

GIS Course

June 18-29 2018

Politecnico di Milano, Lecco Campus



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Geodesy and geoinformatics for
sustainable development in Jordan
586070-EPP-1-2017-1-SE-EPPKA2-CBHE-JP

Examples of Mobile Mapping Applications

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- ✓ [Enketo](#), or Enketo Smart Paper, is the name of an open-source web application that uses a popular open-source form format, [ODK XForms](#). The purpose of this specification is to provide a common form description standard that many different kinds of compatible tools can be based on.
- ✓ Enketo has been used all around the world for a wide range of uses:
 - ✓ humanitarian aid,
 - ✓ raising historical awareness ([Via Regina project](#) of Politecnico di Milano),
 - ✓ clinical research,
 - ✓ election monitoring.
- ✓ Surveys deployed with Enketo work offline, can use very powerful skip and validation logic, run on any device, mobile or desktop, as long as it has a fairly modern browser.
- ✓ It has been adopted by KoboToolbox, Open Data Kit (ODK), Ona and [many more](#).
- ✓ It is free and [open source](#).



Open Data Kit



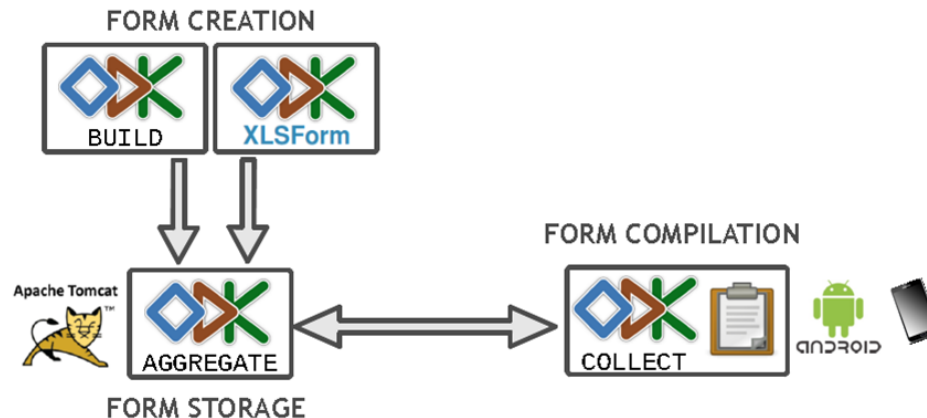
- ✓ ODK is free and open source software for collecting, managing and using data. Its source code is on [GitHub](#) and it is free.
- ✓ ODK is composed of three modules: ODK Build, ODK Aggregate and ODK Collect.
- ✓ ODK Build is used to design the survey form that users fill in. It is a web application used to create simple forms, using drag and drop. [XLSForm](#) can be used for designing more complex forms.
- ✓ [XLSForm](#) (formerly XLS2Xform) is a tool to simplify the creation of forms. Forms can be designed with Excel and XLSForm will convert them to XForms.
- ✓ ODK Aggregate is server-side module of the ODK suite, which provides blank forms to ODK Collect, accepts compiled forms from it, stores the data submitted, and administer the users.
- ✓ ODK Collect is the client-side module of the ODK suite, where users fill blank forms.
- ✓ Allows to collect various data (text, numeric, date/time, location, image, audio, video, barcode).
- ✓ ODK Aggregate visualizes the collected data using maps and simple graphs.



Open Data Kit



- ✓ The Aggregate can be hosted on Google App Engine, Amazon Web Services, on local or cloud server (Apache Tomcat server backed with PostgreSQL or MySQL).
- ✓ Available only for Android.
- ✓ Supports multiple languages and offline collection.
- ✓ Data can be exported in CSV, JSON and KML formats, published to external systems such as Google Spreadsheets, Google Fusion Tables, etc.
- ✓ Used by Google, World Health Organization (WHO), Centers for Disease Control and Prevention (CDC), The United States Agency for International Development (USAID), Red Cross and Red Crescent, ...





- ✓ GeoODK Collect is a mobile application that runs on Android smartphones. It is based on the ODK Collect, but has been extended with offline/online mapping functionalities, the ability to have custom map layer, as well as new spatial widgets, for collecting point, polygon and GPS tracing functionality.
- ✓ Data can be aggregated on either [Formhub](#) or ODK Aggregate.
- ✓ [XLS GeoConverter](#) is a Django web interface for converting data collected with GeoODK Collect/ODK Collect to a geographical format (shapefile). In the XLSForm there are three main geographical formats: geopoint (point), geoshape (polygon), geotrace (polyline).
- ✓ The [Mobile Data Conversion Kit](#) is a desktop application that aims to convert your CSV data that can be exported from either your Formhub account or the ODK Aggregate system to shapefile or KMZ format. Also this application allows you to download the images that are in the system.
- ✓ Its source code is on [GitHub](#) and it is free.

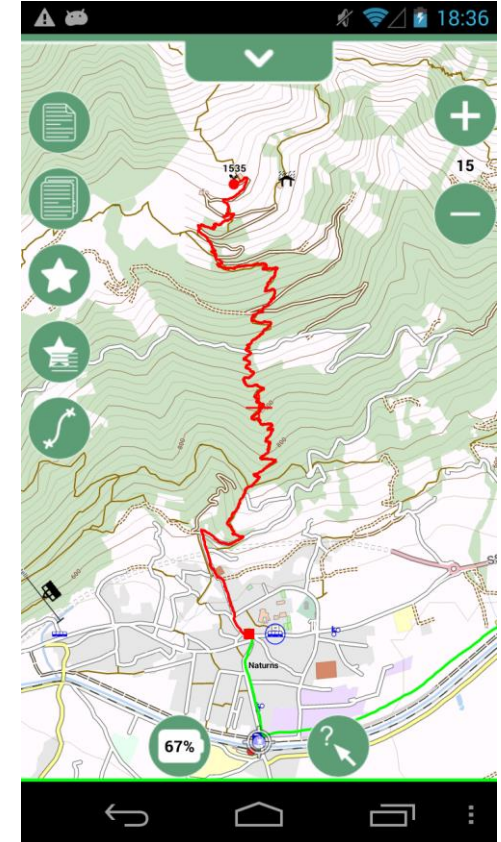
GeoODK



Geopaparazzi



- ✓ [Geopaparazzi](#) is a tool developed to do fast qualitative engineering/geologic surveys and GIS data collection. Its source code is on [GitHub](#) and it is free.
- ✓ Available only on Android.
- ✓ GPS tracking is supported.
- ✓ Allows to take notes in four different types: text, picture, sketch, form-based.
- ✓ Offers a map view for navigation with support for raster tiles and SpatiaLite vector data. In the map view it is possible to create, view, and edit the geometry and attributes of point, line and polygon features held in a SpatiaLite database.
- ✓ Data can be exported in KMZ, GPX, bookmarks in CSV, images, notes in PDF, Cloud Projects; imported in GPX, OGC Web Map Service (WMS), SpatiaLite, bookmarks collected in CSV, Cloud Projects and Profiles formats. Data is not stored on a server.





- ✓ [EpiCollect](#) provides a complete online solution for the definition and design of mobile data gathering projects (including GPS and photos), supports Android and iPhone.
- ✓ [EpiCollect+](#) provides greater flexibility for the design of more complex data gathering projects, including multiple linked forms, multiple media types (GPS, photo, video, sound, barcode), jump questions. Supports only Android. Its source code is on [GitHub](#) and it is free.



Create a Project Website at
EpiCollect.net



Design form(s) online for
data collection (including
GPS and media)

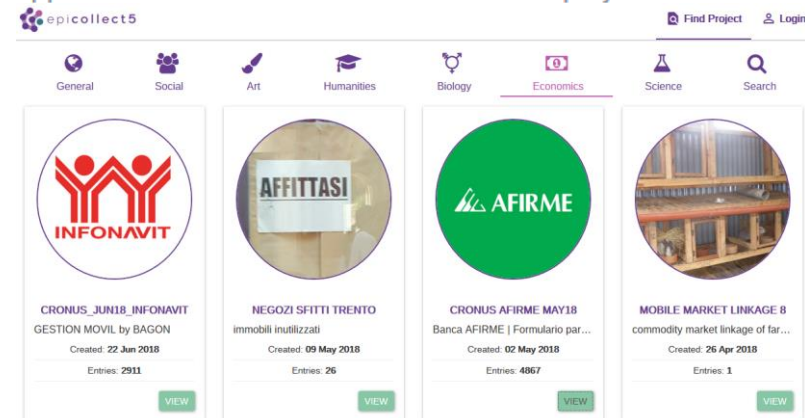


Load Project into the mobile
app and collect data



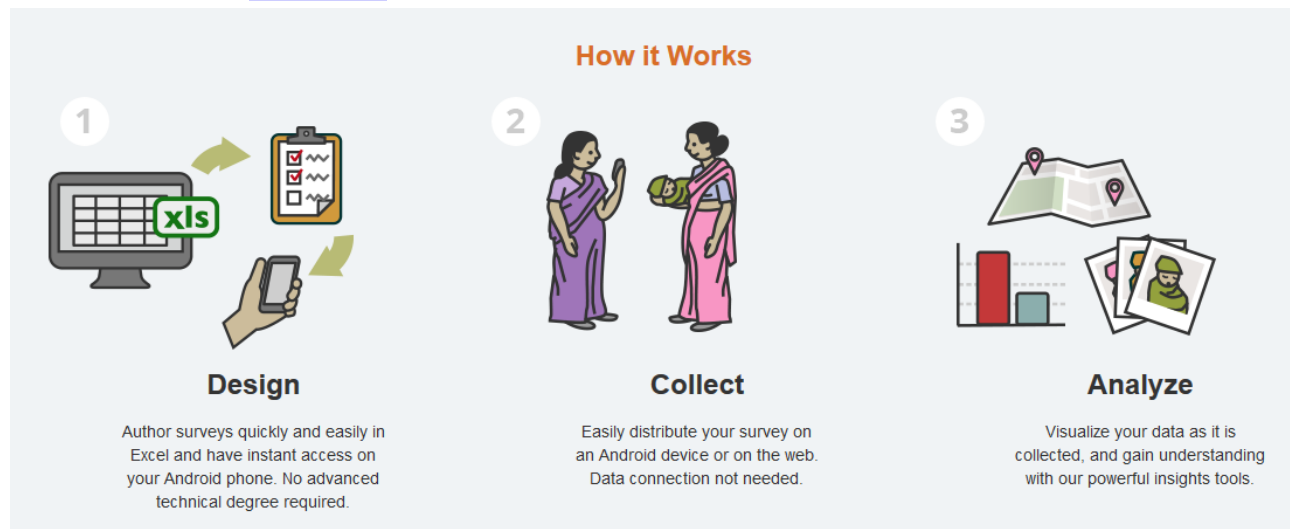
View data collected at your
project website.

- ✓ [EpiCollect5](#) stores the data in a single server, which enables browse all the projects and data, download the data in CSV and JSON formats. Available on Android and iPhone.



formhub

- ✓ Design the form in an excel file, following the XLSForm guidelines, upload it to your [formhub](#) account.
- ✓ Collect the data using ODK Collect, or web-based survey of formhub.
- ✓ Data can be downloaded in CSV, XLS and KML formats.
- ✓ Analyze (distribution of given answers, hexbin + formhub.R, Bamboo) and visualize (tabular and singular formats, on map, images)
- ✓ Used in agricultural surveys, emergency response management, facility inventories, ...
- ✓ Its source code is on [GitHub](#) and it is free.





- ✓ Form is created using the XLSForm standard.
- ✓ Forms are accessed via browsers on desktop and mobile devices.
- ✓ On personal web account data can be analyzed and visualized. Maps let you browse all submissions or filter points based on fields and answers. Summary charts give access to graphs of collected data. XLS reports let you create an Excel dashboard that includes calculations a spreadsheet software can do.
- ✓ [Ona](#) has two types of accounts: personal and organization. Personal accounts work well for small teams and projects. For big teams, Ona organizations let multiple individuals manage a shared organization account. Organization accounts can manage permissions of individuals.
- ✓ There is a free plan, but more features unlock upon payment.
- ✓ It is open source and the source code is available on [GitHub](#).



- ✓ Custom mobile forms can be designed in a web browser with [Fulcrum](#) drag-and-drop form builder, and deployed to mobile data collection applications on [iOS](#) and [Android](#).
- ✓ Supports offline data collection.
- ✓ Data is stored on Fulcrum cloud. Data can be exported in several industry-standard file types, including Excel, CSV, Google Earth, and shapefile. PDF reports can be generated.
- ✓ Data can be viewed on a web map interface to perform analysis and quality checks of data captured in the field.
- ✓ Historical versions of the records are kept, so that it is possible to scroll back in time through the collected data to track changes.
- ✓ Activity Stream shows how data collection is going in real time, with information on who is active and what they're collecting so you can visualize field productivity.
- ✓ The platform is extensible, allowing to integrate own database systems, set up custom notifications, and build tools using the Fulcrum API.

- ✓ There are ready-made form templates from a variety of industries.



Agriculture Apps

Apps for Agricultural, Farming, and Field Work



Archaeology Apps

Apps for Archeology & Field Research



Banking Apps

Apps for Banking & Finance



Business Services Apps

Apps for Business Services



Commercial Apps

Apps for Sales, Marketing, & Finance



Construction Apps

Apps for Construction Management & Site Inspections

- ✓ Can be used for thirty days for free. Afterwards it is paid. There are three plans to choose.
- ✓ Its source code is on [GitHub](#).



- ✓ [KoBoToolbox](#) is an integrated set of tools for building forms and collecting interview responses. It is built by the Harvard Humanitarian Initiative for easy and reliable use in difficult field settings, such as humanitarian emergencies or post-conflict environments.
- ✓ It is possible to create survey forms online with complex validation rules and skip logic, collect data in the browser in any device (desktop and mobile), or using the Android application [KoBoCollect](#) both online and offline, inspect the data online or download it in Excel, CSV, KML and other formats.
- ✓ The installation of KoBoToolbox for researchers, aid workers and everyone else can only be used for small survey deployments (less than 10,000 submissions as well as 5GB file uploads per user per month). It is hosted by [Harvard Humanitarian Initiative](#).
- ✓ An organization providing humanitarian assistance, can use [United Nations Office for the Coordination of Humanitarian Affairs - UN OCHA](#)'s KoBoToolbox installation instead, which provides an unlimited number of submissions.
- ✓ It can be downloaded and installed on one's own [server](#) or [computer](#).
- ✓ It is free and [open source](#).



OpenStreetMap editing



- ✓ [Vespucci](#) is the first OpenStreetMap editor for Android and has been available and developed since 2009. It is free and [open source](#).



- ✓ [StreetComplete](#) is an Android app which finds wrong, incomplete or extendable data in the user's vicinity and provides them the tools to complete these easily and directly on site without having to use another editor. It is free and [open source](#).



- ✓ [Go Map!!](#) is an iOS app that lets you create and edit information in OpenStreetMap. Go Map!! supports editing ways and arbitrary tagging. It is free, but not open source.



Collecting Street-level Imagery

- ✓ [Mapillary](#) allows to collect geotagged street-level photos. Its creators want to represent the whole world (not only streets) with photos using crowdsourcing. The images on Mapillary can be used under Creative Commons Attribution-ShareAlike 4.0 International License (CC-BY-SA). There is special permission to derive data from the photos for contributing to OpenStreetMap and Wikimedia Commons. The GPX tracks can be used without restriction, and derived data can be used provided it is ODbL. The application itself, however, is proprietary.

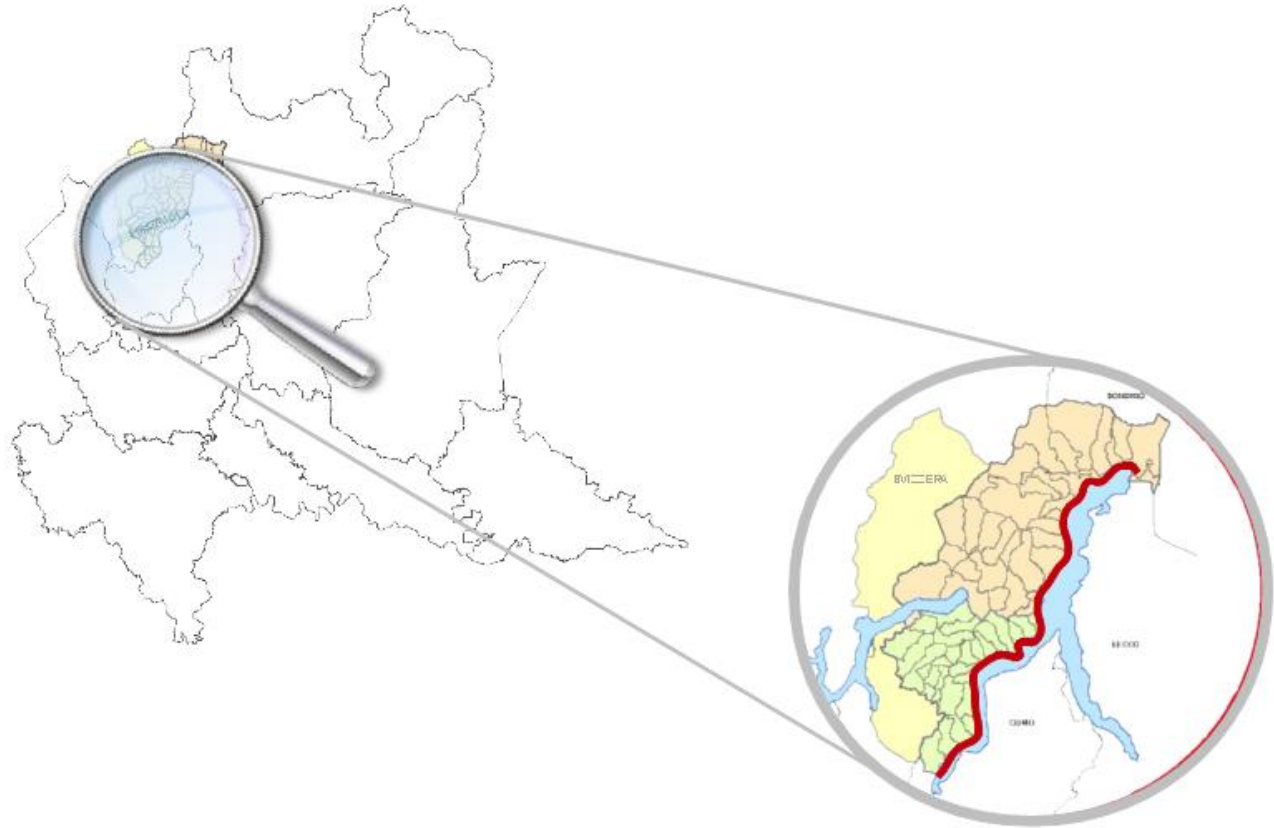


- ✓ [OpenStreetCam](#), formerly called OpenStreetView, is project to collect crowdsourced street-level photographs for improving OpenStreetMap operated by TeleNav. Collected imagery is published under a CC-BY-SA license and most of the project's code is open source. Contributors gather imagery with their smartphones using an [Android](#) or [iOS](#) app.



Via Regina

- ✓ Via Regina defines a cross-border area between Italy and Switzerland.
- ✓ trade and cultural route since Roman times
- ✓ transalpine system of soft mobility paths



Via Regina

- ✓ The Paths of Regina is an INTERREG project (Cross-border Cooperation Operational Programme Italy-Switzerland 2007-2013).
- ✓ Purpose: to valorize the cultural heritage of the area and foster tourism
- ✓ Beneficiaries: local communities, administrations, pilgrims, tourists
- ✓ Expertise involved: cultural heritage, land use and design, geomatics

- ✓ Partners:

- ✓ universities

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SUPSI

POLO TERRITORIALE DI COMO



- ✓ local administrations

- ✓ cultural associations



IUBILANTES
ONLUS - organizzazione di volontariato culturale



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



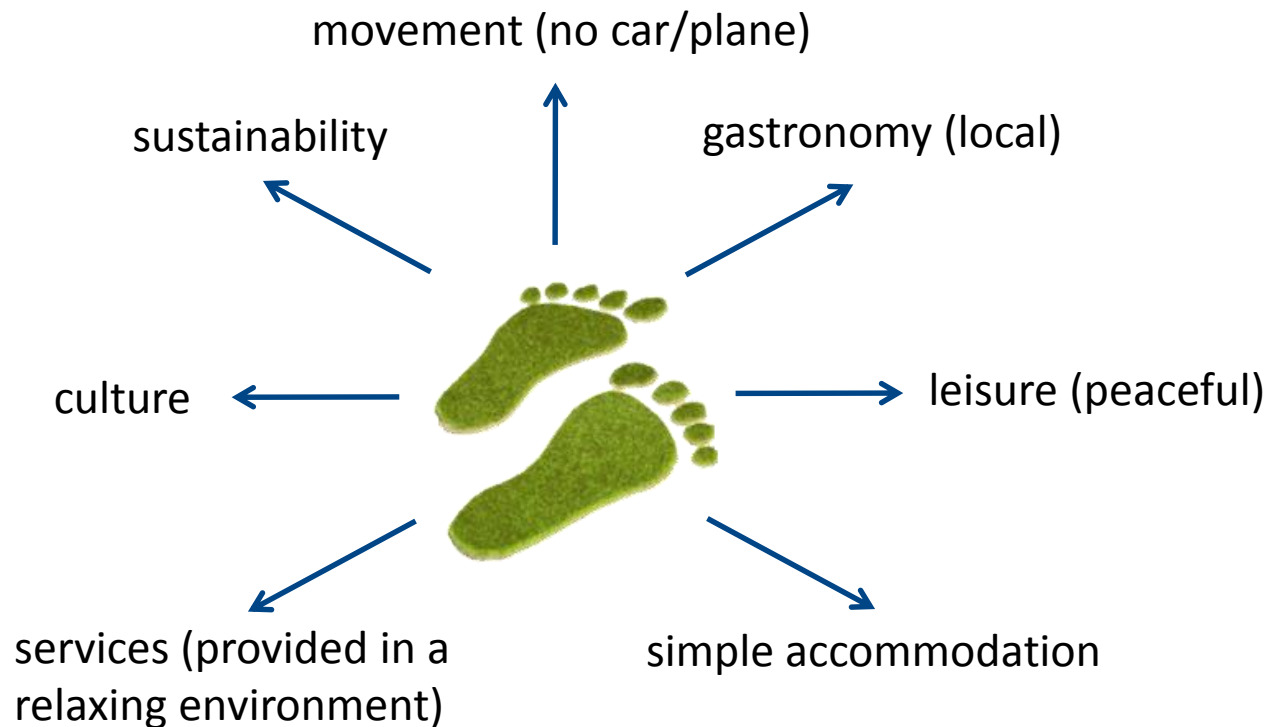
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Mobile Mapping Applications



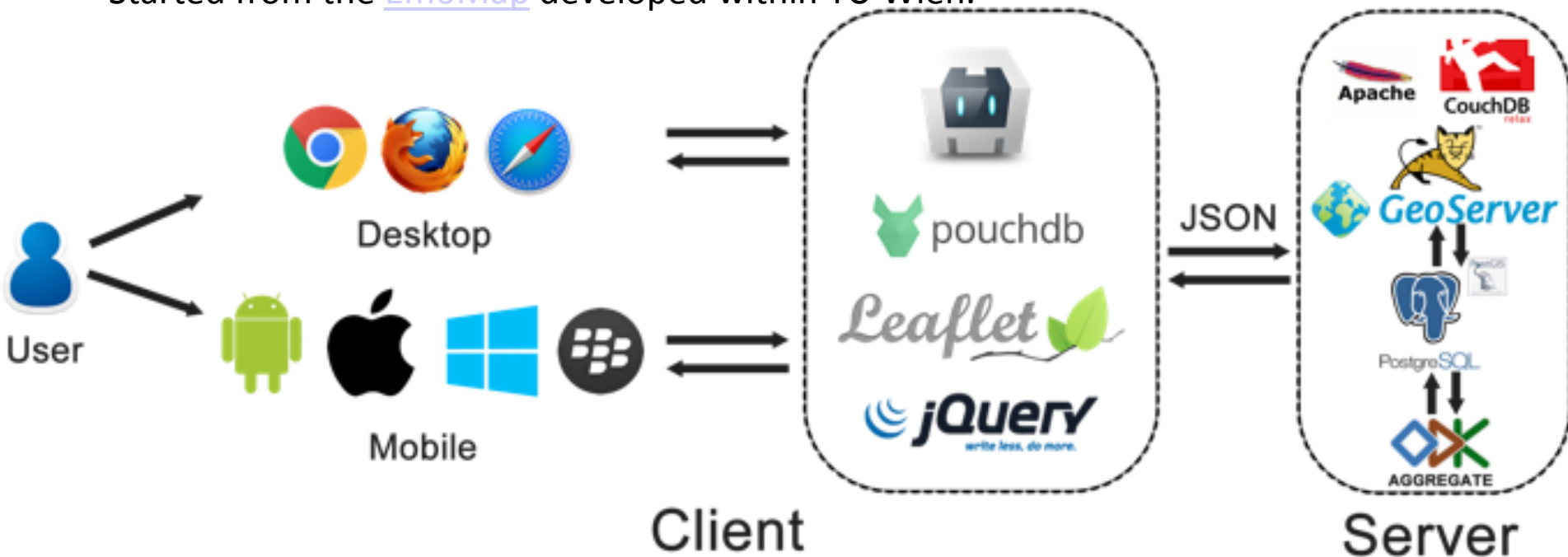
Via Regina

- ✓ Slow tourism (a special kind of sustainable tourism) involves environmental friendliness and rediscovery of local traditions and cultural knowledge.













Via Regina application

- ✓ Allows everyone to report georeferenced points of interest.
- ✓ Available on desktop and mobile browsers: <http://viaregina3.como.polimi.it/app>.
- ✓ The application is also available on Android and iOS online stores, named as “Via Regina”. The apk for Android devices can be downloaded from: <http://viaregina3.como.polimi.it/app/viaregina.apk>
- ✓ Started from the [EmoMap](#) developed within TU Wien.



Via Regina application




Categories of points of interest:



- ✓ Historical and Cultural Elements 
 - ✓ museum 
 - ✓ religious building 
 - ✓ civil building 
 - ✓ archeological element 
 - ✓ rural building 
 - ✓ military building 
 - ✓ factory 
- ✓ Morphological Elements 
 - ✓ surface 
 - ✓ bounding escarpment 
 - ✓ traffic support and manufactured products 



Via Regina application

Categories of points of interest:

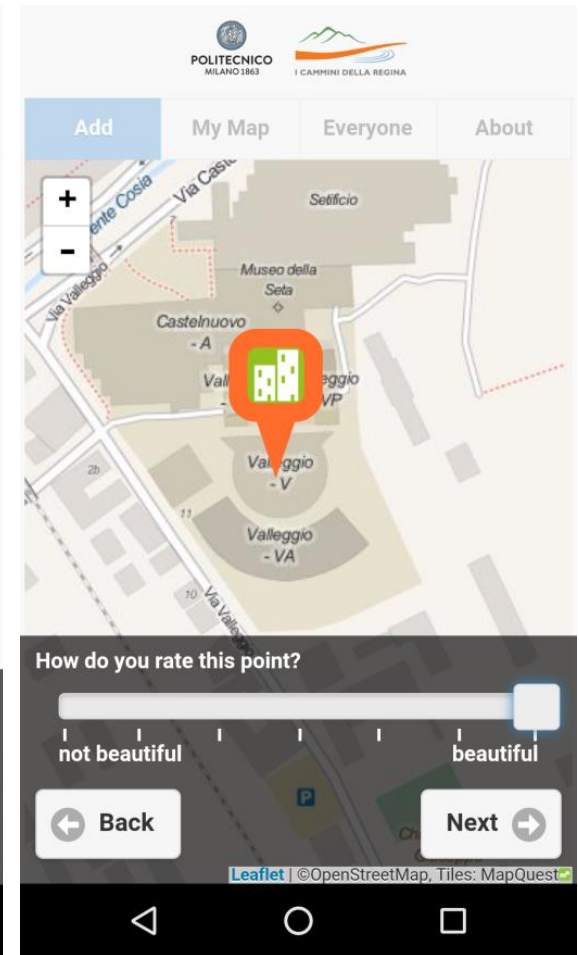
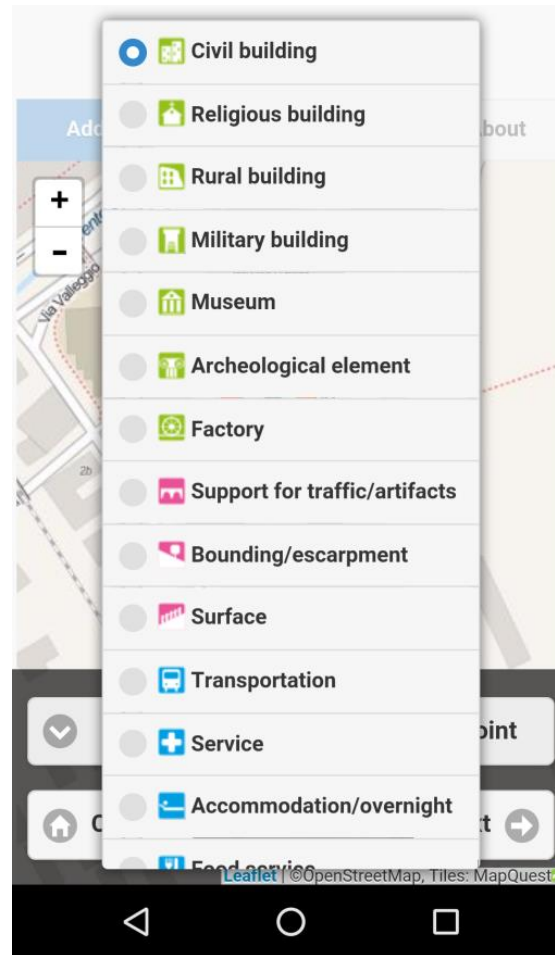
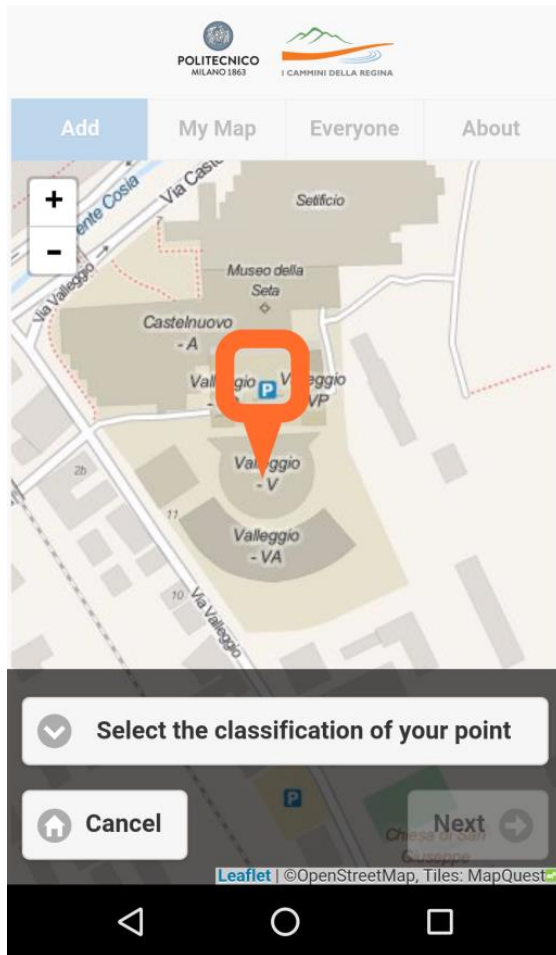
- ✓ Tourist Elements 
 - ✓ accommodation 
 - ✓ transport 
 - ✓ products 
 - ✓ food service 
 - ✓ services 

- ✓ Critical Elements 
 - ✓ morphological 
 - ✓ structural 



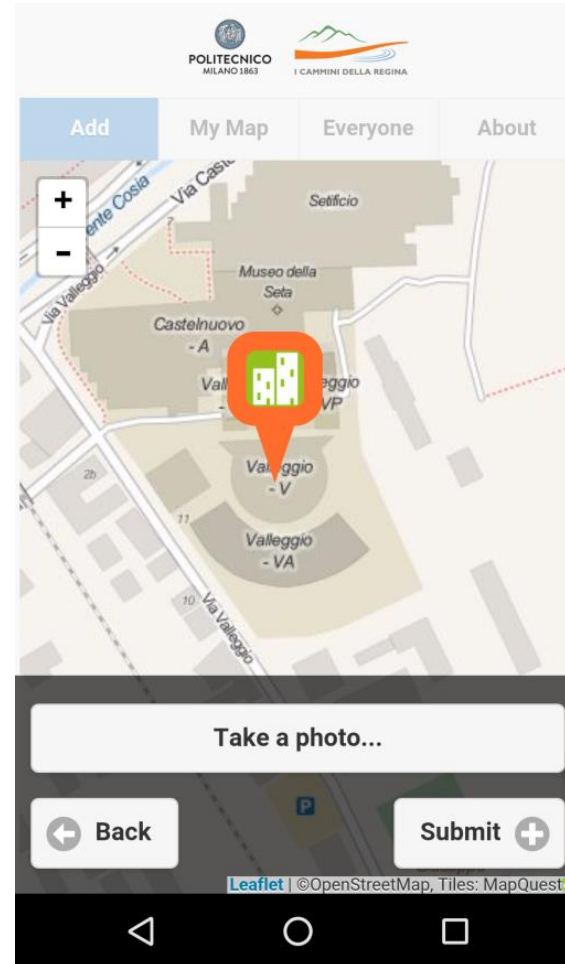
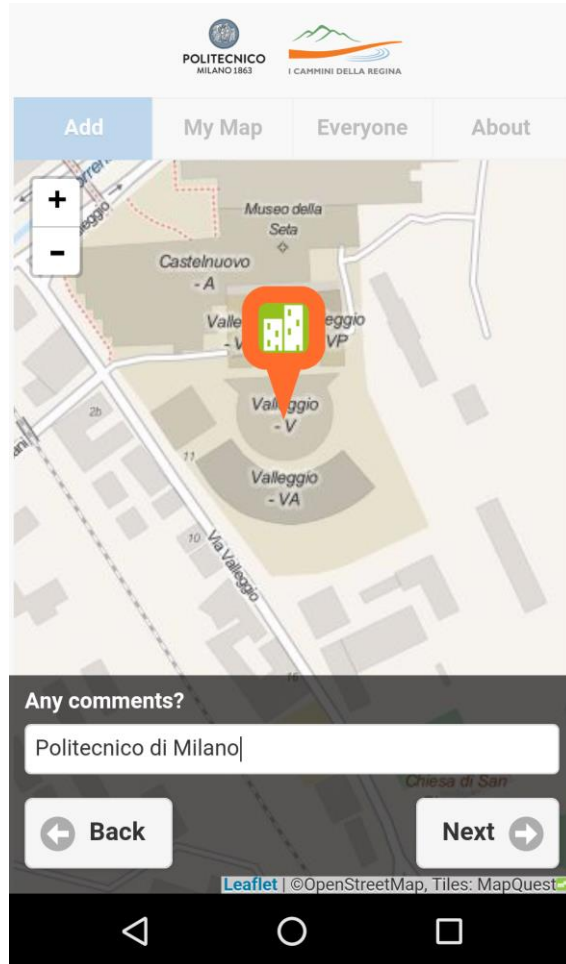
Via Regina application

- ✓ Classify and rate a new POI.



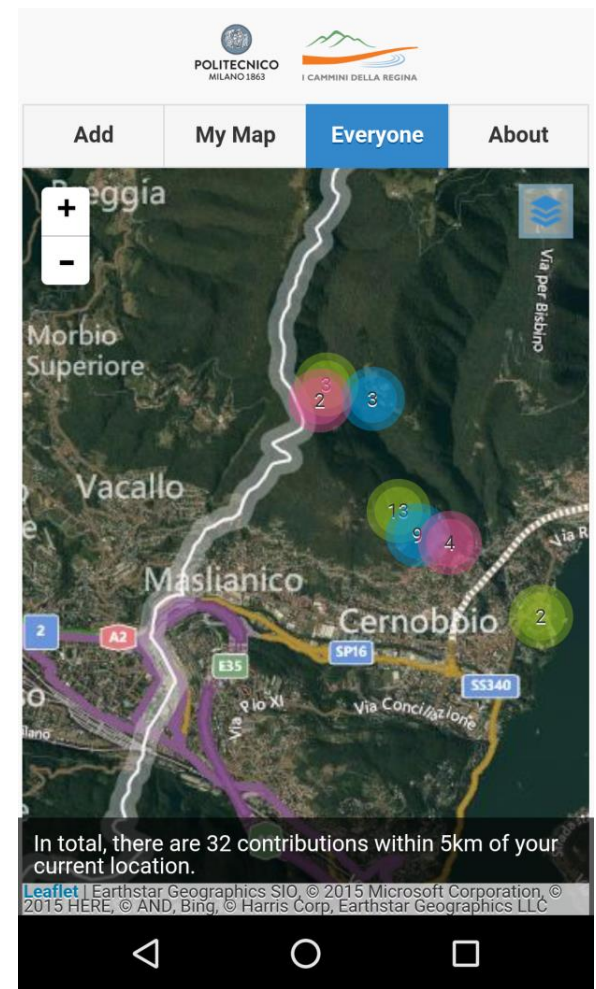
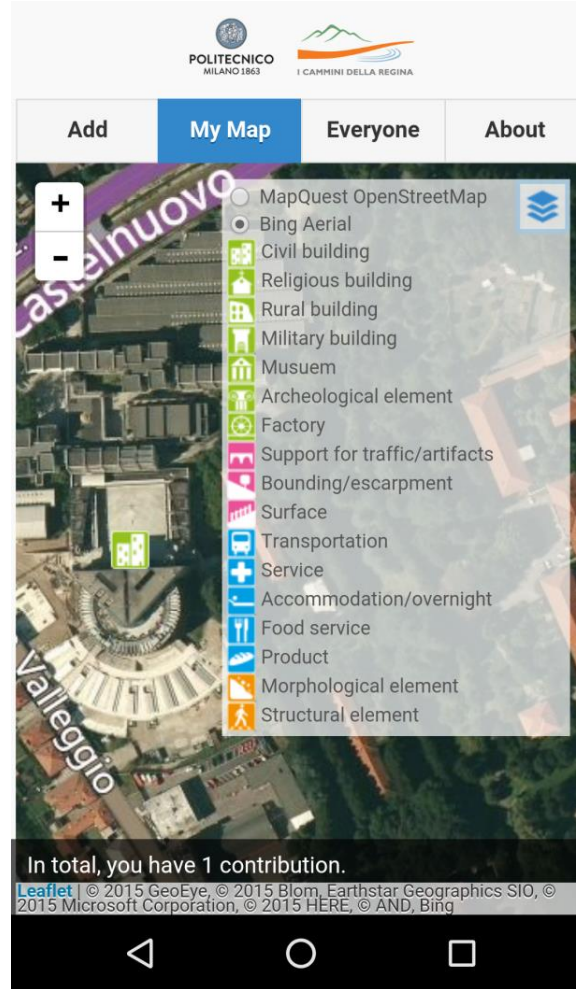
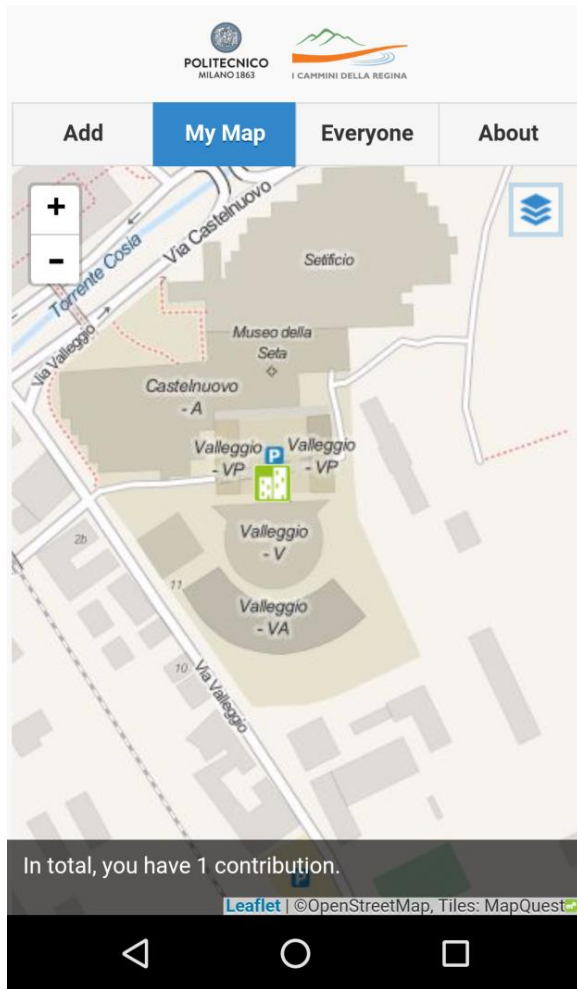
Via Regina application

- ✓ Take/upload picture of the new POI.



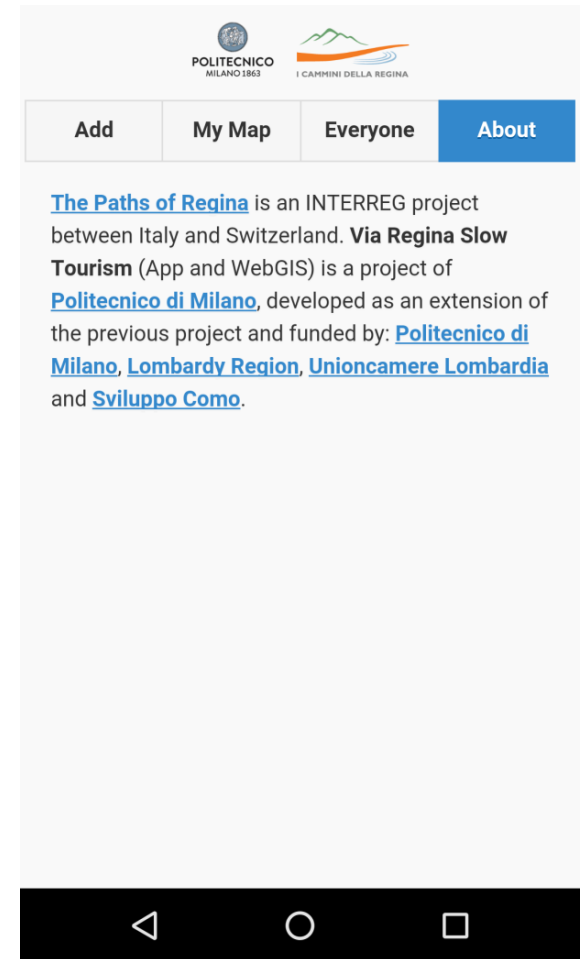
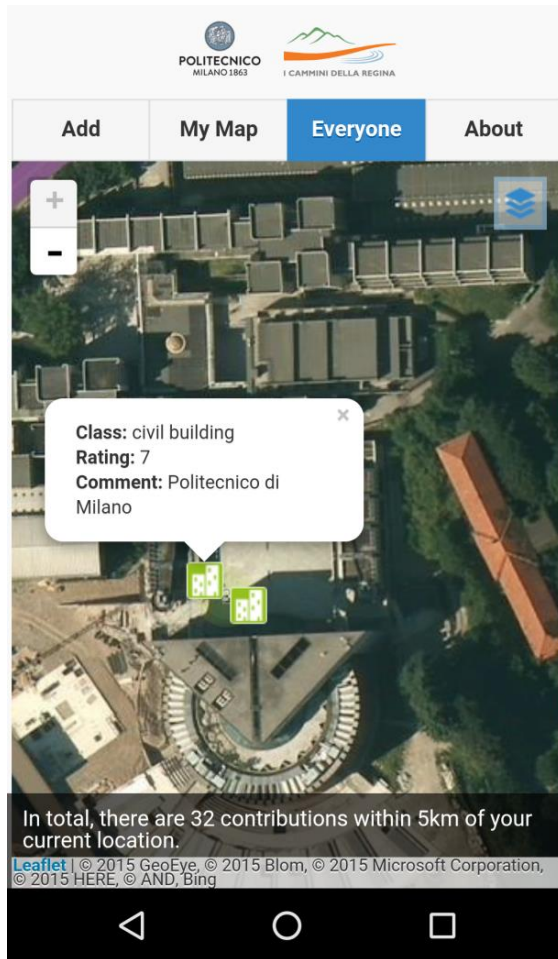
Via Regina application

- ✓ Visualize the map of POIs added by you or by all the users.



Via Regina application

- ✓ Query the POIs collected and access the application information.





Now let's go out and collect data using the Via Regina application!





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