

# *FOSS4G – Europe*

*Bremen – 15-17 July 2014*

# The paths of Via Regina

## geomatics for sustainable mobility

**Maria Antonia Brovelli (\*)**, Massimiliano Cannata (\*\*), Alba Lucchese (\*),  
Marco Minghini (\*), Marco Negretti (\*), Giorgio Zamboni(\*)

(\*) Politecnico di Milano – Department of Civil and Environmental Engineering (DICA),  
Geomatics Laboratory, Como Campus, Como, Italy

(\*\*) Scuola Universitaria Professionale della Svizzera Italiana (SUPSI) – Department of  
Environment, Construction and Design (DACD), Institute of Earth Sciences, Canobbio,  
Switzerland

# The paths of Via Regina project

INTERREG project (Cross-border Co-operation Operational Programme Italy – Switzerland 2007-2013) which aims at valorizing the cross-border area between Italy and Switzerland covered by many historical paths departing from the old Via Regina.



# Objectives

- Valorization of the territory and cultural heritage through the preservation and enhancement of the available historical paths
- Use of geospatial technology for disseminating knowledge, protecting the natural resources and promoting tourism thanks to the environmental and cultural wealth of the territory
- Development and implementation of innovative technological tools such as:
  - multidimensional visualization
  - participation
  - augmented reality





POLITECNICO  
DI MILANO



# Partners

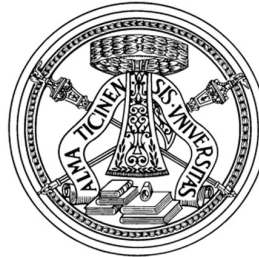


POLITECNICO  
DI MILANO



Scuola universitaria professionale  
della Svizzera italiana

**SUPSI**



M.V.I.S.  
Museo della Via Spluga  
e della Val San Giacomo

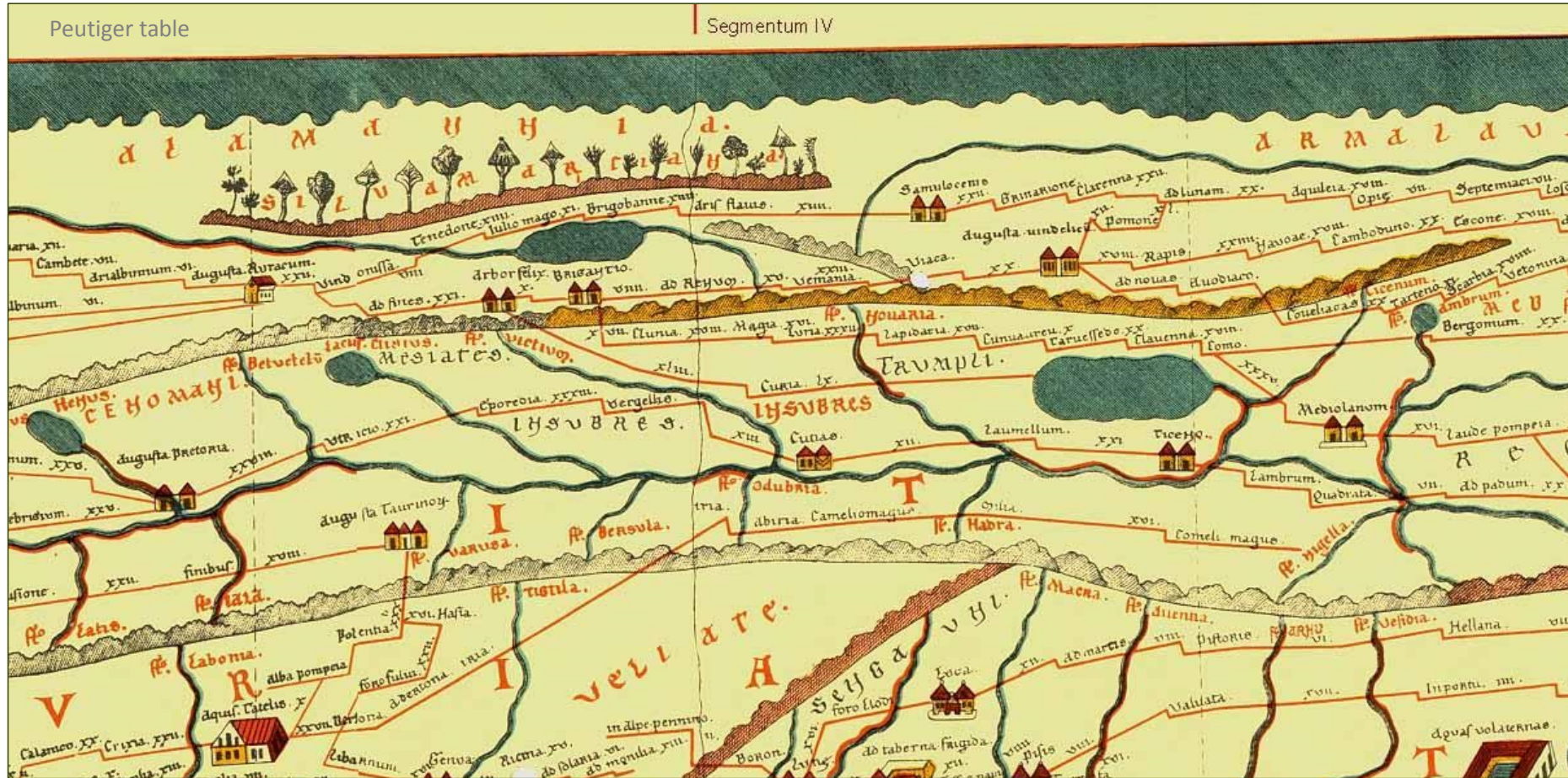


**Le opportunità non hanno confini**



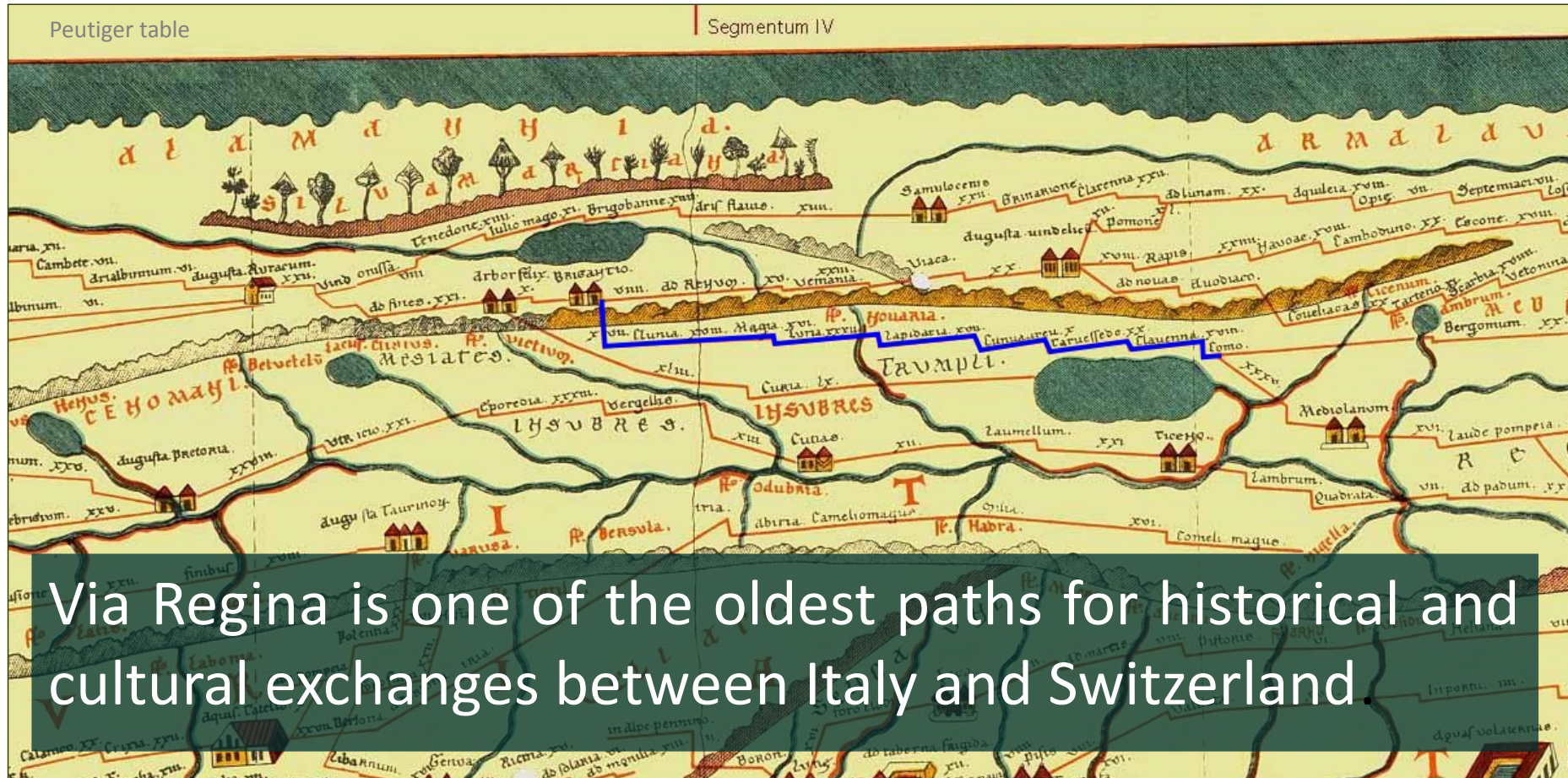


# What is Via Regina?





# What is Via Regina?



# What is Via Regina?

Nowadays it represents a fundamental transalpine system of soft mobility links especially for slow tourism





# What is Via Regina?



The route extends along the West coast of Lake Como, in Northern Italy (Lombardy Region).





# Background



Few pedestrian  
routes WebGIS



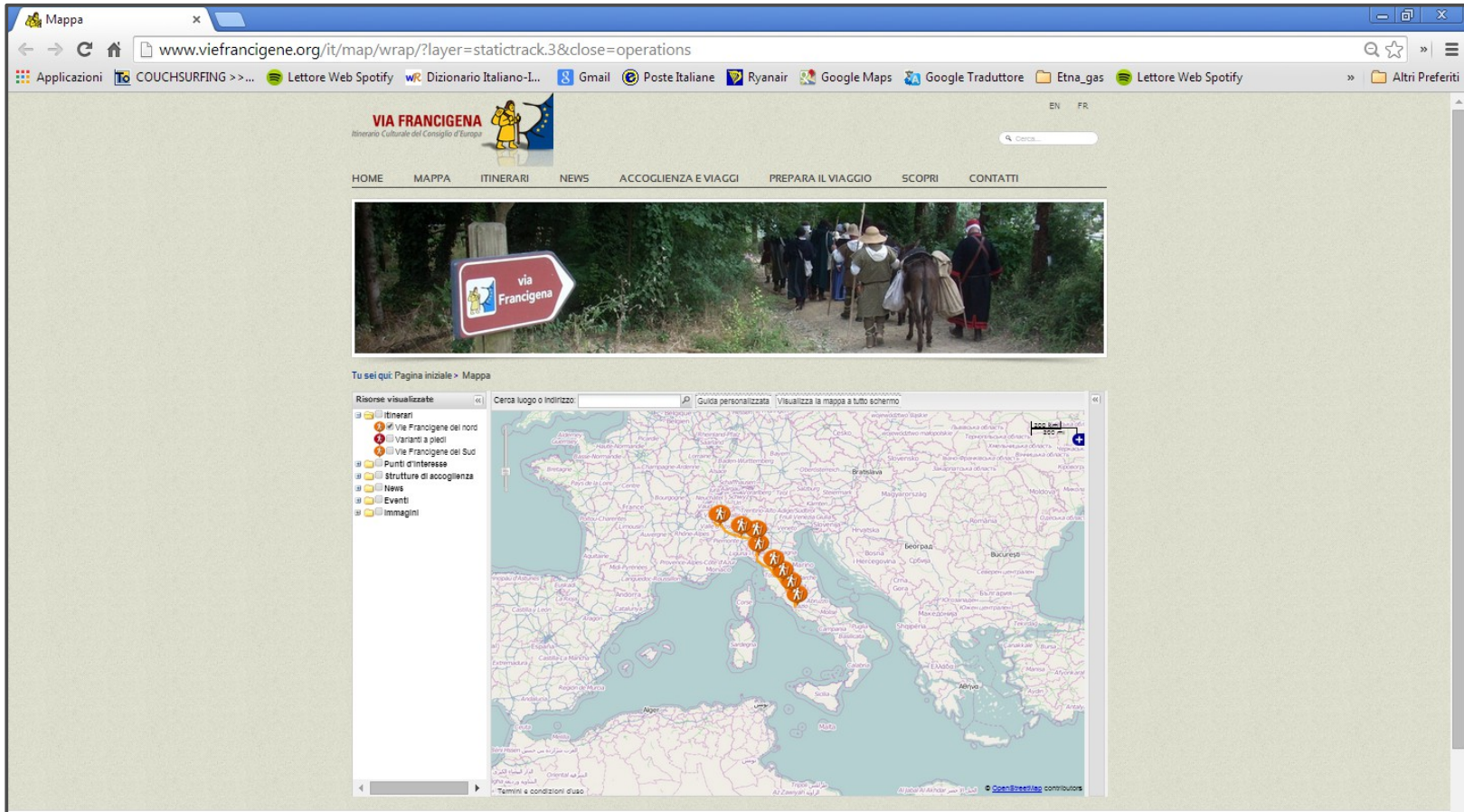
More cycling, hiking and  
horseback WebGIS

# Background

There is not a complete WebGIS for pedestrian routes:

- Existing pedestrian WebGIS lack processing tools (i.e. slope and distance computation)
- Other kinds of complete WebGIS provide processing tools but are not typically designed for pedestrian tourism

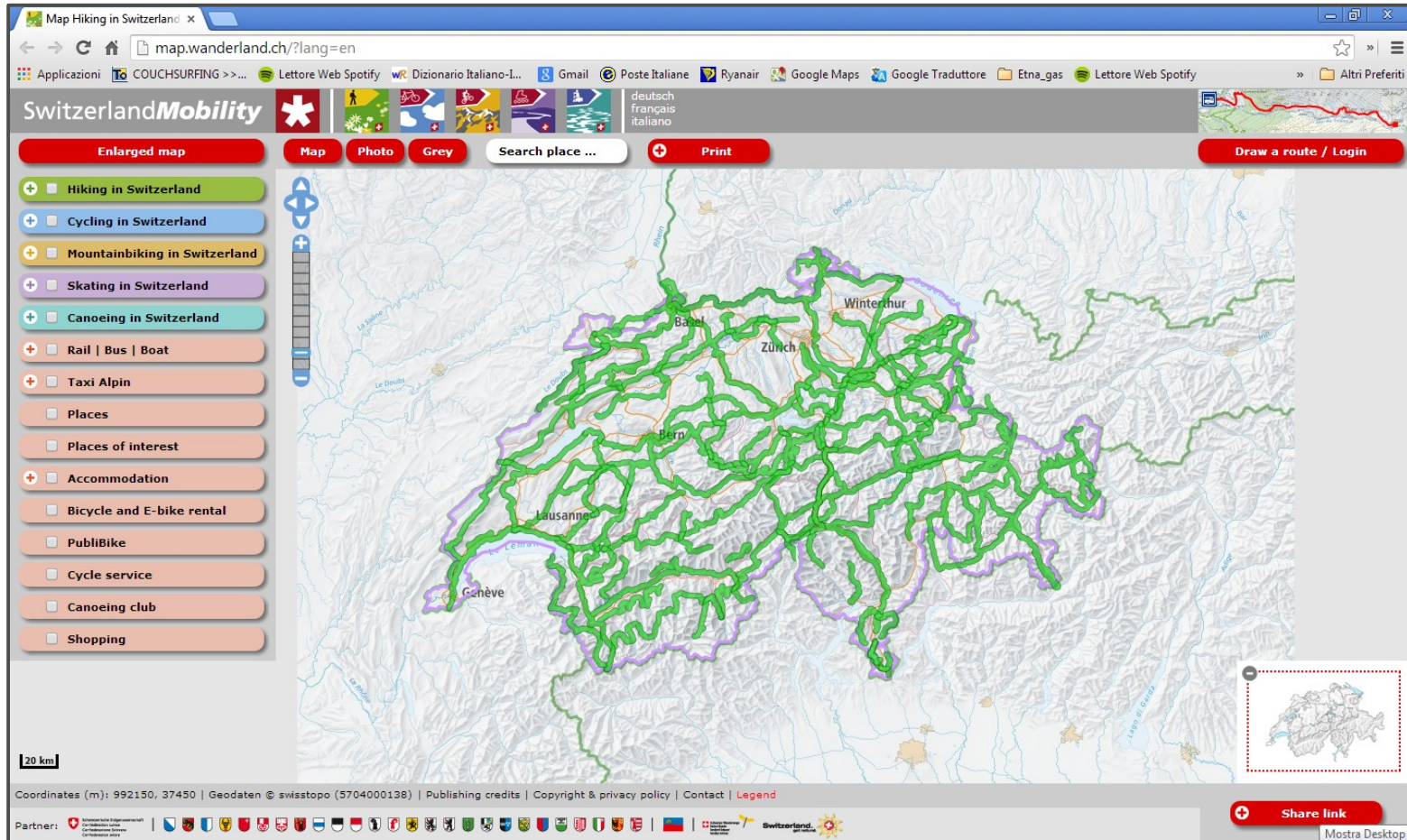
# Via Francigena



<http://www.viefrancigene.org/it/map/wrap/?layer=statictrack.3&close=operations>



# Switzerland Mobility



The screenshot shows the 'Switzerland Mobility' website interface. The main map displays Switzerland with various colored routes (green, purple, orange) representing different mobility options. The sidebar on the left contains a list of categories with checkboxes:

- ☒ Hiking in Switzerland
- ☒ Cycling in Switzerland
- ☒ Mountainbiking in Switzerland
- ☒ Skating in Switzerland
- ☒ Canoeing in Switzerland
- ☒ Rail | Bus | Boat
- ☒ Taxi Alpin
- ☐ Places
- ☐ Places of interest
- ☒ Accommodation
- ☐ Bicycle and E-bike rental
- ☐ PubliBike
- ☐ Cycle service
- ☐ Canoeing club
- ☐ Shopping

The top navigation bar includes buttons for 'Enlarged map', 'Map', 'Photo', 'Grey', 'Search place ...', 'Print', and 'Draw a route / Login'. The bottom of the page features a 'Share link' button and a 'Mostra Desktop' link.

<http://map.wanderland.ch/?lang=en>

Le opportunità non hanno confini

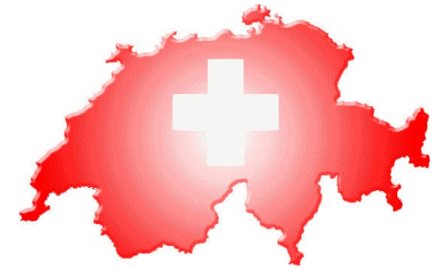


# Available Data

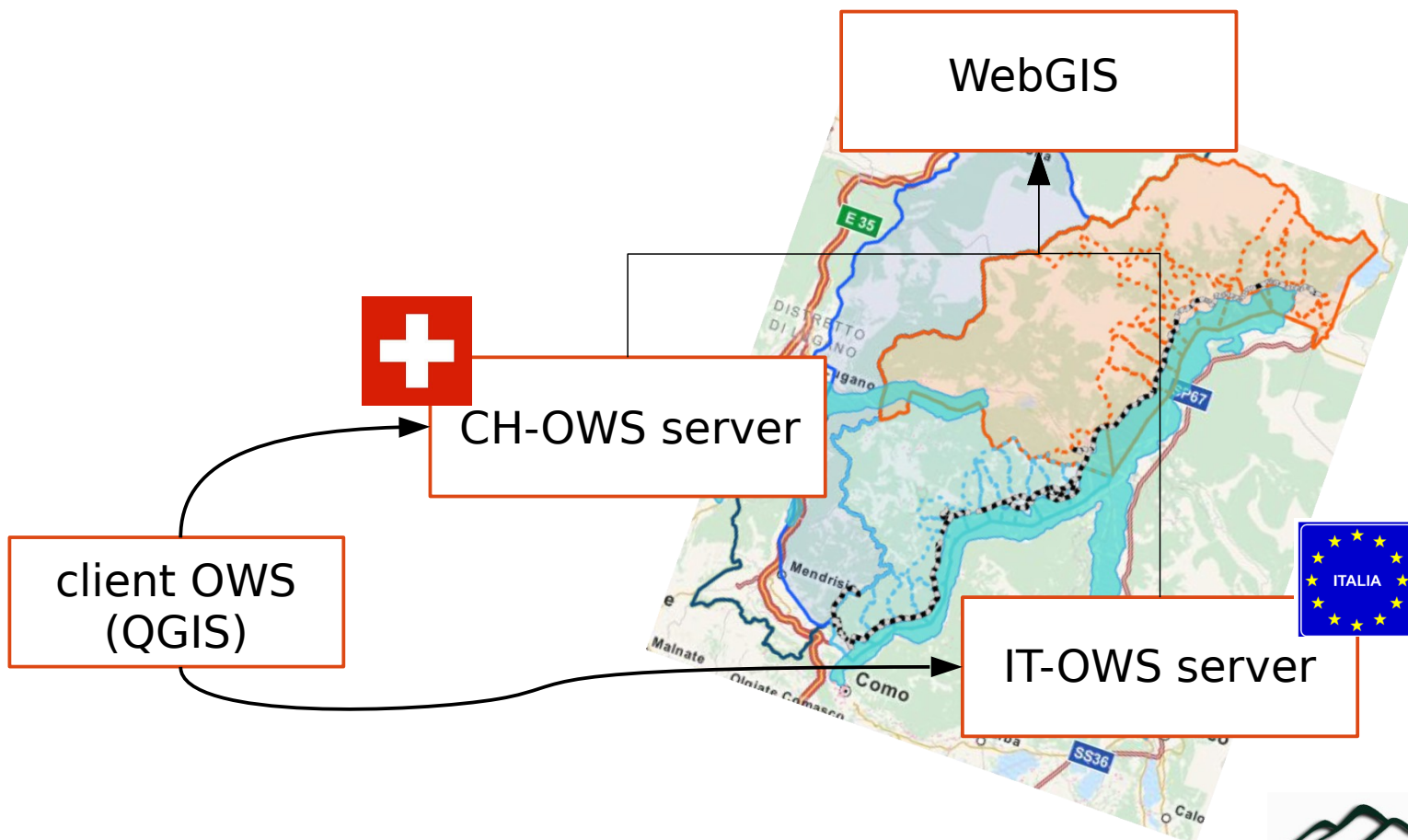
- Regional Technical Map (CTR - Carta Tecnica Regionale)
- Local Digital Terrain Models (DTMs)
- Photogrammetric surveys
- Topographic databases
- Maps of path networks
- Maps of thematic paths



- Aerial images
- National maps
- Historical maps
- Hillshade
- Hiking trails
- 3D building
- Geological Atlas
- Inventory historical routes
- Swiss protection of cultural property inventory
- Land cover
- Boundaries



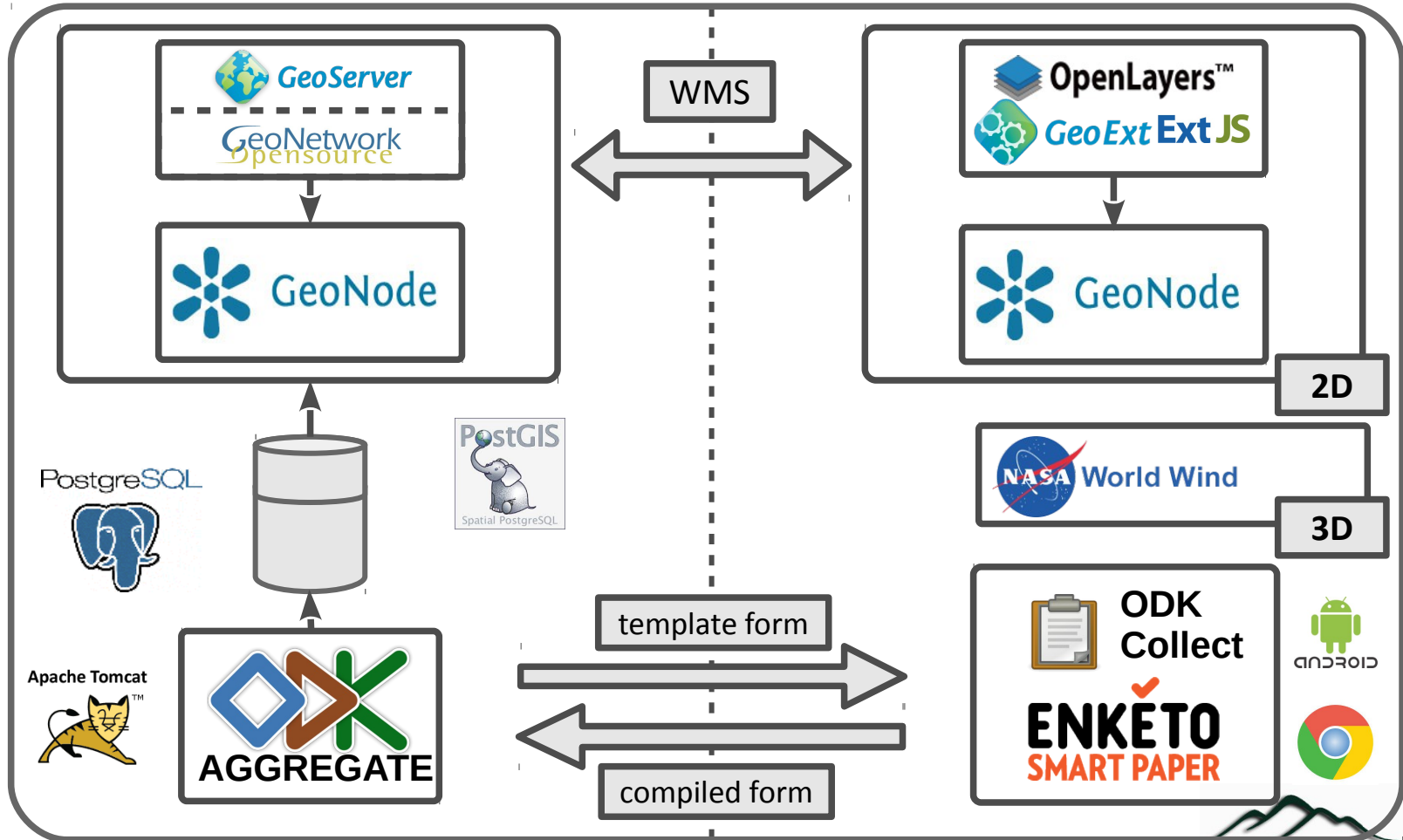
# Server architecture



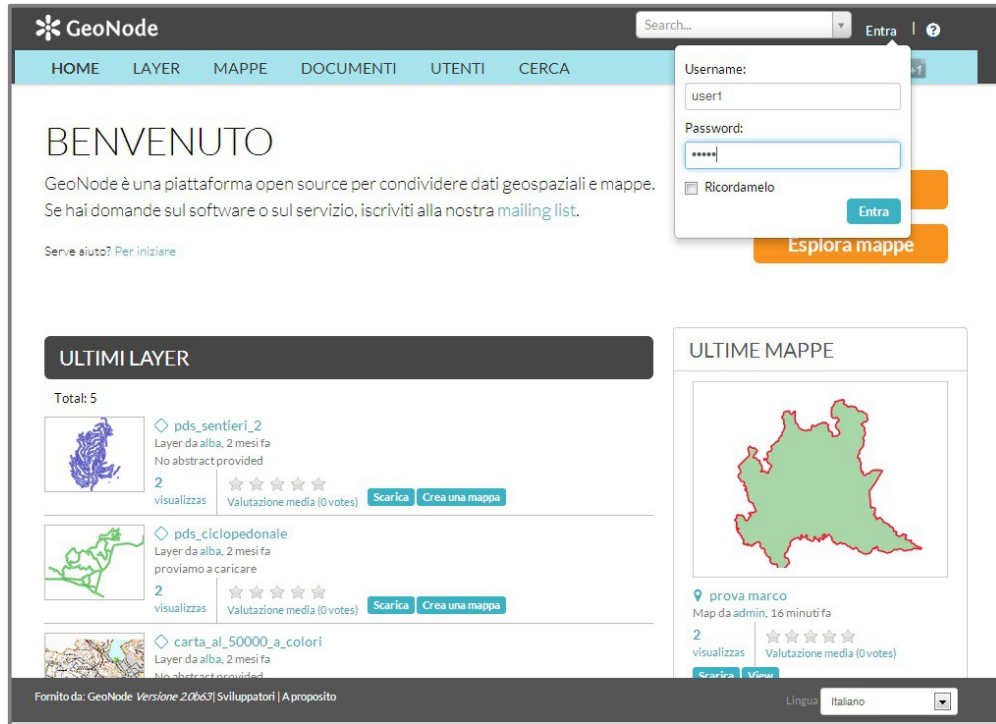
# IT-OWS server architecture

## SERVER

## CLIENT



# Data sharing tools for local administrations



Open source platform for:

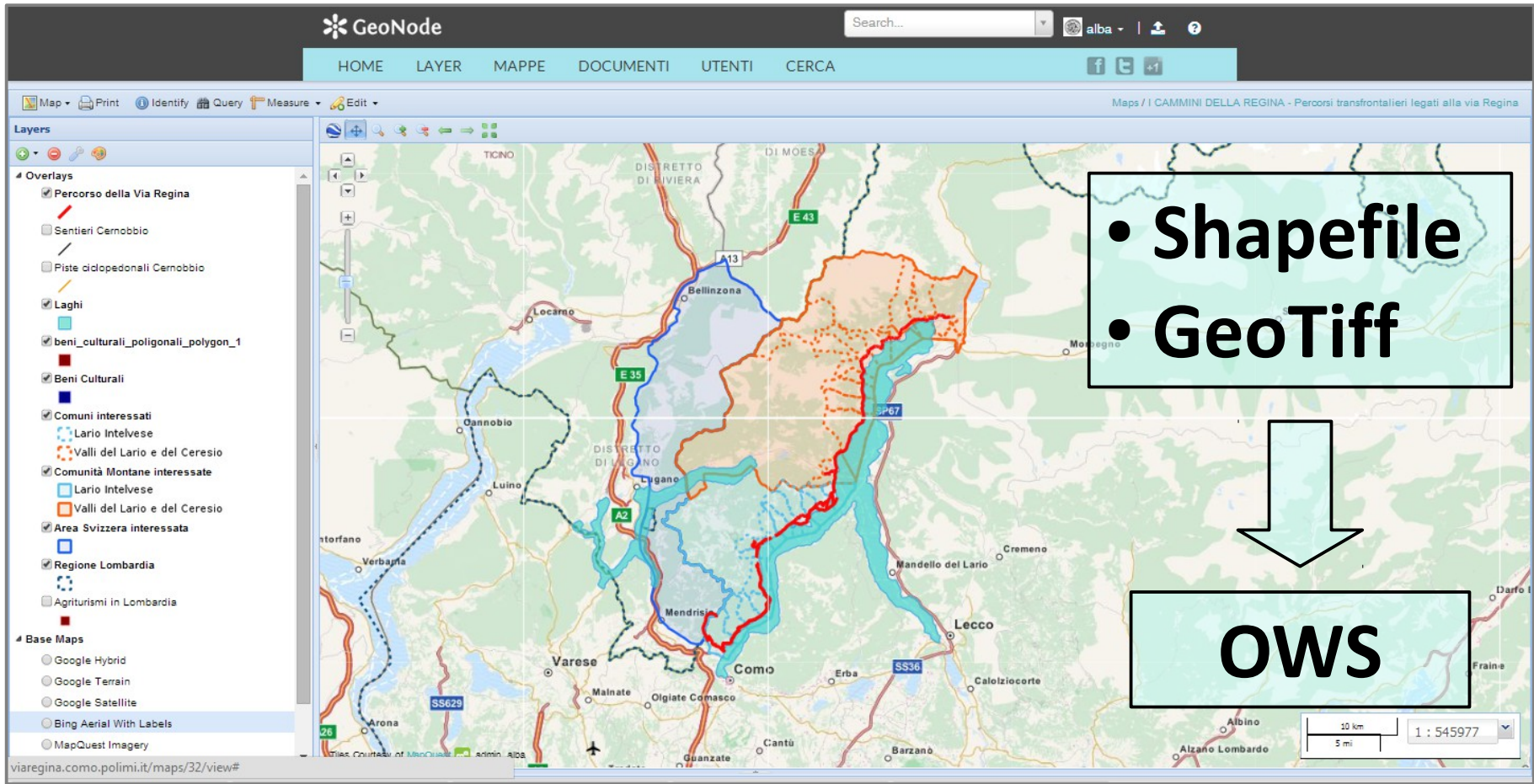
- creation
- management
- publication
- sharing

of interactive maps and  
geospatial information.

Usable also by non expert users.



# Data sharing tools for local administrations



GeoNode

HOME LAYER MAPPE DOCUMENTI UTENTI CERCA

Search...

alba

Layers

4 Overlays

- ☒ Percorso della Via Regina
- ☐ Sentieri Cernobbio
- ☐ Piste ciclopeditoni Cernobbio
- ☒ Laghi
- ☒ beni\_culturali\_poligonal\_polygon\_1
- ☒ Beni Culturali
- ☒ Comuni interessati
- ☒ Lario Intelvese
- ☒ Valli del Lario e del Ceresio
- ☒ Comunità Montane interessate
- ☒ Lario Intelvese
- ☒ Valli del Lario e del Ceresio
- ☒ Area Svizzera interessata
- ☒ Regione Lombardia
- ☐ Agriturismo in Lombardia

4 Base Maps

- ☐ Google Hybrid
- ☐ Google Terrain
- ☐ Google Satellite
- ☐ Bing Aerial With Labels
- ☐ MapQuest Imagery

viaregina.como.polimi.it/maps/32/view#

Maps / I CAMMINI DELLA REGINA - Percorsi transfrontalieri legati alla via Regina

• Shapefile

• GeoTiff

OWS

- ➔ suite providing a set of tools for managing mobile data collection
  - <http://opendatakit.org>
  - **free and open source** under Apache2 license
  - developed by University of Washington – Department of Computer Science & Engineering

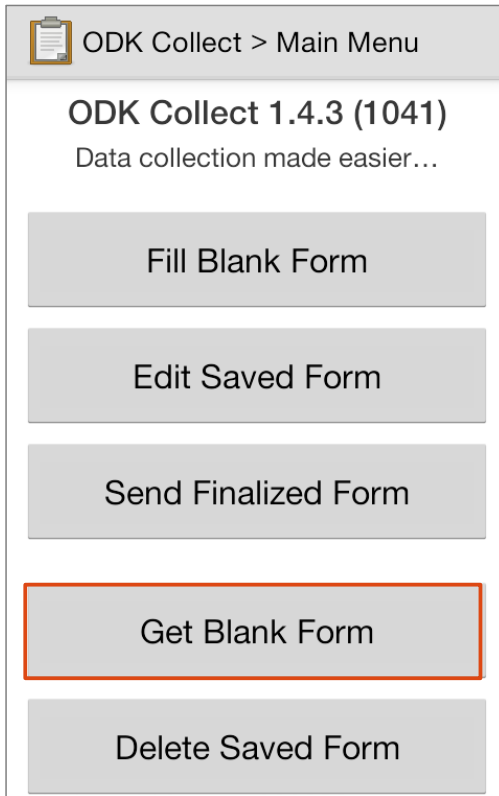


- ➔ Composed of 3 modules
  - form authoring tools:
    - **ODK Build**: graphical drag-and-drop tool for creating simple forms
    - **XLSForm**: form design via Excel spreadsheet
  - **ODK Collect**:
    - Android app for filling forms (which can contain multimedia and locations)
  - **ODK Aggregate**:
    - repository of the data sent by ODK Collect
    - can run in the cloud, on a virtual machine or on a private server (i.e. a Tomcat server backed with a PostgreSQL database)

# Data sharing tools: ODK Collect

✓ Application main menu

✓ Download of form template



ODK Collect > Main Menu

ODK Collect 1.4.3 (1041)  
Data collection made easier...


Fill Blank Form

Edit Saved Form

Send Finalized Form

Get Blank Form

Delete Saved Form



ODK Collect > Get Blank Form

I Cammini della Regina ☒

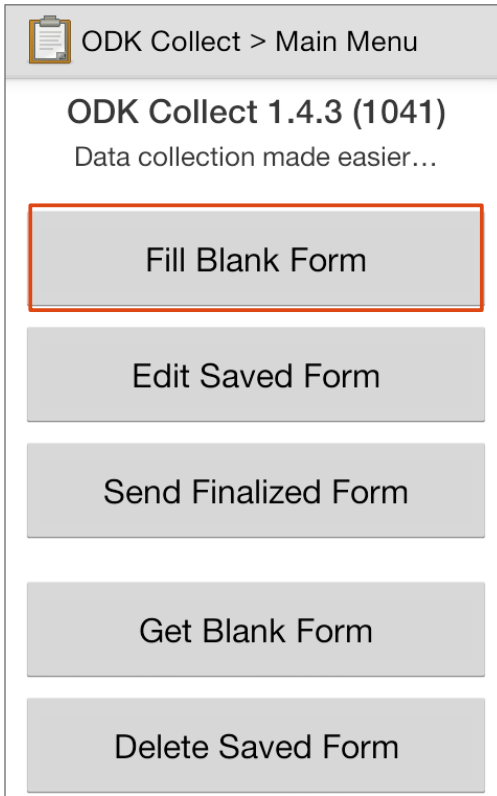
ID: regina\_v9

Toggle All Refresh Get Selected

# Data sharing tools: ODK Collect

✓ Application main menu

✓ Guided form compilation



ODK Collect > Main Menu

ODK Collect 1.4.3 (1041)  
Data collection made easier...

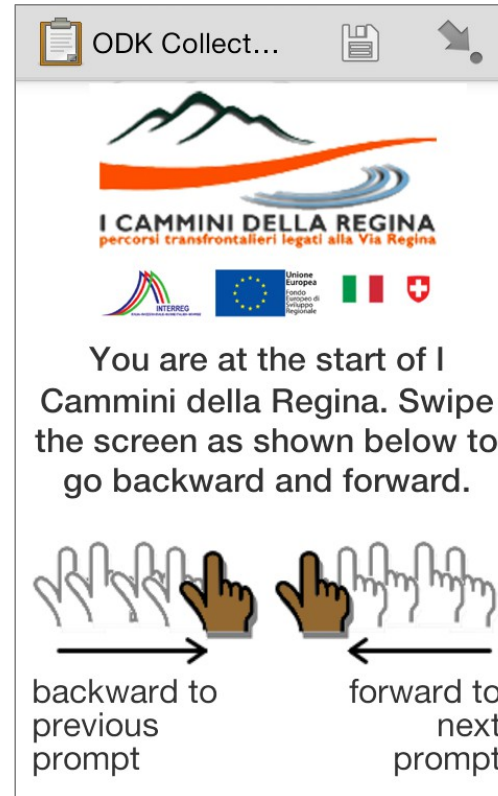
Fill Blank Form

Edit Saved Form


Send Finalized Form

Get Blank Form

Delete Saved Form




ODK Collect...

  
I CAMMINI DELLA REGINA  
percorsi transfrontalieri legati alla Via Regina

Un logo con il titolo "I CAMMINI DELLA REGINA" e il sottotitolo "percorsi transfrontalieri legati alla Via Regina". Sotto il titolo ci sono i loghi di INTERREG, l'Unione Europea, l'Italia e la Svizzera.

You are at the start of I  
Cammini della Regina. Swipe  
the screen as shown below to  
go backward and forward.

  
backward to previous prompt      forward to next prompt



# Data sharing tools: ODK Collect

## ✓ Guided form compilation

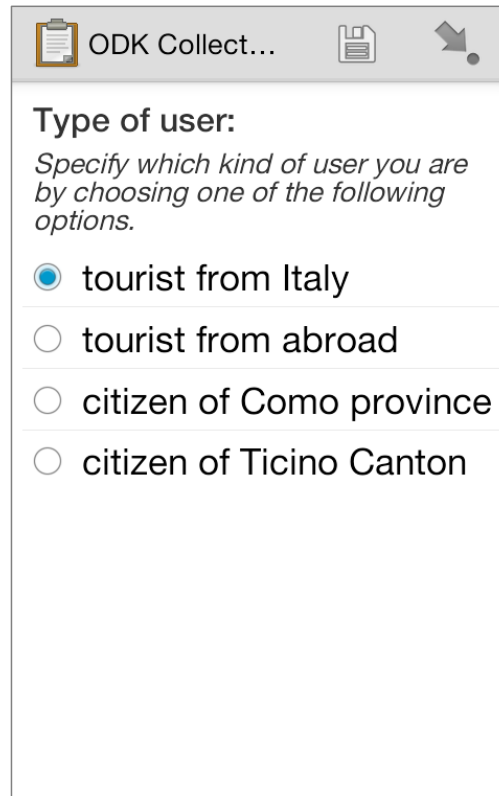


ODK Collect...

Date of report

Aprile 2014

D	L	M	M	G	V	S
30	31	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	1	2	3
4	5	6	7	8	9	10

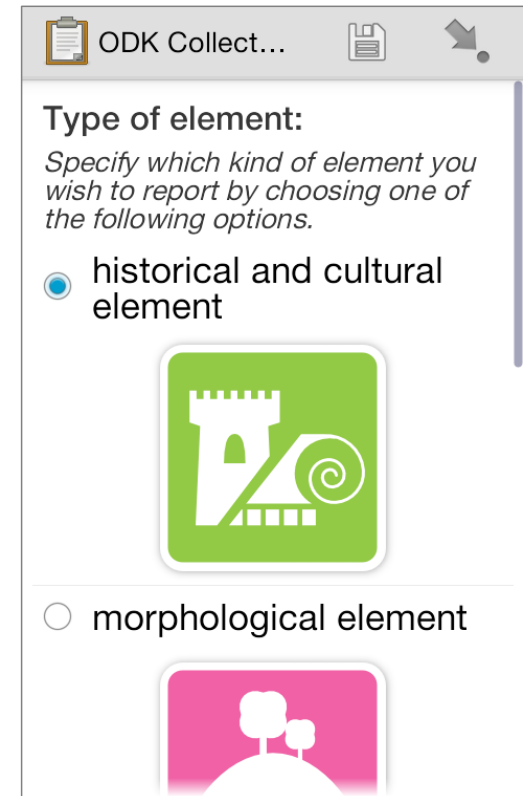


ODK Collect...

Type of user:

*Specify which kind of user you are by choosing one of the following options.*

- ☒ tourist from Italy
- ☐ tourist from abroad
- ☐ citizen of Como province
- ☐ citizen of Ticino Canton



ODK Collect...

Type of element:

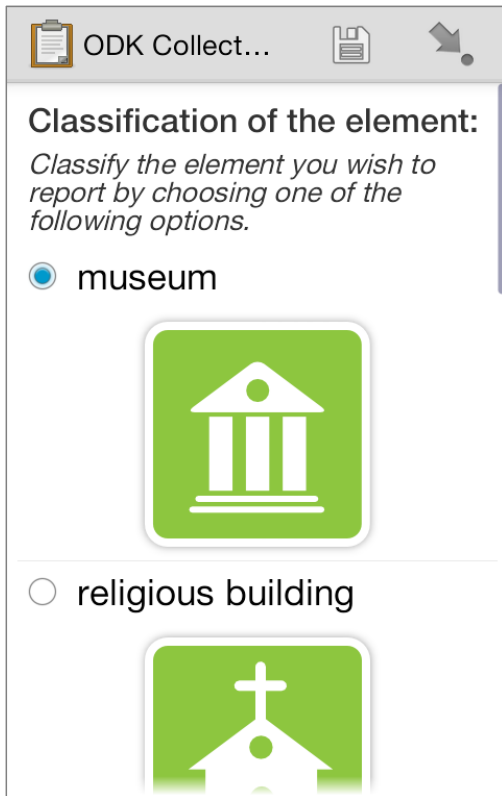
*Specify which kind of element you wish to report by choosing one of the following options.*

- ☒ historical and cultural element
- ☐ morphological element



# Data sharing tools: ODK Collect


## ✓ Guided form compilation



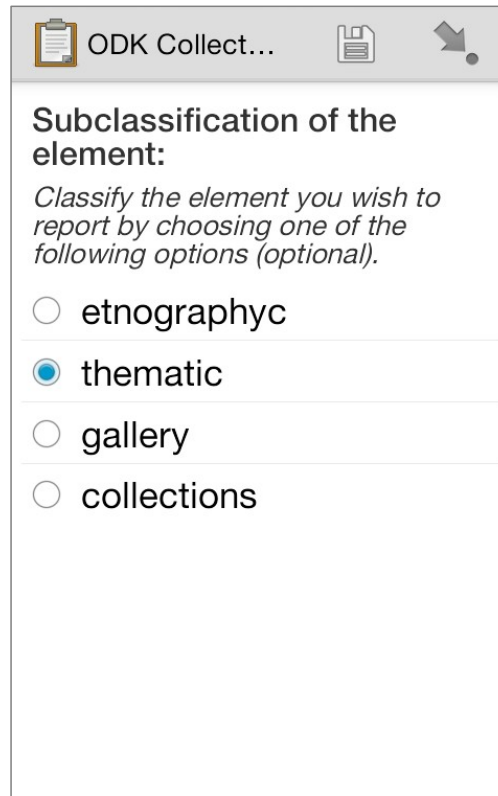

ODK Collect...

**Classification of the element:**  
*Classify the element you wish to report by choosing one of the following options.*

☒ museum



☐ religious building



ODK Collect...

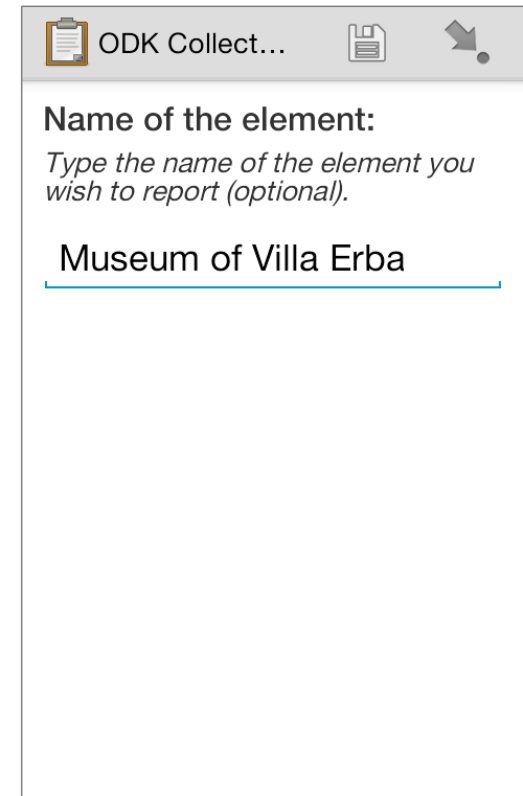
**Subclassification of the element:**  
*Classify the element you wish to report by choosing one of the following options (optional).*

☐ ethnographyc

☒ thematic

☐ gallery

☐ collections



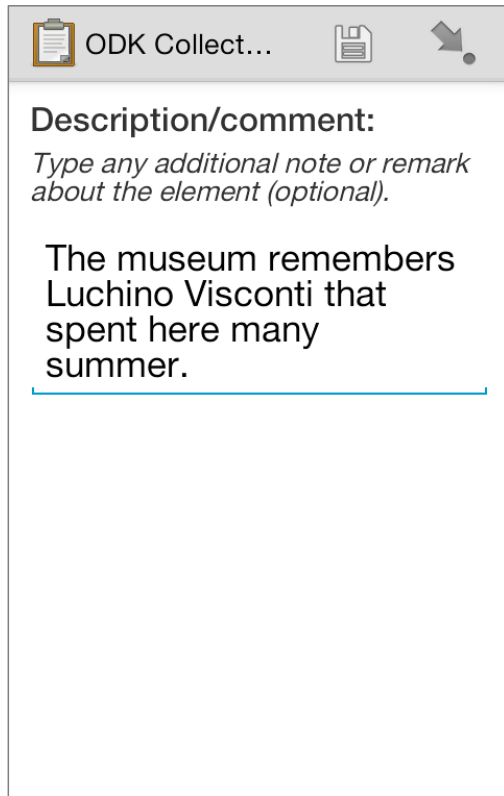
ODK Collect...

**Name of the element:**  
*Type the name of the element you wish to report (optional).*

Museum of Villa Erba

# Data sharing tools: ODK Collect

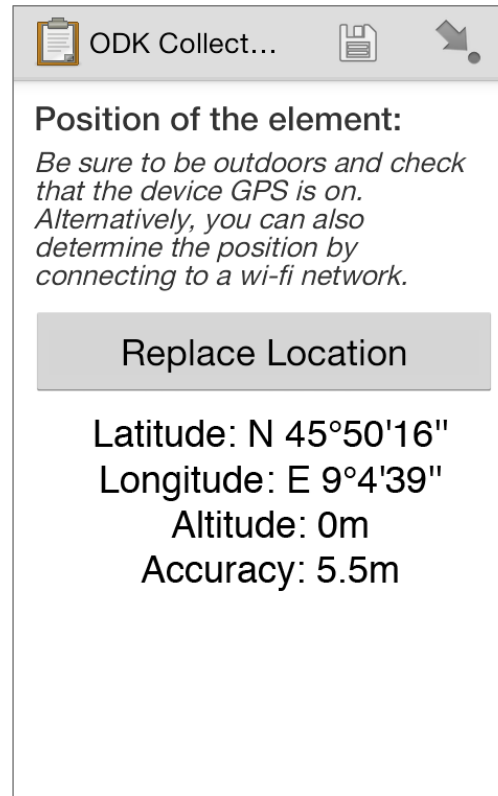
## ✓ Guided form compilation



ODK Collect...

Description/comment:  
*Type any additional note or remark about the element (optional).*

The museum remembers Luchino Visconti that spent here many summer.

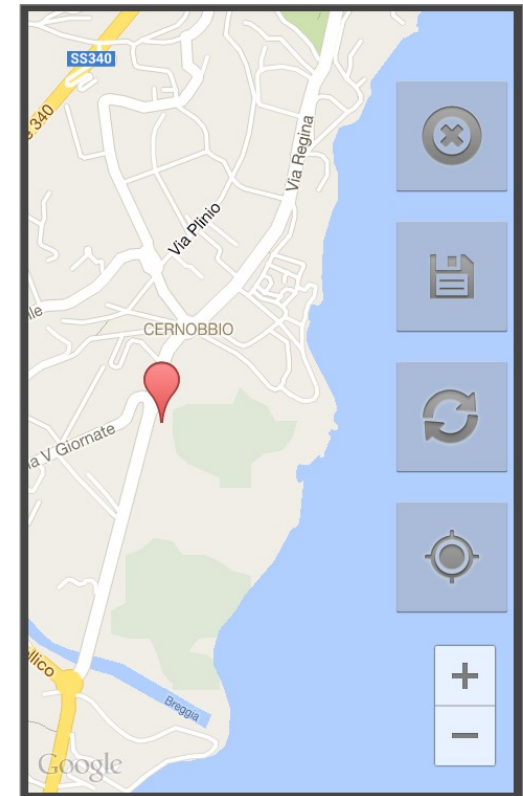


ODK Collect...

Position of the element:  
*Be sure to be outdoors and check that the device GPS is on. Alternatively, you can also determine the position by connecting to a wi-fi network.*




Replace Location

Latitude: N 45°50'16"  
Longitude: E 9°4'39"  
Altitude: 0m  
Accuracy: 5.5m



# Data sharing tools: ODK Collect


## ✓ Guided form compilation




 ODK Collect...  

**Picture showing the element:**  
*Take a picture of the element using the device camera or upload a picture available on the device.*

Take Picture

Choose Image






 ODK Collect...  

**Record audio:**  
*Record or upload an audio using your device (optional).*

Record Sound

Choose Sound

Play Sound

 ODK Collect...  

**Capture video:**  
*Capture or upload a video using your device (optional).*

Record Video

Choose Video

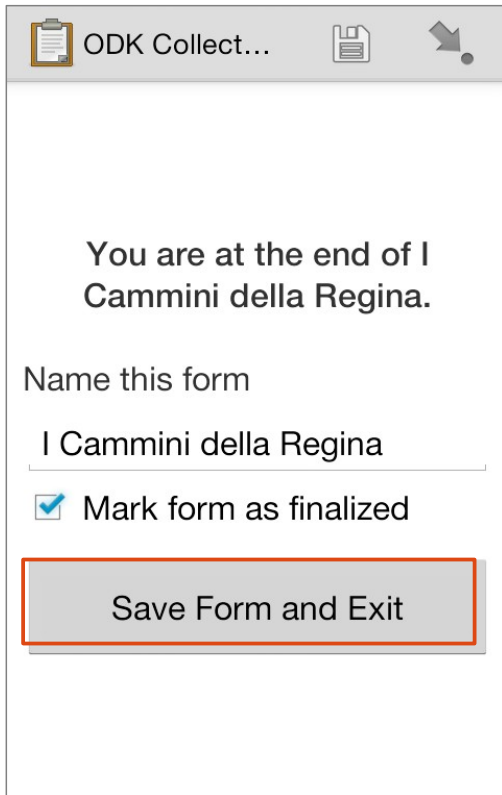
Play Video



# Data sharing tools: ODK Collect

✓ Guided form compilation

✓ Application main menu



ODK Collect...

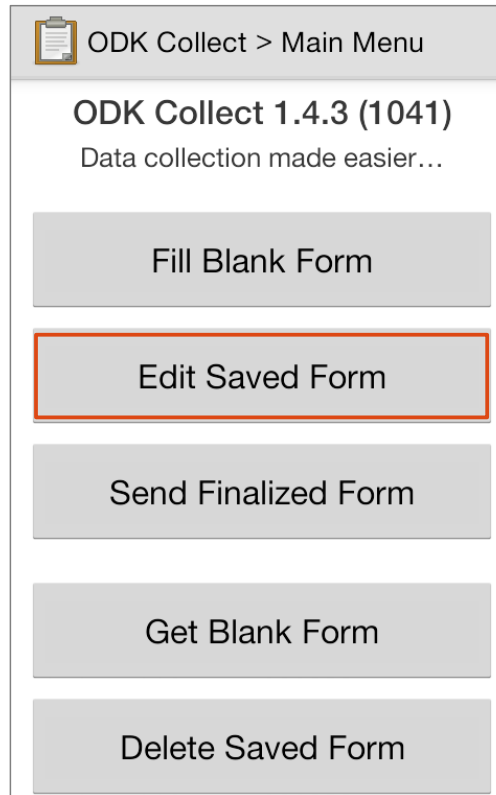
You are at the end of I Cammini della Regina.

Name this form

I Cammini della Regina

☒ Mark form as finalized

Save Form and Exit



ODK Collect > Main Menu

ODK Collect 1.4.3 (1041)  
Data collection made easier...

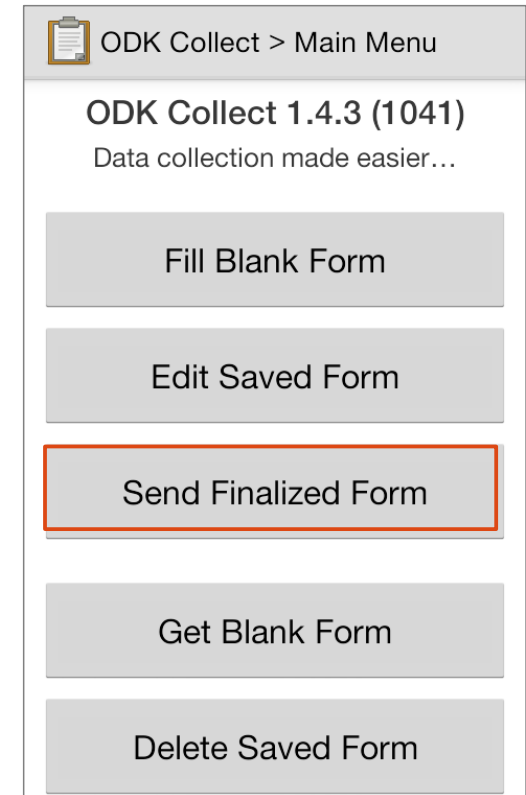
Fill Blank Form

Edit Saved Form

Send Finalized Form

Get Blank Form

Delete Saved Form



ODK Collect > Main Menu

ODK Collect 1.4.3 (1041)  
Data collection made easier...

Fill Blank Form

Edit Saved Form

Send Finalized Form

Get Blank Form

Delete Saved Form

SATURDAY MAY 3 2014

# MapParty!



WALK, OBSERVE, DRAW, MAP ALONG THE VIA REGINA  
FOR A CULTURAL, SENSORY AND PLAYFUL EXPERIENCE

Stories on the road between Italy and Switzerland with the Brigata dei novellatori senza frontiere





# MapParty!

3 MAGGIO 2014





<http://viaregina.como.polimi.it/mapparty/>



The screenshot shows the MapParty! web application interface. At the top, there's a navigation bar with the title "MapParty! 3 MAGGIO 2014" and several icons representing different map features: a shoe, a puzzle piece, a camera, a location pin, and a notepad. Below the navigation bar is a map of the area around Maslianico, Italy. A legend on the left side lists various map elements and their corresponding colors and symbols. A pop-up window titled "Map party - Punto segnalato" is displayed over the map, showing details about a specific point of interest. The details include the date (11/04/2014), the user type (turista italiano), the element name (undefined), the element type (elemento turistico), the classification (servizi), and the sub-classification (fonte). A small photograph of a stone structure is also shown. The map includes a scale bar (200 m, 1000 ft) and coordinates (lon: 9.0619, lat: 45.8438).

**Legenda**

- Mappe di base
- Dati amministrativi
  - Area svizzera del progetto
  - Comune di Cernobbio
- Elementi naturali
  - Aree boschive
  - Aree verdi
  - Aree di pascolo
  - Fiumi
- Elementi antropici
  - Edifici
  - Patrimonio architettonico
- Map Party 03/05/2014
  - Percorso
  - Punti segnalati
    - Elemento storico-culturale
    - Elemento morfologico
    - Elemento turistico
    - Elemento critico
    - Segnalazione

**Map party - Punto segnalato**

Data: 11/04/2014  
 Tipologia di utente: turista italiano  
 Nome dell'elemento: undefined  
 Tipologia dell'elemento: elemento turistico  
 Classificazione dell'elemento: servizi  
 Sottoclassificazione dell'elemento: fonte

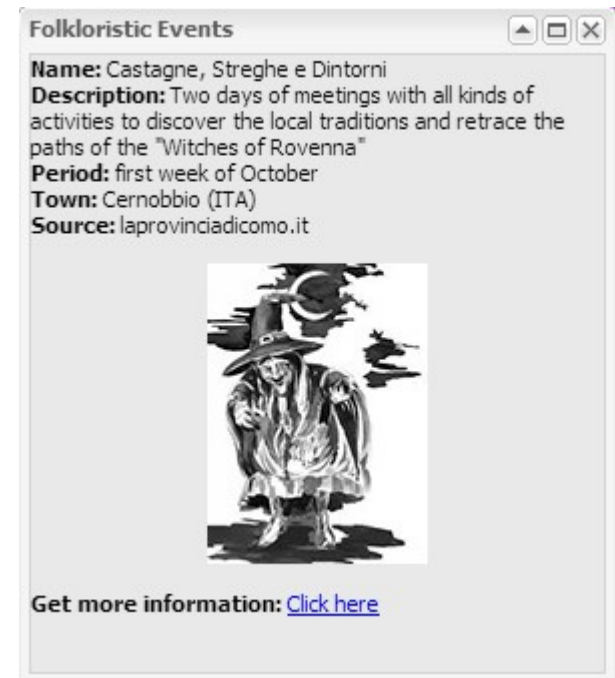
Scale = 1 : 14K  
 lon: 9.0619, lat: 45.8438

# Future developments

Creation of a complete geodatabase for soft tourism

## ✓ before the trip

- Plan the pathway route according to personal interests
- Save useful information on personal devices in order to use them without an active Internet connection



# Future developments

## Creation of a complete geodatabase for soft tourism

### ✓ during the trip

- access to the downloaded information
- make reports in order to correct data or post comments (online or offline to be submitted once connected)
- receive alerts based on local position and preferences (e.g. the presence of close points of interest, the lunch time indication, the reminder that dark is quickly coming, etc.)
- access the augmented reality information (e.g. audio and video contents)



The screenshot shows the 'I Cammini della Regina' web application interface. At the top, there is a logo with a mountain and the text 'I CAMMINI DELLA REGINA'. Below the logo, the title 'I Cammini della Regina' is displayed in orange. The form contains several fields and options:

- Date of report of the element: \***  
Insert the current date or the date the report is referred to.  
A text input field with the placeholder 'yyyy-mm-dd' and a refresh icon.
- Type of user: \***  
Specify which kind of user you are by choosing one of the following options.  
Four radio button options:
  - ☐ tourist from Italy
  - ☐ tourist from abroad
  - ☐ citizen of Como province
  - ☐ citizen of Ticino Canton
- Type of element: \***  
Specify which kind of element you wish to report by choosing one of the following options.  
A radio button option:
  - ☒ historical and cultural element

At the bottom right, there is a green square icon with a white castle tower. The word 'Required' is written in small text next to the 'Type of element' section.



# Future developments

Creation of a complete geodatabase for soft tourism

## ✓ after the trip

- upload new information
- share opinions or notes
- correct wrong information
- report obstacles found along the way



This research has been funded by the INTERREG “I cammini della Regina – Percorsi Transfrontalieri legati alla Via Regina (The paths of Regina – Crossborder paths departing from Via Regina)” 2007-2013 project.

# Thanks for your attention!

Maria Antonia Brovelli

Politecnico di Milano

Laboratorio di Geomatica – Polo Territoriale di Como

Via Valleggio 11, 22100 Como (Italy)

[maria.brovelli@polimi.it](mailto:maria.brovelli@polimi.it)