Promoting slow tourism through FOSS4G Web Mapping: an Italian-Swiss case study

Milan Antonovic[1], Maria Antonia Brovelli[2], Massimiliano Cannata[1], Mirko Cardoso[1], Candan Eylül Kilsedar[2], Marco Minghini[2], Giorgio Zamboni[2]

[1] Institute of Earth Sciences, SUPSI, Campus Trevano, 6952 Canobbio, Switzerland

[2] Politecnico di Milano, Como Campus, DICA, Via Valleggio 11, 22100 Como, Italy

Abstract

Slow tourism defines a sustainable way of experiencing a territory based on environmentally-friendly forms of transportation, the appreciation of nature and the rediscovery of local cultural traditions. Advancements in geo-information technology have opened new possibilities for promoting this practice. A slow tourism ongoing project focused on the cross-border area between Italy and Switzerland is presented. Several FOSS4G-based Web Mapping applications are developed which address different users and feature different functionalities. The applications include: a mobile app allowing tourists to report Points of Interest (POIs) along the paths; a mobile app enabling professionals to survey new paths; a traditional 2D Web viewer providing access to and interaction with the project data; an application offering a virtual tour along the paths; and a virtual-globe based 3D viewer with participative functionalities.

Keywords

FOSS4G, mobile, slow tourism, virtual, Web Mapping.

1 Introduction

Slow tourism has recently acquired great interest. Based on environmentally-friendly forms of transportation like hiking, cycling and horse-riding, it pursues the enjoyment of the territory coupled with a (re)discovery of its local culture (e.g. people lifestyle, history, art, architecture, religion and cuisine). “The Paths of Regina” (http://www.viaregina.eu) is an INTERREG project (Cross-border Cooperation Operational Programme Italy–Switzerland 2007-2013) aiming at the valorisation of slow tourism in the beautiful, hilly area at the boundary between Italy and Switzerland. Thanks to the synergy between Swiss and Italian experts in geomatics, landscape designers, administrations and cultural associations, the project seeks to create new tools to rediscover the European cultural identity of the area.

2 FOSS4G Web Mapping

Traditional tourism tools providing knowledge of the territory (e.g. paper maps and signage along the paths) are coupled with innovative, ad hoc Web Mapping applications developed within the project. They are fully built with FOSS4G and

take into account the new trends of mobile visualization, user participation and crowdsourcing, virtual reality and multi-dimensional view. The applications, that are partially still under development, are separately described in the following Subsections. It is worth to state that the geospatial data used were derived from the administrations involved in the project, ad hoc field surveys by hikers associations (especially for paths and POIs along them) and the OpenStreetMap (OSM) database.

2.1 2D Web viewer

FOSS4G server-side technologies deployed among Italy and Switzerland for the 2D Web viewer take advantage of the latest implementations of GeoServer and ZOO WPS. The client application benefits instead of the latest OpenLayers 3 JS library. Besides simple display of data and more advanced functionalities like geospatial routing and terrain profile computation, it enables navigation to two other applications, i.e. virtual tour and 3D Web viewer detailed in Subsections 2.4 and 2.5, respectively. Routing applied to the cross-border path networks makes use of Dijkstra's algorithm and is performed by pgRouting. Optimal path between two user-selected points is computed based on its cost, which in turn depends on the user input about the types of POIs (e.g. religious buildings, museums, etc.) and their relative weights. This way, the returned path is the most suitable to the user interests. The returned path is the input for terrain profile computation which is based on ZOO GdalExtractProfile service. The display of the chart is then supported by external JS libraries such as Highcharts and jQuery. Before walking on the field users can print a customized page including the returned path, its terrain profile and some additional related information like the total distance, the average slope and the height difference between the start and end points. Lastly, POI data are enriched with TripAdvisor information retrieved by its official API. When clicking a certain position on the map the attractions, hotels and restaurants from TripAdvisor located within a predefined radius are returned to the user together with the related information which is accessible inside a popup.

2.2 Mobile app for slow tourists

A second application involves people in contributing the local knowledge they acquire during slow tourism experiences. Open Data Kit (ODK) is exploited to manage field data collection. This suite is mainly composed of a server module (ODK Aggregate), running under Tomcat and synchronized to a PostgreSQL database to store the data; and an Android app (ODK Collect) allowing users to report POIs (ranging from historical/cultural points of interest to tourism services and morphological elements) through their mobile devices (see Figure 1). Users have to enter the details of the POI (e.g. name, type and description), register its position (e.g. using the device GPS), and take a picture (and optionally also a video and audio) of it. Thanks to the PostGIS extension of the PostgreSQL database, GeoServer can then read and publish this crowdsourced information which is made available as a separate layer in the Web viewer described in Subsection 2.1. Besides being a typical feature of GeoWeb 2.0 (Maguire, 2007) the bottom-up approach where citizens are not only consumers but also active producers of geospatial information, or Volunteered Geographic Information (Goodchild, 2007), represents a major innovation in slow tourism

projects. The app was successfully tested during a number of mapping parties performed all along the project area (see e.g. the data collected during a mapping party in Cernobbio at http://viaregina.como.polimi.it/mapparty).

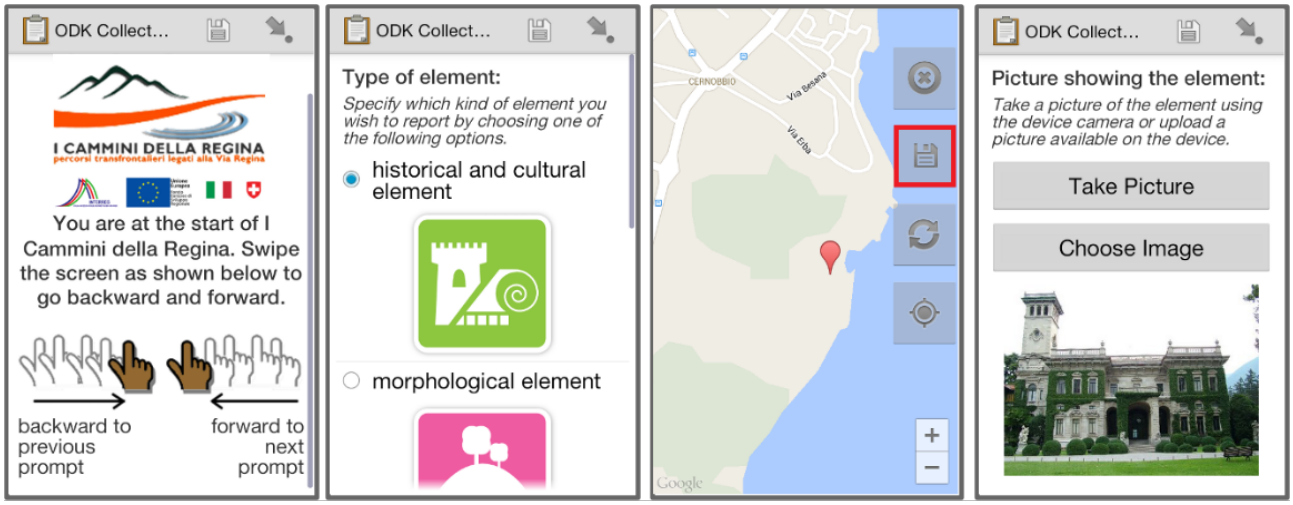

Figure 1: Sample screenshots of the mobile app for slow tourists.

2.3 Mobile app for professionals

During the last decades Switzerland has developed a well-defined procedure to map historical routes. However its application relies only on the manual work of professionals without a specific supporting instrument. An application named GeoIVS was thus developed to fill this gap. Before entering the survey mode, it asks for the definition of the path and its initial surface type. The survey mode interface, which also works offline, is organized into three columns split into two horizontal sections (see Figure 2).

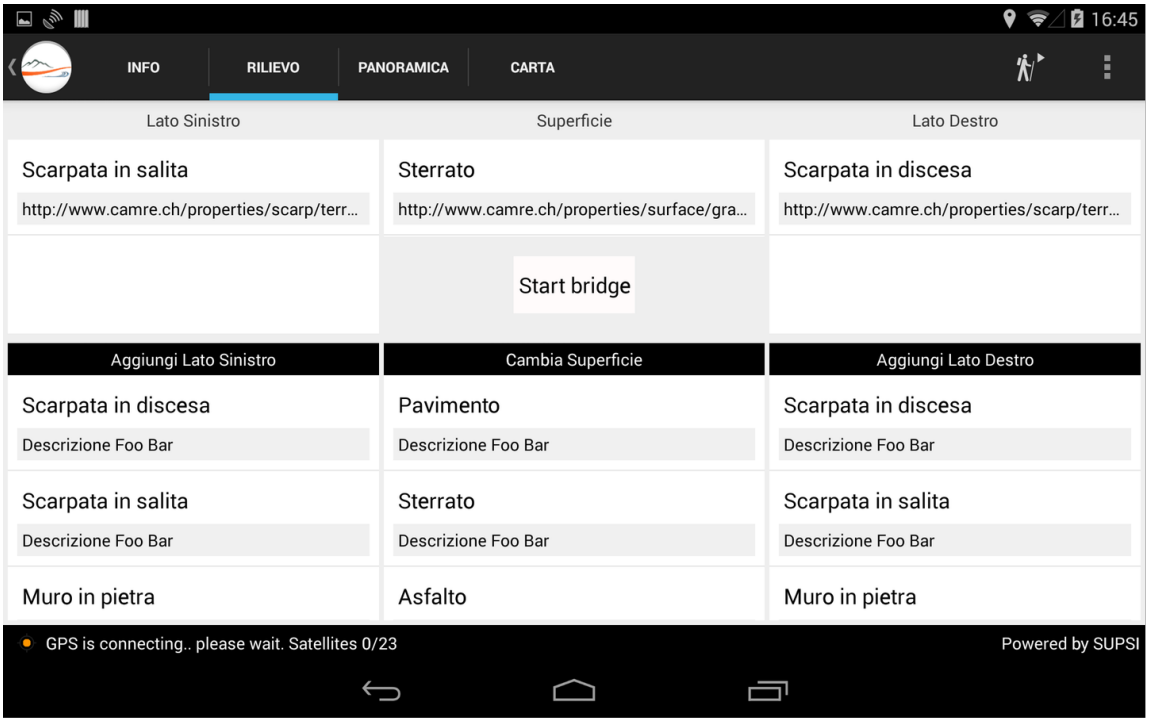

Figure 2: Sample screenshot of the Android virtual tour application.

Left column represents the elements on the left side of the path, right column represents the elements on the right side of the path, while central column represents the path surface. For each column, the lower section shows all the possible elements the user can enter while the upper section represents the elements being registered. Tapping on an element starts its registration by acquiring the starting point; sliding of an element under registration acquires its ending poi1t and stops its registration. Starting and ending points are recorded using the device GPS and specific algorithms which search for the best accuracy in a user-defined period. Linear referencing is then applied to determine the element geometry. Textual and vocal notes as well as pictures and videos can be also associated to each surveyed element. The survey results in a JSON file, which encapsulates all the information and – as soon as a connection is available – is sent to a server for storage, processing and publication. From the technological point of view the application relies on FOSS software like OpenLayers 3, Android SDK, JTS Topology Suite and proj4js.

2.4 Virtual tour application

The objective of this application is the provision of cultural information in an attractive context in order to transform a path without outstanding attractions in an emotional experience. To achieve this goal, an integrated framework was adopted which combines geospatial technologies, the concept of virtual tour, the use of multimedia and the location-based approach. Thanks to the collaboration with designers and experts of the territory (historians, geologists, ethnographists and biologists), the two test paths selected for the project (Sagno-Bisbino-Cernobbio and Bellinzona-San Jorio-Menaggio) were studied and represented in two storyboards. They highlight the cultural aspects of the areas traversed by the two paths through the use of thematic POIs. From a design perspective, the application represents the virtual location of the tourist with a red circle that moves along the path and that is synchronized with the altitude profile at the bottom of the page (see Figure 3).

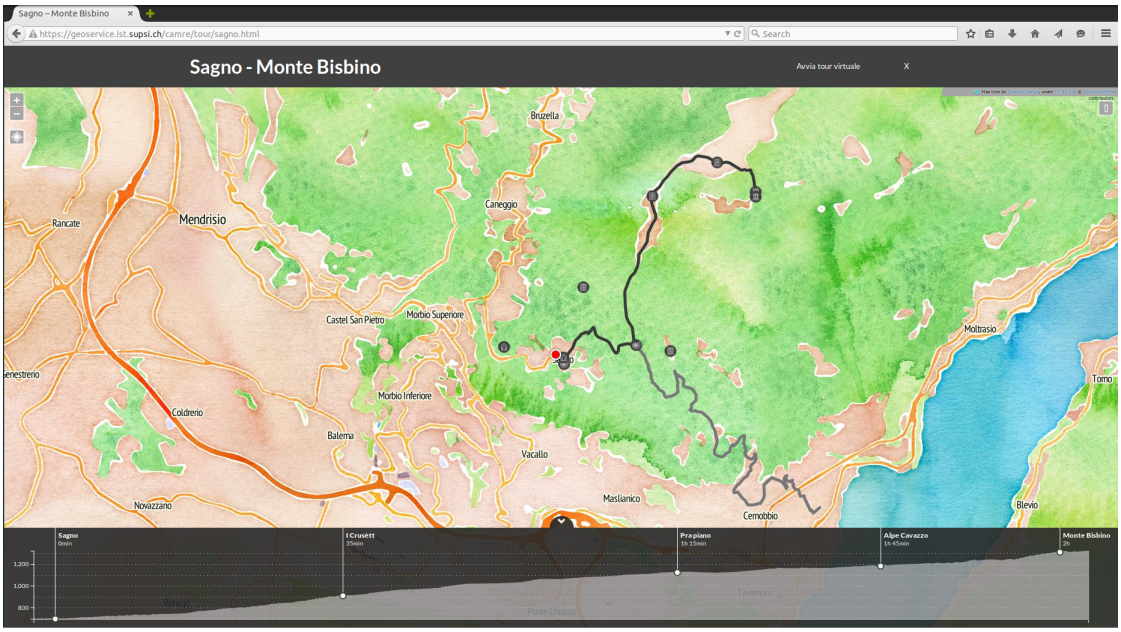

Figure 3: Sample screenshot of the virtual tour application.

When a POI is intercepted, instead of a classical popup a full-screen animation showing sliding bands over a series of background images is activated. Each band has a title, a subtitle and a description which are narrated in an audio. Bands are enriched by multimedia, which currently consist of images, slideshows, videos and photospheres. Notification for users exploring the path on the field is currently under development. The application relies on open source technologies, open formats and open data such as OpenLayers, Bootstrap, JQuery, D3.js, Less.js, GeoJSON, and OpenStreetMap.

2.5 3D Web viewer

Unlike the classic 2D visualization, multi-dimensional viewers like virtual globes offer fully-realistic content visualization that is particularly suitable for tourism purposes (Brovelli, Hogan, Minghini, and Zamboni, 2013). A 3D Web viewer based on the NASA World Wind virtual globe was developed which aims at the valorisation of tourism paths on the project area (see Figure 4). Moreover, the new trend of participation was exploited within the viewer allowing users to add relevant contents (photos, videos, documents and notes) which become heritage of the whole community. A first level of information is the map of paths, which is superimposed to one among several user-selected base maps. In addition to the servers specifically deployed within the project, the application can transparently connect to any WMS compliant server available on the network. A second level of information consists of the crowdsourced data collected by professional hikers as well as occasional walkers, tourists, citizens, etc. The platform has in fact the innovative capability to connect to the ODK server of the project, and to publish the related POIs reported by users through their mobile devices (see Subsection 2.2). When clicking on a POI, its field-collected information is displayed. Visualization of the field-reported POIs can be also filtered in time through the use of a slider.

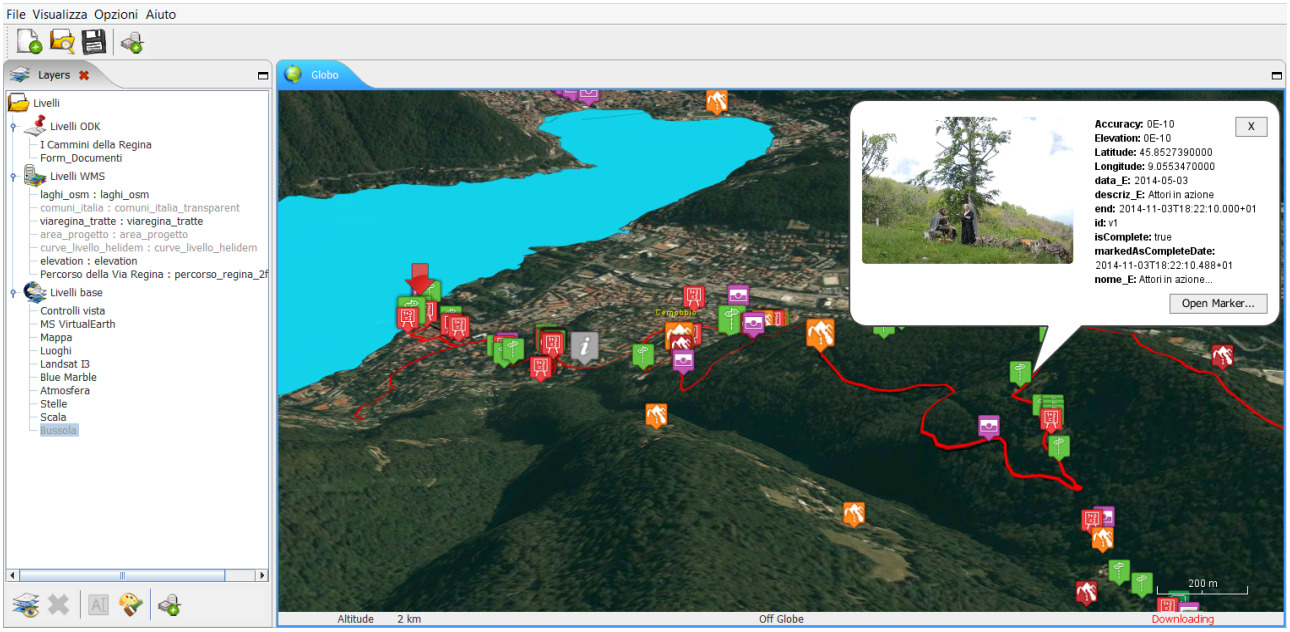

Figure 4: Sample screenshot of the 3D Web viewer.

3 Conclusions

In contrast to the current mass-process phenomenon tourism has largely become, the practice of slow tourism represents a challenging model based on sustainability, environmental friendliness and discovery of local knowledge. In the frame of a slow tourism project focused on a cross-border area among Italy and Switzerland, a set of Web Mapping applications are developed to valorize the local cultural richness through the exploitation of modern technological trends including mobile data collection, virtual reality and 3D visualization. This set of applications greatly extends the geospatial tools typically developed for slow tourism projects and mainly consisting of simple 2D Web viewers. A major point of innovation is represented by the involvement of users, who are not just consumers but also contributors of new data. From the technical perspective, the use of FOSS4G technologies was fundamental as they allowed to develop customized products according to the project needs.

Acknowledgements

This study has been funded by the project “I Cammini della Regina – Percorsi transfrontalieri legati alla Via Regina” (“The paths of Regina – Cross-border paths linked to Via Regina”) within the INTERREG Cross-border Cooperation Operational Programme Italy–Switzerland 2007-2013 (ID 33829732).

References

- ✔ Brovelli, M. A., Hogan, P., Minghini, M., & Zamboni, G. (2013). The power of Virtual Globes for valorising cultural heritage and enabling sustainable tourism: NASA World Wind Applications . *International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, XL-4/W2, 115-120. doi: 10.5194/isprsarchives-XL-4-W2-115-2013.
- ✔ Goodchild, M. F. (2007). Citizens as sensors: the world of volunteered geography. *GeoJournal*, *69*(4), 211-221. doi: 10.1007/s10708-007-9111-y.
- ✔ Maguire, D. J. (2007). GeoWeb 2.0 and volunteered GI . In *Workshop on Volunteered Geographic Information, University of California, Santa Barbara*, 104-106.