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DEVELOPMENT OF A TRAINING PROGRAM FOR ENHANCING THE USE OF ICT TOOLS IN THE IMPLEMENTATION OF PRECISION AGRICULTURE

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T.P.3 Technical Visit Guide 1 - Data collection using Proximal sensors in a real Production Unit

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1 Objective of the Technical Visit

The first technical visit will aim to familiarize students with practical activities regarding data collection using proximal sensing systems. Therefore, it is suggested that the minimum necessary activities that will take place will include the demonstration and explanation on how to create variability maps using two different proximal sensors, a soil electrical conductivity sensor and a proximal canopy reflectance sensor, as well as demonstration on how to retrieve data from a stationary IoT station installed in one of the visited parcels. Therefore, a handheld reflectance sensor and a soil conductivity sensor should be available at the demonstration to perform georeferenced data collection, while an operating and cloud-connected IoT station should also be installed.

The instructor that will conduct this demonstration can be any professional (academic or non-academic) with sufficient experience in agricultural geospatial data collection and management, to ensure that every step of the operations is thoroughly explained and all potential questions from the students will be covered in an analytic and comprehensive way. Ideally, an agricultural vehicle that can enter the parcel while mounted with the sensor(s), although not required, will greatly assist the demonstration compared to a more time consuming and potentially tiring procedure of handheld measurements.

Finally, information on how to perform optimal data collection with each sensor by developing a risk-management strategy and eliminating potential outlier-generating factors should be also mentioned. For instance, for the electric conductivity measurement the minimal distance from any metallic object or electric device should be explained, while for the reflectance sensor the optimal time during a day (near solar noon with minimum cloud presence) should be explained for the optimal accuracy of our data.

2 Suggested schedule of the visit to the Instructor

1) The visit should be scheduled in an open field agricultural production unit that is capable of hosting all the students in each group. The handheld reflectance sensor and the conductivity sensor is of course movable equipment, the IoT station however, should already be installed in one of the unit's parcels that will be visited.

2) The students should be introduced to the concept of proximal mapping and collection of georeferenced field-level data:

a. Planning of the measurements, topological characteristics of the area that we will measure and how they might affect our data, the capabilities of our sensors (autonomy, logging interval) risk assessment of each operation and basic crisis management strategies.
b. The decision on the optimal time to perform data collection, including favorable weather conditions with absence of rain or hail, since they will expose the sensors to danger and potential damage. Additionally, both reflectance and soil conductivity data is sensitive to changes in humidity and water content (in the canopy and the upper soil layers respectively).
c. The decision of the data collection plan parameters. This section can examine what are the ideal sampling parameters, such as the optimal number of rows scanned by the sensor based on the characteristic / parameter that we will measure, the technical characteristics of our sensor, and the final product / dataset, based on which sampling parameters such as rows scan and data logging internal will be decided. Finally, for the IoT stationary station, the positioning of the installment should be examined and explained in each parcel visited

3 Suggested non-technical topics of discussion

Aside from data collection parameters, a reference should be made on the selection of IoT station based on both the endurance of the station's components, as well as the selection of the components themselves, as well as which factors should be considered for this decision (i.e. environmental conditions of the area, the microclimate and potential extreme conditions such as hailstorms, frosts or heatwaves that potentially occur throughout the year in each region).

4 Outputs and data analysis

After the demonstration is finished, it is advised that the technical visit is concluded with a short session in a suitable building / hall for the analysis of the data collected from the data acquisition procedures performed during this technical visit. This will help the students gain a full understanding of all the required steps and methodology on how to use, most importantly in real conditions, the principles and skills they have learned from the theoretical and practical courses of this Training Package.