GeoSmartCity

open geo-data for innovative services and user applications towards Smart Cities

CIP ICT-PSP Project n. 621150

Start date 01-03-2014, duration 36 months

Open geo-data for innovative services and user applications towards Smart Cities

GeoSmartCity implements a platform to share and public geographical open data coming from different sources, such as Public Administrations, Multi-utilities, Companies and Crowd-sourcing.

The platform includes specialized web services to integrate public geographical data with other geo-refenced data (public or private) useful for the smart management of urban infrastructures and public services in the context of the **Smart City** initiative and the **Digital Agenda** for Europe.

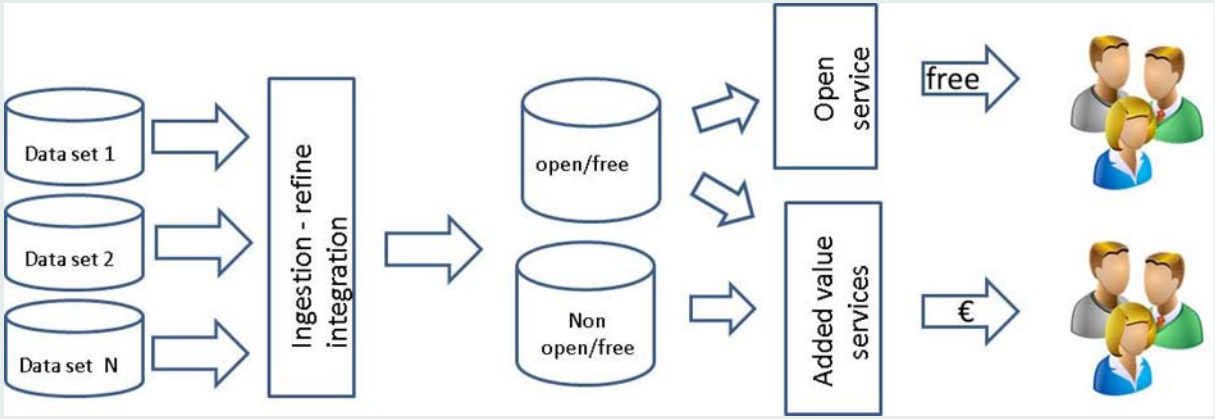
Partnership

Objectives

- Support Cities to 'open' their data to professionals and citizens
- Establish a cross-platform, re-usable, able to publish open-(GI) data, in an urban context, but with a European dimension
- Provision of tools and facilities to integrate GI data/info with open data
- Framework and services to integrate proprietary/restricted data with open (GI) data of the City

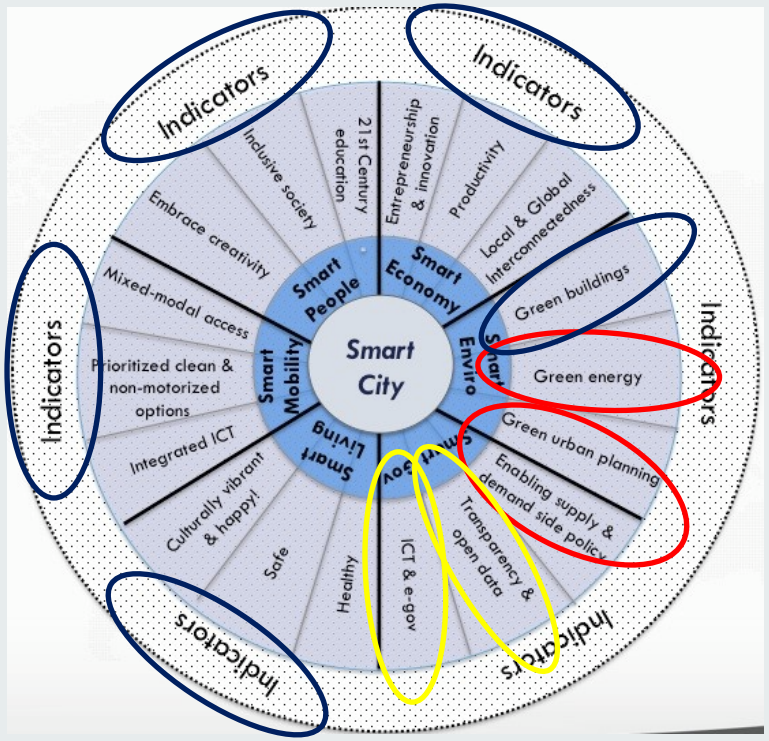
Objectives vs Exploitation

- Open infrastructure to build new business model for PAs and SMEs
- PPP (Public Private Partnerships): collaborative management of Open(GI) data
- Integration of restricted data in a secure way



Objectives vs Exploitation

- Open infrastructure extandable to different SmartCity contexts



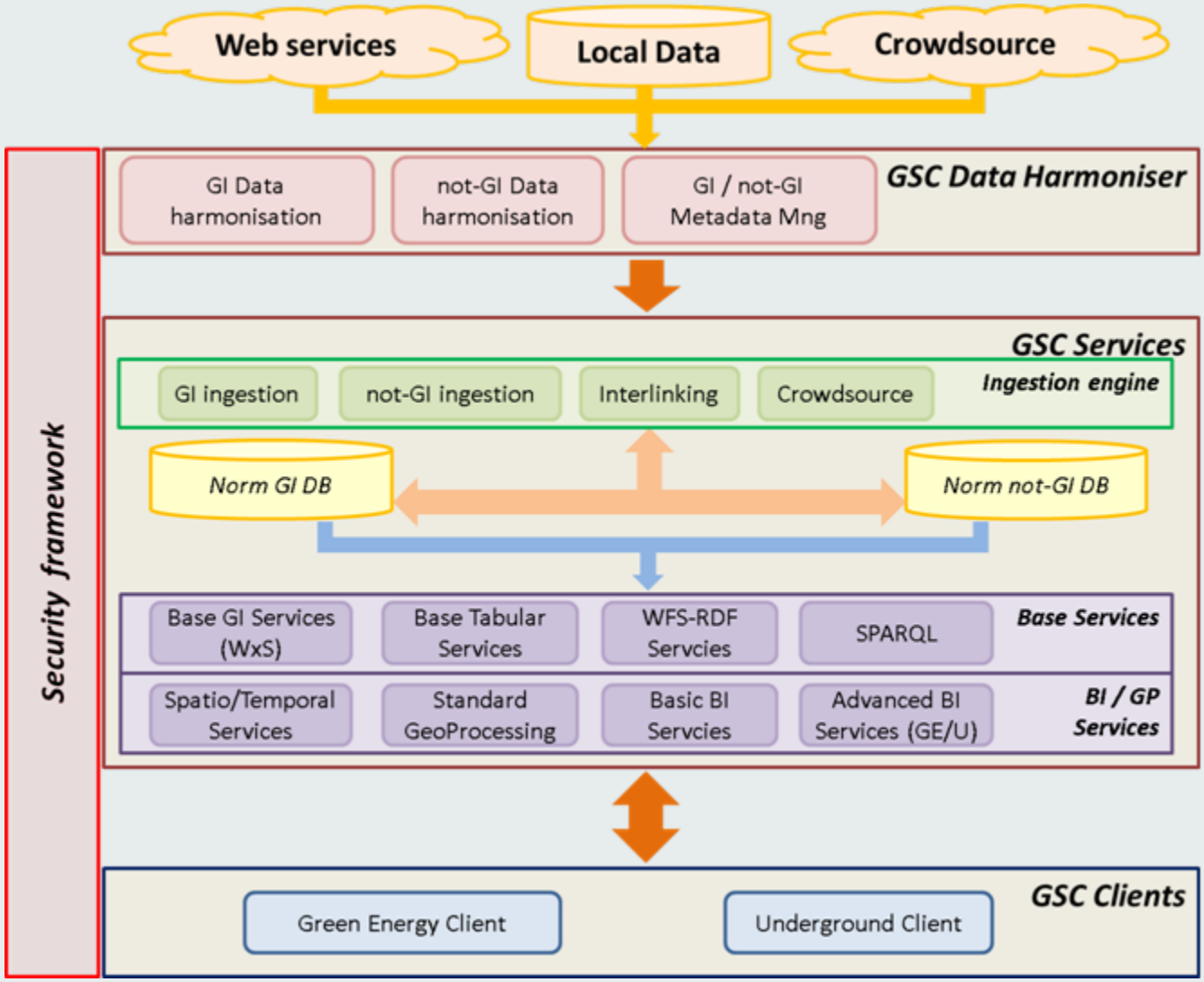
- Two application scenarios:

✓Green Energy (5 pilot cases)
✓ Underground (6 pilot cases)

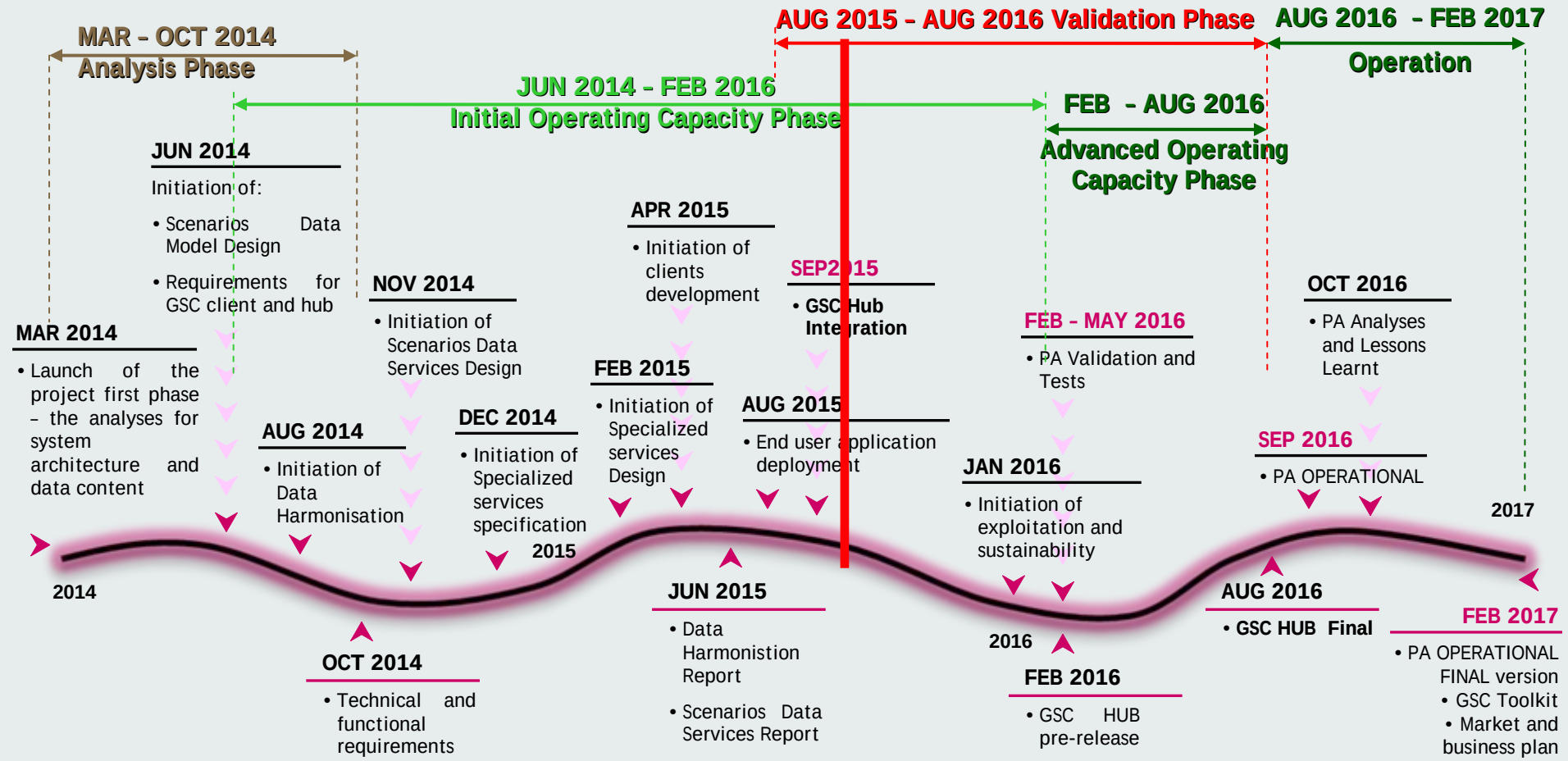
ICT Objectives

- Harmonised environment to integrate different operational protocols and standards, based on existing infrastructures
- Re-use of specialized services based on open standards
- Integration of new base/specialized services
- Ingestion and data integration engine composed by:
  - Harmonised data storage (based on GI standard, open data format)
  - a set of ingestion and data relation services:
    - Ingestion toolkit of GI data (open/restricted)
    - Ingestion toolkit of not-GI data (open/restricted)
    - Refine and reconcile toolkit to link and interconnect data
    - Crowd-sourcing base services based on location services

Ingestion and data integration engine



Road Map


MAR – OCT 2014
Analysis Phase
JUN 2014 – FEB 2016
Initial Operating Capacity Phase
AUG 2015 – AUG 2016 Validation Phase
AUG 2016 – FEB 2017
Operation
FEB – AUG 2016
Advanced Operating Capacity Phase
JUN 2014
Initiation of:
• Scenarios Data Model Design
• Requirements for GSC client and hub
MAR 2014
• Launch of the project first phase – the analyses for system architecture and data content
AUG 2014
• Initiation of Data Harmonisation
NOV 2014
• Initiation of Scenarios Data Services Design
DEC 2014
• Initiation of Specialized services specification
APR 2015
• Initiation of clients development
FEB 2015
• Initiation of Specialized services Design
SEP2015
• GSC Hub Integration
AUG 2015
• End user application deployment
FEB – MAY 2016
• PA Validation and Tests
OCT 2016
• PA Analyses and Lessons Learnt
JAN 2016
• Initiation of exploitation and sustainability
SEP 2016
• PA OPERATIONAL
2014
2015
2016
2017
OCT 2014
• Technical and functional requirements
JUN 2015
• Data Harmonistion Report
• Scenarios Data Services Report
FEB 2016
• GSC HUB pre-release
AUG 2016
• GSC HUB Final
FEB 2017
• PA OPERATIONAL FINAL version
• GSC Toolkit
• Market and business plan

City Pilots and Scenarios

Turku

Flanders Region

South Moravian Region

Comarca of Pamplona

Ruda Slaska (Katowice area)

Reggio nell'Emilia

Girona

Genova

Maroussi

Oeiras

Oeiras

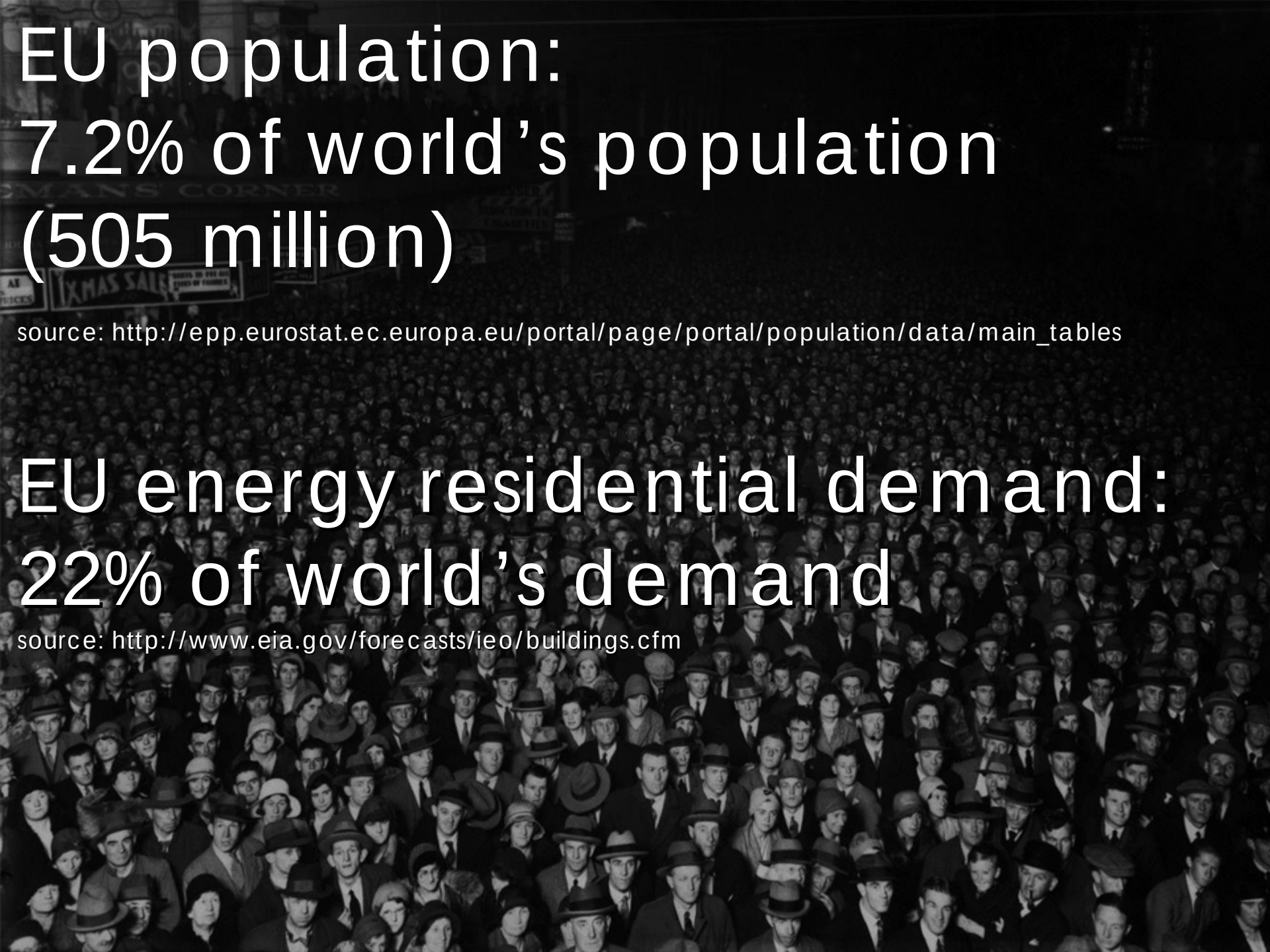
The Green Energy Scenario

few (but big) numbers and contest

Piergiorgio Cipriano

SINERGIS

DEDAGROUP ICT NETWORK



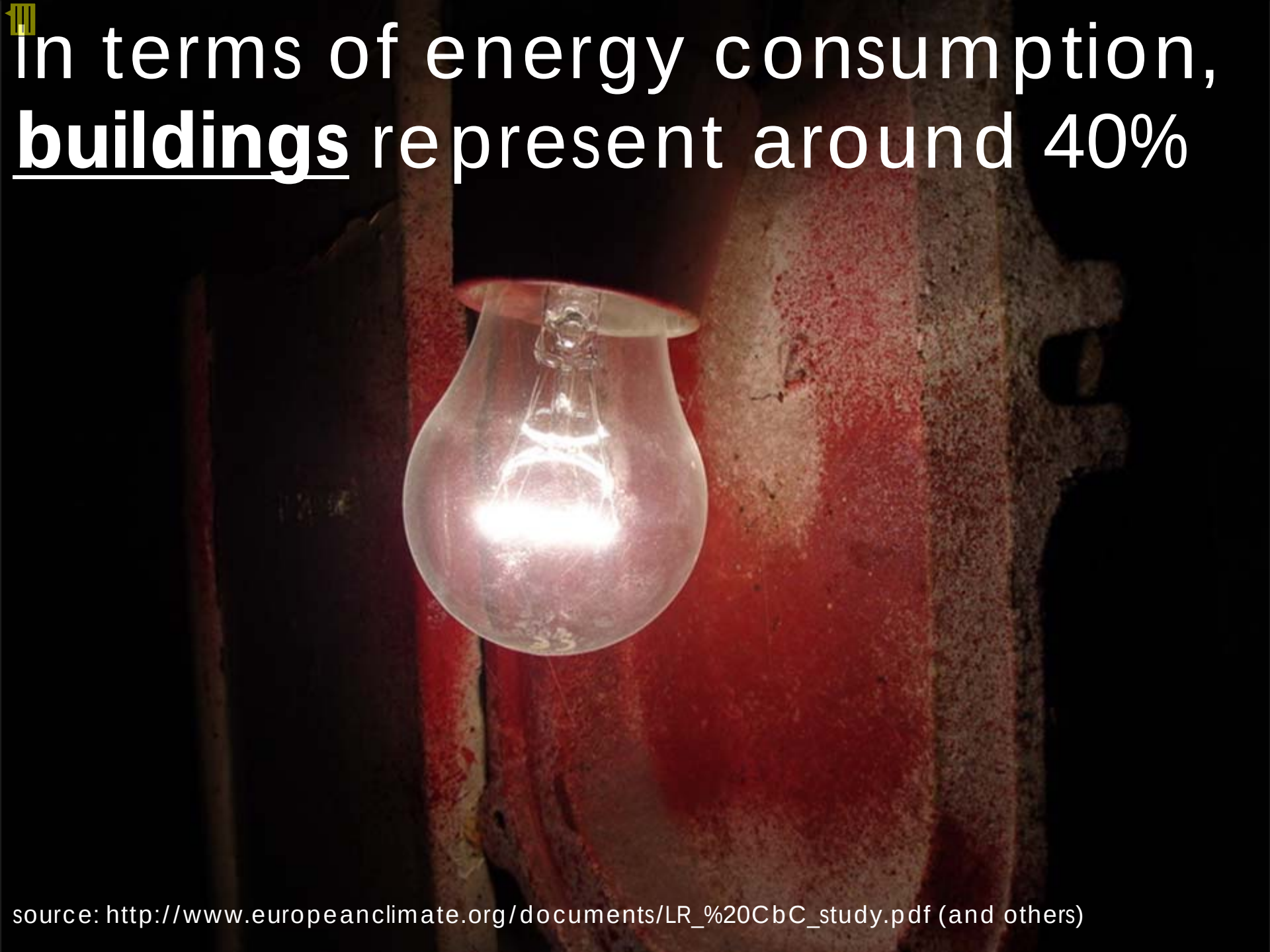
EU population:
7.2% of world's population (505 million)

source: http://epp.eurostat.ec.europa.eu/portal/page/portal/population/data/main_tables

EU energy residential demand:
22% of world's demand

source: http://www.eia.gov/forecasts/ieo/buildings.cfm

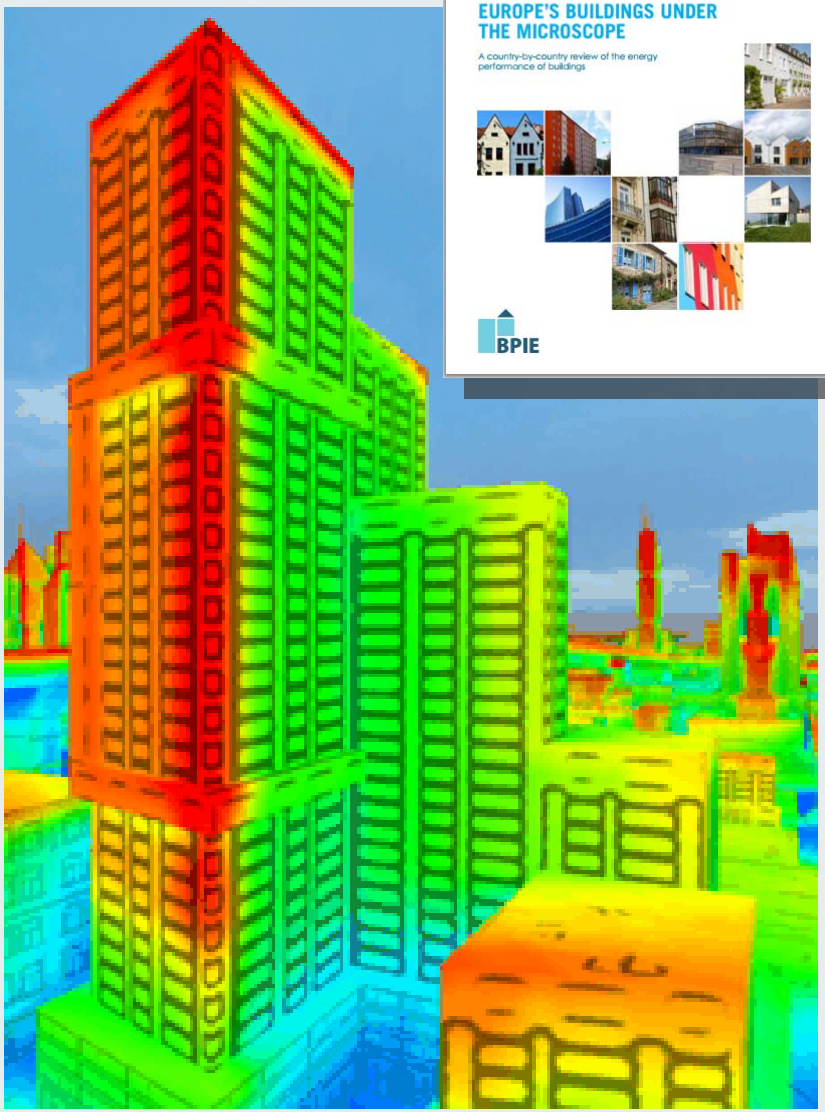

In 2020, the European consumption of energy will be 25 trillion kWh (25,000,000,000,000)
In 2040 it will rise to 28 trillion kWh
source: http://www.eia.gov/forecasts/ieo/


In terms of energy consumption,
buildings represent around 40%
source: http://www.europeanclimate.org/documents/LR_%20CbC_study.pdf (and others)

European households are responsible for **68%** of the total final energy use in buildings, for:

- heating (**70%**)
- cooling
- hot water
- cooking
- appliances

The most used fuel is gas.



source: http://www.europeanclimate.org/documents/LR_%20CbC_study.pdf

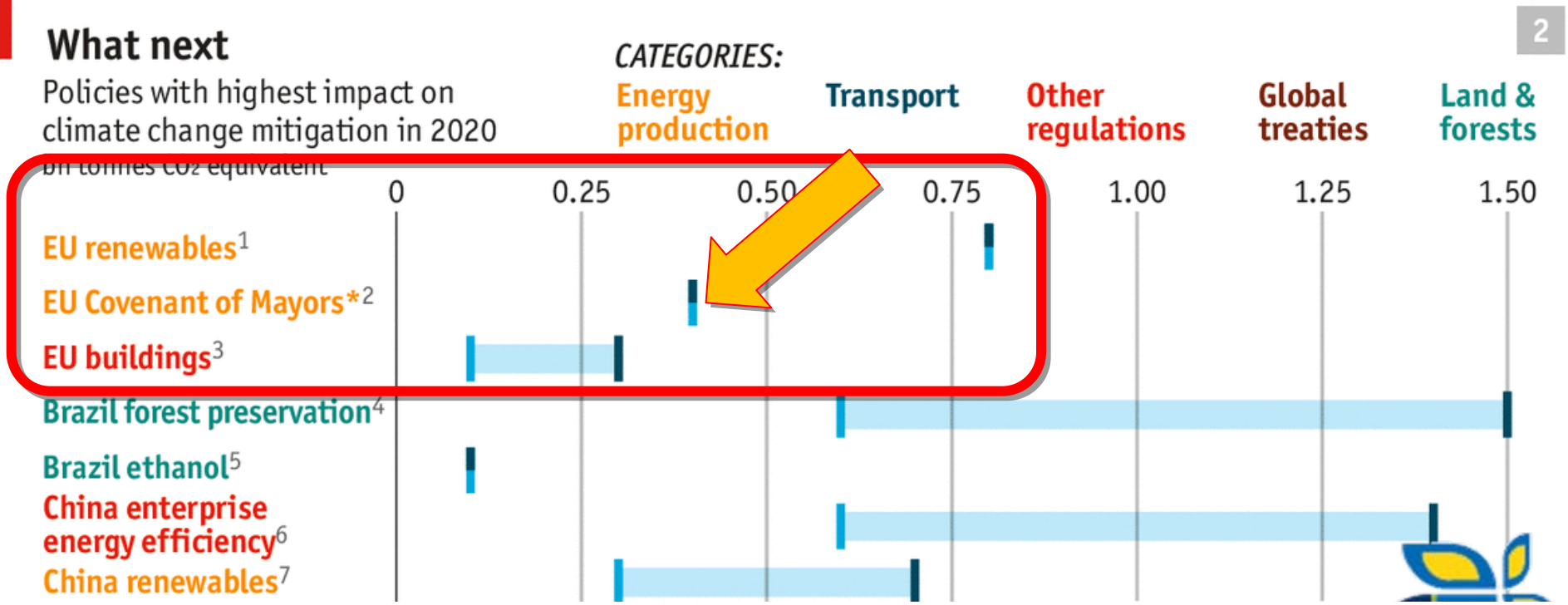
Green Energy Context

The 2020 climate and energy package:

- A 20% reduction in EU greenhouse gas emissions from 1990 levels;
- Raising the share of EU energy consumption produced from renewable resources to 20%;
- A 20% improvement in the EU's energy efficiency.

- ***Reducing greenhouse gas emissions by at least 40%***
- ***Increasing the share of renewable energy to at least 27%***
- ***Increasing energy efficiency by at least 27%***

From: http://ec.europa.eu/clima/policies/2030/index_en.htm



In September 2014 the Economist listed the Covenant of Mayors among '*policies with highest impact on climate change mitigation*'

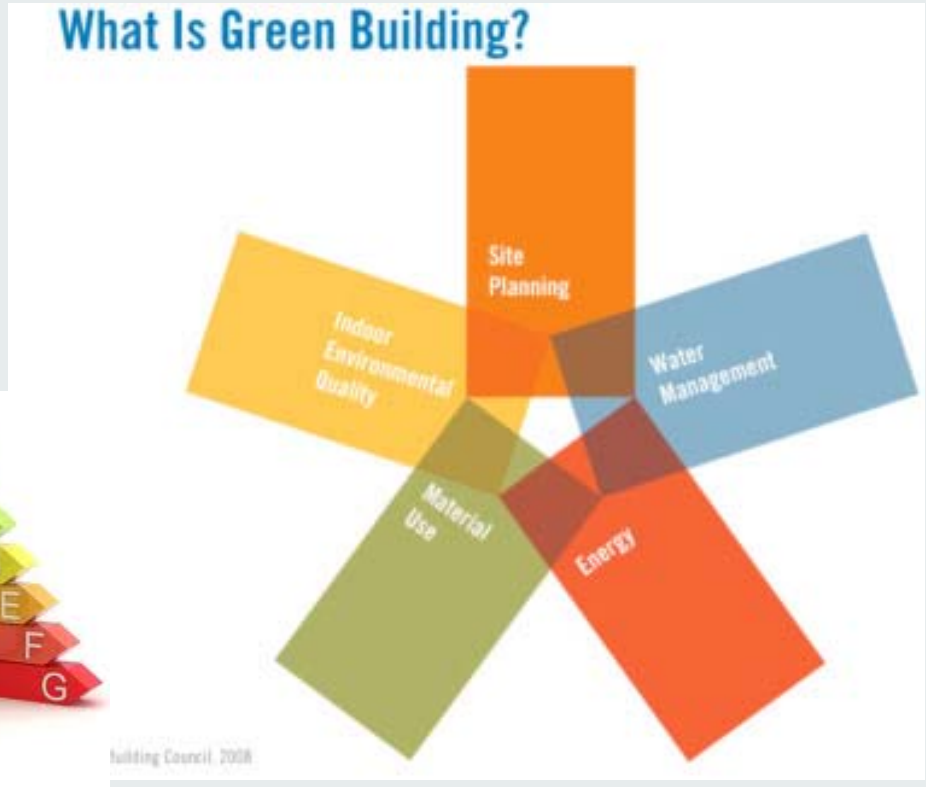
See following panel for sources and explanations

*Urban targets over and above EU or national law
†Determines substitutes for gases replaced under Montreal protocol

http://www.economist.com/news/briefing/21618680-our-guide-actions-have-done-most-slow-global-warming-deepest-cuts

Green Energy Context

- "The Covenant of Mayors" to increase energy efficiency and use of renewable energy sources on their territories (> 6.000 signatories for over 190 Mln people).
- Sustainable Energy Action Plan (SEAP) ➔ CO2 reduction target by 2020
- Related information:
  - Buildings
  - Environmental info
  - Energy Infrastructure
  - Planning
  - Smart grids



GREEN ENERGY Scenario

Objectives:

- To provide the PAs with instruments for the definition and management of their "smart energy" policies
- Support the process of energy transition (traditional to renewable) and to provide the needed knowledge
- Demonstrate the importance of data integration to optimize and improve the use of energy resources: real time sensors (enviro/climate/energy consumption), smart metering, smart grid
- To activate and test, on real use cases with high added value, new public-private collaborations
- To create an environment which favours the economic development at territorial level by exploiting the opportunities from the energy transition and the ICT potentiality

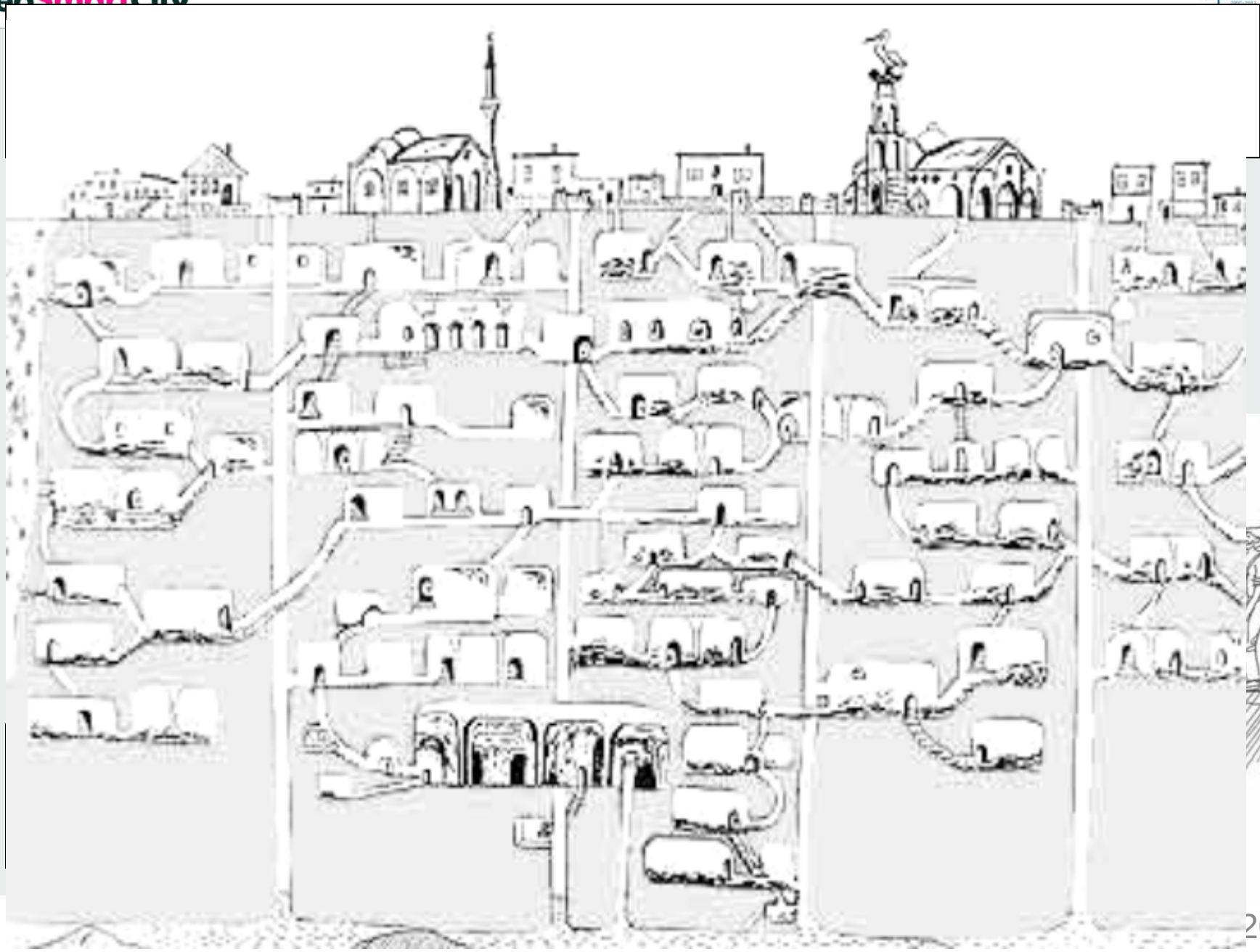
5 pilot cases (IT, GR, PT, FI, ES)

UNDERGROUND SCENARIO

tracasa

Maria Cabello

mcabello@tracasa.es



Underground Context

- Different infrastructure under the same area
- Unconnected information for the management of assets and systems (damages during maintenance activities)
- Environmental ← impact → infrastructure
- Safety and security

UNDERGROUND Scenario

Objectives: enforce the dialogue between utility companies and Public Administrations to improve the sharing of underground data and the data flow toward and from the Public Administration.

Benefits:

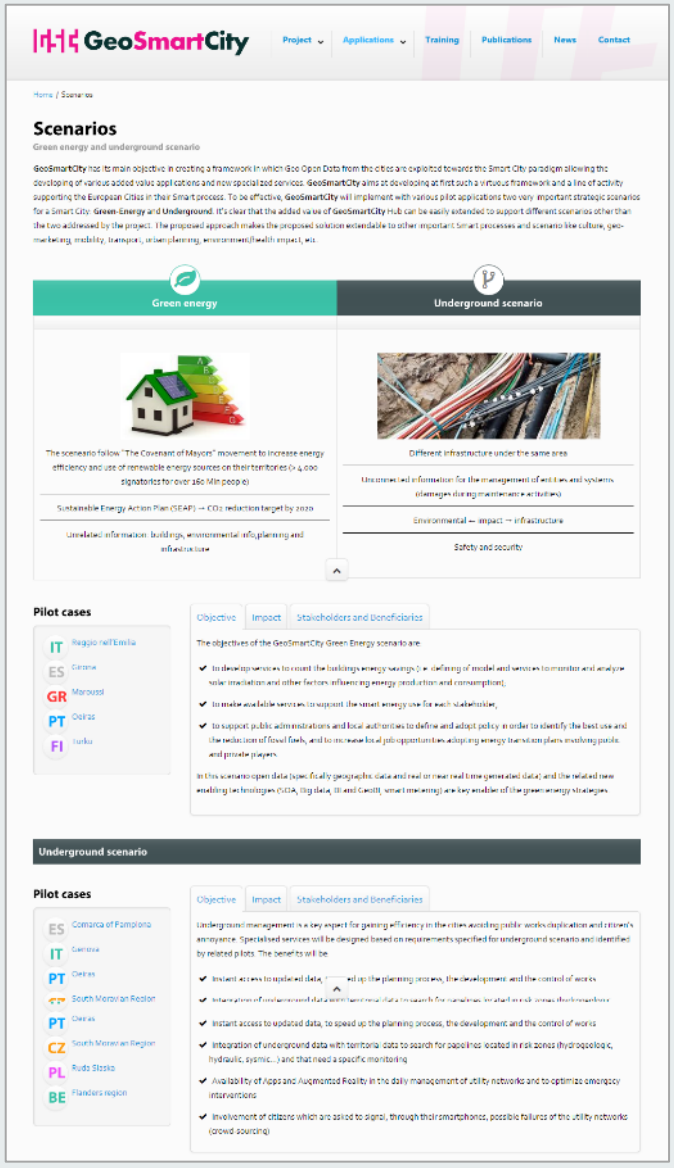
•access to updated data, to speed up the planning process, the development and the control of works

•Integration of underground data with territorial data to search for papelines located in risk zones (hydrogeologic, hydraulic, sysmic…) and that need a specific monitoring

•Availability of Apps and Augmented Reality in the daily management of utility networks and to optimize emergecy interventions

•Involvement of citizens which are asked to signal, through their smartphones, possible failures of the utility networks (crowd-sourcing)

6 pilot cases (ES, IT, PT, BE, CZ, PL)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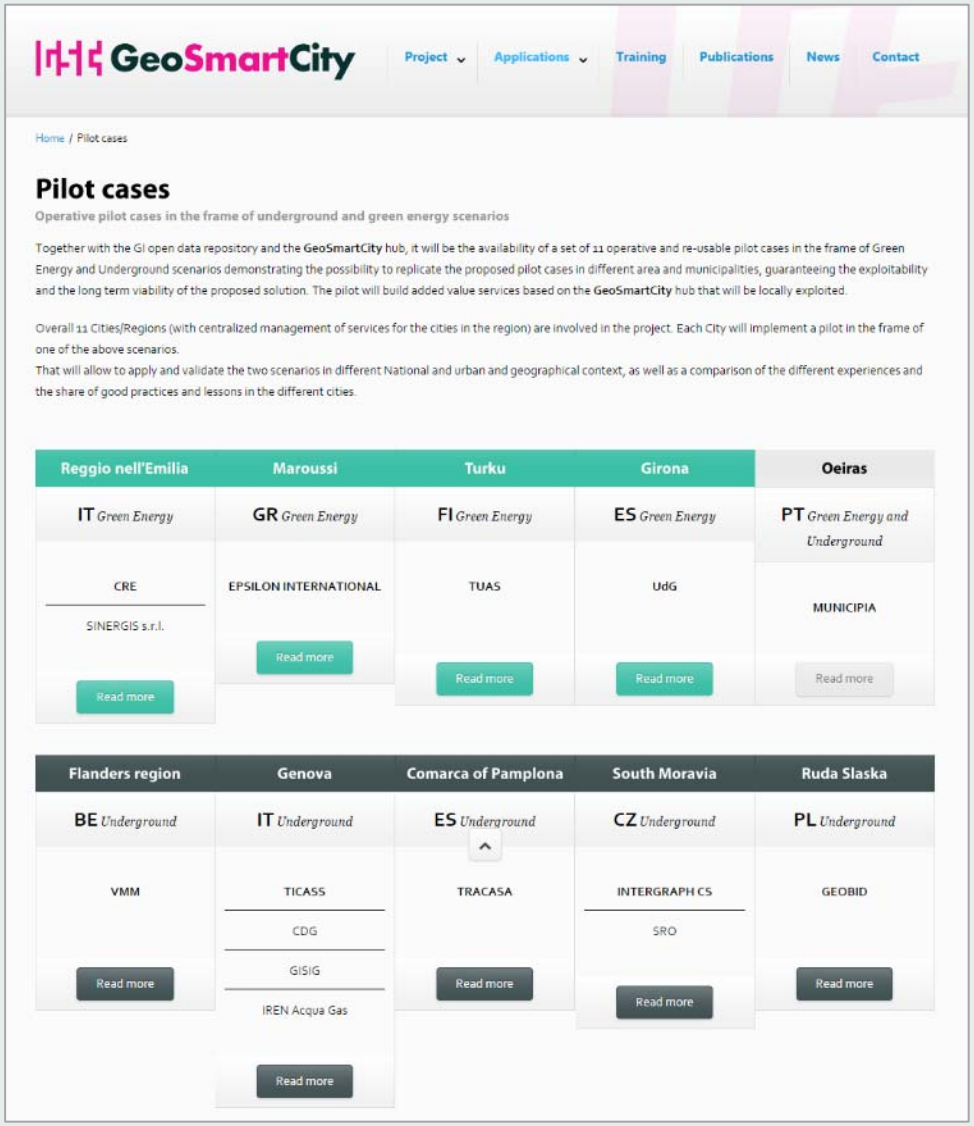
Scenarios
Green energy and underground scenario
GeoSmartCity has its main objective in creating a framework in which Geo Open Data from the cities are exploited towards the Smart City paradigm allowing the developing of various added value applications and new specialized services. GeoSmartCity aims at developing at first such a virtuous framework and a line of activity supporting the European Cities in their Smart process. To be effective, GeoSmartCity will implement with various pilot applications two very important strategic scenarios for a Smart City: Green Energy and Underground. It's clear that the added value of GeoSmartCity Hub can be easily extended to support different scenarios other than the two addressed by the project. The proposed approach makes the proposed solution extendable to other important Smart processes and scenarios like culture, geo-marketing, mobility, transport, urban planning, environment/health impact, etc.
Green energy
Underground scenario
The scenario follow "The Covenant of Mayors" movement to increase energy efficiency and use of renewable energy sources on their territories (> 4.000 signatories for over 160 Mln people)
Sustainable Energy Action Plan (SEAP) → CO2 reduction target by 2020
Unrelated information: buildings, environmental info,planning and infrastructure
Different infrastructure under the same area
Unconnected information for the management of utilities and systems (damages during maintenance activities)
Environmental → impact → infrastructure
Safety and security
Pilot cases
IT Reggio nell'Emilia
ES Girona
GR Maroussi
PT Oeiras
FI Turku
Objective
Impact
Stakeholders and Beneficiaries
The objectives of the GeoSmartCity Green Energy scenario are
In this scenario open data (specifically geographic data and real or near real time generated data) and the related new enabling technologies (VGI, Big data, IR and GeoIR, smart metering) are key enablers of the green energy strategies
Underground scenario
Pilot cases
ES Comarca of Pamplona
IT Genova
PT Oeiras
South Moravian Region
PT Oeiras
CZ South Moravian Region
PL Ruda Slaska
BE Flanders region
Objective
Impact
Stakeholders and Beneficiaries
Underground management is a key aspect for gaining efficiency in the cities avoiding public works duplication and citizen's annoyance. Specialised services will be designed based on requirements specified for underground scenario and identified by related pilots. The benefits will be:
Instant access to updated data, to speed up the planning process, the development and the control of works
Integration of underground data with territorial data to search for pipelines located in risk zones (hydrogeological, hydraulic, sysmic...) and that need a specific monitoring
Availability of Apps and Augmented Reality in the daily management of utility networks and to optimize emergency interventions
Involvement of citizens which are asked to signal, through their smartphones, possible failures of the utility networks (crowd sourcing)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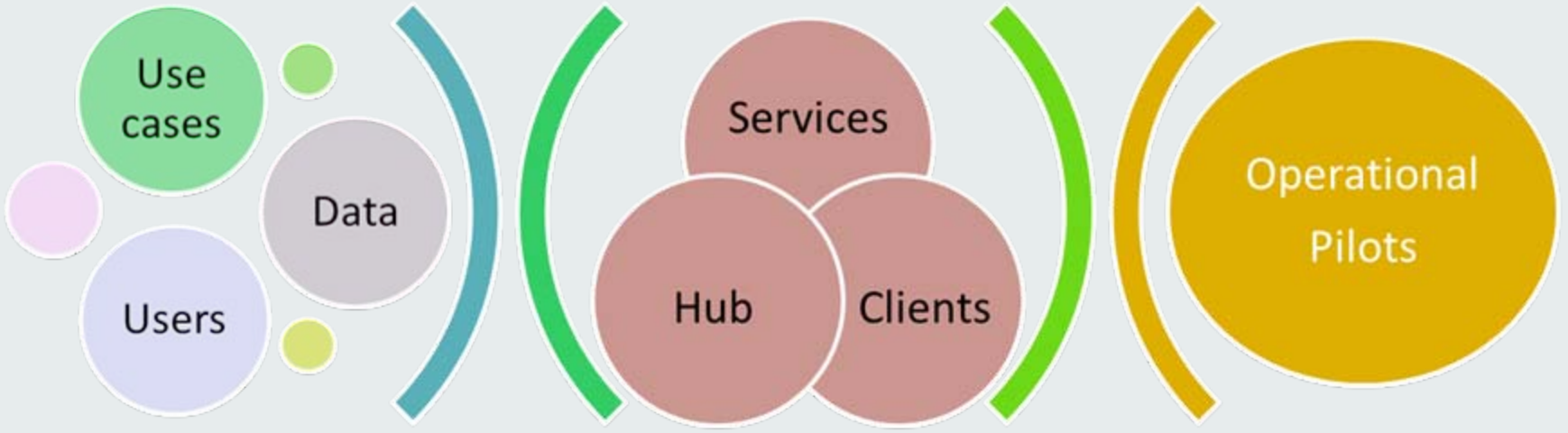
Home / Pilot cases
Pilot cases
Operative pilot cases in the frame of underground and green energy scenarios
Together with the GI open data repository and the GeoSmartCity hub, it will be the availability of a set of 11 operative and re-usable pilot cases in the frame of Green Energy and Underground scenarios demonstrating the possibility to replicate the proposed pilot cases in different area and municipalities, guaranteeing the exploitability and the long term viability of the proposed solution. The pilot will build added value services based on the GeoSmartCity hub that will be locally exploited.
Overall 11 Cities/Regions (with centralized management of services for the cities in the region) are involved in the project. Each City will implement a pilot in the frame of one of the above scenarios.
That will allow to apply and validate the two scenarios in different National and urban and geographical context, as well as a comparison of the different experiences and the share of good practices and lessons in the different cities.
Reggio nell'Emilia
IT Green Energy
CRE
SINERGIS s.r.l.
Read more
Maroussi
GR Green Energy
EPSILON INTERNATIONAL
Read more
Turku
FI Green Energy
TUAS
Read more
Girona
ES Green Energy
UdG
Read more
Oeiras
PT Green Energy and Underground
MUNICIPIA
Read more
Flanders region
BE Underground
VMM
Read more
Genova
IT Underground
TICASS
CDG
GISIG
IREN Acqua Gas
Read more
Comarca of Pamplona
ES Underground
TRACASA
Read more
South Moravia
CZ Underground
INTERGRAPH CS
SRO
Read more
Ruda Slaska
PL Underground
GEOBID
Read more

Use Cases and Requirements

PROJECT PHASES



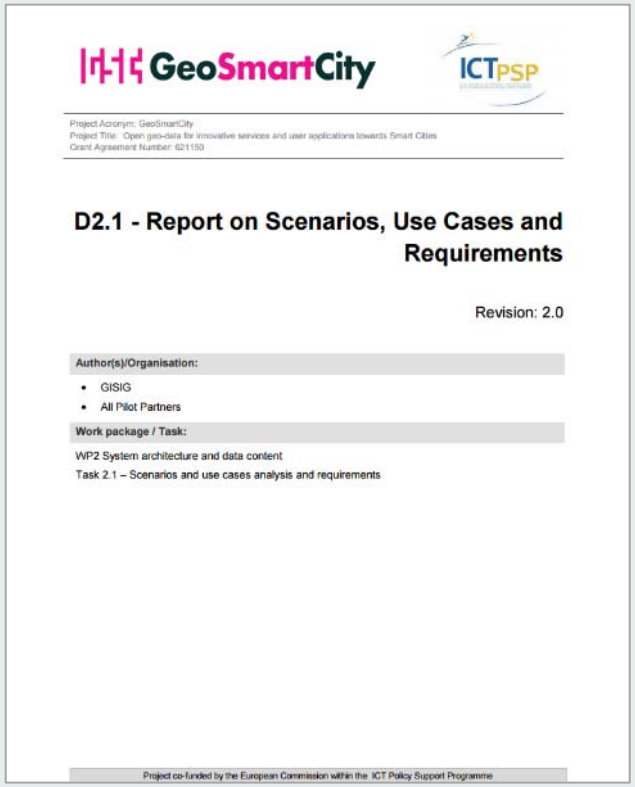
Use case analysis and description

Requirements analysis and description

Technical specifications

Real Deployment

USE CASES AND REQUIREMENTS



GeoSmartCity

ICTPSP

Project Acronym: GeoSmartCity
Project Title: Open geo-data for innovative services and user applications towards Smart Cities
Grant Agreement Number: 621159

D2.1 - Report on Scenarios, Use Cases and Requirements

Revision: 2.0

Author(s)/Organisation:

- GISIG
- All Pilot Partners

Work package / Task:

WP2 System architecture and data content
Task 2.1 – Scenarios and use cases analysis and requirements

Project co-funded by the European Commission within the ICT Policy Support Programme

- Focus on Use Case analysis and description (and also early requirements collection)
- Introduces the methodology for the second step ” Functional Requirements analysis
- Based on a common use cases definition

Pilots are not immutable, some use case have been refined or better described the during technical specification phase

USE CASES AND REQUIREMENTS

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Task 2.1 - Scenarios and use cases anal

GSC - WP2
June 13, 2014

This is a repository of use-cases for the task 2.1.

- Pilot01: Girona - Scenario: Green Energy
- Pilot02: Reggio nell'Emilia - Scenario: Green Energy
- Pilot03: Maroussi - Scenario: Green Energy
- Pilot04: Oeiras - Scenario: Green Energy
- Pilot05: Turku - Scenario: Green Energy
- Pilot06: Comarca of Pamplona - Scenario: Undegrou
- Pilot07: Genova - Scenario: Undeground
- Pilot08: Oeiras - Scenario: Undeground
- Pilot09: South Moravian Region - Scenario: Undegr
- Pilot10: Ruda Slaska (Katowice area) - Scenario: Ur
- Pilot11: Flanders region - Scenario: Undeground

Files

- GeoSmartCity_Use-Cases_03_GISIG.doc - Use Cas
- GeoSmartCity_Use-Cases_VMM.doc - Use Cases doc
- GeoSmartCity_Use-Cases_2014_06_04.doc - Use
- GeoSmartCity_Use-Cases_eps.doc - Use Cases docu
- UC-GSCP04-01 - Oeiras_Urban Sustainable Planni

2014 05:50 PM

- UC-GSCP04-02 - Oeiras_EventManagementUnderg

2014 05:55 PM

- GeoSmartCity_Use-Cases_Underground_INGR_DR

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- GeoSmartCity_Use-Cases_SIGTE_v2.docx - Use cas
- GeoSmartCity - Ruda ?l?ska 29_07.pdf - Use cases
- GeoSmartCity_Use-Cases_Underground_INGR_So

Gorni, July 30, 2014 12:44 PM

- GeoSmartCity_Use-Cases_SIGTE_v3.docx - Use cas
- GeoSmartCity_Use-Cases_07_TRACASA_v2.doc -

GeoSmartCity

Initial conditions

List the conditions/constraints which need to be taken into account during the execution of the use case. For example the actor has to download an application for running the system locally or some configurations have to be done prior to executing the use case, etc.

Example:

- The user must be logged
- Data is available and published via OGC services…
- Data should be harmonized in..
- The user must approve license conditions first
- …

Main process

Simply imagine the operation of the system and document the steps in using it. Be short and concise in describing the interactions between the system and its external actors, related to a particular goal.

Describe the consecutive steps (Flow of Events) during the main process of the use case in the following form: *ACTOR does something.*

Example:

1. The PLANNER and/or the RESEARCHER logs in into the SYSTEM
2. The SYSTEM provides…
3. The USER can make a choice between…
4. The USER selects…
5. The SYSTEM returns…
6. …

Alternative process (Optional)

Description of the consecutive steps in an alternative process.

Example:

- Instead the steps X to Y, A to D can be chosen

Exceptional Situations (Optional)

Description of exceptional situations which can occur during the execution of the use case including the step in which the situation can occur and the handling of the exception by the SYSTEM

Example:

- Main process step 5: Online connection to web service not available
  - SYSTEM displays error message

GeoSmartCity

Use case main user/functional requirements

Based on the workflow detailed before (Main process), here we ask you to list all functions that the GeoSmartCity system is supposed to accomplish to fulfil the objective of your use case.

Example:

- The GeoSmartCity Hub should handle and process the…
- The GeoSmartCity mobile client should be able to…
- …

Final results

Description of results of the use case execution, e.g. generated datasets (persistent or not, form of data set, e.g. file, report, database) or a certain state of the system.

Example:

- Geodata in different layers are available to planners and professionals for browsing and analysis….
- WMS and/or WFS can be integrated into a Desktop GIS
- …

UML Activity diagram (Optional)

Activity diagrams are graphical representations of step-by-step workflows of activities and actions.

There are some good free open source UML tools you can choose.

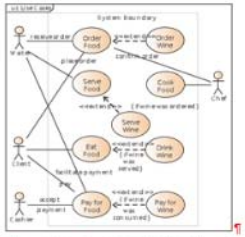
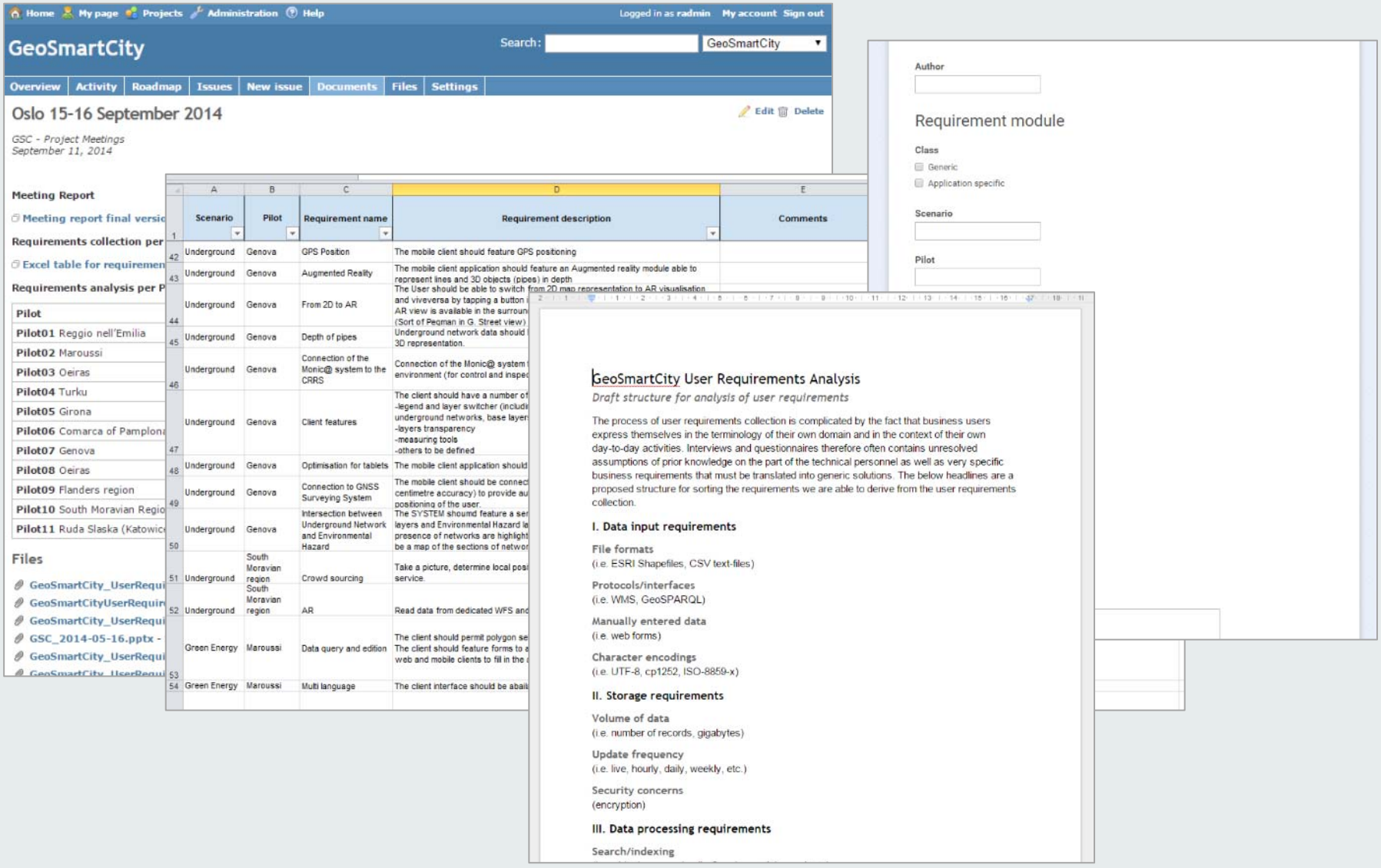


Figure 1: Use Case "XXXXXX" UML diagram

USE CASES AND REQUIREMENTS



Green Energy Pilots

5 pilot cities involved in this scenario

- Reggio Emilia (Italy)
- Maroussi (Greece)
- Oeiras (Portugal)
- Turku (Finland)
- Girona (Spain)

13 Use Cases collected

61 requirements (functional, non-functional, generic)

Reggio Emilia (Italy)

Use cases

- Publication of energy performance of municipal buildings
- Publication of energy performance of other buildings

General objectives

- Integrate geodata and energy data for strategic purposes
- Provide integrated open geodata

Main requirements

- Estimate energy performance and CO2 emissions
- Energy maps and reports, interoperable access to data

Maroussi (Greece)

Use cases

- Data collection via field survey and crowdsourcing
- Energy map creation
- Data publication

General objectives

- Enable citizens and SMEs to make valuable comments and enhance their energy consumption behavior

Main requirements

- Mobile app for editing buildings' properties
- Searching capabilities for buildings
- Provide open geodata through the hub

Oeiras (Portugal)

Use cases

- Urban sustainable planning tool
- Zero-balance calculation
- Calculation of energy performance of buildings

General objectives

- Monitor energy consumption in public buildings
- Achieve a balance between various urban areas

Main requirements

- Calculate solar potential and electric balance
- Reports, statistics

Turku (Finland)

Use cases

- Selecting green route
- Green driving
- Green parking

General objectives

- Shift from private to public transportation in commuter traffic
- Acquire real-life information that can be utilized in city planning and decision making

Main requirements

- Bike routing, bus timetables, paths for commuters
- Estimation of fuel consumption, collect stats

Girona (Spain)

Use cases

- “I want to ride my bicycle, I want to ride it where I like”
- Find healthy bike route

General objectives

- Encourage alternative/light transportation
- Involve city users and stakeholders in data integration

Main requirements

- Provide updates to OpenStreetMap
- Estimate pollution, calculate bike routing

Green Energy Scenario

GeoSmartCity

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The ICT-PSP European project GeoSmartCity establishes a cross-platform, able to publish open GI and to provide specialized services based on open standards.

Virtual hub

For integration and publishing of local, web based, real-time sensor or user-generated open geo-information. Learn more

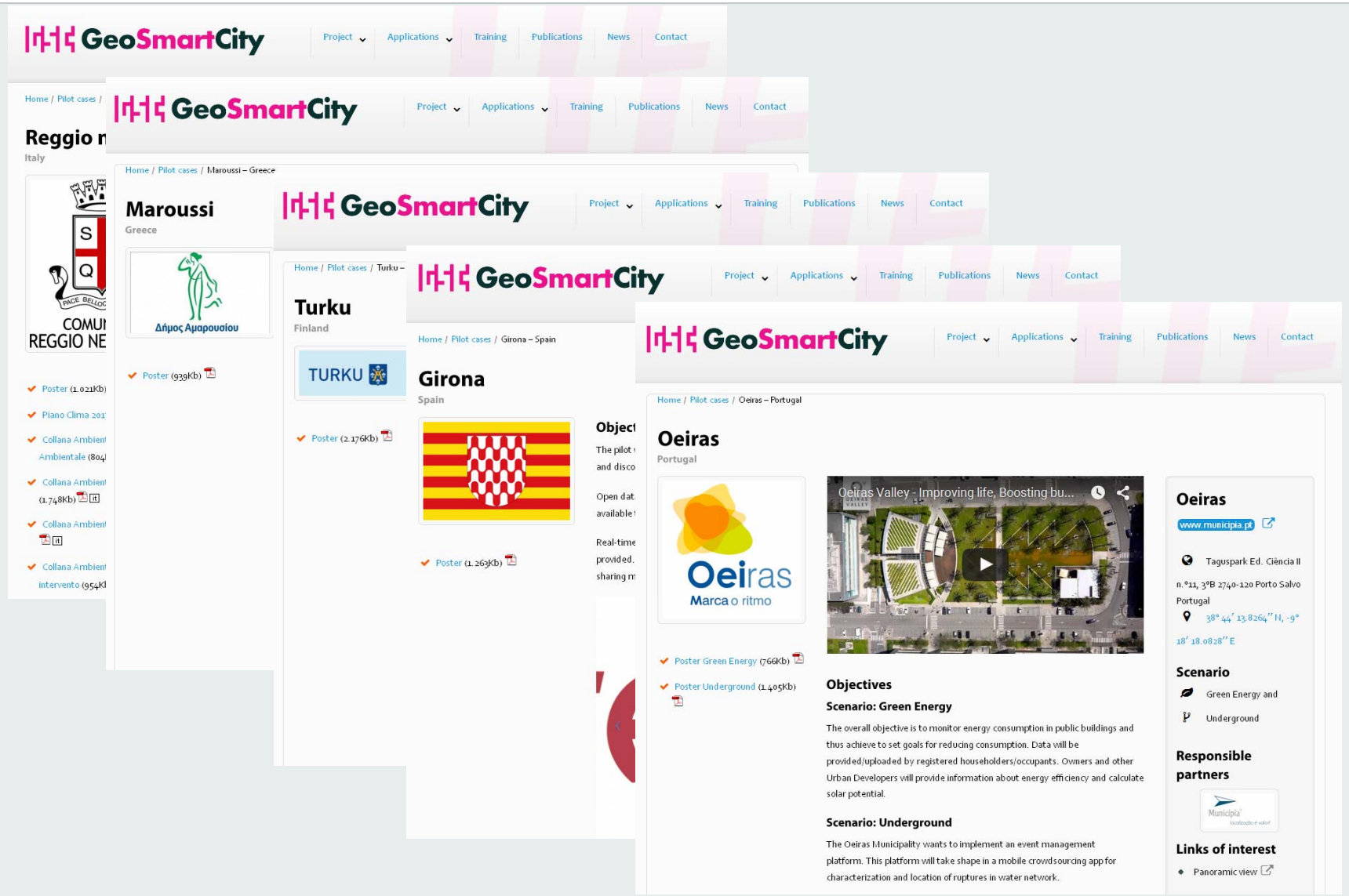
Pilot cases

The potentiality of GeoSmartCity is demonstrated through the development of 11 operative and re-usable pilot cases in the frame of the two scenarios: Green-Energy and Underground. Learn more

Innovative services

To facilitate the day-to-day operation and management of key municipal infrastructure sectors and public utilities activities. Learn more

Green Energy Scenario



Underground Pilots

Status

- 6 pilot sites in EU
- 12 Use cases
- 61 User/System Requirements

Commonalities

- The improvement of the efficiency of the underground network management (mainly in terms of integration of resources from different actors)
- The citizen involvement (crowdsourcing mobile apps)

Pilot in Pamplona (Spain)

Use cases:

- Consulting real-time data of the water supply and sanitation systems in a GIS viewer.
- Check smart sensor values or incidents in networks

General Objectives:

- They want to improve the water and sewage GIS existing platform:
- Integrating **real-time information** provided by smart sensors through a SCADA system (a computer system for gathering and analyzing real time data)
- Consult a map with values from sensors or incidents from SCADA

Main requirements:

- The SCADA system should be linked to the GIS through standardized protocols
- An interface should enable the user to communicate with the SCADA system to consult the real-time data
- The platform should enable the user to generate thematic maps (geoprocessing)

Pilot in Genova (Italy)

Use cases:

- Underground Cadastre
- Excavation procedure
- Field works
- Underground networks and environmental hazards

General Objectives:

- **Integrate different underground information** layers from different actors (mainly Municipality and Multi-utilities)
- Include **INSPIRE** compliant data in the city underground data management workflow (Harmonisation of gas, water and sewer datasets)
- Use of mobile client for data management
- Use of advanced visualization techniques such as **Augmented Reality**
- Use of a high precision positioning (**GNSS**) device integrated with mobile client for field works
- Intersection between Underground Network and **Environmental Hazard information**

Pilot in Oeiras (Portugal)

Use cases:

- Underground Event Management

General Objectives:

- As in the case of the Oeiras Pilot in the Green Energy scenario, the Municipality wants to implement an event management platform.
- This platform will take shape in a mobile **crowdsourcing** app for characterization and location of **ruptures in water network**.
- The System shall serve as a Metadata and Open Data provider through Web Services (WMS, WCS, ...).

Main requirements:

- An authenticated user must approve the crowdsourcing inputs to appear on the map.
- The web client should ensure different authentication levels depending on user roles.
- Open data: All information must be available to be used by applications from other stakeholders.

Pilot in South Moravian Region (CZ)

Use cases:

- Mobile application

General Objectives:

- Focus the provision or **volunteered geographic information** (VGI) trough a mobile app to report a problems on the public underground infrastructure.
- Use of mobile clients by municipalities and companies technicians (equipped with innovative visualization features such as **Augmented Reality**) to support the management and update of existing data on the field.

Main requirements:

- Take a picture, determine local position, user comment and send it to appropriate service.
- Read data from dedicated WFS and display them in AR environment.

Pilot in Ruda Śląska (Poland)

Use cases:

•An integrated WebGIS platform giving the ability to verify/update basic information on the underground networks and to share the data in order to clarify the ownership issues.

General Objectives:

•Similar to the Genova case, this pilot also focuses on the **integration and harmonization of the underground network** data coming from the municipality and the Utility companies.
•Data and specialized services will be integrated in existing GIS platform supporting an integrated approach on the management and maintenance of the networks.

Main requirements:

•Mobile and web clients
•Authenticated access to information and permission roles

Pilot in Flanders Region (Belgium)

Use cases:

- Mobile application for the management of the sewage database
- Crowd-sourcing tool

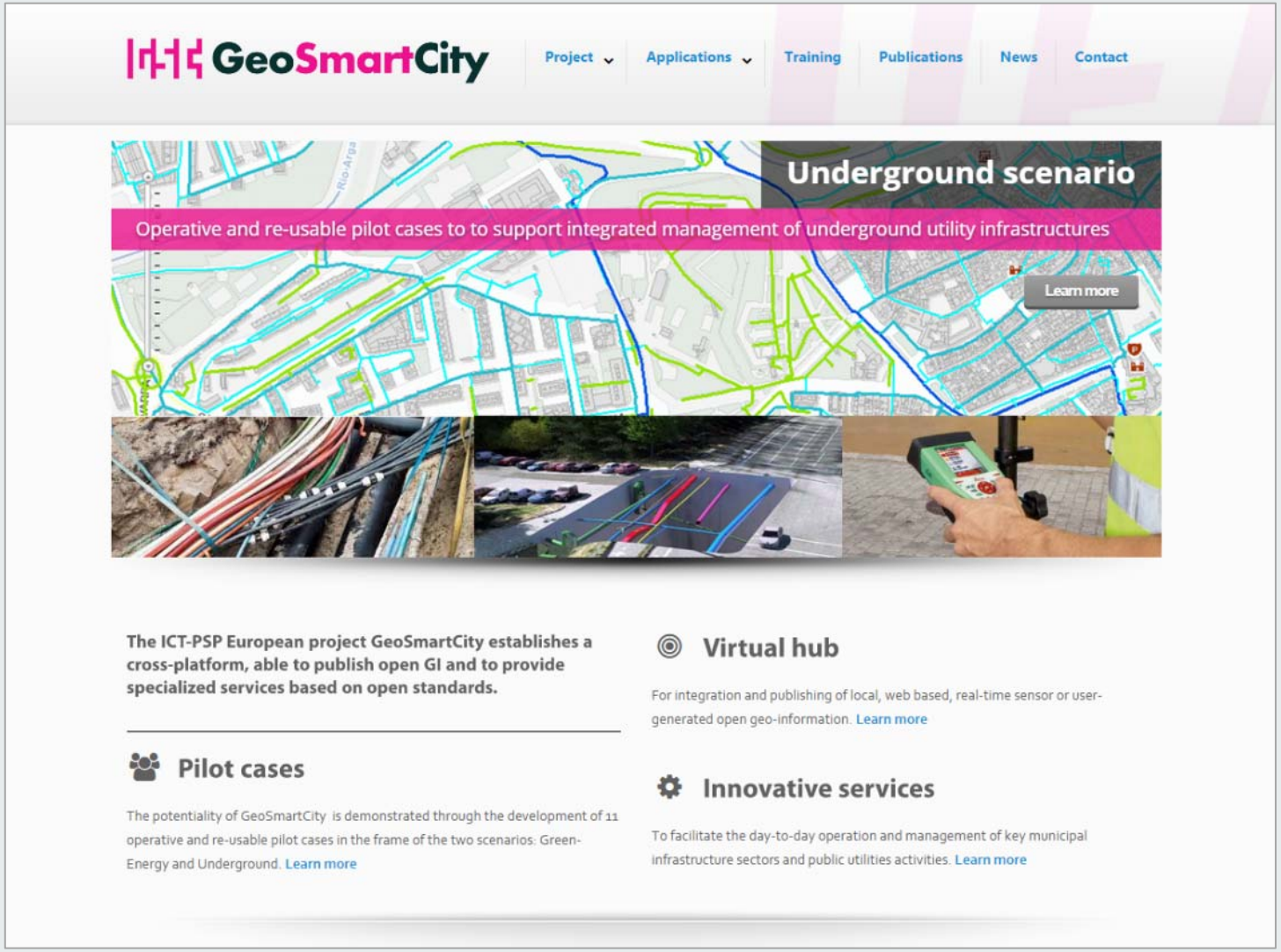
General Objectives:

- Focus on the conformance of the Flanders sewer network data to **INSPIRE** specifications
- Manage sewage network from a **mobile/web client** application
- Integrate in the system a **crowdsourcing** component so the sewage database can be consulted by the public in order to report possible anomalies or remarks.

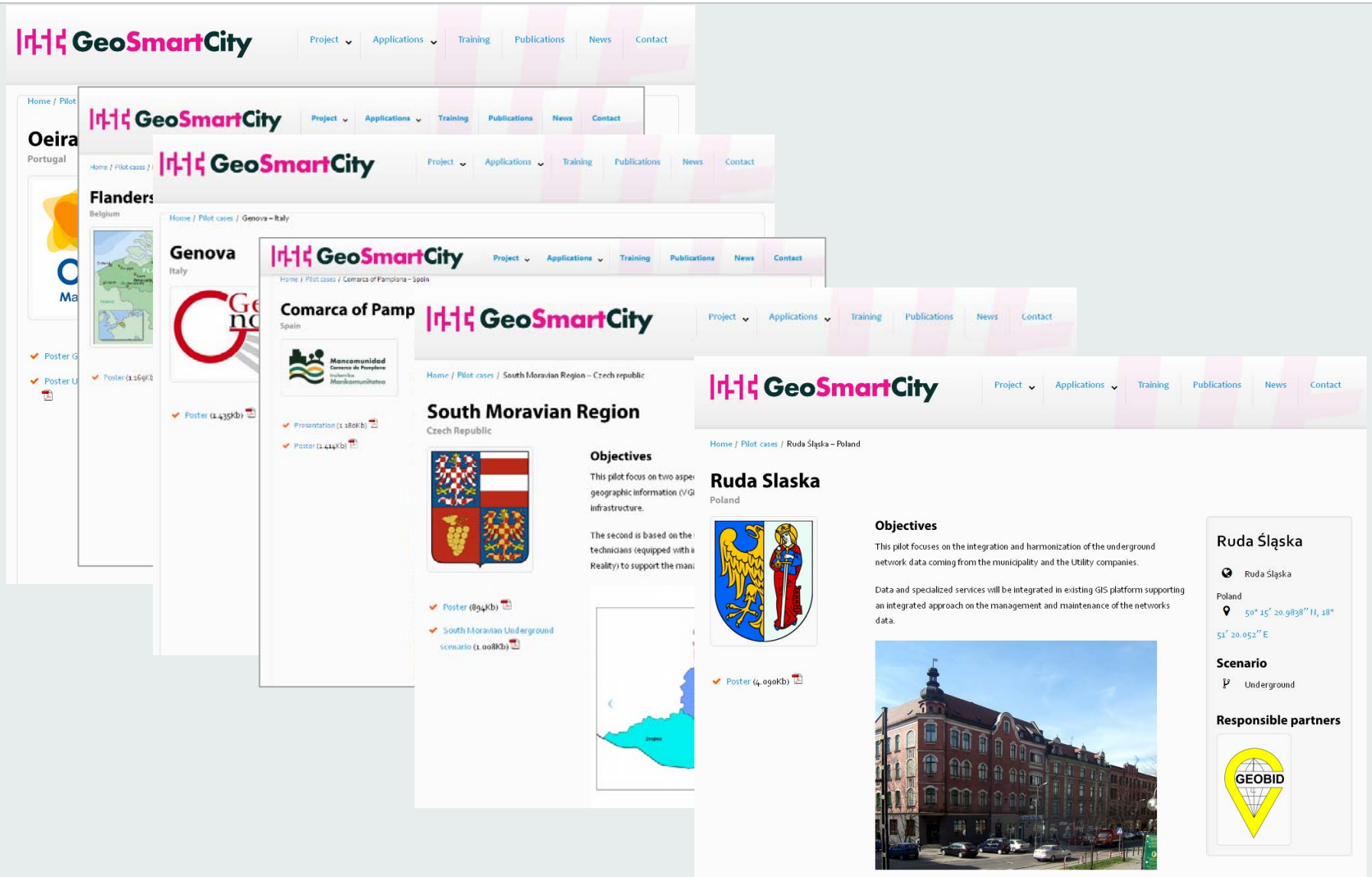
Main requirements:

- The application must give the opportunity to professionals to enter data, upload different files and to propose changes to geodata.
- The updates (by the users) are live but will only be implemented in the sewage database after validation.

Underground Scenario



Underground Scenario



See more in the next presentations…

10:00 - 10:45	• The GeoSmartCity technical approach (SINERGIS-AVINET)
11:15-12:15	**Green Energy model** • The GeoSmartcity Data model and Data harmonization - *G. Martirano (Epsilon Italia)* • Girona Pilot description *(University of Girona)*
12:15 - 13:00	**Networking and conclusions** • Exploitation towards Thematic Communities, Training Framework and stakeholders involvement – *G. Saio (GISIG)* • Discussion and workshop conclusions