VINIoT precision viticulture service

Based on IoT sensors network for the digital transformation of SMEs in the SUDOE space

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www.viniot.eu

Interreg Sudoe
European Regional Development Fund

EUROPEAN UNION

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PARTNERS

VINIoT pursues the creation of a new technological vineyard monitoring service.

This service will allow wine sector companies in the SUDOE space to monitor plantations in real time and remotely at various levels of precision (grapes, plant, plot and vineyard).

We are 7 partners in the consortium in the fields of research, technology and transfer:

ADVID
ASSOCIAÇÃO PARA O DESENVOLVIMENTO DA VITICULTURA DURIENSE

AGACAL
AXENCIA GALEGA DA CALIDADE ALIMENTARIA

aimen
CENTRO TECNOLÓGICO

FEUGA
FUNDACIÓN EMPRESA-UNIVERSIDAD GALLEGA

Gobierno de La Rioja

INRAE

IFV
INSTITUT FRANÇAIS DE LA VIGNE ET DU VIN

OBJECTIVES

The main innovation of the VINIoT service is to merge in the same solution the two main technologies that are currently used independently in the Vineyard monitoring: multispectral images and ground sensorization. Taking advantage of the main strengths of both technologies, we will design a system based on an IoT architecture that allows assessing parameters of interest viticulture and the collection of data at a precise scale (level of grape, plant, plot or vineyard).

Digitization of the wineries

Implementation of technologies in wineries to develop new opportunities.

Transfer technology to the wineries

Transfer to wineries and other interested organizations of the wine sector.

VINIoT HUB

A meeting point for agents interested in services offered by experts in different fields.

PHASES

DESIGN

VALIDATION

TRANSFER

VINIoT HUB

PROJECT

Design and architecture of sensors and IoT

This task force has two main objectives:

- Establish VINIoT service requirements, technology and application in the different territories of the SUDOE space.
- Design and implementation of service hardware/software architecture to be implemented in the different demofarms to obtain data from the vineyards to develop the artificial intelligence technology.

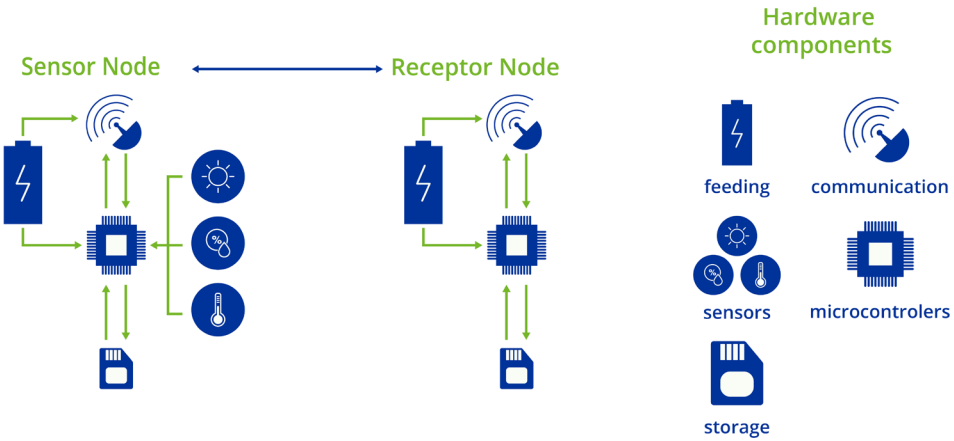

Image 1. IoT NODES

AI Algorithms Development

This group of tasks aims to develop the Artificial Intelligence algorithms that will allow the automation of the vineyards monitoring from the information obtained by the imaging techniques and sensor networks deployed on the ground. First, it will be necessary to develop the multispectral image processing algorithms to, a posteriori, combine them with the information from ground sensors and finally relate all this information with chemical analyzes that provide real value to the relevant parameters in vineyards.

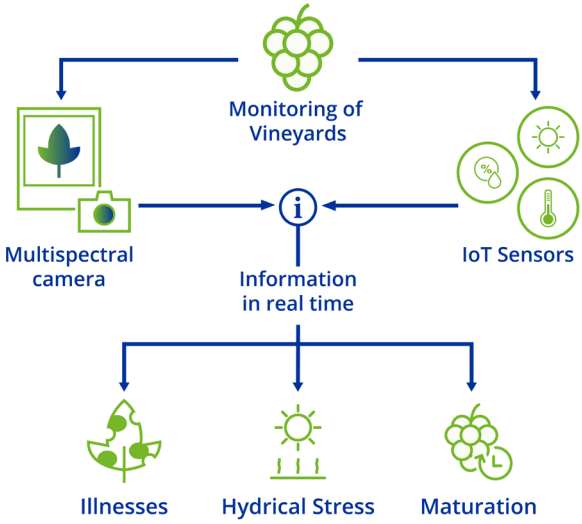

Image 2. Development of IoT Intelligence Algorithms

VALIDATION

The VINIoT service will be validated in 4 demofarms located in different regions of the SUDOE space.

Tests and validation systems

The validation will be carried out in 4 demofarms located in different regions of the SUDOE Space: Galicia, La Rioja, Douro-Portugal and in the South of France. The main objective is to collect data to adjust the Artificial Intelligence models. Campaigns will be carried out to collect spectral examples from different parts of the vine. Together with laboratories analyzes carried out, there will be the observation of experts to relate both aspects. We will use VINIoT service tools (cameras and sensors) to make estimations, which will be corroborated with laboratory analysis and expert observation.

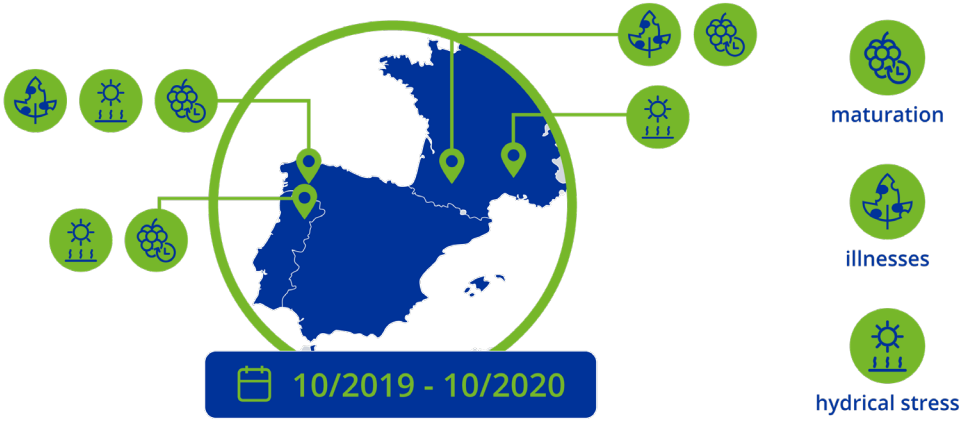

Image 3. Field tests carried out in the 1st year

Methodology in maturity trials (1st year)

For the evaluation of maturity and to avoid the loss of information due to the heterogeneity of the berries, it has been decided to work the first year 2020 at the berry scale in the laboratory. If the correlations between the samples and the images obtained work, the second year it will be possible to work at the bunch scale and then in the vineyard. Different varieties of white and red grapes have been used. The acquisition of the spectral photograph, as well as the reference analyzes to measure the maturity, were carried out in the laboratory after harvesting the berries.

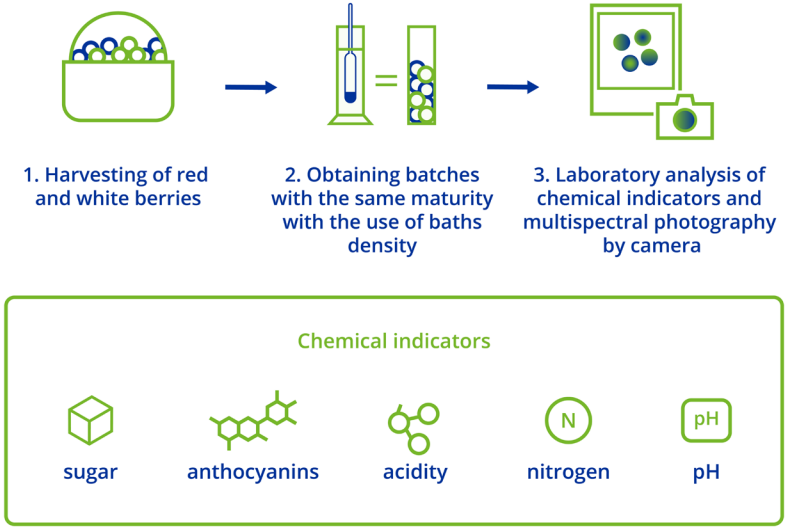

Image 4. Field tests to characterize the state of ripeness of the grape

Methodology in disease trials (1st year)

Golden Flavescence:

To detect this disease, the first year, the experimental plan has consisted of work at leaf scale in laboratory. In the 2020 campaign more than 200 leaves (red and white varieties) have been collected. The leaves were sampled in the field by an expert who identified and classified them on the same day. The leaves were kept in a fridge until they reached the lab. Leaves were divided into three categories: with symptoms of GF, with other symptoms and healthy. Before taking the picture with the spectral camera, a measurement was made with the Dualex® sensor, which measures the rate of chlorophyll and flavonols in the leaf (expressed by NBI index). The image with the spectral camera was taken the same day. For the 2021 campaign, the work will be performed in the field. 50 photos of leaves will be taken on site.

Mildew:

We work with the Albariño variety, which is sensitive to mildew. 500 leaves were collected and divided into 5 categories: mold symptoms, black rot symptoms, powdery mildew symptoms, other physiopathies and no pathology, with 100 leaves each. In this first year, mold symptoms were clearly visible and developed (no early detection).

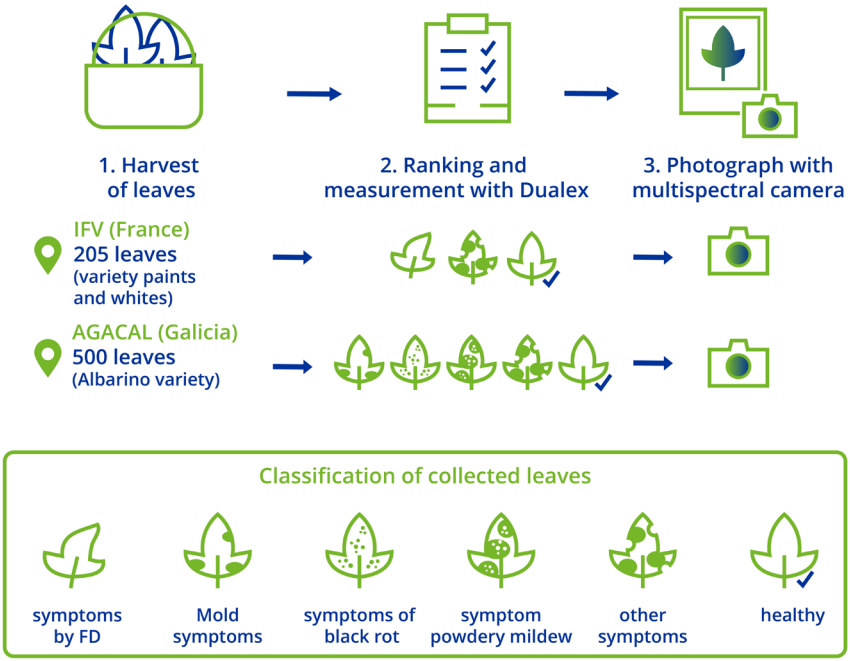

Image 5. Field tests to characterize the health status

Methodology in water stress tests (1st year)

In order to work with a significant variability in terms of water status, it has been worked the first year with potted plants under 2 different water regimes.

They have been carried out by INRAE, at the Supagro Campus in Montpellier, and by AGACAL in EVEGA. INRAE pots have a capacity of 9 liters, while in AGACAL were 15 liters. The facilities have allowed the supervision of irrigation and micro-climatic conditions.

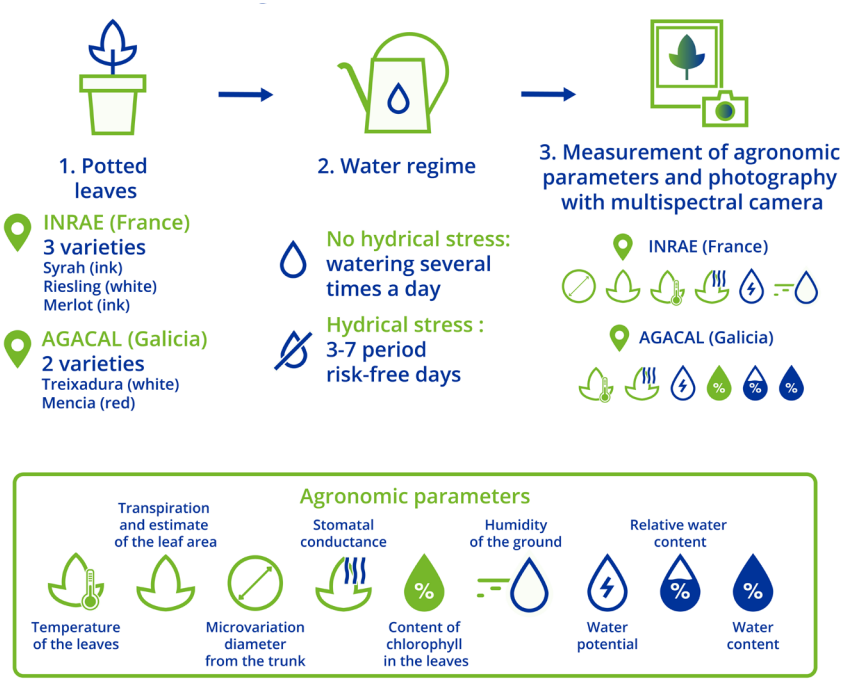

Image 6. Field tests for the characterization of hydrical stress

TRANSFER

Technology transfer to wineries and other interested organizations in the wine sector.

Transfer to the wineries

One of the main objectives of VINIoT is to transfer and disseminate technology developed to the largest number of wineries in the SUDOE Space and others stakeholders (end-users, technology providers, policy makers..) giving special emphasis to the benefit of its implementation between the wineries of the sector.

- A series of workshops will be organized in different regions in coordination with dissemination activities.
- There will be 50 visits to wineries and demofarms to get feedback from the participants.

Training (AIMEN)

Course for wineries: course with 4 editions (AGACAL, ADVID, IFV, GOBLARIOJA)
Together with laboratories analyzes carried out End-Users training on precision viticulture and the VINIoT service.

SEMIPRESENTIAL EXPERTS 50H course
Viniot service implementation blended training for experts from the consortium and other centres/ companies. This course is open to others wine regions. A duration of 50 hours is estimated for this course in combination of face-to-face and remote stage.

Visits to demofarms (FEUGA)

Visits will be made to the 4 demofarms in which the VINIoT service is validated. During these visits there will be a demonstration of how the service is implemented in reality, so that interested wineries can know first-hand the VINIoT system in details.

Image 7. Map of visits to demofarms

Workshops (AGACAL):

5 editions in total:

- 3 Spain (AGACAL, GOVERNMENT OF LA RIOJA, FEUGA). .
- 1 Portugal (ADVID) .
- 1 France (IFV).

Image 8.Workshop Map

Visits to wineries (FEUGA):

50 visits in total:

- Spain (25): Galicia (15) and La Rioja (10).
- Portugal (15).
- France (10).

Image 9. Winery visits map

Meetings (AIMEN)

Meetings will be organised with centres and experts in precision viticulture interested in the project results.

AIMEN will coordinate meeting scheduling in terms of dates and taking into account the availability of the support materials generated in the project (manuals, brochures, reports, etc.), and the state of service implementation. A total of 25 meetings will be organised, with the collaboration of all beneficiaries.

VINIoT HUB

The VINIoT HUB is a meeting point for all agents related to VINIoT (wineries, regulatory councils, technology providers ...) The activities of the VINIOT HUB will be open not only to the consortium partners, but also also to centers and companies interested in the VINIoT service.

Connection

Facilitators of information exchange and creation of synergies.

Transfer to the wineries

Technology transfer to wineries and other interested organizations of the wine sector.

Training

Training for wineries and experts for the implementation of the service VINIoT.

Promotion

Visits to vineyards and demofarms, workshops and outreach activities.

Helpdesk

Helpdesk is a support service that the VINIoT project offers to supervise the entire information chain within the project. It includes the possibility to create entries about the project or about any of the services included in VINIoT HUB.

Create
Create query tickets related to VINIoT HUB services or projects.

Check
You can follow the status of your ticket and check the comments.

Connect
Find the right services and providers.

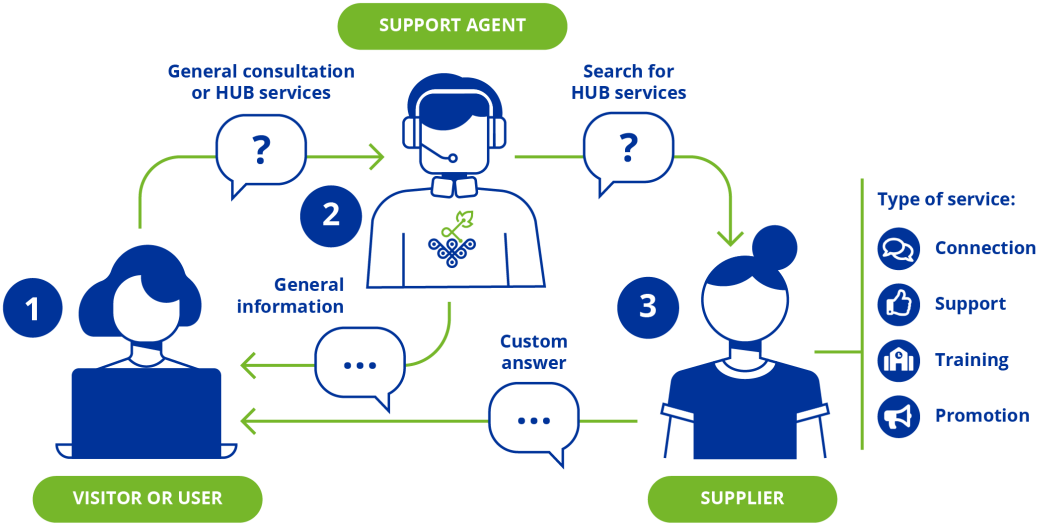

Image 10. VINIoT Helpdesk Operation

Contact

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