Low-Cost Water Desalination and Sensor Technology Compact Module

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Water JPI
WaterWorks2014 Cofunded Call
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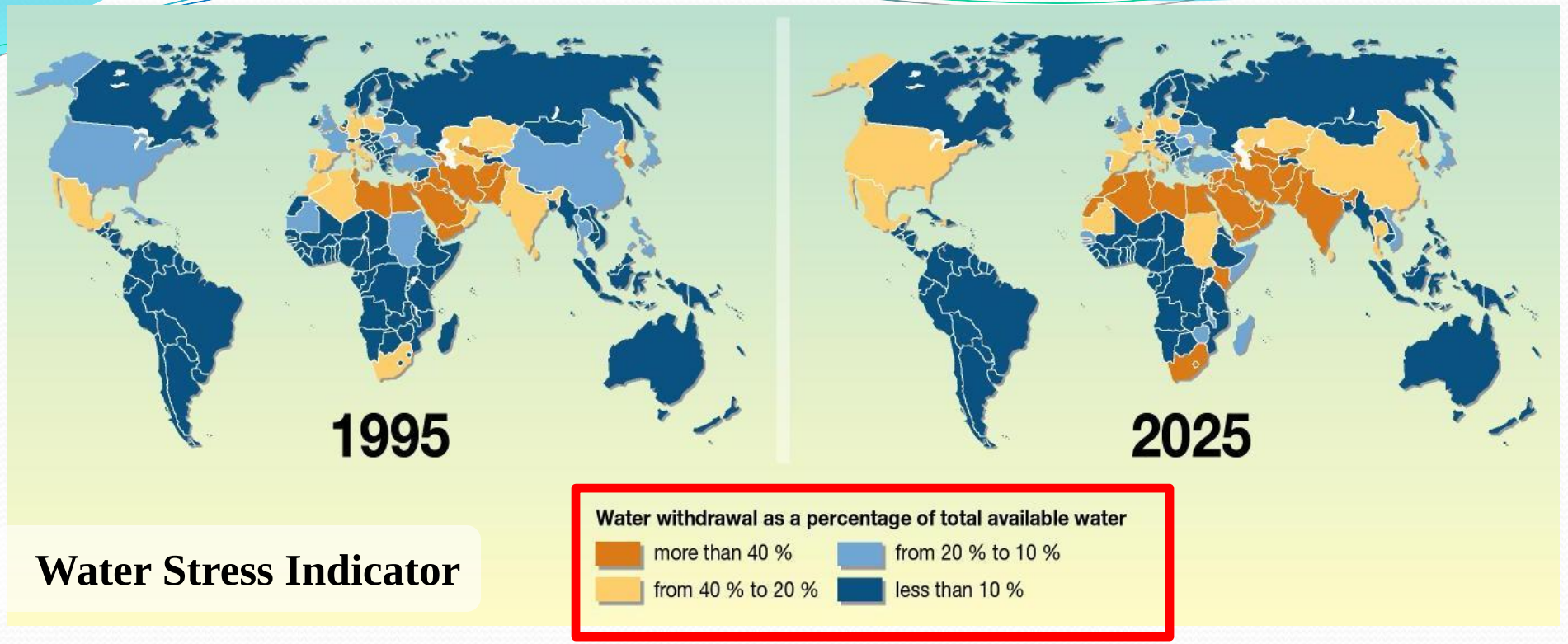
CONSORTIUM DESCRIPTION

ACRONYM	TOPIC	Coordination	Partners
DESERT	**1 ; 2**		
Low-Cost Water Desalination and Sensor Technology Compact Module		**non-conventional water; desalination; smart agriculture; energy efficiency; wastewater treatment; recycling; soil fertility conservation; nutrient use efficiency and continuous monitoring**	

PRINCIPAL INVESTIGATOR	INSTITUTION	COUNTRY
Salvatore Camposeo	**Università degli Studi di Bari Aldo Moro**	**Italy**
Emilio Nicolás	Agencia Estatal Consejo Superior	Spain
Philippe Lebailly	Université de Liège	Belgium
Anna Maria Stellacci	Consiglio per la Ricerca in Agricoltura e l'Analisi dell'Economia Agraria	Italy
Lucas Galera Quiles	NOVEDADES AGRICOLAS S.A.	Spain

State-of-art



Water Stress Indicator

3 billion people in 2025 will live in

a water scarce areas

…something like 60% of world population!!

Source: United Nations Environment Programme (UNEP) 2005

State-of-art

REUSE as a key strategy

Europe: it is estimated could reuse **3,222 Hm³/year** by 2025

Spain and Italy, where **80% withdrawn for agricultural**, could reuse 1,700 Hm³/year

Innovative aspects of the project

Water

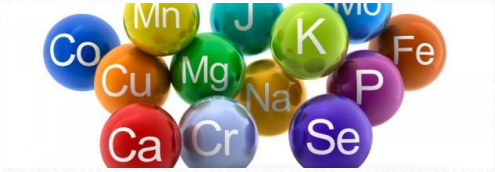
Reuse of non conventional water

Energy

Alternative energy used for water treatments

Nutrients/Soil

new continuous monitoring system and soil quality preservation



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Aim:

create an innovative concept of *smarter agriculture*

Specific Objectives

1. Developing:

- **two solar powered equipments** (**HidroNIC- Desal and HidroNIC-Fert**) for desalination and fertigation with **NON CONVENTIONAL WATERS**

- **an innovative chemicals monitoring system** (**QUANTUM**).

2. Monitoring and evaluating the **medium-term evolution of crop&soil status**.

3. Modelling the “value of irrigation water” by combining physical, biological and environmental factors to derive **water-crop production functions (CWF).**

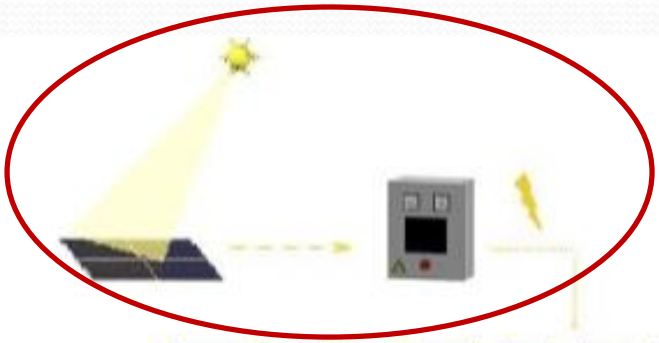
Work packages

- **WP1**: Integration of two water compact modules
- **WP2**: Development of on-line intelligent fertigation equipment
- **WP3**: DESERT irrigation water validation and agronomic assessment for fruit tree crops and soil quality monitoring
- **WP4**: Sustainability assessment, energy and cost efficiency of the DESERT system
- **WP5**: Dissemination on strategy and exploitation plan for transfer of knowledge and market uptake

WP 1
Integration of two water compact modules

Responsible: NOVEDADE AGRICOLA

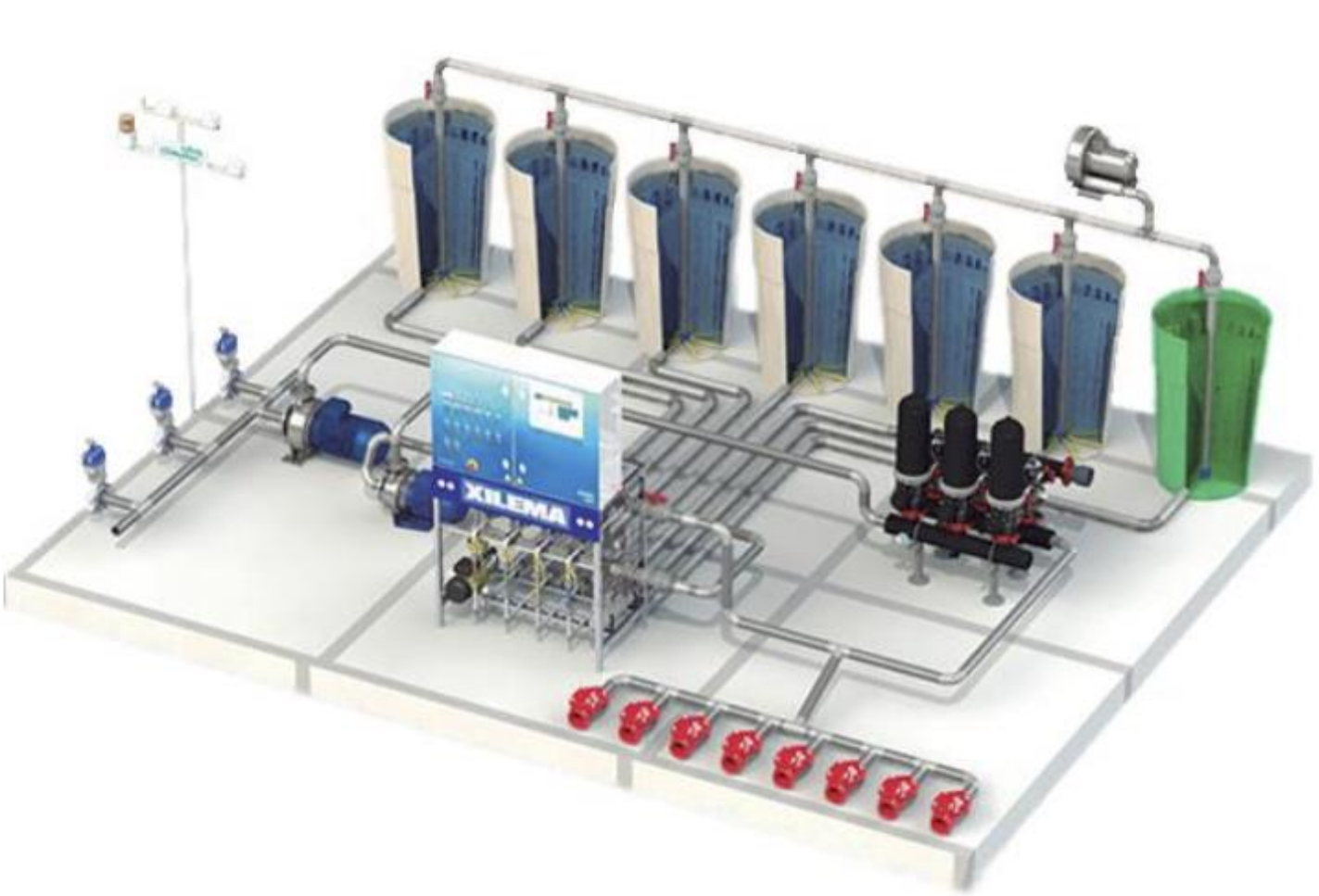
“Hidro-Nic Desal”



reduce treatment costs

non conventional water (saline and/or municipal wastewaters)

“Hidro-Nic Fert”



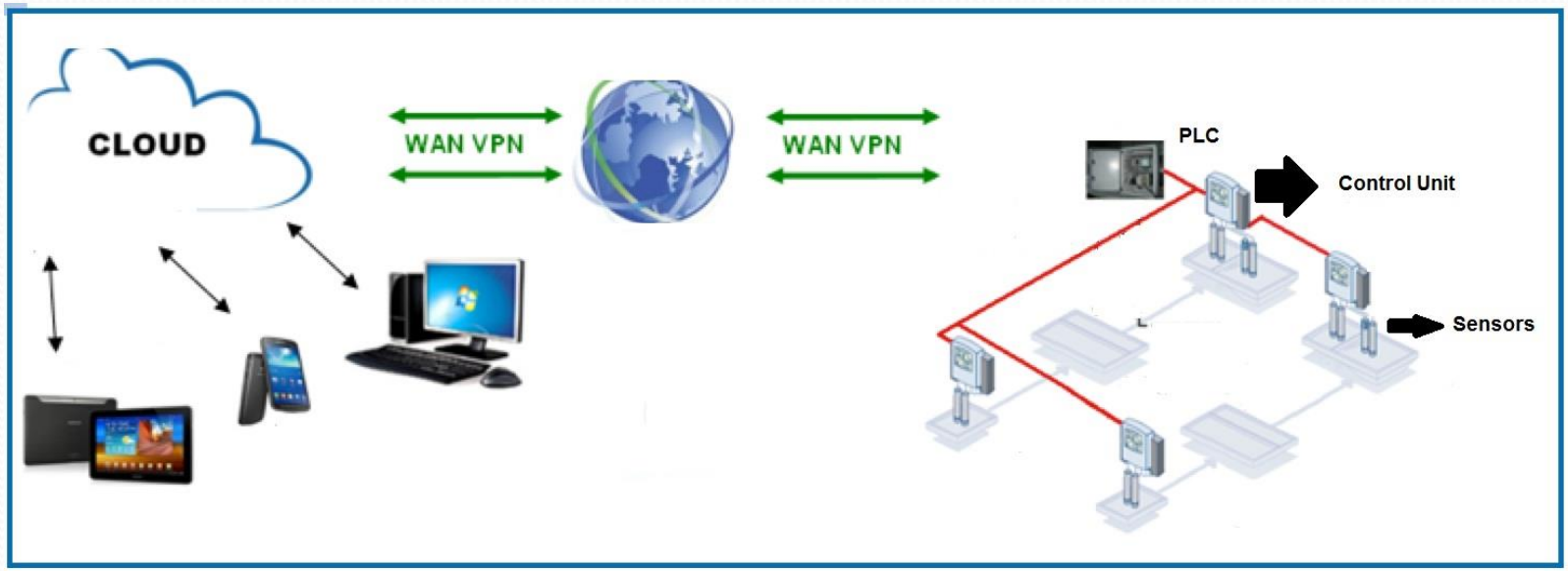
integrated with the first one
in order to add nutrients and then to fertigate

WP2

Development of on-line intelligent fertigation equipment

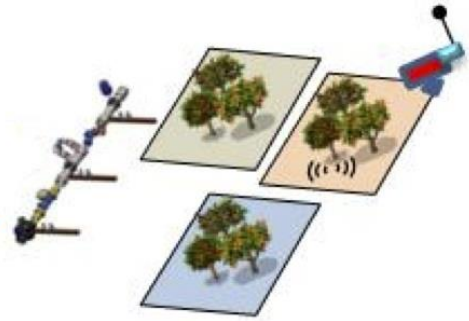
Responsible: University of Bari – DISAAT and INTESIS srl

“QUANTUM”



Treat **Monitor** **Reuse**

MUNICIPAL WASTEWATER
BRACKISH WATER



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“QUANTUM”

It will be composed from:

Hardware

PLC (Programmable logic controller), panel control, rooter, **sensors for chemicals**

Software

Support tool to help **growers** to control and manage in real time irrigation and fertilization

Soil characteristics

Texture

Structure

Soil depth, properties

Crop Characteristics

Species

Phenological stages

Production expected

Software

Toxicity Monitoring

Monitoring of Cl and Na

Elaborate a previsional model

Water Monitoring

Chemical elements

WP3

DESERT irrigation water validation and agronomic assessment for fruit tree crops and soil monitoring

Responsible: CREA-SCA, CEBAS and UNIBA

EXPERIMENTAL FIELDS

Spain

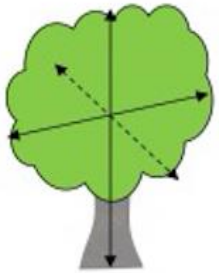
Italy

DESERT TECHNOLOGY EVALUATION

evaluating the medium-term evolution crop nutritional status and ecophysiological response

Plant measurement

Tree
Canopy



Fruit
Diameter, fruit set

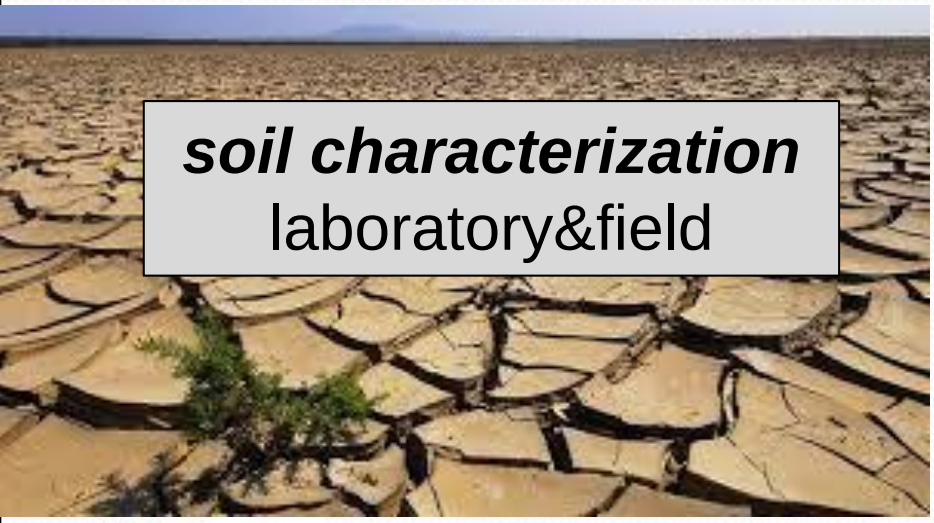
Stem water
potential

Leaf gas
exchange

Yield Quality Indices

Monitoring of soil fertility evolution

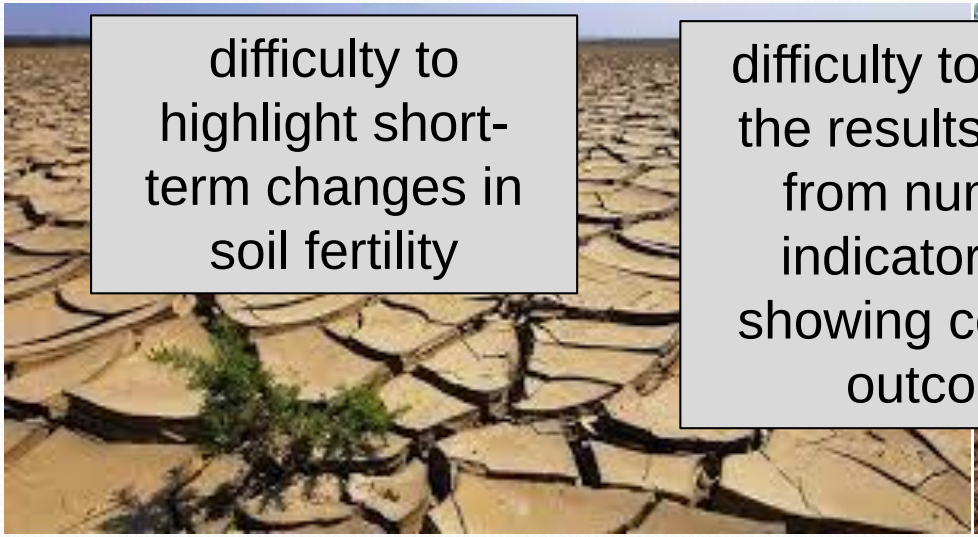
This aim will be reached by means of innovative approaches



soil characterization
laboratory&field

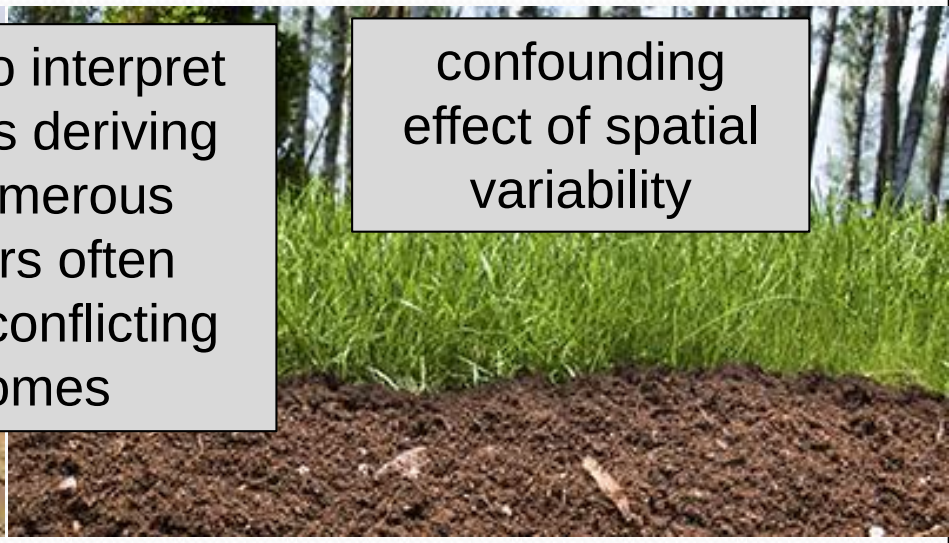
methodologies
for ***data analysis***

The project will address some **critical issues** trying to define **innovative solutions**



difficulty to highlight short-term changes in soil fertility

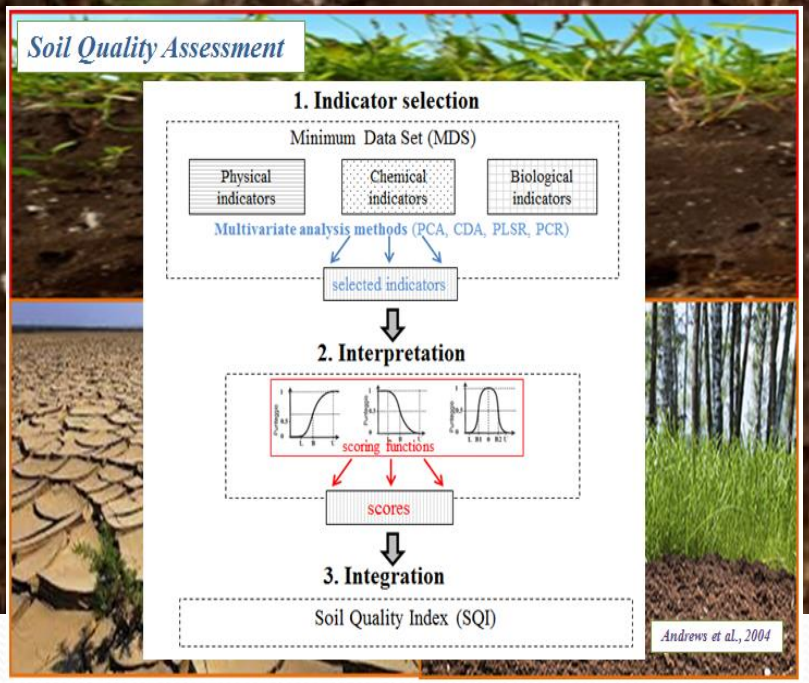
difficulty to interpret the results deriving from numerous indicators often showing conflicting outcomes



confounding effect of spatial variability

Solutions proposed (1,2)

1. identification of sensitive indicators able to highlight differences in management systems
2. definition of standardized protocols to quantify Soil Quality Indices (SQI)



- **SQIs combine in a single value a variety of information regarding soil chemical, physical and biological properties.**

Solutions proposed (3)

Proximal geophysical sensors will be used to characterize spatial variability and assess its change over the time

- optimizing soil sampling;
- monitor the evolution of soil quality during the experimental period;
- improve data analysis, using the auxiliary information as covariate data and implementing mixed effects models

WP4

Sustainability assessment, energy and cost efficiency of the DESERT system.

Responsible: University of Liege

WP 4: Sustainability assessment, energy and cost efficiency of the DESERT system

OBJECTIVES

a) *Assess the **environmental sustainability** and energy efficiency of the Desert system*

b) *Assess the **economic sustainability** of the Desert system using the crop-production function*

Methodologies

a) *Cradle-to-farm gate Life Cycle Assessment*
of all the experimental fields

b) *Crop-production functions*

c) *Water-crop functions*

WP5

Dissemination strategy and exploitation plan for transfer of knowledge and market uptake

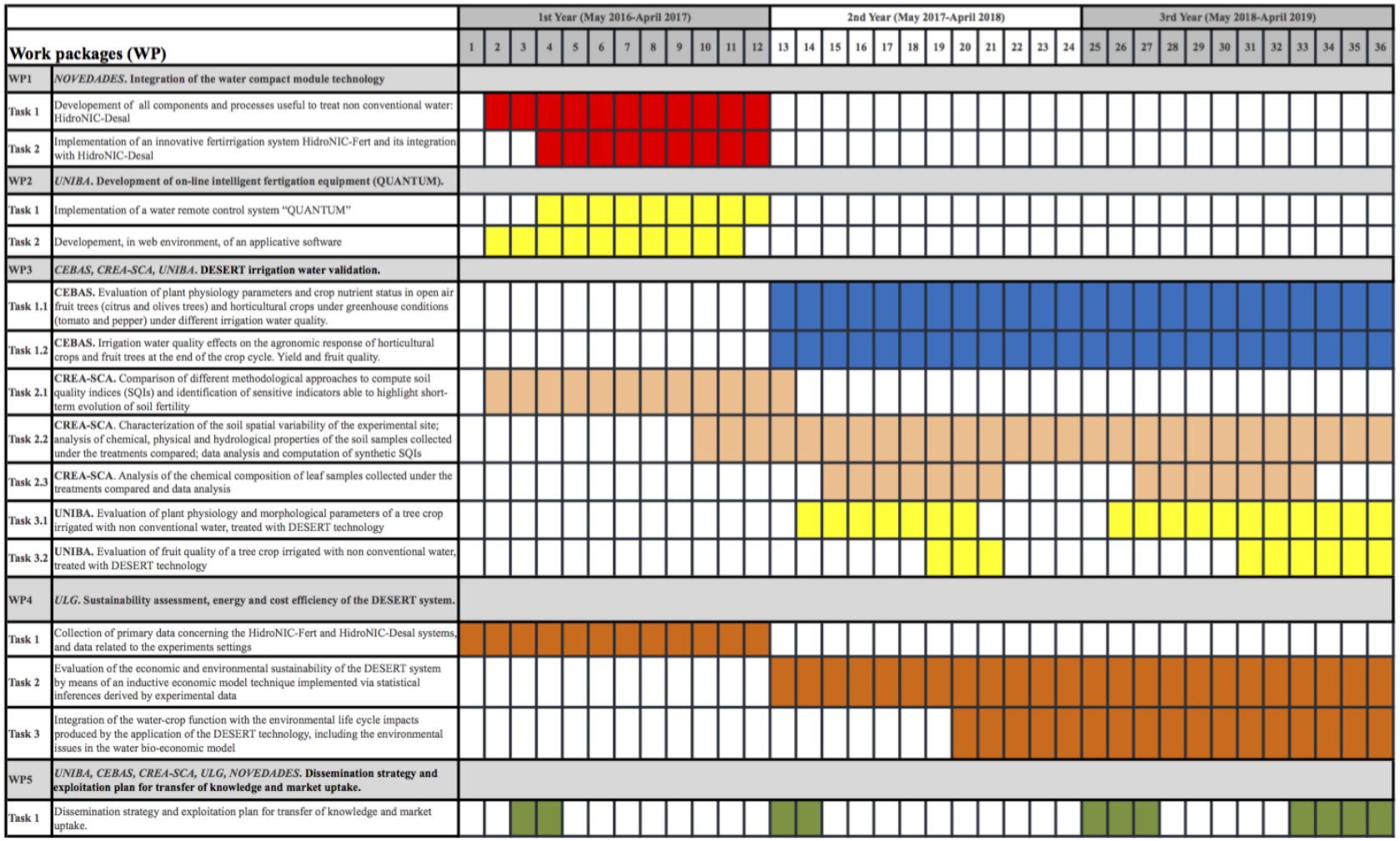
Responsible: University of Bari – DISAAT, CEBAS, CREA, ULG and NOVEDADE

Dissemination

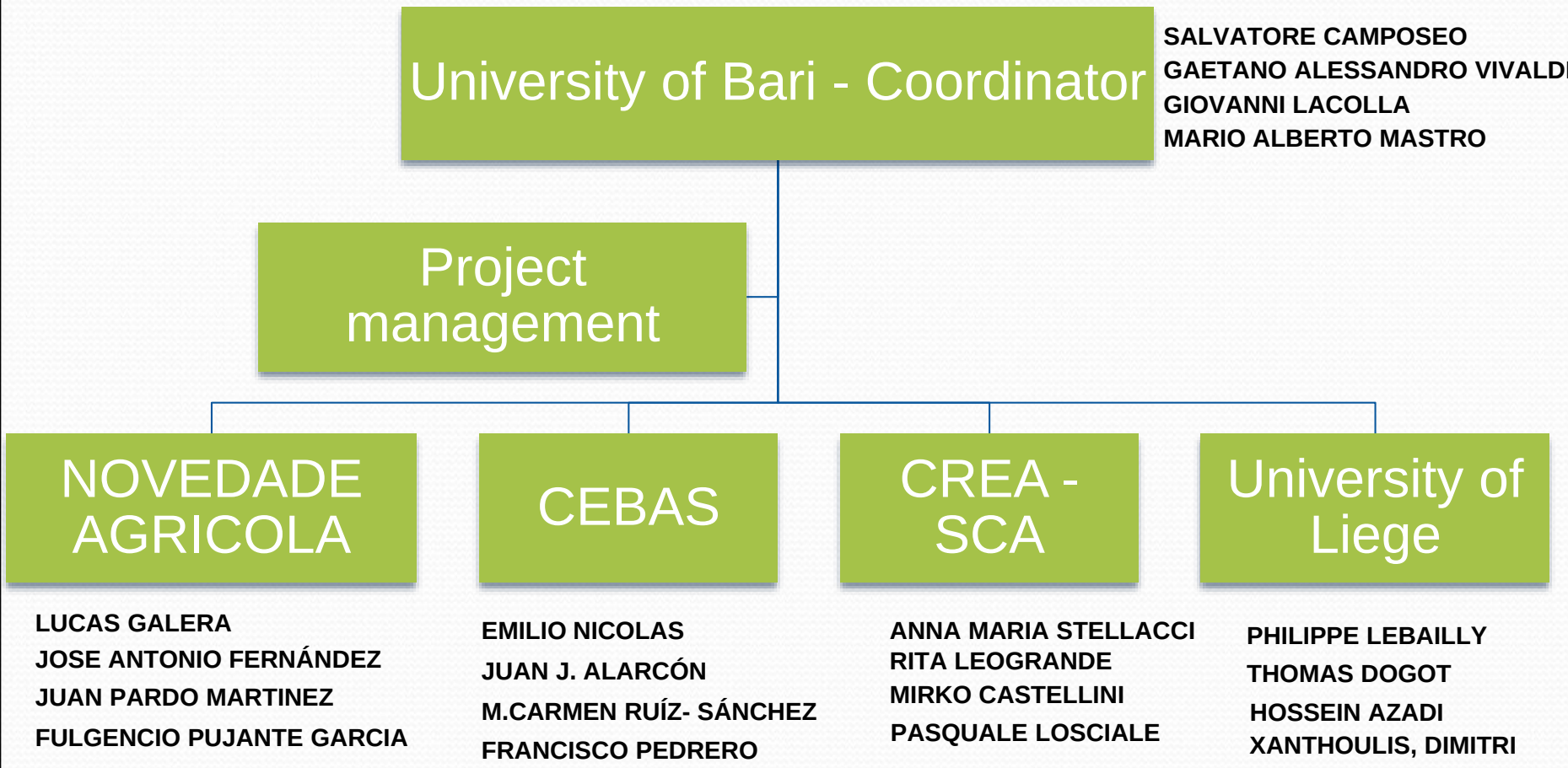
- Congress
- Workshop
- Symposium
- Reports
- Scientific and technical pubblications
- Social media (Twitter, website…)

First DESERT meeting at Bari, middle of July
University of Bari "Aldo Moro"

Distribution of tasks



Consortium description



Expected impacts

- developing low-energy, low chemical and high-efficiency technologies for water treatment and desalination
- promoting the interoperability of real-time information tool (sensor networks) of water-soil-plant system
- combining socio-economic and crop water function models

Expected impacts

*The **DESERT technology** will contribute to:*

1. mitigate the negative effects of groundwater abstraction

2. improve water quality for agriculture

3. increase farmers' income through

- saving costs of energy

- reducing the water and fertilizers needs

Relation to the Call and to the European Research Area objectives

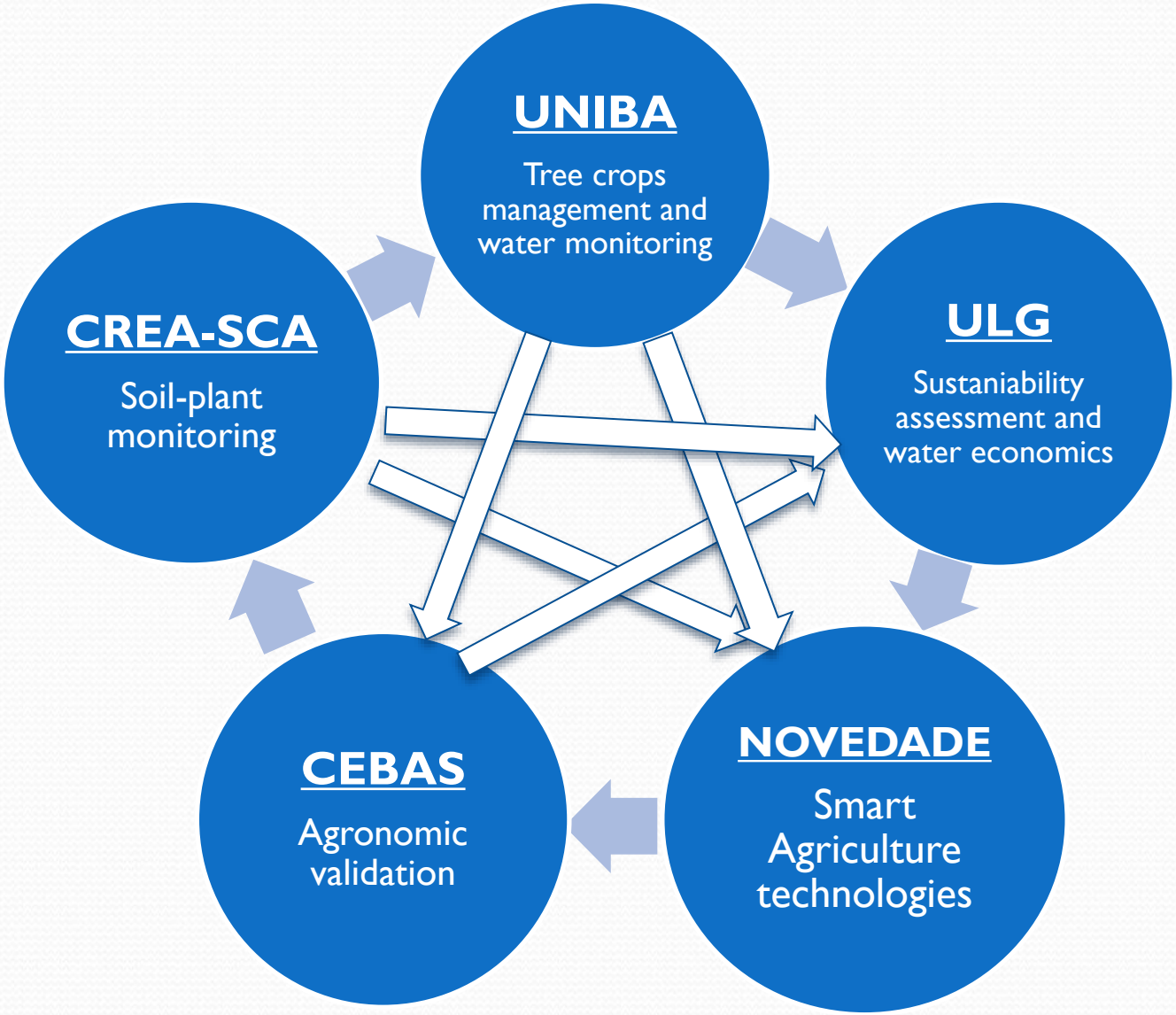
DESERT project is aimed at **finding technical solutions** and **services** to:

1. Water Treatment, Reuse, Recycling and Desalination
2. Water Resources Management

These cross-cutting issues will enable partners, stakeholders and policy makers to face problems related to **non-conventional water use in agriculture** and develop feasible technical and managerial solutions

Relation to the Call and to the European Research Area objectives

The mutual cooperation among DESERT partners will allow sharing knowledge and expertise also through mobility of young researchers



thank you for your attention

PRESENTATION INSTRUCTIONS

Please address the following topics:

- state-of-art and the originality and innovative aspects of the project
- objectives of the project and the relation to the scope of the call
- Work package description/ distribution of tasks/ consortium description (management structure)
- Expected impacts (research-related/ innovation-related/ societal-related)
- Address how your project is related to the Call and to the European Research Area objectives (multidisciplinary work; mobility of researchers; knowledge sharing throughout the project lifetime and beyond; effective articulation between Basic Research/Applied Research/Innovation)

15 MINUTE PRESENTATION.

Direct it towards a HEALTHY DISCUSSION OF IDEAS and potential NETWORKING with the other projects

Water JPI

Nutrient Monitoring

- pH
- EC Electrical conductivity
- Oxygen dissolved
- TSS Total suspended solids
- Nitrates
- Ammonium
- Phosphorus
- Potassium
- Calcium
- Magnesium
- Boron

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