

Supporting Knowledge Sharing and Learning via Semantic Geographical Maps

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Introduction

- Interactive geographical maps are a key user interface component of several applications: they help **user orientation** thanks to the graphical representation of information.
- In education domain, maps prove to **support learning** (Taylor et al., 2006).
- Students can create maps and focus them on a **temporal and spatial dimension**, instead of only reading them.
- Interactive maps enable teachers and students to co-create personalized layers for supporting individual and group-based analysis.

Community Maps

- Community Mapping is a **collaborative practice** to enable stakeholders to cooperate at the description of **values and resources of a territory**.
- Community maps integrate information into a **map-based representation** which synthesizes different aspects to facilitate data synthesis and interpretation.
- Web GIS support the **sharing** of crowdsourced geographical data offering classification tools for **representing knowledge** in a searchable format.



We propose to use them to enable teachers and students to co-create thematic, custom maps presenting data under different points of view.

OnToMap Project

<https://ontomap.ontomap.eu/>

Goals: Supporting cartographic information sharing and visualization in local communities. In detail:

- Consult spatial data
- Integration of Open Data
- Creation of interactive community maps

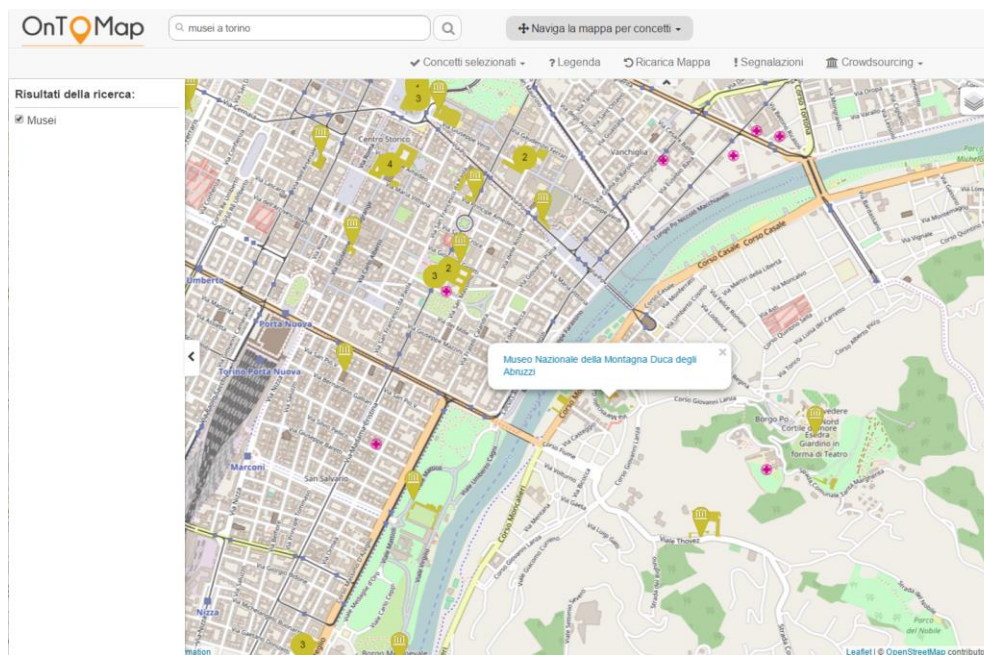
In OnToMap an **ontological layer** is used to

- Integrate heterogeneous data and manage them as Linked Data
- Describe territorial data according to a number of high-level dimensions
- Describe semantic relations among information items to express spatial and thematic relations

Information retrieval

The application supports two types of information retrieval

1. Semantic category selection
2. Textual search queries



| | |
|----------------|---|
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| Città | TORINO |
| Circoscrizione | 8 |
| CAP | 10131 |

Mostra/nascondi elementi correlati

- Riferimento Normativo - Corona Verde
- Riferimento Normativo - PUT
- Riferimento Normativo - PRGC
- Riferimento Normativo - PUM
- Riferimento Normativo - PTR
- Riferimento Normativo - PPR
- Parco Urbano - Monte dei Cappuccini

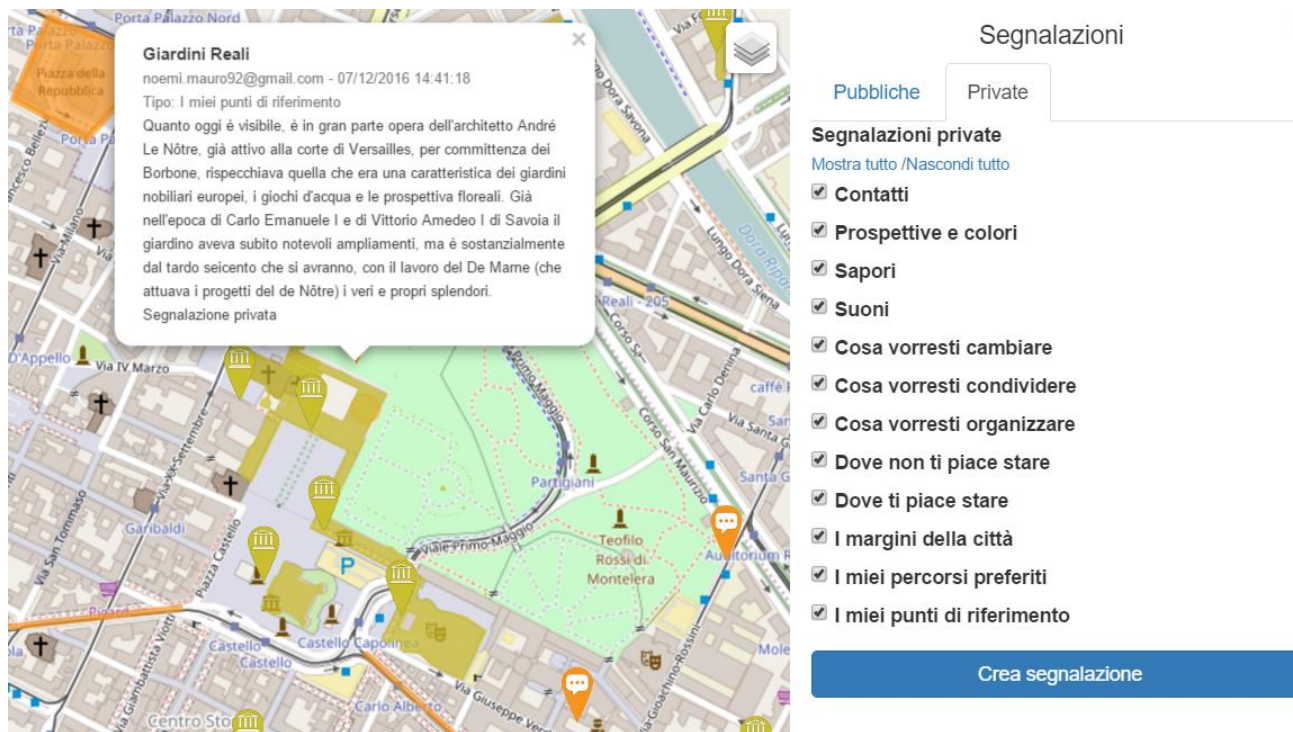
Mostra/nascondi segnalazioni



Crowdsourcing

The application supports two forms of crowdsourcing

1. Introduction of new geographical objects
2. Decoration of information items with textual annotations



Possible application scenarios (1)

Given its features, OnToMap could be used to support interactive learning via community mapping:

1. The teacher can create an interactive map supporting a **virtual tour** of a geographical area to **highlight specific elements** of the selected area.
 - Students will be able to explore geographical objects by analyzing their properties and by following the links to their official web pages.
2. The teacher can **enrich** the map by drawing points, lines and polygons and adding textual annotations to explain and **highlight particular points of interest**.
3. The map can be used as an **interactive table** by the students, as well as by the teacher, in order to annotate areas and items with **comments and notes**.

Possible application scenarios (2)

1. The students create the maps themselves.
2. The teacher gives students a task to perform; they can explore the available information by **querying the application**.
 - The inspection of the items allows an **indirect form of learning**: the students can retrieve information while exploring the objects in the map.
 - Students can explore **semantically related elements** in autonomy.
3. This methodology allows the gathering of proposals on particular themes located in a geographical area and facilitates the **brainstorming** activity.

Possible application scenarios (3)

The third scenario is derived by combining the previous ones.

1. The teacher could create a **map template** forming a basis for a brainstorming activity.
2. The students enrich it by collaboratively searching for missing information and annotating relevant data items.

The creation of the template

- Facilitates the teacher in the presentation of the task to be performed.
- Offers a starting point for the students' work.

Experiment in a related domain

- **Task:** creation of projects for the organization of a sport event in Torino.
- **People:** group of secondary level students.
- The students used the application to retrieve data and to plan the details of the events by creating personalized annotated maps.
- A post-test questionnaire showed that **OnToMap supported the students in a more effective way** in comparison to OpenStreetMap, thanks to
 1. The semantic information retrieval support (in comparison to keyword-based search).
 2. The generation of annotated custom maps.

Conclusions

- The use of interactive maps improves students' attention by itself with respect to static maps.
- OnToMap provides more than this:
 1. It enables teachers and students to **explore large information spaces** by offering flexible information retrieval functions.
 2. It supports the **co-creation of custom maps** and their annotation, facilitating team work.
- The lesson becomes an **active** method of learning and provides the possibility of doing a **brainstorming activity** at the end of the task, with the goal of improving the **students' criticism skill**.

Thanks for your attention!

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