

MOBILE MAPPING AND ADVANCED VISUALIZATION

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Sources: none



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V: 1.0 | 09/2014

General Information

□ Scope

The objective of this training module is to acquire know-how on the basic concepts of mobile mapping and advanced visualization. Mobile mapping will be used to increase the number of information provided by eENVplus by the use of a Crowdsourcing app for mobile devices.

The second part of the module is devoted to the use of the Augmented Reality functionality provided by the eENVplus mobile App, which allows to visualize data provided by the mobile mapping module on the real representation of the environment.

Introduction on Mobile Mapping

□ Crowdsourcing

From Wikipedia, the free encyclopedia

Is the process of obtaining needed services, ideas, or content by soliciting contributions from a large group of people, and especially from an online community, rather than from traditional employees or suppliers.

The process of crowdsourcing is often used to subdivide tedious work and has occurred successfully offline.

It combines the efforts of numerous self-identified volunteers or part-time workers, where each contributor of their own initiative adds a small portion to the greater result.

The term "crowdsourcing" is a portmanteau of "crowd" and "outsourcing"; it is distinguished from outsourcing in that the work comes from an undefined public rather than being commissioned from a specific, named group.

Introduction on Mobile Mapping

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□ Crowdsourcing

For this purpose, the eENVplus infrastructure offers a specific web service used to collect data provided by users in accordance with data models provided by the project pilots, explained in the next chapter.



The eENVplus CrowdSourcing Service

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□ Software Requirements

The eENVplus CrowdSourcing service is composed by a set of Java-based [Servlets](#), exported as a Web Application Archive ([WAR file](#)) compiled with JDK 1.6, and a [PostGIS](#) spatial extension for Postgres relational database to store the collected information.

The reference application server to execute the CrowdSourcing service is [Apache Tomcat](#).

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□ Pilots Data model

In this set of slides, the complete definition of the data models defined by the involved Pilots are provided.

The data models are designed to describe heterogeneous real-life situations, from a damage to a natural element, to the reporting of a specific animal specie seen during your last hike in a natural park.

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□ Pilot EP05 – France

The aim of this Pilot is to enable users to collect information about species distribution in France protected areas.

The user will be able to choose Scientific Names of species stored in the EUNIS_SPECIES database, select the quantity, the position, and add a note if necessary.

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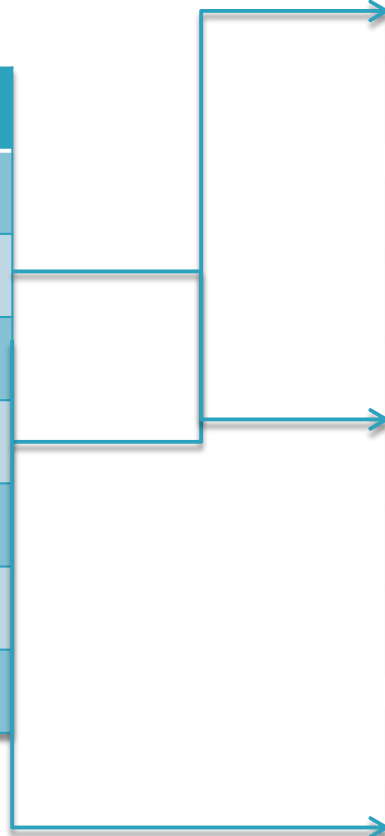
□ Pilots Data model: EP05

Crowd_EP05	
ID	SERIAL PK
SPECIE_ID	INTEGER
USER_ID	INTEGER
QUANTITY_ID	INTEGER
THE_GEOM	GEOMETRY
DESCRIPTION	VARCHAR(255)
INSERTEDON	VARCHAR(19)

Crowd_QUANTITY	
ID	SERIAL
QUANTITY	VARCHAR(255)

Crowd_SPECIES	
ID	INTEGER
PRIMARY_ID	INTEGER
SCIENTIFIC_NAME	VARCHAR(255)
LABEL	VARCHAR(255)
TF	VARCHAR(255)

Crowd_USERS	
ID	SERIAL
.....



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□ Pilot EP07 – Hungary/Slovakia

The aim of this Pilot is to enable users to collect information about species distribution in Hungary and Slovakia protected areas.

The user will be able to choose Scientific Names of species stored in the EUNIS_SPECIES database, select the quantity, the position, add a note if necessary, and, optionally, add a picture taken from the device's camera.

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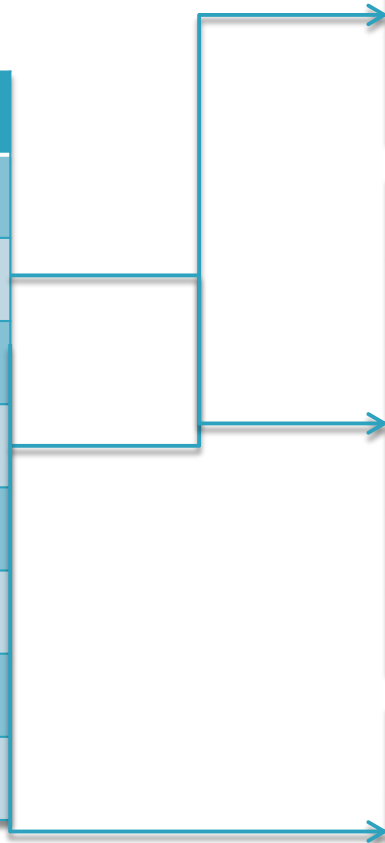
□ Pilots Data model: EP07

Crowd_EP07	
ID	SERIAL PK
SPECIE_ID	INTEGER
USER_ID	INTEGER
QUANTITY_ID	INTEGER
THE_GEOM	GEOMETRY
DESCRIPTION	VARCHAR(255)
INSERTEDON	VARCHAR(19)
IMAGE	BYTEA

Crowd_QUANTITY	
ID	SERIAL
QUANTITY	VARCHAR(255)

Crowd_SPECIES	
ID	INTEGER
PRIMARY_ID	INTEGER
SCIENTIFIC_NAME	VARCHAR(255)
LABEL	VARCHAR(255)
TF	VARCHAR(255)

Crowd_USERS	
ID	SERIAL
.....



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□ Pilots EP08 – Iceland

The aim of this Pilot is to enable users to collect heterogeneous information about the environment in Iceland. There are four main categories:

- ▣ Road Obstacles
- ▣ Natural Objects
- ▣ Damage to Nature
- ▣ Surface Type

Each one subdivided into several sub-types, in order to increase the quality of the obtained observation.

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□ Pilots EP08 – Iceland

The user will be able to choose between categories and related types, insert the title, the position, a note if necessary and, optionally, a picture taken from the device's camera.

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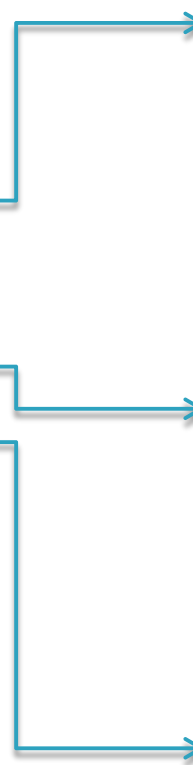
□ Pilots Data model: EP08

Crowd_EP08	
ID	SERIAL PK
CATEGORY_ID	INTEGER
TYPE_ID	INTEGER
USER_ID	INTEGER
TITLE	VARCHAR(255)
THE_GEOM	GEOMETRY
DESCRIPTION	VARCHAR(255)
INSERTEDON	VARCHAR(19)
IMAGE	BYTEA

Crowd_EP8_CATEGORIES	
ID	SERIAL
CATEGORY	VARCHAR(255)

Crowd_TYPES	
ID	INTEGER
CATEGORY_ID	INTEGER
TYPE	VARCHAR(255)

Crowd_USERS	
ID	SERIAL
.....



The eENVplus CrowdSourcing Service

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□ Web Services

The CrowdSourcing Service offers a set of REST services used for enable users to put observations in the CrowdSourcing Database.

The interaction with the Crowd DB can be performed in several ways by using the following methods:
GetCapabilities, RegisterUser, CheckLogin, GetObservations, PutObservation.

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□ GetCapabilities

The GetCapabilities method allows to retrieve the Capabilities file, encoded in XML format, of the service through a GET Request.

URL: [http://\\$HOST:\\$PORT/\\$SERVICE/GetCapabilities](http://$HOST:$PORT/$SERVICE/GetCapabilities)

INPUT PARAMETERS: NONE

OUTPUT: XML DESCRIPTOR FILE

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□ RegisterUser

The RegisterUser method allows new users to register into the system through a POST Request.

URL: [http://\\$HOST:\\$PORT/\\$SERVICE/RegisterUser](http://$HOST:$PORT/$SERVICE/RegisterUser)

INPUT PARAMETERS: USERNAME, NAME, SURNAME, EMAIL, PASSWORD

OUTPUT: STATUS STRING (“REGISTERED”, “ERROR”)

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□ CheckLogin

The CheckLogin method allows registered users to login into the system, getting 1H session for upload new observations, through a POST Request.

URL: [http://\\$HOST:\\$PORT/\\$SERVICE/CheckLogin](http://$HOST:$PORT/$SERVICE/CheckLogin)

INPUT PARAMETERS: USERNAME, PASSWORD

OUTPUT: STATUS, USER ID, PRIVATE KEY

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□ GetObservations

The GetObservations method allows registered and not registered users to get observations provided by registered users for a specific Pilot, between two temporal intervals, through a POST Request.

URL: [http://\\$HOST:\\$PORT/\\$SERVICE/GetObservations](http://$HOST:$PORT/$SERVICE/GetObservations)

INPUT PARAMETERS: BEGINPOSITION, ENDPOSITION, PILOT

OUTPUT: XML OBSERVATIONS FILE

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□ PutObservation

The PutObservation method allows logged users to put observations belonging to a specific Pilot Data model in the CrowdSourcing Database through a POST Request.

URL: [http://\\$HOST:\\$PORT/\\$SERVICE/PutObservation](http://$HOST:$PORT/$SERVICE/PutObservation)

INPUT PARAMETERS: USER ID, PRIVATE KEY, PILOT, DATAMODEL COMPLIANT ENTRIES

OUTPUT: STATUS

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□ Administration Panel

Available at: eenvplus.graphitech-projects.com

is composed by two independent parts:

- Public Visualization Tool: allow users to visualize collected observations by the use of a browsers-based application;
- Restricted Area: allows pilot moderators to visualize, approve or reject observations; allows users to change their personal data.

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□ Public Visualization Tool

WebGL-based spinning globe,
powered by CesiumJS,
allows the visualization of
approved observations.

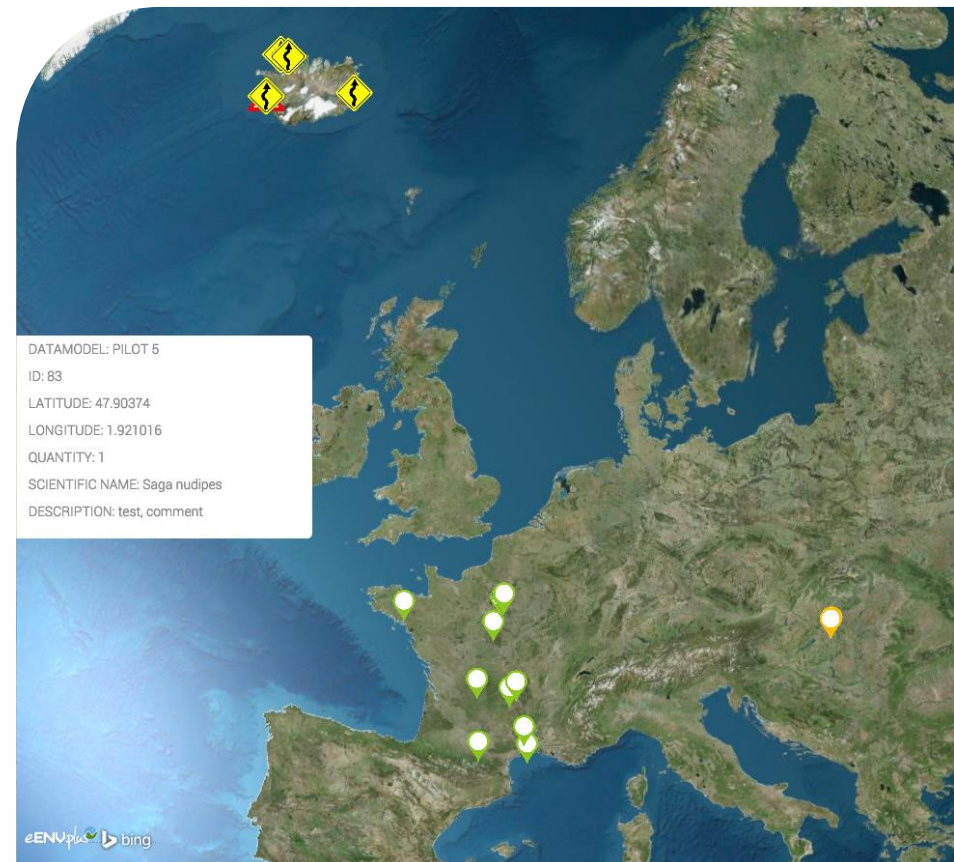


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□ Public Visualization Tool

Observations data can be showed simply by clicking on it.



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❑ Restricted Area

A moderator can enable or disable

- ❑ Auto Validation functionality: automatic publication of the data without human-based final approving

Manage

In this section the System Administrator can validate the collected Pols in order to publish them
To publish a specific point of interest, it is simply required a click on the "publish" button, located near each entry.

Auto Validation
 Topo Validation

Total Observations: 22

ID	SCIENTIFIC NAME	QUANTITY	LATITUDE	LONGITUDE	DESCRIPTION
There are no data to publish.					

[Export INSPIRE-SD](#) [Export CSV](#)

Last 15 days observations

1.0
0.5
0.0

2015-02-25 2015-02-26 2015-02-27 2015-02-28 2015-03-01 2015-03-02 2015-03-03 2015-03-04 2015-03-05 2015-03-06 2015-03-07 2015-03-08 2015-03-09 2015-03-10 2015-03-11

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❑ Restricted Area

A moderator can enable or disable

- ❑ Topological Validation functionality: observations collected outside the pilot geographical bounding box will be automatically rejected

Manage

In this section the System Administrator can validate the collected Pols in order to publish them
To publish a specific point of interest, it is simply required a click on the "publish" button, located near each entry.

Auto Validation
 Topo Validation

Total Observations: 22

ID	SCIENTIFIC NAME	QUANTITY	LATITUDE	LONGITUDE	DESCRIPTION
There are no data to publish.					

[Export INSPIRE-SD](#) [Export CSV](#)

Last 15 days observations

1.0
0.5
0.0

2015-02-25 2015-02-26 2015-02-27 2015-02-28 2015-03-01 2015-03-02 2015-03-03 2015-03-04 2015-03-05 2015-03-06 2015-03-07 2015-03-08 2015-03-09 2015-03-10 2015-03-11

The eENVplus CrowdSourcing Service

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□ Restricted Area

A moderator can also

- ▣ Export approved observations in **CSV** file format

Manage

In this section the System Administrator can validate the collected Pols in order to publish them
To publish a specific point of interest, it is simply required a click on the "publish" button, located near each entry.

Auto Validation
 Topo Validation

Total Observations: 22

ID	SCIENTIFIC NAME	QUANTITY	LATITUDE	LONGITUDE	DESCRIPTION
There are no data to publish.					

[Export INSPIRE-SD](#) [Export CSV](#)

Last 15 days observations

1.0
0.5
0.0

2015-02-25 2015-02-26 2015-02-27 2015-02-28 2015-03-01 2015-03-02 2015-03-03 2015-03-04 2015-03-05 2015-03-06 2015-03-07 2015-03-08 2015-03-09 2015-03-10 2015-03-11

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❑ Restricted Area

A moderator can also

- ❑ Export approved observations in GML file format according with the **INSPIRE SD V3.0** schema

Manage

In this section the System Administrator can validate the collected Pols in order to publish them
To publish a specific point of interest, it is simply required a click on the "publish" button, located near each entry.

Auto Validation
 Topo Validation

Total Observations: 22

ID	SCIENTIFIC NAME	QUANTITY	LATITUDE	LONGITUDE	DESCRIPTION
There are no data to publish.					

[Export INSPIRE-SD](#) [Export CSV](#)

Last 15 days observations

1.0
0.5
0.0

2015-02-25 2015-02-26 2015-02-27 2015-02-28 2015-03-01 2015-03-02 2015-03-03 2015-03-04 2015-03-05 2015-03-06 2015-03-07 2015-03-08 2015-03-09 2015-03-10 2015-03-11

The eENVplus CrowdSourcing Service

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□ Mobile Client

The eENVplus Mobile Client allows users to use the services exposed by the eENVplus cloud Infrastructure.

The logo for eENVplus is a large, stylized leaf shape. The left half of the leaf is dark green, and the right half is a lighter green. The letters 'eENV' are written in white, bold, sans-serif font across the bottom of the leaf. The 'e' is on the dark green side, and 'ENV' is on the light green side.

eENV

The eENVplus CrowdSourcing Service

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□ Mobile Client

The App, available for Android and iOS mobile devices, can be downloaded at the following URLs [available soon].

It is strongly suggested to install and execute the App before continue with this training module.

The logo for eENV is a large, stylized graphic on the right side of the slide. It consists of a dark green shape on the left and a light green shape on the right, both with rounded corners. The letters 'eENV' are written in white, bold, sans-serif font across the center of these shapes. The 'e' is on the dark green background, and 'ENV' is on the light green background.

eENV

The eENVplus CrowdSourcing Service

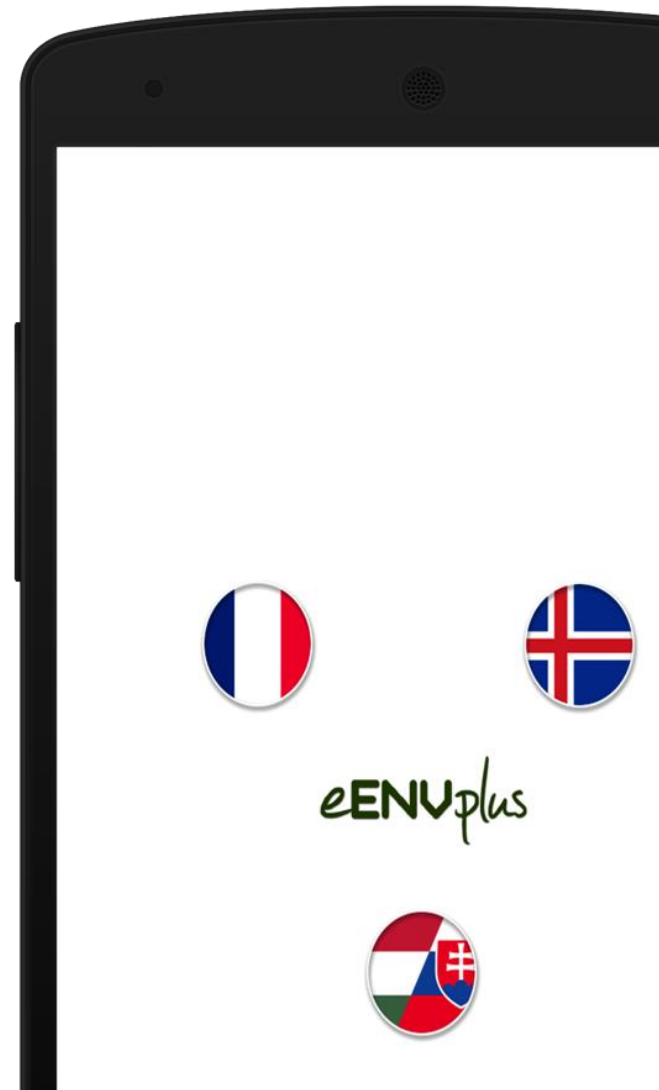
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□ Mobile Client

This screenshot represents the first menu that the user will see once the App's icon is pressed.

This allows the application to be initialized with the parameters related to the selected pilots:

France, Iceland, and Hungary/Slovakia.

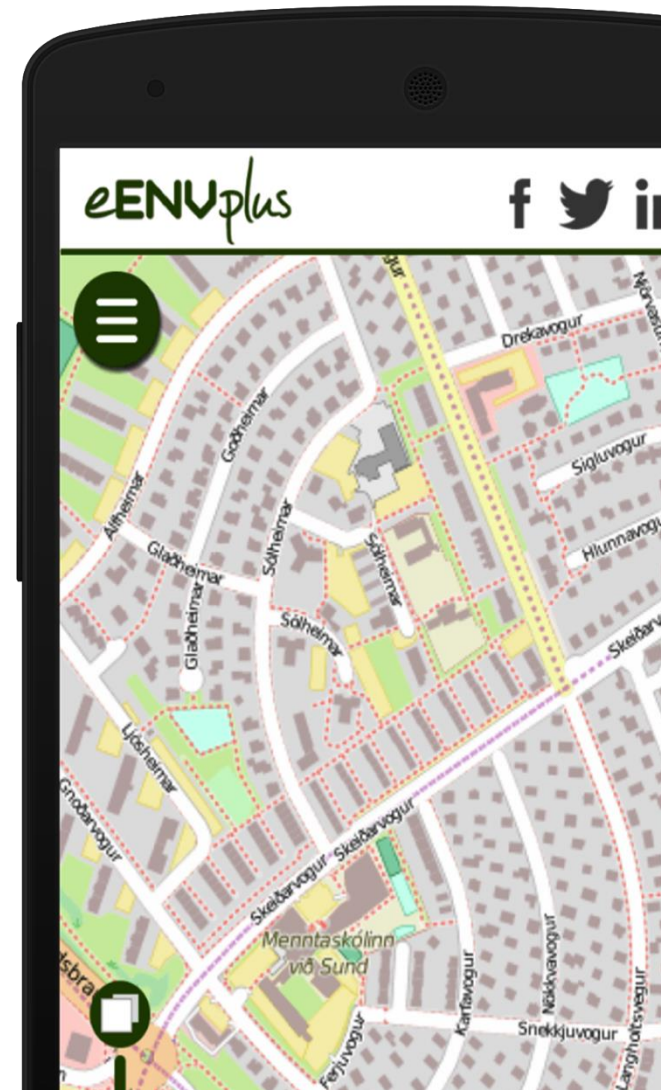


The eENVplus CrowdSourcing Service

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□ Mobile Client

Once a pilot is selected, it is possible to start the interaction with the Map-Viewer with the classical gestures of “Pan” and “Zoom”.

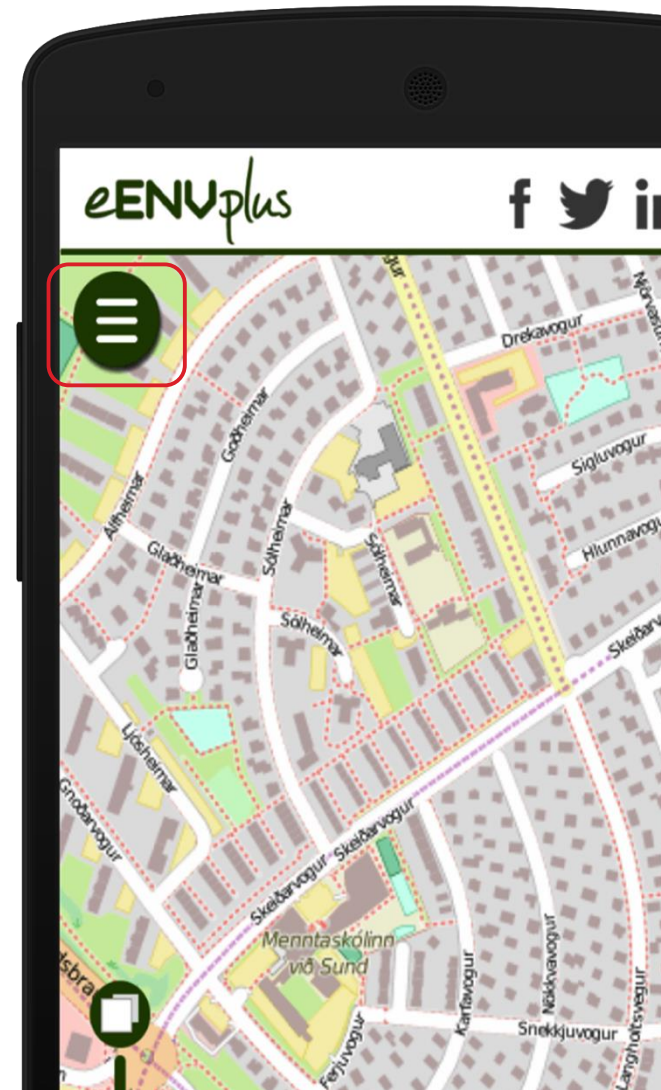


The eENVplus CrowdSourcing Service

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□ Mobile Client

The top-left menu allows users to visualize the entire set of functionalities provided by the Application.

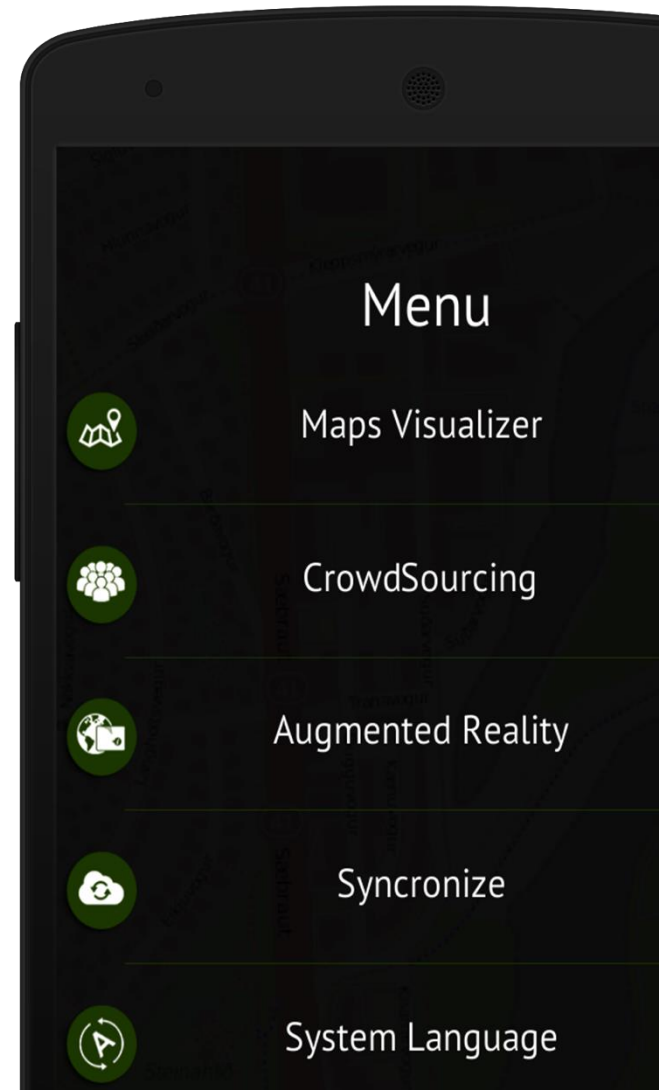


The eENVplus CrowdSourcing Service

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□ Mobile Client

The top-left menu allows users to visualize the entire set of functionalities provided by the Application.

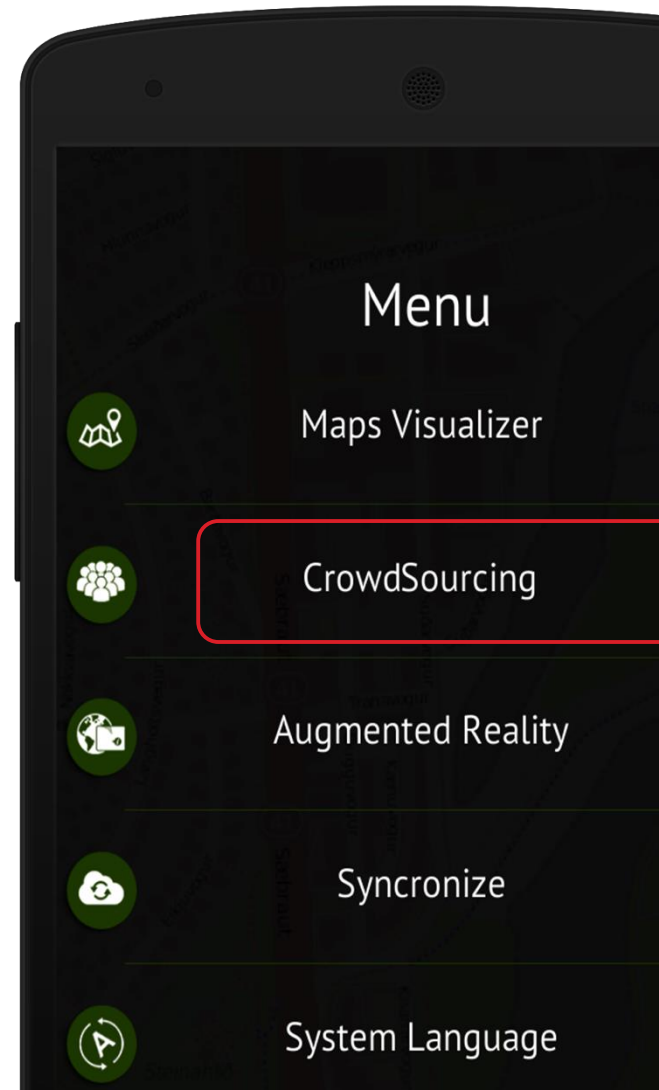


The eENVplus CrowdSourcing Service

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□ Mobile Client

By clicking on “CrowdSourcing”, the user will enter on the application’s section related to the collection of information, in accordance with the chosen data model of the Pilot.

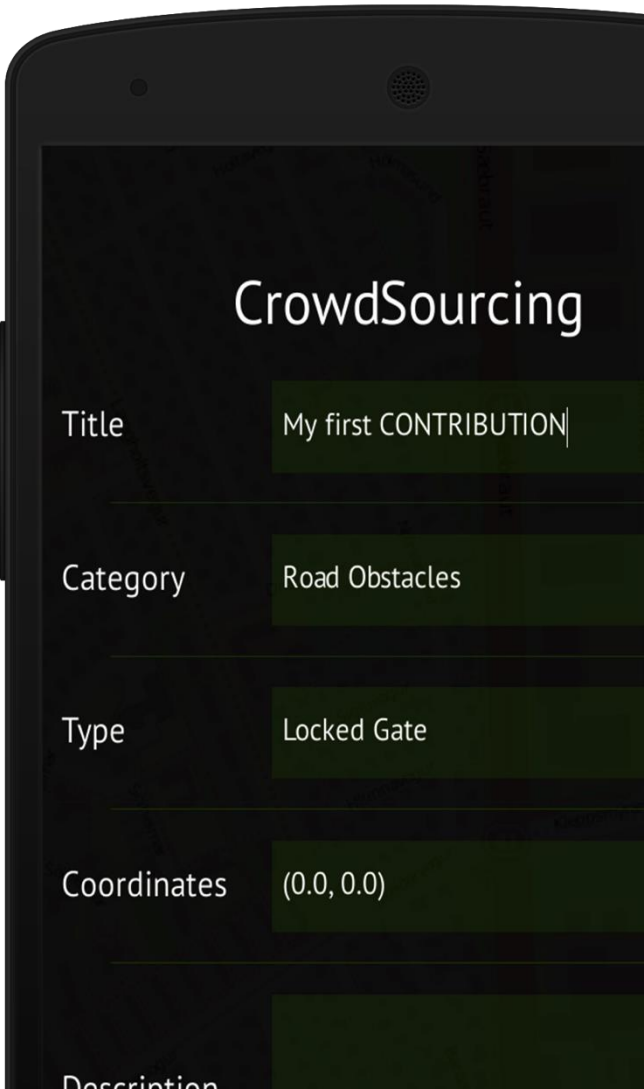


The eENVplus CrowdSourcing Service

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□ Mobile Client

For example, this screenshot regards the Icelandic Pilot, where it is possible to collect several information from different categories and types.



The screenshot shows a mobile application interface for creating a crowdsource contribution. The title of the form is "CrowdSourcing". The form contains several input fields:

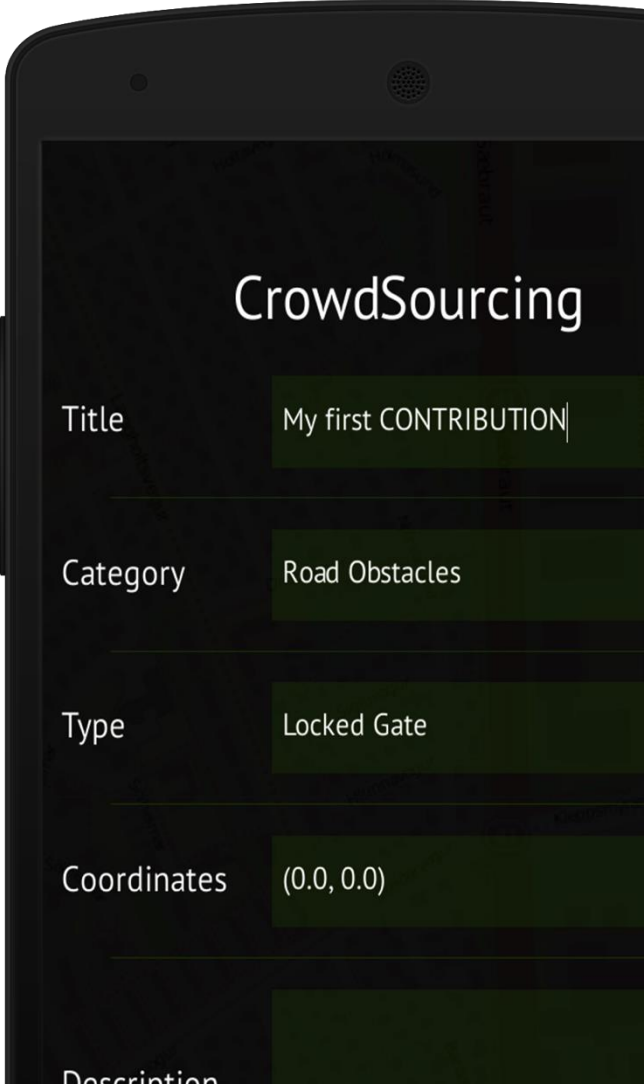
Field Label	Value
Title	My first CONTRIBUTION
Category	Road Obstacles
Type	Locked Gate
Coordinates	(0.0, 0.0)
Description	

The eENVplus CrowdSourcing Service

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□ Mobile Client

By the use of the “Coordinates” Button, it is possible to specify the position (LAT/LON) on the map in which the new Point of Interest have to be geo-referenced.



The image shows a smartphone screen displaying a form titled "CrowdSourcing". The form has several input fields:

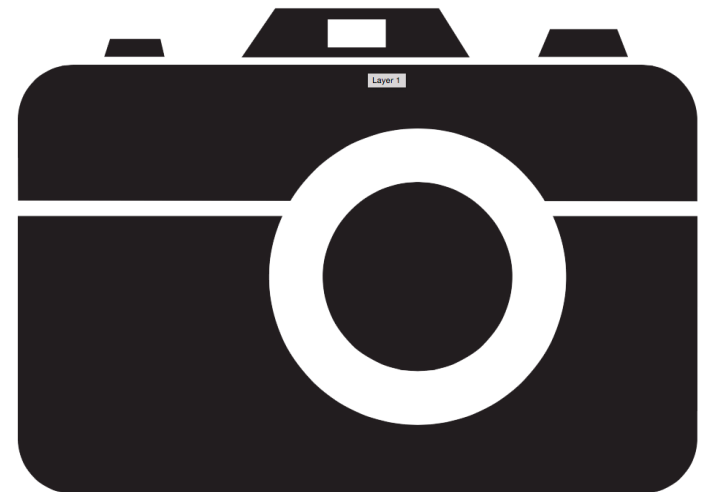
- Title: My first CONTRIBUTION|
- Category: Road Obstacles
- Type: Locked Gate
- Coordinates: (0,0, 0,0)
- Description: (empty field)

The eENVplus CrowdSourcing Service

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□ Mobile Client

Some data models offer the possibility to attach a picture on the collected data. This can be performed by clicking of the “Camera” button.

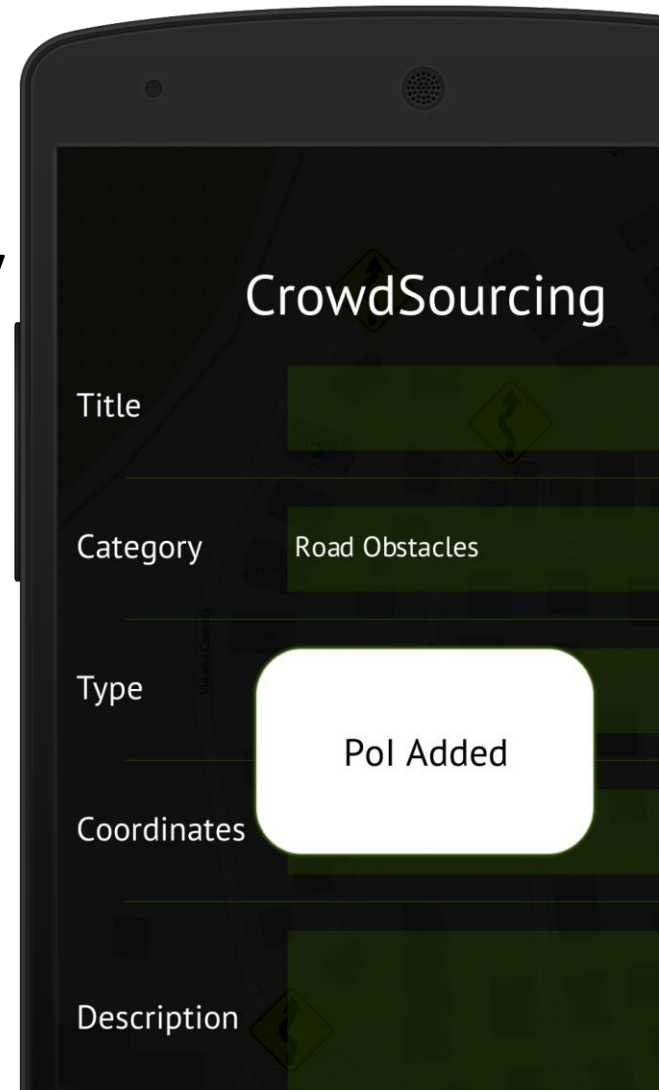


The eENVplus CrowdSourcing Service

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□ Mobile Client

A confirmation message will inform the user if all the mandatory data are correctly inserted, which allows the App to store the Pol in its internal database.

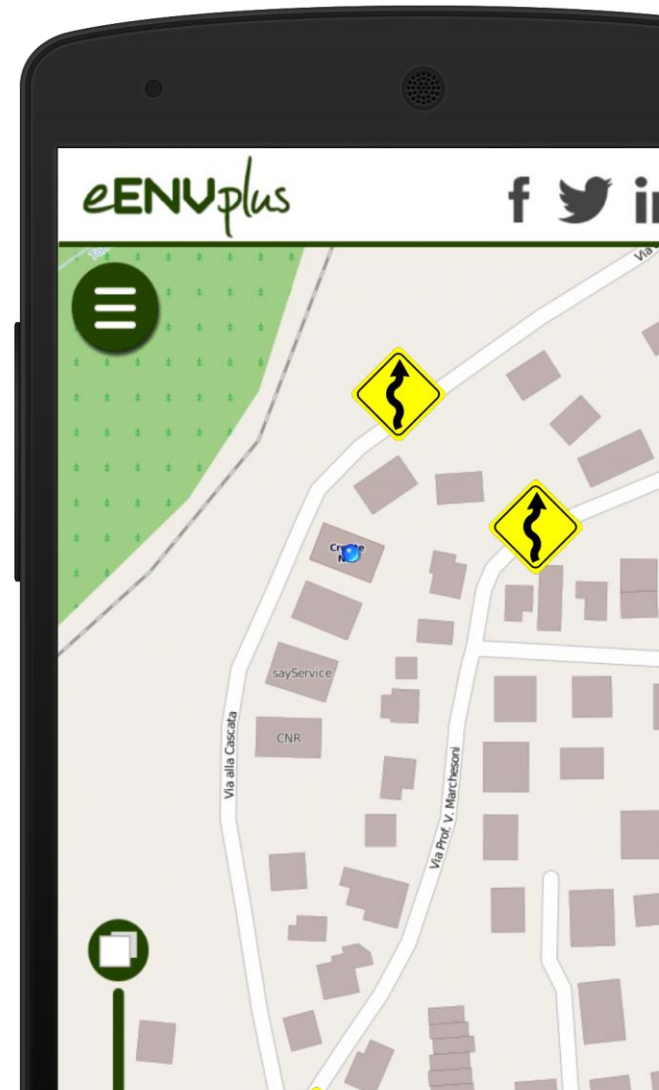


The eENVplus CrowdSourcing Service

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□ Mobile Client

At this stage, the user is already able to visualize its Pol in the map, without any synchronization with the main server.

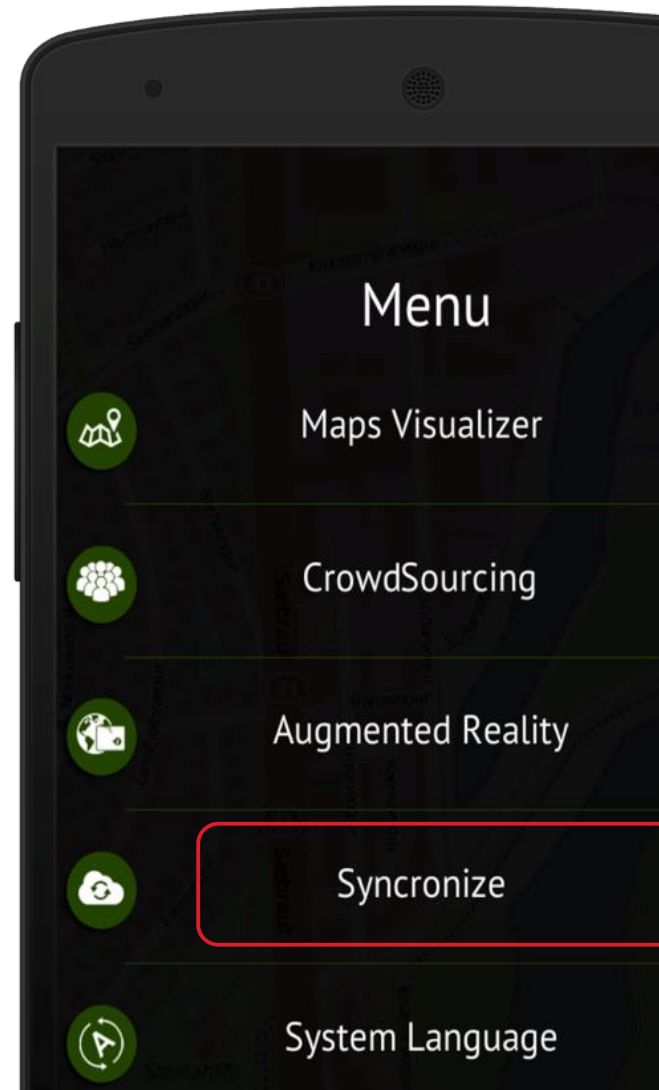


The eENVplus CrowdSourcing Service

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□ Mobile Client

To send the collected information and/or download other verified Pol from the main server, it is just required to press on the “Synchronize” button on the main menu.



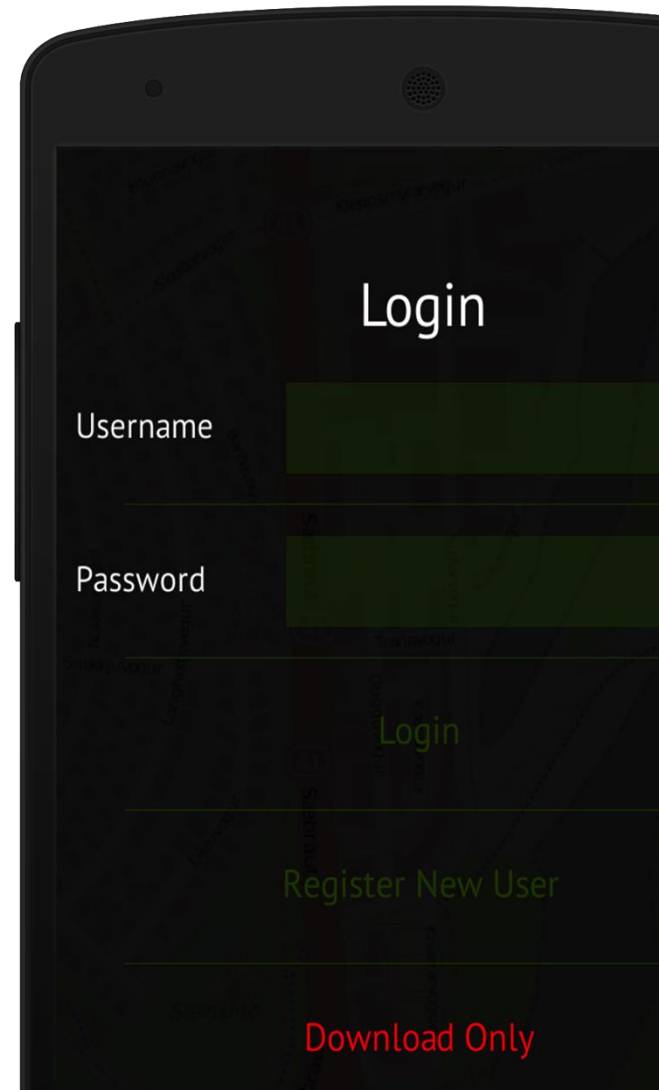
The eENVplus CrowdSourcing Service

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□ Mobile Client

From this screen, three types of options are offered:

- ▣ Login: the user inserts its credentials and the application automatically uploads Pol on the main server and downloads new entries from other users. Automatic download and upload of new data will be performed every 360 seconds.



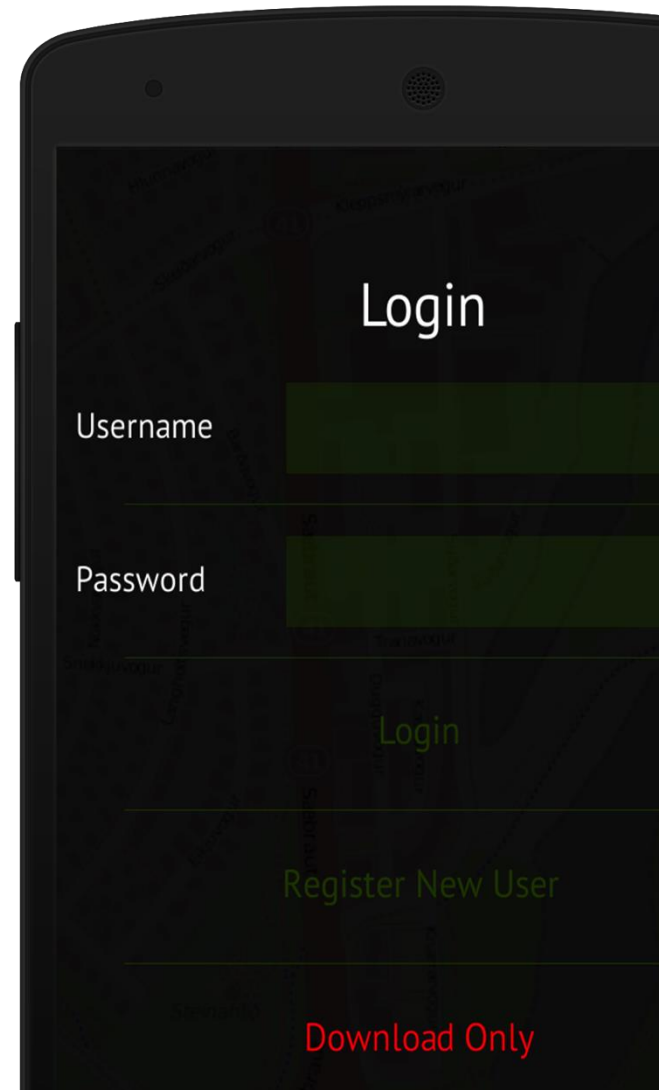
The eENVplus CrowdSourcing Service

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□ Mobile Client

From this screen, three types of options are offered:

- Register: this option allows new users to be registered into the system, and to upload their collected data.



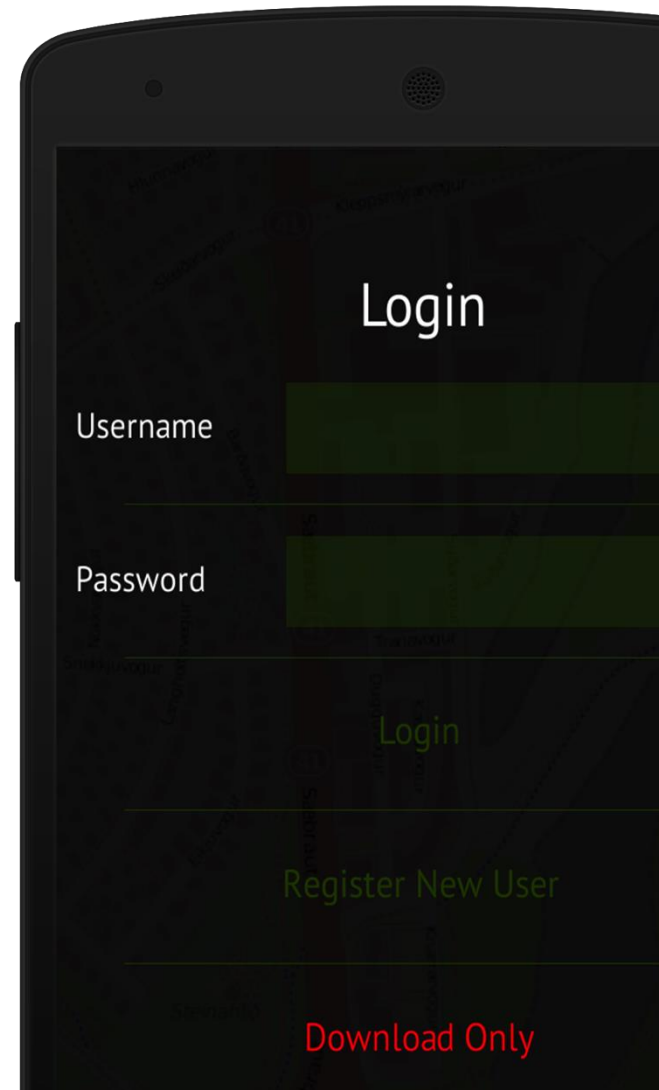
The eENVplus CrowdSourcing Service

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□ Mobile Client

From this screen, three types of options are offered:

- ▣ Download only: for those who have not an account, it is possible to download collected information without the uploading phase.



Introduction on Advanced Visualization

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□ Augmented Reality

From Wikipedia, the free encyclopedia

Is a live direct or indirect view of a physical, real-world environment whose elements are *augmented* by computer-generated sensory input such as sound, video, graphics or GPS data.

It is related to a more general concept called **mediated reality**, in which a view of reality is modified by a computer. As a result, the technology functions by enhancing one's current perception of reality. By contrast, virtual reality replaces the real world with a simulated one.

Augmentation is conventionally in real-time and in semantic context with environmental elements, such as sports scores on TV during a match. With the help of advanced AR technology, the information about the surrounding real world of the user becomes interactive and can be digitally manipulated. Artificial information about the environment and its objects can be overlaid on the real world.

Introduction on Mobile Mapping

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□ Augmented Reality

For this purpose, the eENVplus infrastructure offers a specific web service to visualize collect data provided by users in Augmented Reality mode.



The eENVplus ADV Service

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- Mobile Client

The eENVplus Mobile Client allows users to visualize collected Pol in Augmented Reality mode.

The logo for eENV is a large, stylized graphic on the right side of the slide. It consists of a dark green shape on the left and a light green shape on the right, both with rounded corners. The letters 'eENV' are written in white, bold, sans-serif font across the bottom of these shapes. The 'e' is on the dark green background, and 'ENV' is on the light green background.

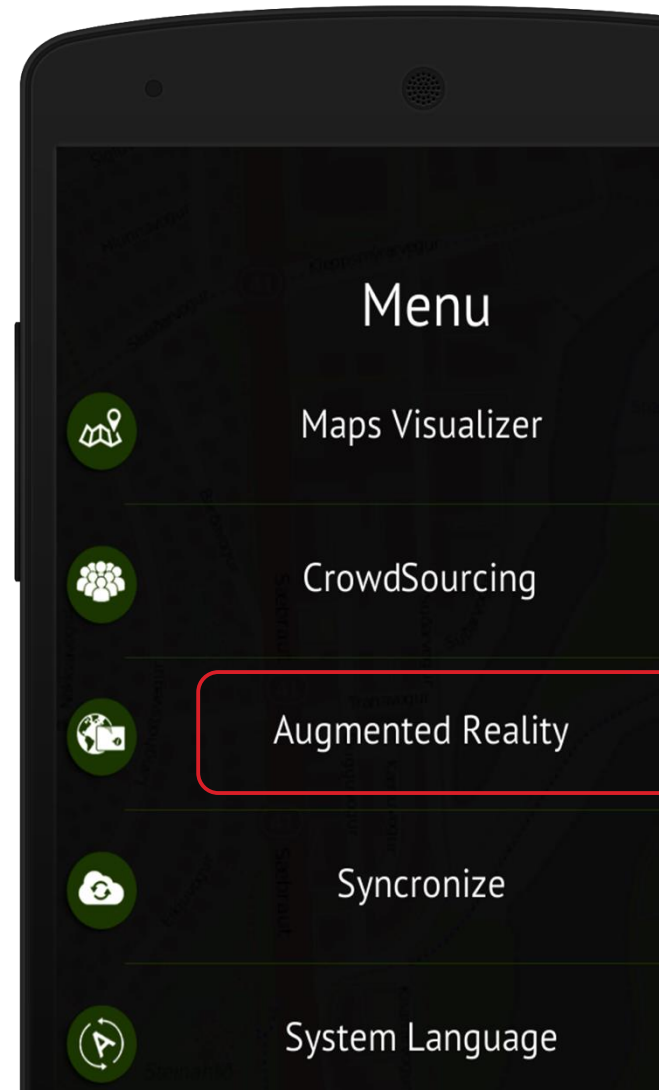
eENV

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□ Mobile Client

To enable the Advanced Visualization feature it is just need to click on the “Augmented Reality” button, that can be found in the main menu.

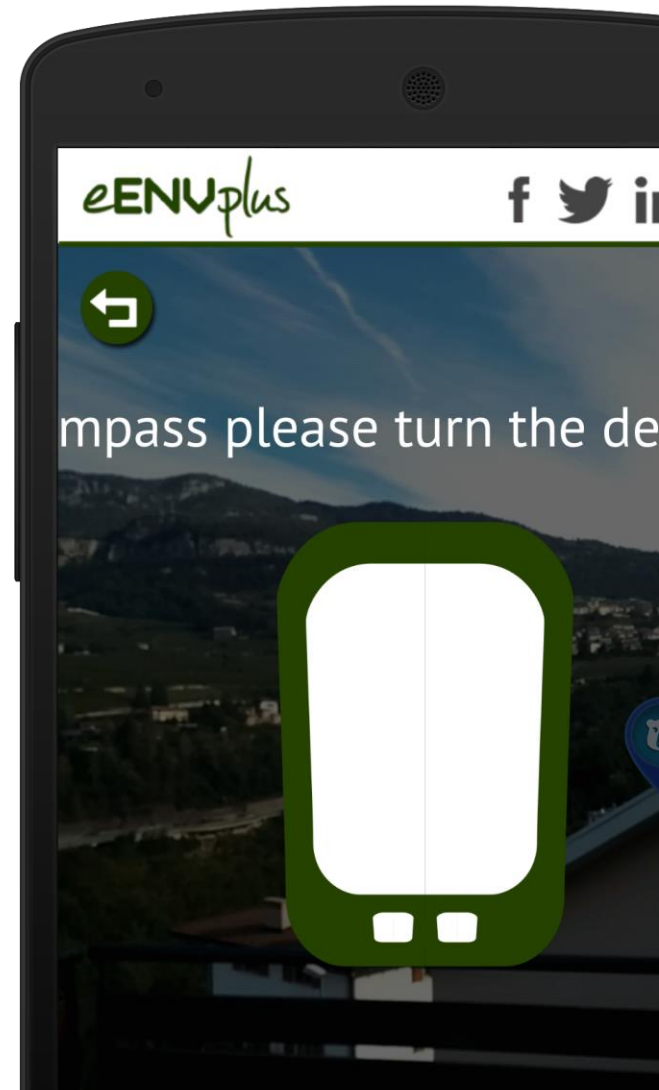


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□ Mobile Client

To work correctly, the application requires the calibration of the set of sensors that equip the mobile device.

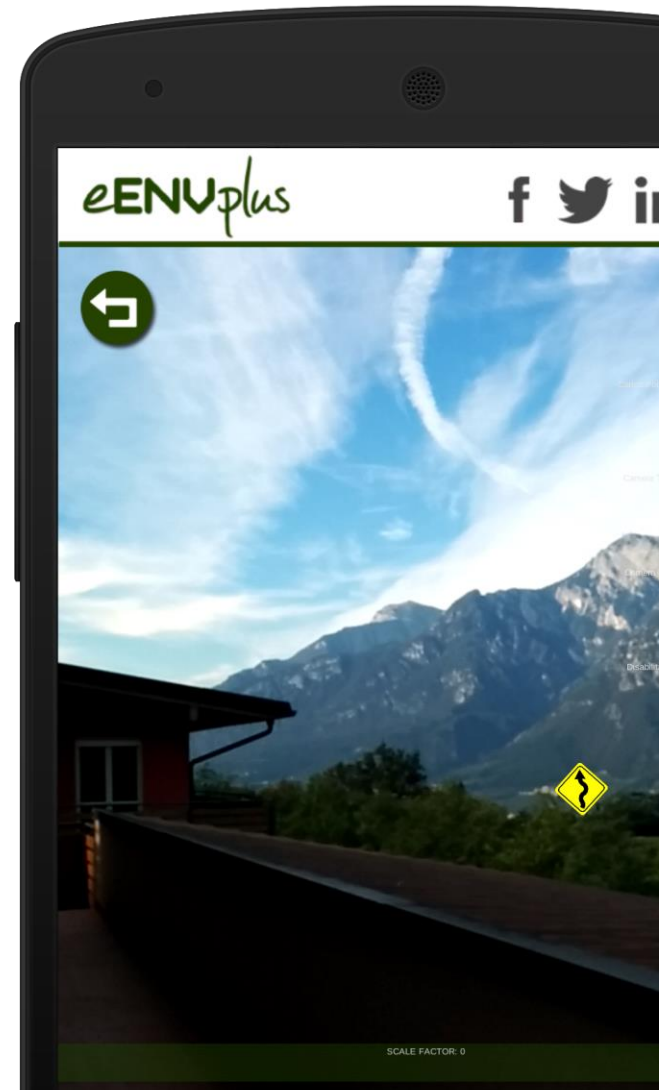


The eENVplus CrowdSourcing Service

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□ Mobile Client

Once the calibration is finished, it is possible to start the visualization of the same set of Pols that can be also visualized on the map Visualizer tool, as showed before.



Conclusions

In this training module, the complete specification of the CrowdSourcing Service and Advanced Visualization Service has been provided. The user will be able to use these services provided by the eENVplus infrastructure by the eENVplus mobile application for CrowdSourcing and Augmented reality.

- Demo videos on YouTube GraphiTech channel
 - <https://youtu.be/wZrTubDwJoY>
 - <https://youtu.be/jlpIM2szMWQ>

MOBILE MAPPING AND ADVANCED VISUALIZATION

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Source:

None
