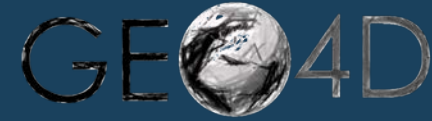




Co-funded by the  
Erasmus+ Programme  
of the European Union



**POLITECNICO**  
MILANO 1863



# INNOVATIVE TEACHING @ POLITECNICO DI MILANO - giCASES -

Maria. A. Brovelli  
Politecnico di Milano – DICA | GEOLab

11/09/2019



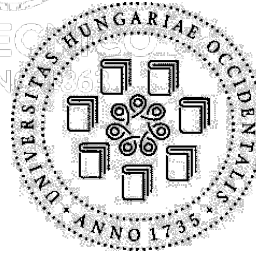
# About giCASES (January 2016 – January 2019)

- ✓ **giCASES** - Creating a university-enterprise Alliance for a Spatially Enabled Society (in the context of Geographic Information)
- ✓ Knowledge Alliance project under the Erasmus+ programme of the European Commission
- ✓ The giCASES project main goals were:
  - Enable and strengthen innovation in GI education and industry
  - Facilitate the collaborative creation, management and sharing of knowledge
- ✓ New learning material was created in collaboration of **industrial partners and universities**
- ✓ Creation and delivery of **training material and courses** was based on **6 real cases**
- ✓ Case-based approach was a way to engage students in **real-world examples**.

giCASES partners



POLITECNICO  
MILANO 1863



UNIVERSITY  
OF SOPRON



Novogit AB



INNOVATION



ISPRA  
Istituto Superiore per la Protezione  
e la Ricerca Ambientale



# Case studies



POLITECNICO  
MILANO 1863

Case Study	University	Enterprise
✓ CS1. Use of indoor GIS in healthcare	POLIMI	TRILOGIS
✓ CS2: Environmental analysis using cloud service system	NOVA IMS	ISPRA
✓ CS3. Location enablement of e-Government	KU Leuven	GISIG
✓ CS4: Integrated management of the underground	PLUS	Digpro
✓ CS5: Harmonizing data flows in Energy saving EU policies	POLIMI	EPSIT
✓ CS6: Forest management	UWH	EPSGR
✓ CS7: Harmonized data and services in forest fire management	UWH	EPSGR

# Case studies

## ✓ Environmental analysis using cloud service system

- Assessment of potential hazard to Sites of Community Importance (SCI) areas (i.e. species and habitats of interest) caused by agrochemicals and pesticides
- Use of new web technologies and GIS analysis
- Implementation as **Master thesis in International Master in Geographic Information Systems and Science** at NOVA-IMS in collaboration with ISPRA

## ✓ Location enablement of e-Government

- Experience at making spatial data available, for decision making and e-Government, using state-of-the art methods and tools
- Integration of INSPIRE Directive components
- Design, develop and/or test location enabled applications by using knowledge and skills of GIS, Spatial Data Infrastructures and Information and Communications Technologies
- Developed within the **course “Geographic Information Systems (GIS) Internship”** (15 ECTS) at KU Leuven in collaboration with Geosparc NC and GISIG

# Case studies



POLITECNICO  
MILANO

## ✓ Integrated management of the underground

- *Asset management of utility networks and the sharing of utility network data by following INSPIRE Directive*
- *Use of technologies for publishing utility network data and GIS applied to utility network information*
- *Implemented as an **elective course included in International Master in Applied Geoinformatics** offered by University of Salzburg in collaboration with Digpro Technologies AB, Novogit AB, GISIG*

## ✓ GIS Applications in Forestry

- *Introduce the GIS tools that can be used in forest management, and to provide novel data processing, spatial and multi-objective methods*
- *Use of complex tools and methods serving at the real-world fire cases, geospatial analysis and simulation of forest fire events and creation of thematic maps*
- *Implemented within **Forestry MSc Programme (2 ECTS)** offered by University of Sopron in collaboration with Epsilon International SA*

# Case studies - Use of indoor GIS in healthcare

- ✓ Integration of indoor location for tracking and managing assets (human or material) based on open Geographic Information Systems (GIS)
- ✓ Interaction between POLIMI and TRILOGIS company
- ✓ Developed within the course “Geographic Information Systems (GIS)” (10 CFU), offered at Politecnico di Milano as a lab project of the course:
  - 5 groups of students
  - 15 hours in class with tutors + 50 hours of additional project work
- ✓ Learning objectives:
  - Location Based Services
  - Indoor Location Based Services principles
  - OGC Indoor GML standard
  - Geospatial Web
  - WebGIS

# Case studies - Use of indoor GIS in healthcare

## Course contents:

1. Introduction to geospatial web and web geoservices
  - ✓ Geospatial Web
2. Geospatial web servers and clients to create Web Mapping applications
  - ✓ GeoServer overview
  - ✓ Practicing with GeoServer
  - ✓ Introduction to OpenLayers - 1
  - ✓ Introduction to OpenLayers – 2
3. Indoor positioning and applications
  - ✓ Indoor Localization - theory and practical examples
  - ✓ Examples in Healthcare
  - ✓ Exercises on the combination of geospatial web technologies and indoor positioning
4. Technical specifications of the indoor positioning system
  - ✓ User guide for the wi-fi based positioning system



# Case studies - Use of indoor GIS in healthcare

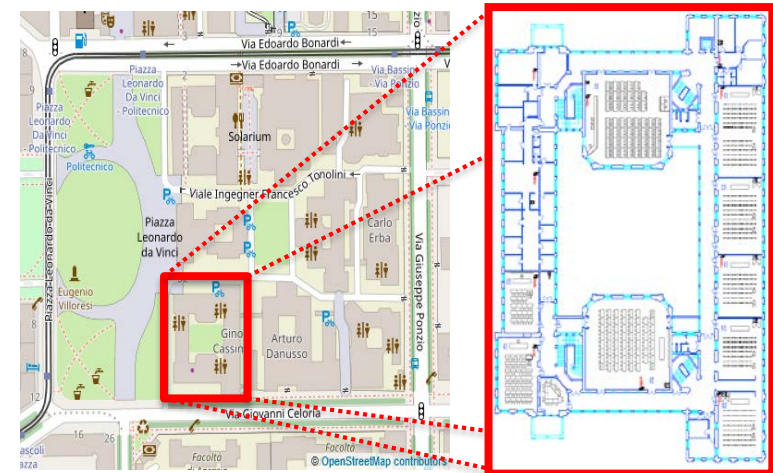
## Project assignment:

- ✓ Practical **experiment** of indoor localization
- ✓ Creation of a **WebGIS** (with server and client components) showing the resulting dataset
- ✓ Technical & GIS tools used by students:
  - ZIGPOS (wi-fi based indoor localization system)
  - GeoServer (open source geospatial server)
  - OpenLayers (open source Web Mapping library)
  - Other GIS tools (e.g. QGIS) for data preprocessing

POLITECNICO  
MILANO 1863



Indoor positioning hardware - ZIGPOS



Location: POLIMI Campus Leonardo,  
Building 3

# Case studies - Harmonizing data flows in Energy saving EU policies



POLITECNICO

- ✓ Development of an application focused on one or more specific aspects of a data flow in support of one of the energy policies relying on the concepts, principles and technicalities of the EU INSPIRE Directive
- ✓ Interaction between POLIMI and Epsilon Italia Srl company
- ✓ Developed within the course “Geographic Information Systems (GIS)” (10 CFU), offered at Politecnico di Milano as a lab project of the course:
  - Five groups of students (15 students)
  - 15 hours in class with tutors + 50 hours of additional project work
- ✓ Learning objectives:
  - Energy Saving/Efficiency Policies
  - Data harmonization and interoperability according to INSPIRE
  - Open source geospatial software and open standards

# Case studies - Harmonizing data flows in Energy saving EU policies



POLITECNICO  
MILANO 1863

## Course contents:

1. Geodata sharing on the Web: GeoNode
  - ✓ GeoNode: an Open Source Geospatial Content Management System
2. INSPIRE data and metadata harmonization in the energy saving domain
  - ✓ Overview of the EU energy policies
  - ✓ Introduction to INSPIRE
  - ✓ Principles of INSPIRE data and metadata harmonization
  - ✓ INSPIRE Data transformation and validation
  - ✓ INSPIRE metadata editing and validation

# Case studies - Harmonizing data flows in Energy saving EU policies



## Project assignment:

- ✓ Execute an INSPIRE-compliant **data model transformation** on a real dataset on building energetic certification
- ✓ Create a **WebGIS** (with server and client components) showing the dataset with additional ancillary information
- ✓ Technical & GIS tools used by students:
  - QGIS for data preprocessing
  - GeoServer/GeoNode (open source geospatial platform)
  - OpenLayers (open source Web Mapping library)
  - hale studio (open source data transformation tool)

# giCASES lessons learned



POLITECNICO  
MILANO 1863

- ✓ This approach is good for all the parties:
  - **Students** - strengthens their curricula and fosters their employability
  - **Industry** – ensures skillful employees for the future
  - **Academia** – providing the high-quality educational offer
- ✓ Students of Politecnico di Milano found collaborative teaching as an attractive way to learn and use GIS technologies
- ✓ **All the materials** for case studies are available online at <http://www.gicases.eu/> and **can be reused** under the [CC by SA 4.0](https://creativecommons.org/licenses/by-sa/4.0/) license
- ✓ Additional efforts were required to switch from the common approach to this one, but the results are showing that it was worth
- ✓ The giCASES initiative will continue after the end of the project an open giCASES Alliance (<http://www.gicases.eu/gicases-alliance/>).



# Attribution-ShareAlike 4.0 International (CC BY-SA 4.0)

## You are free to:

**Share** — copy and redistribute the material in any medium or format

**Adapt** — remix, transform, and build upon the material for any purpose, even commercially.

The licensor cannot revoke these freedoms as long as you follow the license terms.



---

## Under the following terms:



**Attribution** — You must give [appropriate credit](#), provide a link to the license, and [indicate if changes were made](#). You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.



**ShareAlike** — If you remix, transform, or build upon the material, you must distribute your contributions under the [same license](#) as the original.



For more information visit: <http://www.gicases.eu/> or scan



The content of the presentation is partially based on different presentations prepared for giCASSES project

# Thank you for your attention!

**Maria Brovelli**  
**maria.brovelli@polimi.it**

*Politecnico di Milano – GEOLab - DICA*  
*P.zza Leonardo da Vinci 32,*  
*20133 Milano (IT)*

