Exercise: fieldwork data collection

(*Last update: 28/09/2023*)

This exercise covers the use of GIS to collect field data on a digital format. The example presented here is designed so it can be applied in any geographic area and to be easily adapted by the students.

The development of the exercise includes:

- Creation of field forms to collect geolocated data.
- Configuration of a mobile app synchronised with the desktop GIS.
- Collection of data on the field.
- Processing field data and creation of reports.

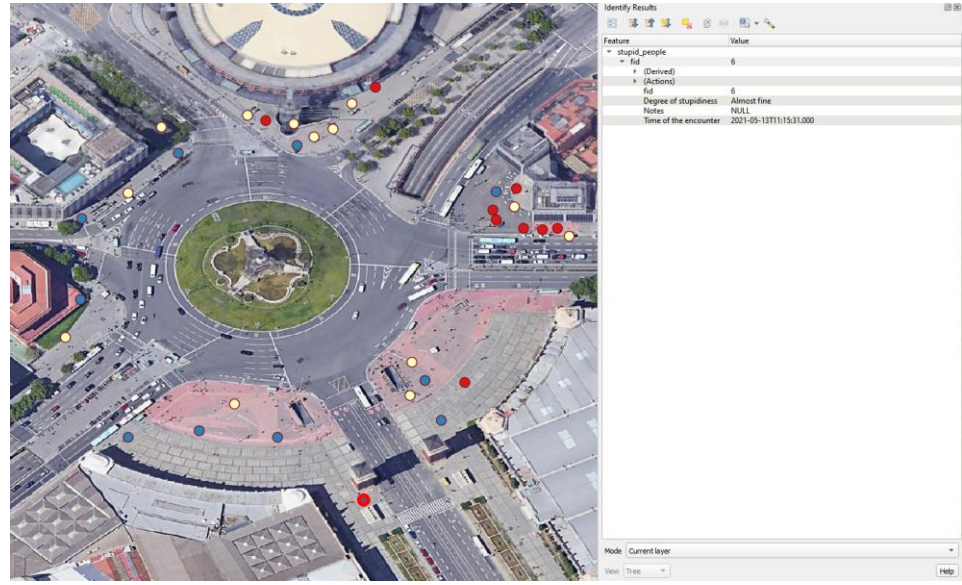
The exercise is based in Qfield (https://qfield.org/), an open source project linked to QGIS. The exercise has been created in a way that can be completed without any previous knowledge of Qfield. It requires also the use of QGIS desktop (the present document has been elaborated using the 3.28 version of QGIS, note that some inconsistencies might arise due further updates. Contact your instructor if you encounter any difficulty). Basic QGIS functions needed here are covered in **e1** and **e2** tutorials (https://github.com/ArnauArqueo/training_giap).

This exercise is designed to synchronize the desktop and mobile versions by transferring the files using a usb connection. Qfiled is associated also to a cloud system which allows online synchronization in multiple devices (https://qfield.cloud/). If you are interested, you can explore the free community plan (https://docs.qfield.org/get-started/tutorials/get-started-qfc/).

1: Define the study case

Collecting geolocated field data is a significant part of almost all archaeological research. The target can be a more traditional exploration (collect the position of findings and monuments) or directed to validate remote data analysis. Here we will practise how to collect data in a digital format, ready to be displayed and analysed in a GIS.

For that objective, we are going to create a form to record field data with your smartphone. That will generate a vector file containing geographic data (points, lines or polygons) linked to a table with information about each point. The idea is to select some "study case" in which you can easily work during your daily life. So, the first step is to define which type of data are you interested and for what purpose you want to use it. Beyond this specific tutorial, this exercise is a critical first step in any research design.



Let's say, for example, that I am interested in map my encounters with people that I consider "stupid". Knowing were and when is more probable to encounter this type of annoying people would allow me to avoid them in my future walks. With that in mind I decide that:

- Each encounter will be represented as one point.
- Each point will contain the the coordinates and the time of the day of the encounter.
- In each point I will associate a value according to the level of "stupidity" (1 to 3, from less to more "stupid).

You can design your own project using you everyday life or some real project. Some examples you can use are types of cars, favorite food, buildings, shops, plants and trees, animals etc… In case of doubts, you can discuss your idea with your instructor.

Translated to archaeological research, typical examples would be the distribution of archaeological findings or information on historical buildings, dry-stone structures, ethnoarchaeological data and so on.

2: Setup

Once you have the idea of what is going to be your “project”, it is time to design the form.

But, first of all, we need to setup the software we are going to use. Install Qfield in your device (it is available in the Play Store, for the project documentation check, https://qfield.org/docs/install/index.html).

In your QGIS desktop you have to install the plugin QFieldSync plugin (https://docs.qfield.org/get-started/tutorials/get-started-qfs/).

Plugins -> Manage and install Plugins…

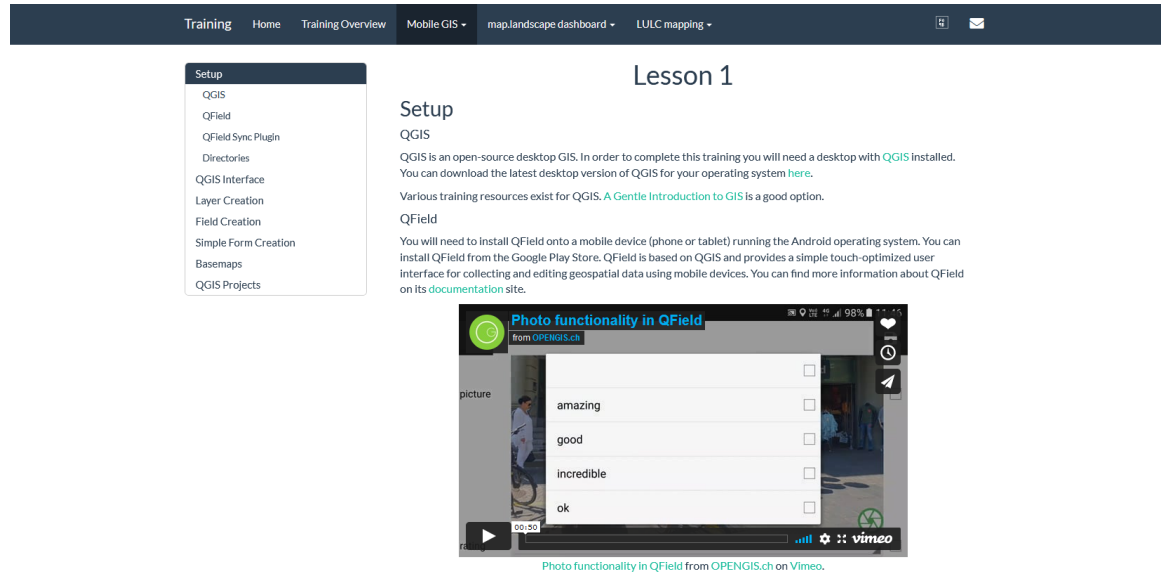
In the next points you will find an example on how to create a form for the “stupid people map”. It is a very simple form, designed to be very easy to create and manage. You can adapt that in your own example.

There are several online tools to learn how to use Qfield, which include tutorials for working with Qfield and QFieldCloud. For example, you can find a tutorial with a more complex case in the following link:

(https://livelihoods-and-landscapes.com/docs/tutorials.html#qfieldcloud-for-project-management)

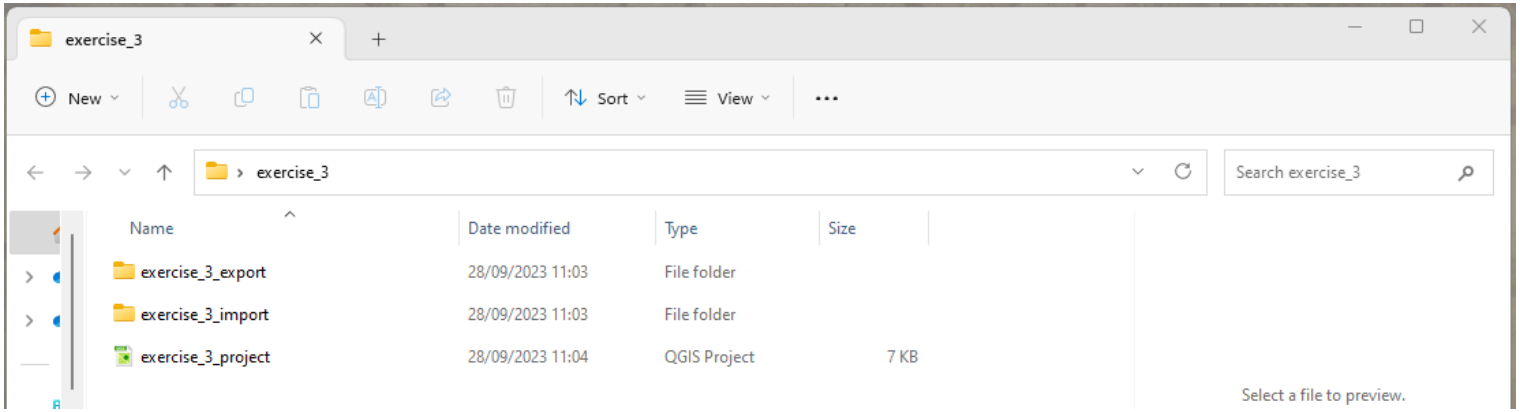
Or in the official Qfield documentation:

https://docs.qfield.org/get-started/



For a detailed description on how to download and install QGIS desktop and set up a new project, check exercise 1: https://github.com/ArnauArqueo/training_giap/tree/main/e1_optical_telegraph.

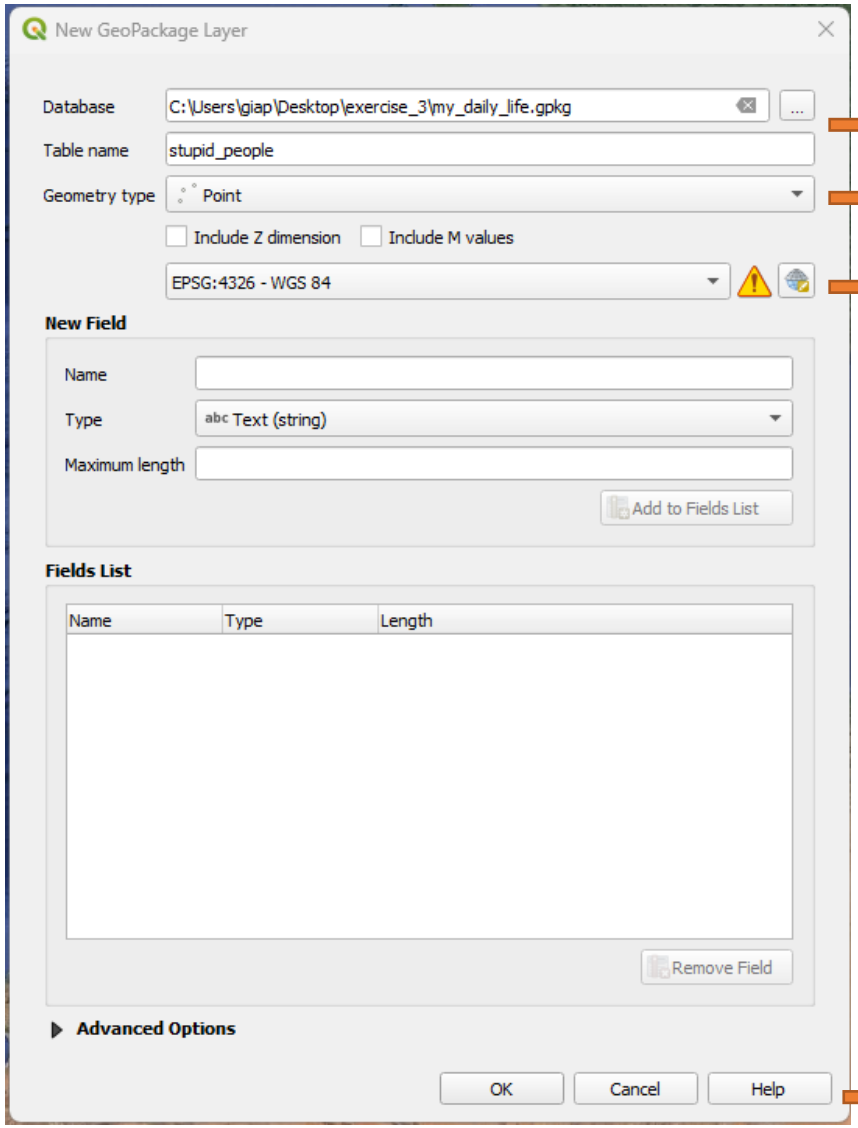
3: Setup



For this exercise you are going to use the usb connection to exchange files between your desktop and mobile devices. For that reason is useful to create two subfolders on the main exercise folder (named _export and –import).

4: Exercise settings: Geopackage creation

Start by creating a New Geopackage (*Layer -> Create Layer -> New Geopackage Layer*).



Here I am naming the database and the table. They will be stored in the project folder (exercise 3).

Note that we are using points here.

Use WGS84 (global geographic system) as the CRS of this project.

A Geopackage is a file-based database container for spatial and non-spatial data. One difference with shapfiles is that it keeps all the layers in a single file. For more information on the *geopackage (.gpkg)* standard, check (https://www.geopackage.org/).

Leave the rest in blank and press OK

5: Exercise settings: Table fields

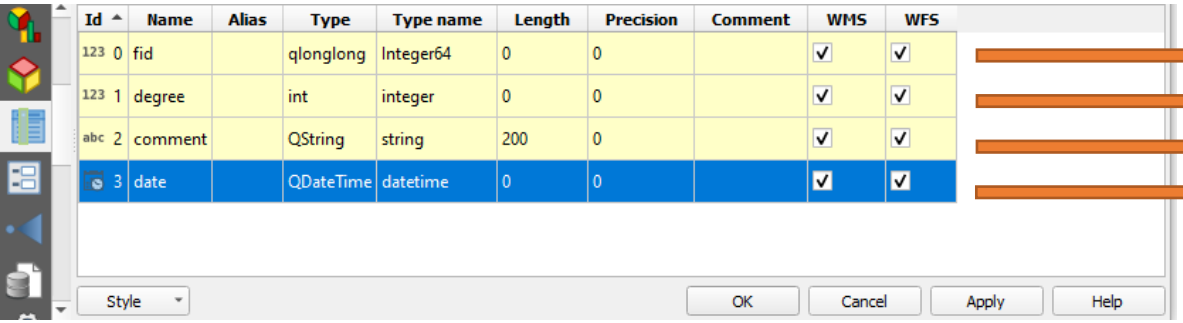
Go to the layer properties: Right-click the layer and select “properties”.
You can also access the window using the main menu:

Layer -> Layer properties…

Go to **Manage fields**

1 2 3 4

Use (**3**) to activate the edition mode. Use (**1**) to add new columns and (**2**) if you want to delete one.



Automatic unique code (as in all vector files).

The degree will be express as a quantity (integer number)

A text field to add free extra information

A date/time field will be used to collect the time of the day

Press **(3)** to save the changes and the **OK**.

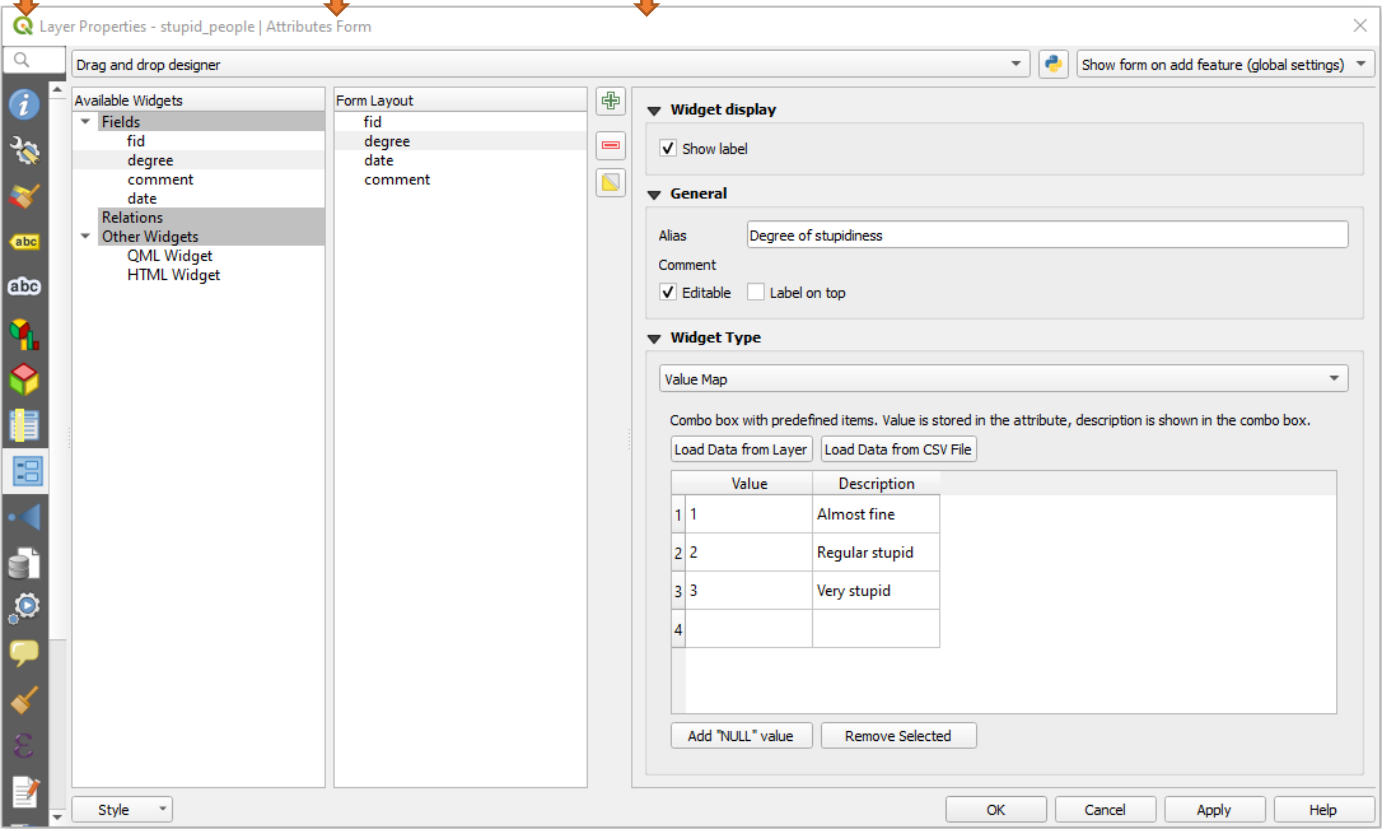
6: Exercise settings: Widget

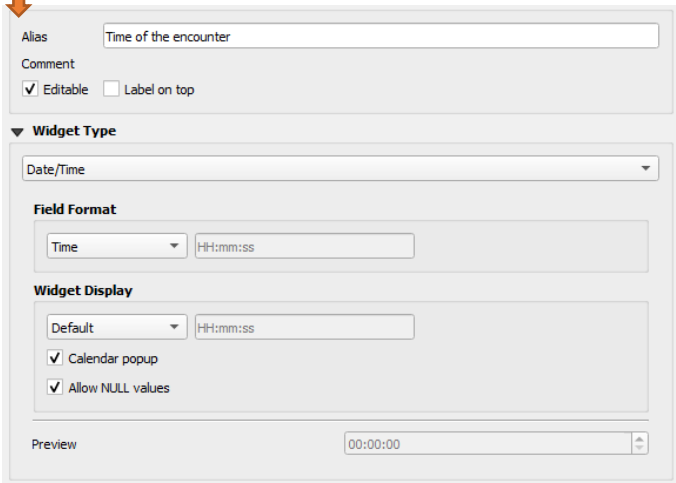
Go to attribute form designer

Select the fields you want to include in the form.

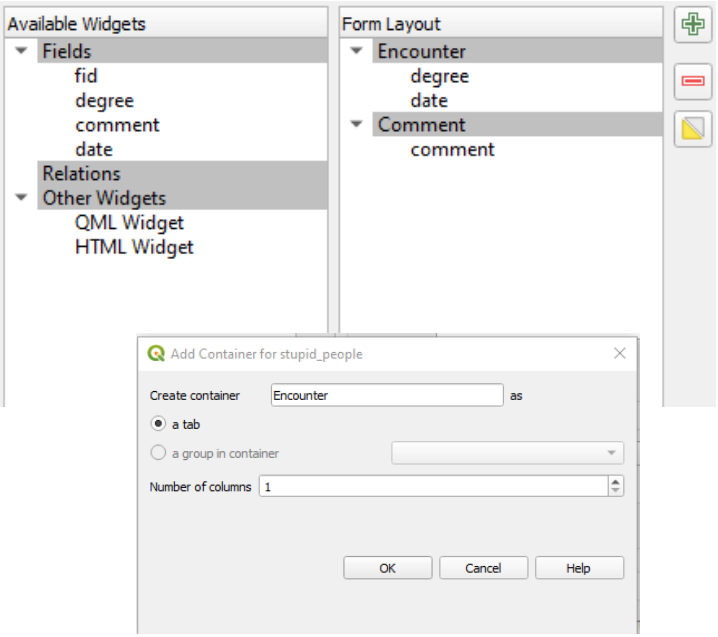
Here the *degree* field is set as a value map to display three options linked to the different values.

For the date/time field I select only Time. The Comments field is defined as a multiline to facilitate writing.





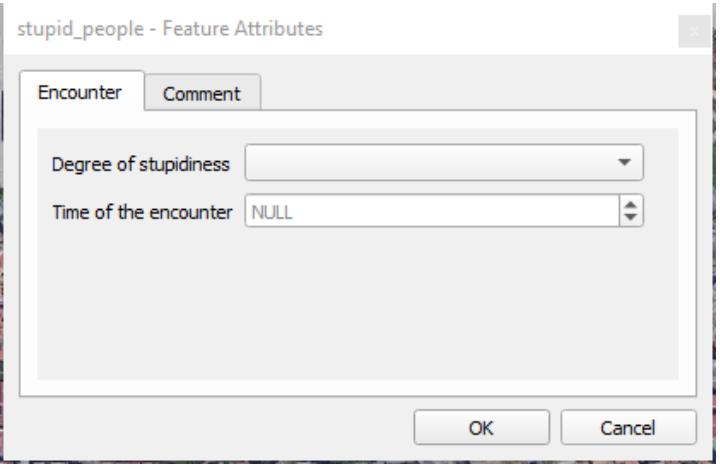
7: Exercise settings: Widget



The form is organised here in two containers. One to collect the data about the encounter and a second for the free comments.

Use the **+** and **–** icons to add and delete containers and drag and drop the different fields on them.

Press **OK** once finished

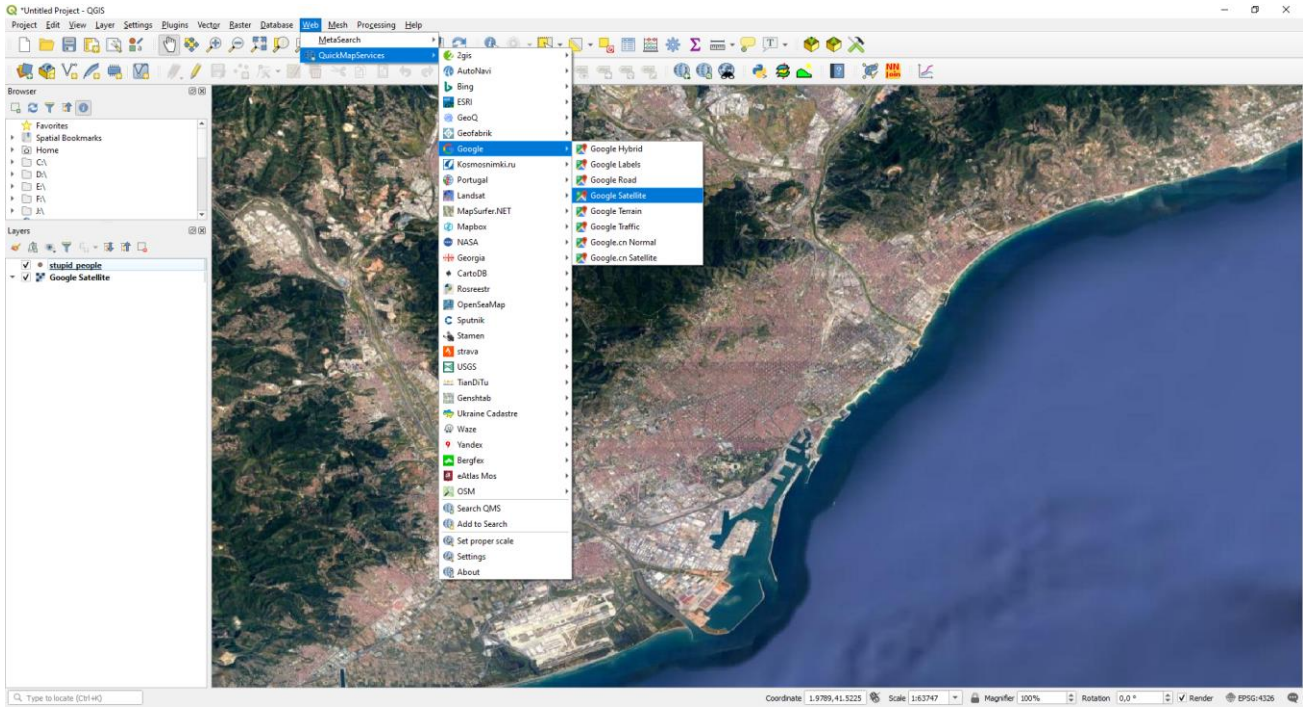


Adding a **new point** you can check how the form looks (it will look similar in your phone).

8: Exercise settings: basemap

Here I am using **QuickMapServices** plugin to add Google satellite as a basemap. You can use the basemap more convenient for your project.

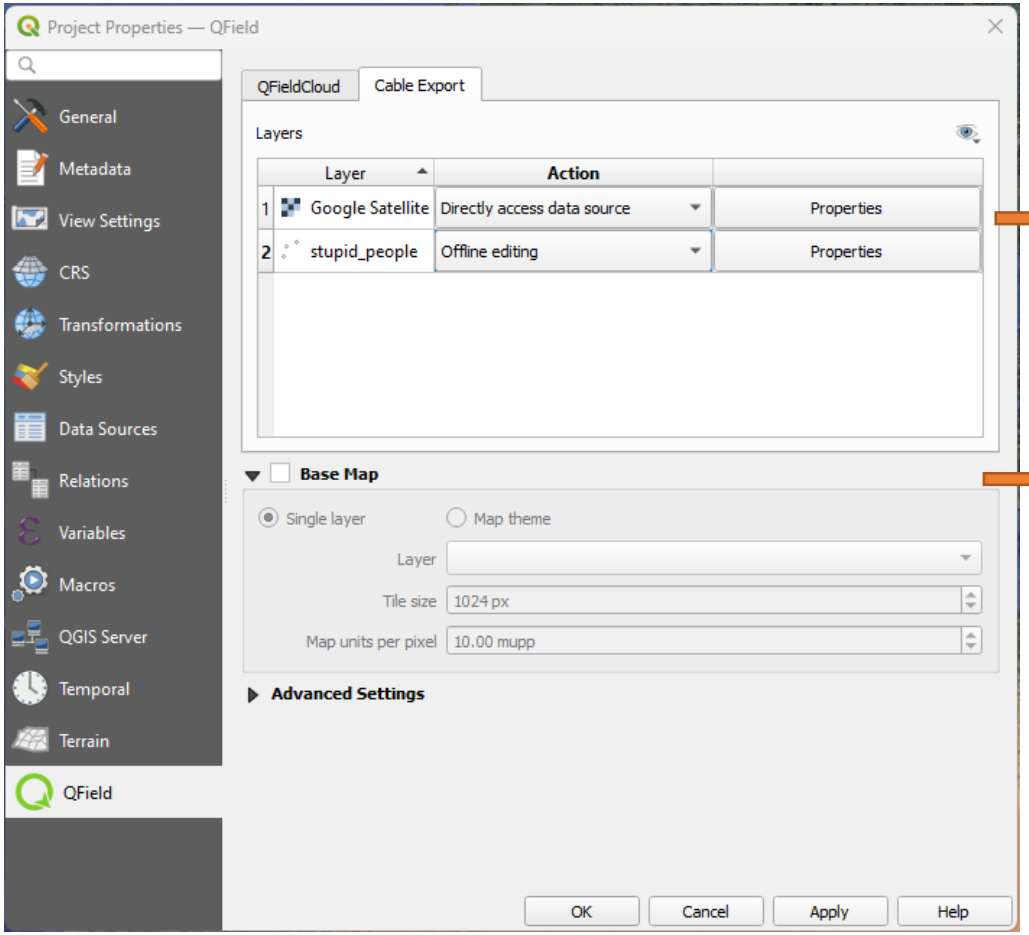
Now everything is ready. Remember to save your project and to check that the CRS is set (here we are using WGS84/ EPSG 4326).



9: Configuration in Qfield Sync.

At this point you will use the **Qfield Sync** plugin in your QGIS desktop and the **Qfield** app in your mobile device.

Start by **Configure Current Project** and select **Cable export**.

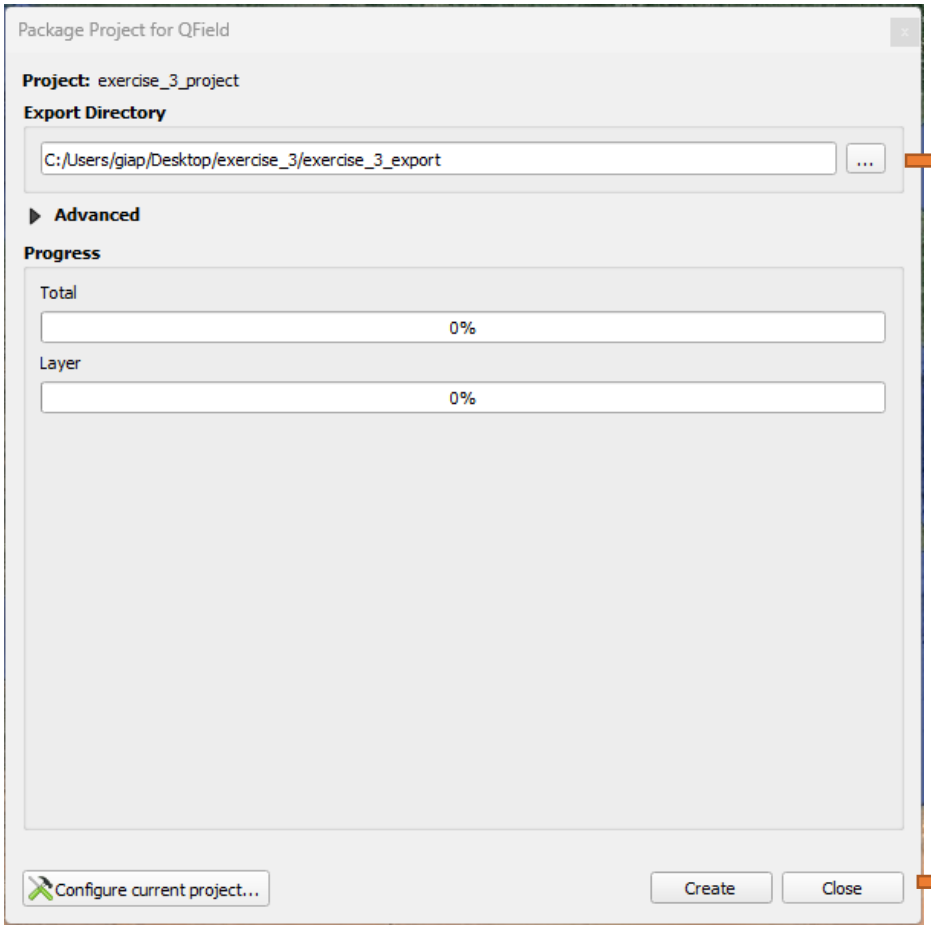


Select here the layers you want to display in your mobile device. In this case only the database and the basemap. In the action options, you can select **remove** if you don't want to export a layer. Also is better to select **offline edition** for the forms in which you want to collect data. In that way you will be able to edit it also offline.

Note that here I am not configuring a Base Map. In this case we will use the connection to the Google service. It is a simplified (and lighter) version of the tutorial, but I am assuming internet connection will be available on the field.

10: Package for Qfield settings

For the next step open **Package for Qfield**.



Note that I am using the subfolder **_export**.

You can have a final check at the project configuration before **create**.

11: Copy and open Qfield projects in your mobile device

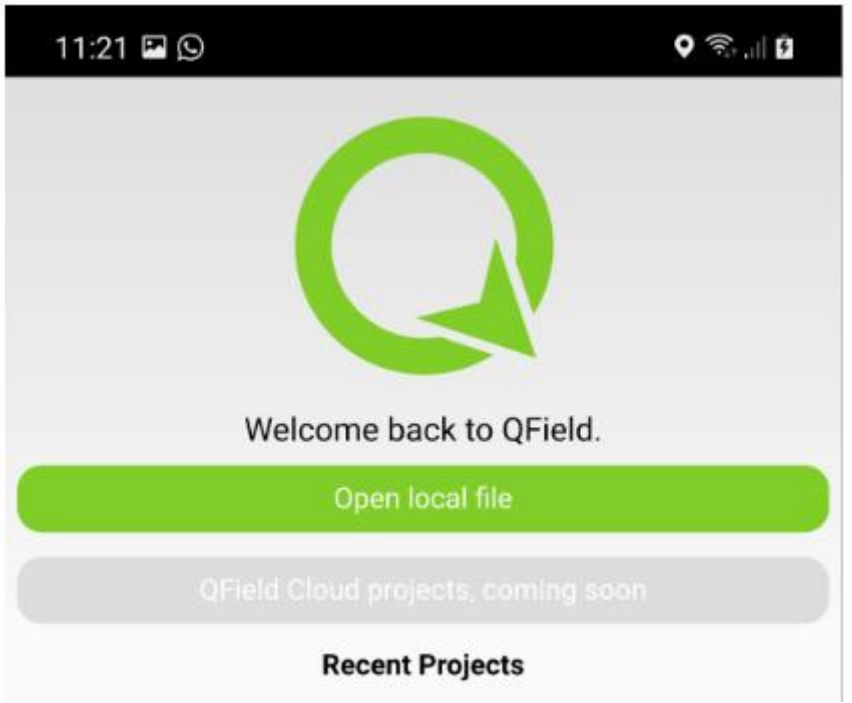
Copy your “export” subfolder in your device. Remember to use the internal storage and not any sd card or other external storage.

This step depends on the configuration of your device. Contact your instructor in case you have difficulties at this point.

In most android devices the folder is in:

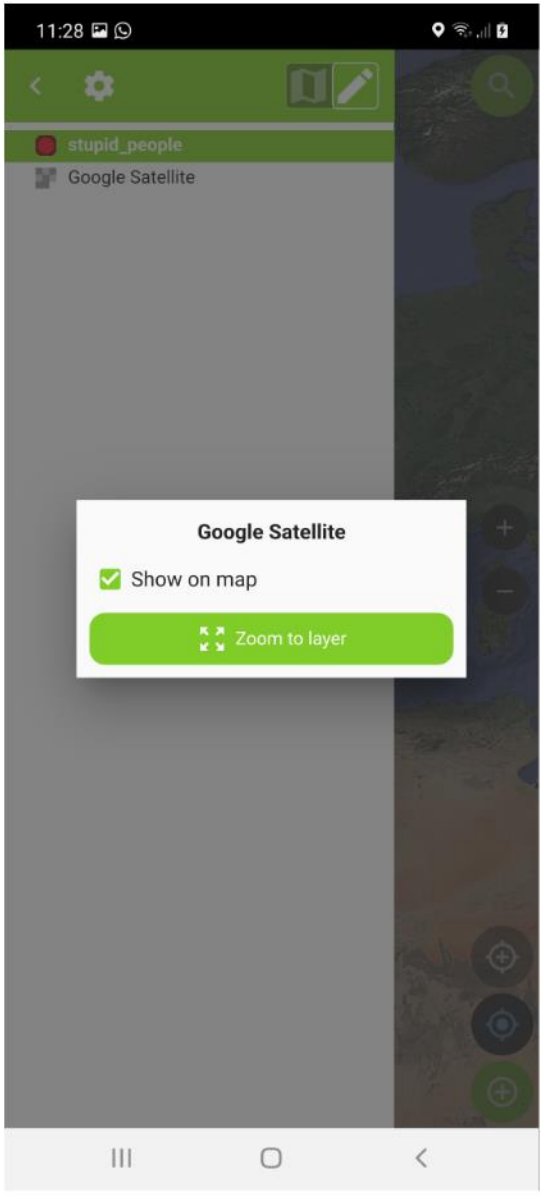
…\Android\data\ch.opengis.qfield\files\Imported Projects

Search the folder in your device and open the .qgs file.



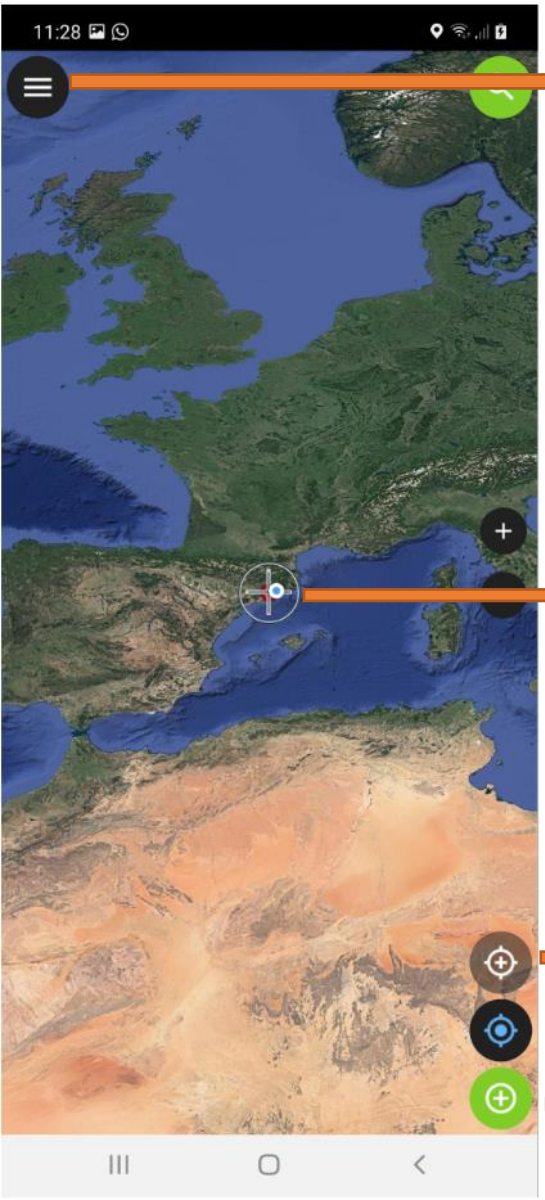
12: Working on field

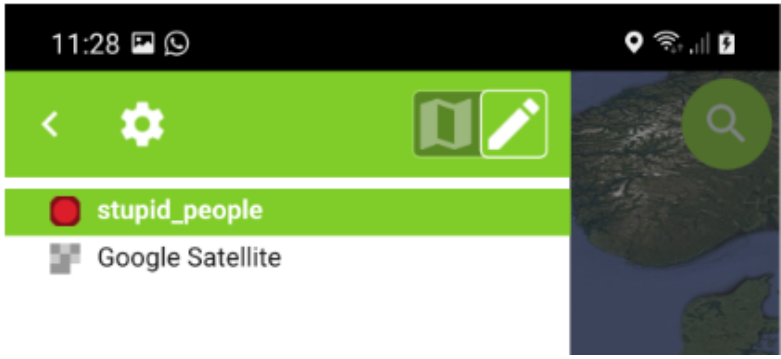
Use this menu to access the layers of the project. By holding in one layer you can access to the options to display it and to zoom on the layer extension.



Use the geolocation of your device to centre the view in your current position.

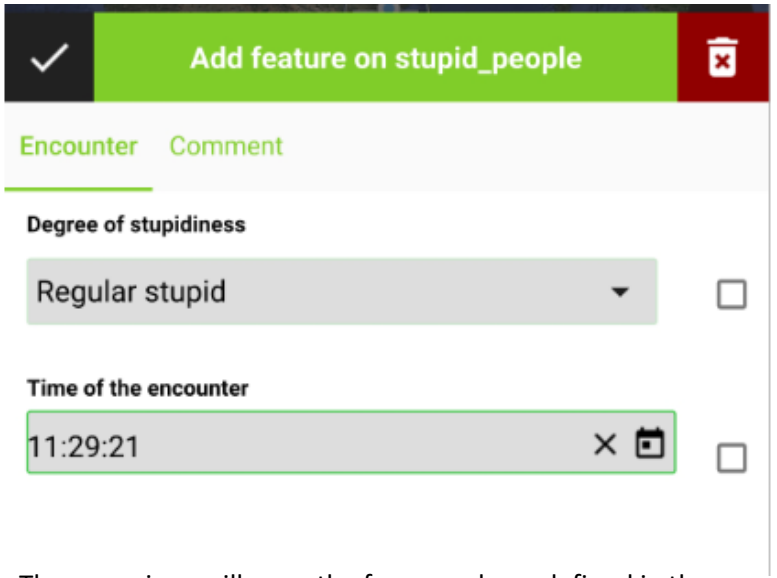
13: Collecting points





Select the pencil icon and the layer in which you want to add the data to activate edition mode

The blue point represents your current position (based in the mobile device geolocation) and the cursor the point in which the new feature will be created (note that it does not need to be the same place).



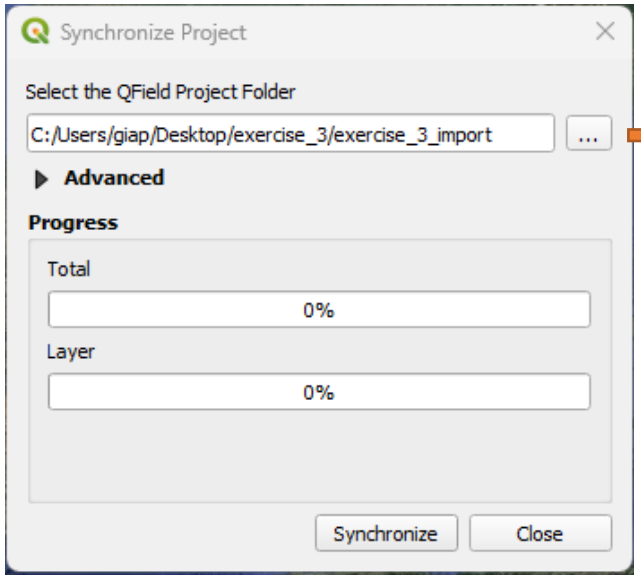
Lock and unlock the cursor in your position.

The green icon will open the form you have defined in the initial phase of the exercise. You can fill the data and check **v** to create a new point.

14: Import

Now you are ready to start collecting data. Once you have completed your “fieldwork” copy the content of the mobile device folder to the import subfolder.

Use **synchronize from Qfield** to import the data.



Select the copy of the table in your import form, you can update this folder during the fieldwork and see the provisional results.

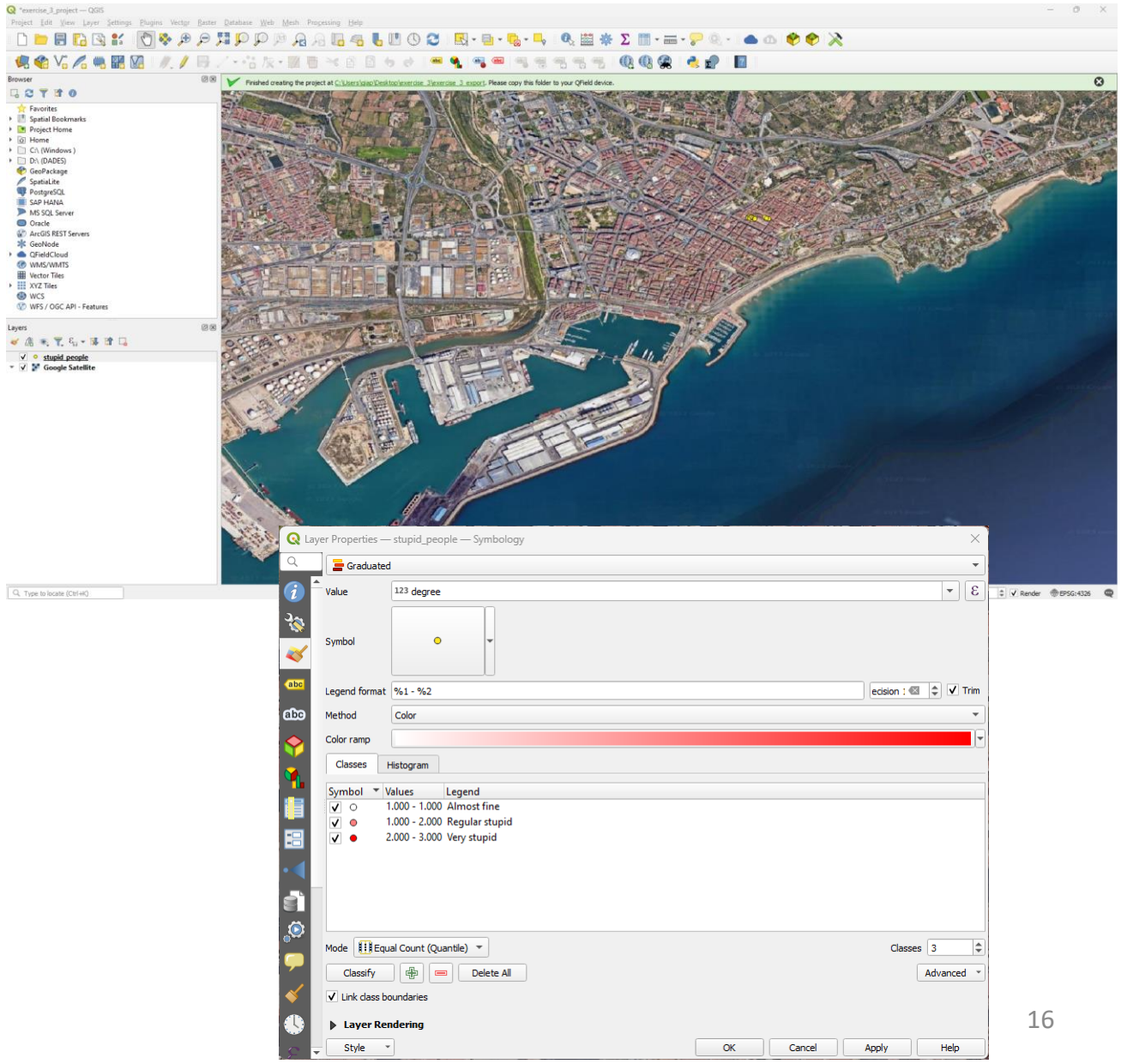
To keep the data for future sessions (or once you are finished for good), you can export the data in a new file, select the layer and use

Layer -> Save as…

You can name the new copy with the data (e.g. *stupid_people_version1*).

15: Display results

After synchronization, you will be able to see the results in your desktop. QGIS provides multiple tools to explore the results, both visually and statistically.



A first step would be, for example, to display the points collected by its level of “stupidiness”. For that we can use the layer **symbology**

Layer -> Layer Properties…

Here it is udes **graduated** to show the classes based in the field *degree* value.