a local level (the level of a city),
- simplicity of the indicators and easiness of its interpretation,
- significance for CoP members, BRIDGE researches,
- significance for quality of life: indicator should enable to find out whether quality of life in a city has increased/decreased,
- clearness and easiness to be accepted by CoP members,
- easiness of presentation chosen indicators in local media as instruments of monitoring development processes of the city and assessing the sustainable urban development.

There is no one universal list of local sustainable development indicators. These lists can differ for different cities. In BRIDGE proposed list of indicators will be confronted with the real needs of local communities during the process of CoP meetings (there are some questions in the BRIDGE CoP

3. GIS data, maps and indicators for the five BRIDGE case studies

3.1 Helsinki

3.1.1 Collected data

Data from 2008 except unemployment (2006), income level (2006) and car ownership (2007)
Study area (SA)
Major districts 1 and 3, district 501 and subdistrict 285
Comparison area (CA)

Table 1. Population Distribution.

Population	SA total	SA %	CA total	CA %
under 19 years	24260	12,4770491	101327	17,82259894
19-64 years	143388	73,7452234	386523	67,98626636
over 64 years	26789	13,7777275	80681	14,1911347
total	**194437**		**568531**	
	SA		CA	
Average household size	1,66		1,85	

Table 2. Education.

Education level (population over 14 years)	SA total	SA %	CA total	CA %
only compulsory education	44656	25,4673617	159130	32,44591159
upper secondary education	64016	36,5083891	166237	33,89499783
lower academic degree	34254	19,5350906	94469	19,26181626
higher academic degree	32420	18,4891586	70611	14,39727432
total	**175346**		**490447**	

Table 3. Income level/ Unemployment.

	SA, euros	CA, euros
Income level (2006)	30234	24190
	SA %	CA %
Unemployment (2006)	6,6	7,8
	SA, euros	CA, euros
Average price of old dwellings (flats)	3976	3331

Table 4. Migration.

Migration	SA total
in migration from other districts in Helsinki	16399
out mirgration to other districts in Helsinki	17213
net migration (internal balance, Helsinki)	-814
in migration from other municipalities and abroad	16248
out migration to other municipalities and abroad	12633
net migration	3615
total migration	**2801**

Table 5. Other.

	SA	CA
Construction density (building sqm/land area sqm)	0,47	0,23
	SA, %	CA, %
Car ownership (2007) (% of households, company cars excluded)	38,1	45,5

In August-September 2009 UHEL produced a sample data set. In the sample data set the following socio-economic data was collected (data from 2008 except unemployment (2006), income level (2006) and car ownership (2007):

- Land use classification SLICES, map of Helsinki and legend of the map. Raster image in 10 m x 10 m pixels, coordinate system EUREF-FIN/TM35FIN = ETRS89, Transverse Mercator, Zone 35.
- Excel table on indicators regarding the selected city districts (major districts 1 and 3, district 501 and sub-district 285 put together (= Study Area) and Helsinki as a whole (= Comparison Area): population, average household size, education level, income level, unemployment, average price of old dwellings (flats), several migration figures, construction density, and car ownership. The Study Area covered for instance the Kumpula and Viikki measurement sites as well as the coming sites of run-off water measures (i.e. the sites of WP 3.1 measurements).

This data was delivered to the WP3 responsible persons as well as to the DSS developers

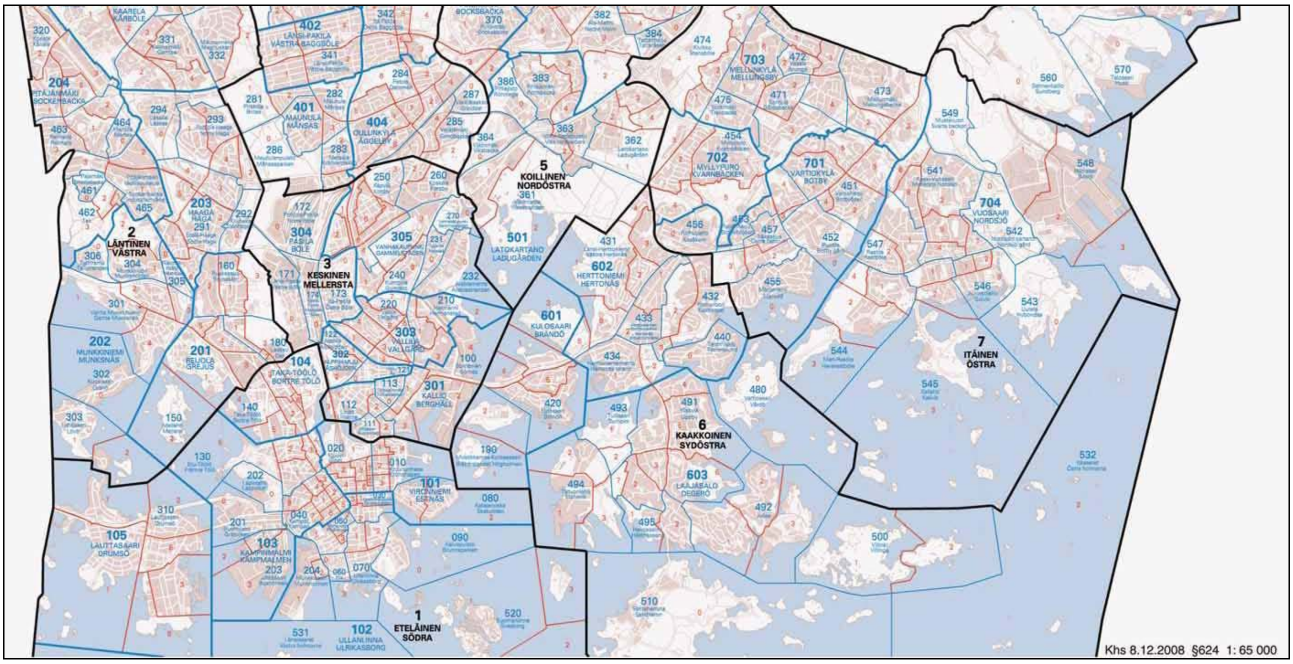

Figure 1. Map: Socio-economic data sample area Helsinki - the Kumpula and Viikki measurement sites

3.1.2 Quantitative and qualitative indicators:

In October 2009, UHEL provided a refined excel data set where data was divided into four levels. As new levels to the sample data set are the Meri-Rastila area (sub-district 544) which has been selected as the DSS test planning case (ref. CoP kick-off meeting 15.6.09), and the major district 7 which is the larger unit around Meri-Rastila:

Study area 1: Major districts 1 and 3, district 501 and sub-district 285 (same as above bullet point 2)

Study area 2: Major district 7

Study area 2a: Sub-district 544 (part of the major district 7), Meri-Rastila DSS test case area

Comparison area: Helsinki

Some of the indicators (construction density and car ownership) will be updated in week 43.

This data was/is delivered to the DSS developers

3.1.3 GIS data:

In October 2009, UHEL also delivered AutoCad files regarding the planning alternatives of the Meri-Rastila DSS area. The data was provided by the subcontractor, the City Planning Department of the city of Helsinki. This data will be utilised in the modelling and DSS development. The data is stored in the BRIDGE ftp server.

3.1.4 Other spatial data:

The UHEL WP3.3 team and the subcontractor will also deliver a broad GIS format data set in October/November for the DSS developers.

3.1.5 Contact info:

Hanna Ristisuo, MSc, hanna.ristisuo@helsinki.fi

3.2 Athens

The Athens Case Study is focused on the municipality of Egaleo, which lies in the western part of the Athens basin.

Figure 2. The Athens Case Study

The following data have been collected and are available in the **BRIDGE ftp server**. Municipality of Egaleo

- National Statistical Service in Greece
- National and Kapodistrian University of Athens (NKUA)

3.2.1 Collected data:

Not described within reporting period.

3.2.2 Quantitative and qualitative indicators:

Not gathered within reporting period.

3.2.3 GIS data:

Topography

The file is called topo.shp and provides topography information for the municipality of Egaleo in a shapefile format.

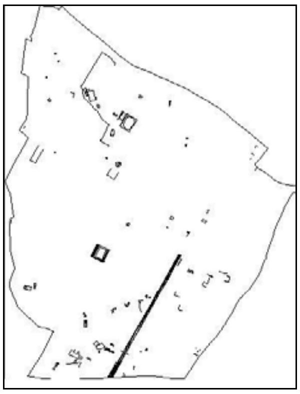

Figure 3. Topography of Egaleo

Building blocks

The file is called block.shp and it is a vector map of the building blocks of the municipality of Egaleo. The code number of each block as used by the National Statistical Service (ESYE) is given in the attribute table.

Figure 4. Building blocks of Egaleo

Buildings

The file is called build.shp and it provides information about the number of buildings included in each building block of the municipality of Egaleo. Each building in a block is numbered, for example building no1, building no2 etc. Therefore, in the attribute table, the column “ESYE CODE” gives the code of the block and the column “COUNT” gives the building number. The total number of buildings included into a block results from the number that a specific code appears in the "ESYE CODE" list.

Figure 5. Buildings within blocks for Egaleo

Road network

The file called axon.shp provides the road network of the municipality of Egaleo.

Figure 6. Road network of Egaleo

Transportation

- Bus stops
- Bus routes

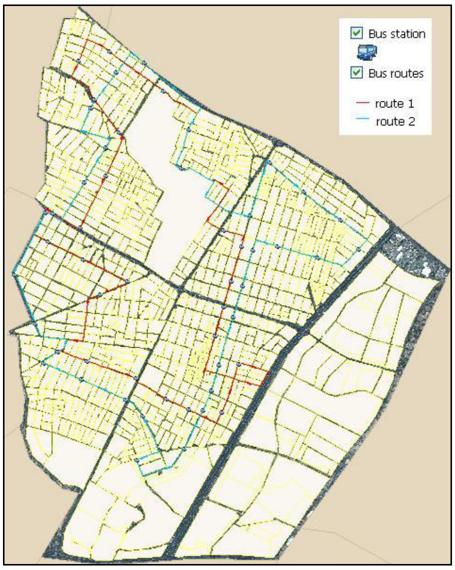

Figure 7. Transportation facilities in Egaleo

Landscape

- Land use
- Urban planning zones

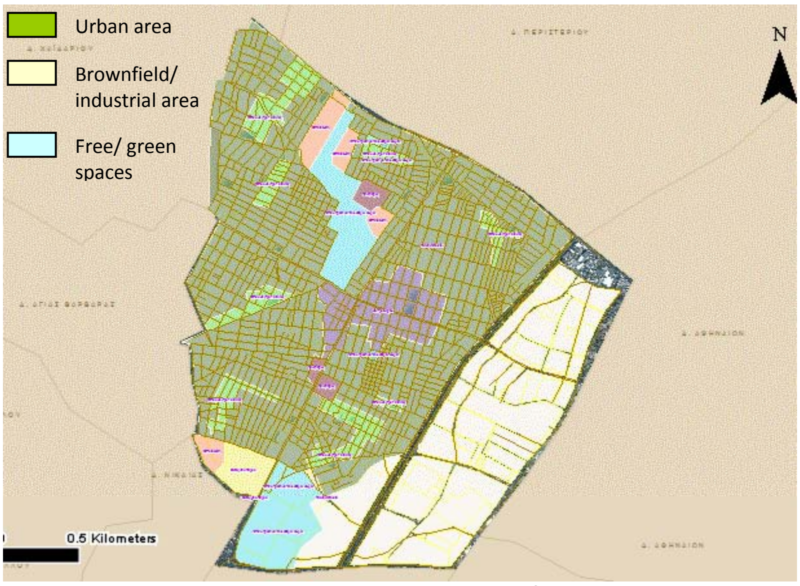

Figure 8. Urban use zone map of Egaleo

3.2.4 Other spatial data:

Population (2001 census data)

- Population per block [these data are provided by the Greek National Statistical Service in excel format].

Social features per block

- Points of interests
- Healthcare
- Churches
- Educational and Sport Units
- Squares

Economic data per block

- Objective value zones

Buildings per block (2000 census data)

These data are provided by the Greek National Statistical Service in excel format.

- Number of buildings
- Buildings by number of floors
- Buildings by construction period

3.2.5 Contact info:

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Tel.: +30-210-7276843

3.3 London

3.3.1 Collected data:

Not described within reporting period.

3.3.2 Quantitative and qualitative indicators:

Data can be downloaded from the following sites:
http://www.london.gov.uk/gla/publications/factsandfigures/factsfigures/population.jsp

http://www.gos.gov.uk/facts/factgol/London/
http://www.go-london.gov.uk/SourceDatasets/HTMIndex.htm
http://www.visionofbritain.org.uk/census/index.jsp
http://www.ons.gov.uk/census/index.html

3.3.3 GIS data:

3D data set
Virtual London, Centre for Advanced Spatial Analysis (CASA)

SOTON GIS data
1 : 200 000 scale vector boundary data maps of Great Britain used to define urban features and London borough boundaries.

The London Atmospheric Emissions Inventory (LAEI) for 2006 and forward projections (2015). This includes both the 25 m PM_{10} concentration map (µg m^{-3}) and the total emission predictions for London (tonnes) for each borough and emission sources (1 km grid squares).

A 25 m2 resolution land classification map of the UK (LCM2000, Centre of Ecology and Hydrology, UK)

3.3.4 Other spatial data:

Airborne acquired images
KCL: Airborne (one daytime, one night time flight in August 2008), north/south transects of Greater London:

- hyperspectral radiances measured by NERC ARSF EAGLE/HAWK sensors, broadband radiances measured by NERC ARSF ATM (Spectral bands from 400 up to 2500 nm)
- Leica ALS50-II LiDAR
- Leica RCD105 39 megapixel digital camera

SOTON GIS data
Urban vegetation data for the Greater London Authority (GLA) has been extracted at each of the 33 London borough levels using ArcMap™ (ESRI® ArcMap ™ version 9.3). The habitat classes extracted are: Class (1) Broad leaved trees, Class (2) Coniferous trees and Classes (5-8) Grasses.

The raster data-sets (25 m) were used to quantify the area of these land cover classes for each London borough.

KCL GIS data
Morphological characteristics

- Roughness length for momentum

- Zero plane displacement length
- Plan area index
- Frontal area index
- Sky view factors

Anthropogenic heat flux

3.3.5 Contact info:

KCL:
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Prof. Gail Taylor (G.Taylor@soton.ac.uk)
Dr. M J. Tallis (M.J.TALLIS@soton.ac.uk)

3.4 Firenze

3.4.1 Collected data:

The main source of the data are:

- Municipality of Firenze
- University of Firenze Department of agronomy and land management
- Tuscany Regional Agency for Environmental Protection (ARPAT)

3.4.2 Quantitative and qualitative indicators:

Not gathered within reporting period.

3.4.3 GIS data:

Firenze GIS data are available in shapefile format, processed and identified as numeric code:

- **Road Networks**

101 Road

102 Unpaved road
103 Foot track / Mule track
104 Road under construction
105 Road disused
106 Traffic Island
107 Footpath access
108 Flyover / Bridge
109 Little bridge
110 Ford
111 Footbridge
112 Subway
113 Wing wall
114 Tunnel
116 Boundary km stone
117 Diesel Railway
118 Electric Railway
119 Railway under construction
120 Railway disused
122 Level crossing
123 Mobile platform
126 Path
127 Runway
128 Beacon
129 Steps
130 Street Number

- **Building and other structure**

201 Civil/administrative building
202 Industrial/commercial building
203 Place of worship
204 Building under construction
205 Needs rebuilding
206 Loggia
207 Newsstand
208 Skylight
209 Round top
210 Greenhouse
211 Bus/train station
212 Power/box station
213 Monument
214 Sports ground
215 Garden centre
216 Stalls
217 Chimney/Tower

218 Bin
219 Tabernacle
220 Flight of steps
221 Ramp
222 District
223 Hospital department
224 School building
225 Sport arena
226 Religious place
227 Compound
228 Cemetery
229 Camping/Holiday camp
235 Basement
236 Building edge on the ground

- **Hydrography**

301 River/Canal
302 Waterway
303 Spillway
304 River island
306 Pond/Lagoon
307 Underground Waterworks
308 Waterworks
309 Water tank
310 Fountain/basin
311 Pool
312 Spring
313 Well
314 Water fall
315 Purifier
316 Underground waterway
319 Uncovered Pipe

- **Infrastructure**

401 Utility pole
402 Pylon
403 Electric line
404 Underground gas pipeline
405 Gas pipeline
407 Oil pipeline
409 Mine/Peat bog
410 Generating station
411 Petrol pump

412 Dumping
413 Junk yard

- **Divisor and ground element**

501 Partition wall
502 Enclosure/railings
503 Hedge
504 Dry laid wall
505 Walls/Bastion
506 Retaining structure (top)
507 Retaining structure (foot)

- **Terrestrial build**

601 Escarpment/slope (top)
602 Escarpment/slope (foot)
603 Dyke (top)
604 Dyke (foot)
606 Rock

- **Vegetation**

701 Crop line
702 Tree line
703 Flowerbed
704 Isolated tree
705 Tree Row
706 Vine Row
707 Olive Row
708 Orchard Row
709 Garden/Park
710 Vegetable plot/Garden centre line
711 Vineyard line
712 Olive grove line
713 Orchard line
714 Scrub line
715 Fruit tree
716 Olive
717 Vine
718 Vegetable plot/Garden centre
719 Copse
720 Fir
721 Pine
722 Cypress

723 Oak
726 Larch
727 Poplar
729 Scrub

- **Orographic element**

801 Main line
802 Ordinary line
803 Auxilary line
804 Height

- **Administrative Limit**

901 Municipality line
905 Outstation line
906 Map making limit

- **Toponymy**

1001 ISTAT CENTRE (building)
1002 UNIT CENTRE (building)
1003 Scattered ISTAT (building)
1004 Road network/Railroad
1005 Churc/Monument/Antiques
1006 Garden/Park/Estate
1007 Mountain
1008 Hill/Pass/Gorge
1009 Valley
1010 Water way
1011 Lake/Lagoon
1012 Hydrographic structure
1013 Main line value
1014 Height point value
1015 Point value
1016 Kilometric value

All GIS data are available for FTP download at:

ftp:\\149.139.16.152
username: toscano
pwd: piero1980

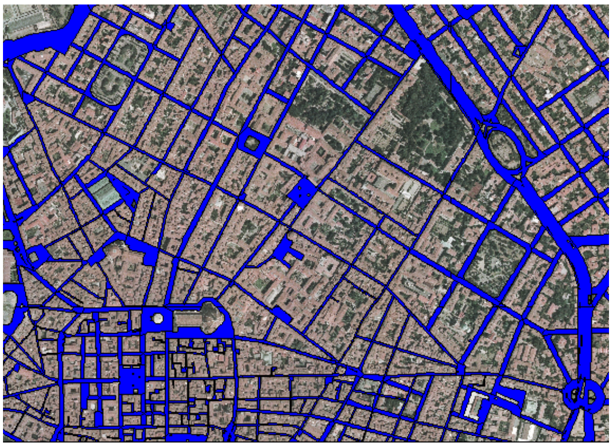

Figure 9. Road network of Firenze

Figure 10. Buildings of Firenze

Figure 11. Land Use of Firenze

3.4.4 Other spatial data:

Orthophoto full coverage 2004 (0.5 m) / 2007 (0.15 m)

Figure 12. Firenze Image Mosaick

Full coverage images are available on DVD-Rom

DEM (Digital Elevation Model) high resolution (10 m) digital elevation model is available

3.4.5 Other no spatial data:

Population (2001-2007 census data)

Concentration of pollutants (PM_{10}, CO_2, NOx, SOx, CO): Network of 5 air quality monitoring stations (2003 – present)

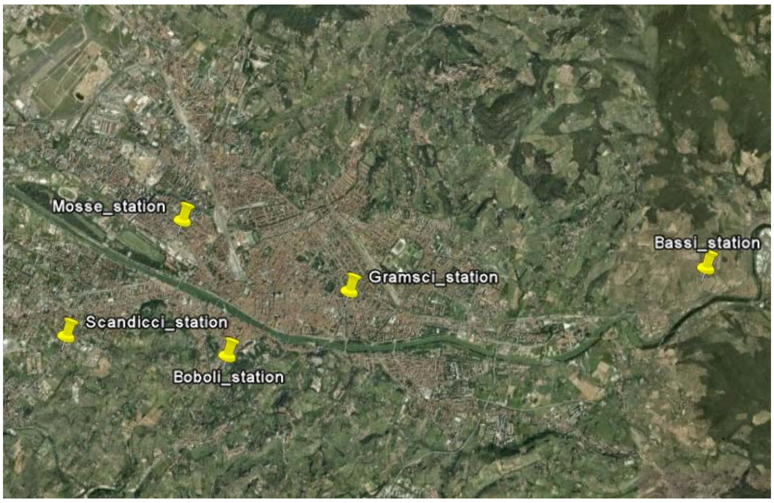

Figure 13. Air quality monitoring Network

Population data and air quality data are available for FTP download at:

ftp:\\149.139.16.152
username: toscano
pwd: piero1980

3.4.6 Contact info:

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3.5 Gliwice

In 2008 the total number of inhabitants amounted 191 232 and with decreasing tendency (100.149 woman and 91.083 man). Area of Gliwice is 133,9 km^2, what means that population density was 1.428 per km^2. Between 2006 and 2008 moderate increase of birth indicator were observed at low rate.

The number of people in working age in comparison to total number of inhabitants exceeded 25% in 2008. Mean salary amounted 3.146,53 PLZ in national economy in Gliwice (2933,32 PLZ in Silesian Voivodeship and 2735,28 PLZ in Poland). The number of unemployment amounted 4249, including 467 people with university education.

In the end of 2008 there were in Gliwice:

- 53 existing land use plans,
- 8 land use plans within Strategic Impact Assessment procedure,
- 3 land use plans before Strategic Impact Assessment procedure.

3.5.1 Collected data:

Development of the BRIDGE database containing GIS system linked with database resources is one of the fundamental premises of DSS creation which uses spatial and statistical data for elaboration of variety if different indexes.

The main source of the data are:

- Gliwice Town Council
- Institute for Ecology of Industrial Areas (IETU)
- Central Statistical Office in Poland (PESEL database system)

Additional sources are:

- European Environment Agency (and others European Agencies) and
- Polish GEOPORTAL.

The Data from above mentioned sources differ in terms of spatial precision, availability, topicality and data format. It is planned that the main data provider will be Gliwice Town Council. Gliwice has developed Municipal Spatial Information System. Huge number of GIS coverages enclosed in that system are ones of high precision and are quite updated.

The other source of spatial data is IETU GIS. The coverages are ones of less precision usually appropriate for analyses made on province (Voivodeship) extent.

Central Statistical Office provides statistical/ census data on variety of subjects addressed on the whole town of Gliwice.

It is planned to use as an analytical platform ESRI software – ARC/GIS and ESRI shape as exchange format. The spatial data can be organised as distinct BRIDGE GIS geodatabase. Some data can be Gliwice Spatial Information System can be available via WMS platform.

As a spatial reference system WGS 1984 or ETRF are planned to be used in the BRIDGE project. For purpose of analyses other spatial reference system based on the two above mentioned geodetic systems.

Below in the table and on the cards have been attached meta information on the coverages from IETU and Gliwice Town Council.

The decision concerning selection of the specific spatial and statistical data is planned to be made during meeting in Gliwice in October 2009.

3.5.2 GIS data and maps:

The case study in Gliwice will look at the effects of land use change on the parameters analysed by BRIDGE (i.e. air, water and energy). The Gliwice Town Development Plan is currently under consultation and, therefore, it is not a suitable case study. However, the town planner indicated that a number of areas will have more detailed planning (i.e. will be subject to local area planning). These areas include the Kopernika housing district and the Academic district.

Table 6. Web Map Service.

Subject	Address
State Register on Boundaries	http://sdi.geoportal.gov.pl/wms_prg/wmservice.aspx
State Register on Geographical Names	http://sdi.geoportal.gov.pl/wms_prng/wmservice.aspx
Polish Hydrographical Map	http://sdi.geoportal.gov.pl/wms_hydro/wmservice.aspx
Polish Ecological Map	http://sdi.geoportal.gov.pl/wms_sozo/wmservice.aspx
Topographical maps	http://sdi.geoportal.gov.pl/wms_topo/wmservice.aspx
Aerial photo map (orthophotomap)	http://sdi.geoportal.gov.pl/wms_orto/wmservice.aspx

http address: http://maps.geoportal.gov.pl/webclient/

Table 7. IETU coverages.

Coverage Name	Field name	Field description
IETU_table	L_LUD_2001	Number of inhabitants in 500 metres grid (year 2001 – modelled)
	L_M_BEZ_OG	Number of flats heated by coal-fired boiler plant in 500 metres grid
	M_Z_IND_	Number of flats heated by coal-burning furnace in 500 metres grid
	PM10KG_TRA	Emission of PM10 from traffic in 500 metres grid in kilograms (emission from state, provincial, county and city roads. Local roads not included)
Gliwice_DEM	value	Digital elevation model in 10m grid (1700 columns x 1800 rows)
Gliwice_boundary		Polygon map of administrative boundaries of Gliwice town
Gliwice_extent		Polygon map representing extent of the Gliwice land use map and Gliwice DEM
Gliwice_landuse	Code, level 1, level 2, level 3	Land use / land cover map Corine Land Cover CLC
Gliwice_Politechnika		Polygon map, preliminary map of the boundaries of Politechnika district

Table8. Gliwice City Hall coverages (in possession of Gliwice Municipality).

DEM	Digital elevation model in 1m grid
Boundary	boundaries of Gliwice town
Districts	boundaries of Gliwice districts
Roads	Axes of roads (road network)

Polish Geodetic Service (representing Polish government) possesses the following coverages:

- Gliwice municipal boundaries
- Boundaries of Gliwice districts/ urban units
- Map of address points
- Map of buildings (including info on type of building and number of floors)
- Land use map
- networks of following facilities:
  - waterworks,
  - sewage system,
  - central heating system,
  - gas pipelines.

The Academic district presents the most suitable real life project to be assessed by BRIDGE, as a number of studies have already been undertaken and, consequently, relevant information for the area is available. The Land Use Plan for the Academic District will be probably changed according to BRIDGE DSS tool. A number of layout alternatives are being considered.

Area: 16,6 km^2
Perimeter: 5640,5488 m

Figure 14. Plan of the Academic District in Gliwice

3.5.3 Other spatial data:

Will be delivered in the next reporting period.

3.5.4 Contact info:

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