PRECIMED NEWSLETTER
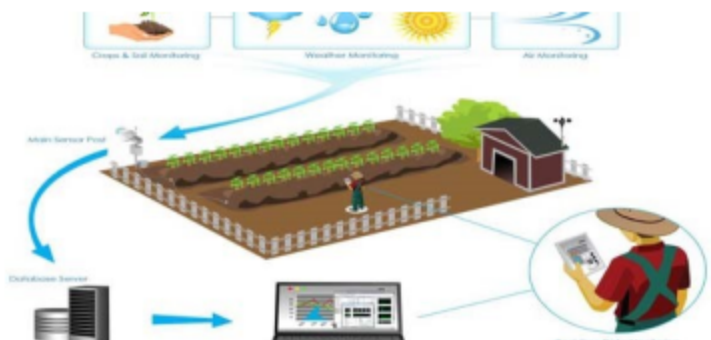
PRECIMED technological concept

The DSS data-driven IoT-standards-based approach for precise irrigation and nutrition, with its emphasis on existing and emerging standards will ensure interoperability and ease of integration across the agricultural sector. It will bring together heterogeneous types of IoT devices and infra-structures – from field and plant sensors, weather stations, monitoring and control devices, actua-tors, and remote sensors, connected in various configurations present on the market today. The DSS platform will validate and prove, in collaboration with end users, how resilient and interopera-ble IoT ecosystems can contribute to clear economic benefits in different value constellations and business setups. This will provide further opportunities, including new business models on the farm. Figure 1 shows the technological concept of the project wherethe DSS will be the heart and the brain of the whole system. From the farmer point of view, PRECIMED DSS will be able to use any type and volume of data to understand, with high precision, the needs of the crop in terms of irrigation and fertilization. This solution could be installed in greenhouses and open field crops. The DSS will have built-in software tools to process all the information received from the dif-ferent data acquisition components making it usable. To achieve this, the DSS will be developed by improving, in parallel, the current techniques in both indoor and outdoor allowing the project to arrive to a complete solution. PRECIMED will implement a closed-loop monitoring/control strategy which will consist of the following steps:

Step 1: Monitor and record the water, soil, crop and climate parameters, **Step 2:** Process and ana-lyze the collected data, **Step 3:** Implement selected algorithms for parameters and processes esti-mation, **Step 4:** Filter the output and produce recommendation/decision making by the end-users in order to execute remote actuations over the crops.

PRECIMED Technological Concept

Control of fertirrigation System

Drainage Tanks

Injection Pumps

Architecture of IoT-standards-based Decision Support System (DSS)

The overall architecture of the IoT- standards-based DSS to cover the needs of precise irrigation/nutrition management is depicted in Figure 2. It is essentially distributed into three main planes: Cyber-Physical-system (i.e. gateways integrating sensors/actuators), intermediate edge computing and BigData cloud analytics. The CPS gateways are designed to be deployed at the local crop premises meanwhile the BigData techniques are deployed in cloud servers. The intermediate edge computing comprises a set of monitoring and control modules based on Network Functions Virtualization (NFV) that can be instantiated in the local field facilities or the cloud plane. To enable edge and cloud computing, the PRECIMED DSS will be developed according to the EU FIWARE platform providing this versatility in the computing deployment, at the same time improving the standardized connectivity with the CPS gateways, BigData analytics and management services.

Control of fertirrigation System

Precimed Operational Website

Data

Sensor data:

-Air temperature
-Air relative humidity
-Volumetric Water Content
-Solar radiation
-pH and Electrical Conductivity
-Irrigation and drained nutrient solution

Results of scheduler operations per 5 minutes, daily and period:

Software Development

Software development refers to the display and use of sensor values via RTU's (Remote Terminal Units) and finally via Web site, for the purposes of the program.

Domain name: precimed.eu, with SSL security certificate Developed on the University Web server: https://precimed.eu

and connected to the internet. The latest versions of theme OSMO-SIS and WordPress were used.The Web site defines a supervisor role, which has access to all RTU's of the system listed at https://precimed.eu

The scheduler receives the RTU's sensor data and through equations and algorithms produces results which it records in the database.

It also receives weather data for the next day via Weather server.

GUI (Graphical Unit Interface) was developed on the Web site for the presentation of sensor data, but also the results of the scheduler operations.

Through the GUI the user can also enter the data of his cultivation, as well as download in EXCEL format the recorded data.

PROJECT PARTNERS

HELLENIC REPUBLIC
MINISTRY OF
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PRIMA
IN THE MEDITERRANEAN AREA

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