



Low-Cost Water Desalination and Sensor Technology Compact Module



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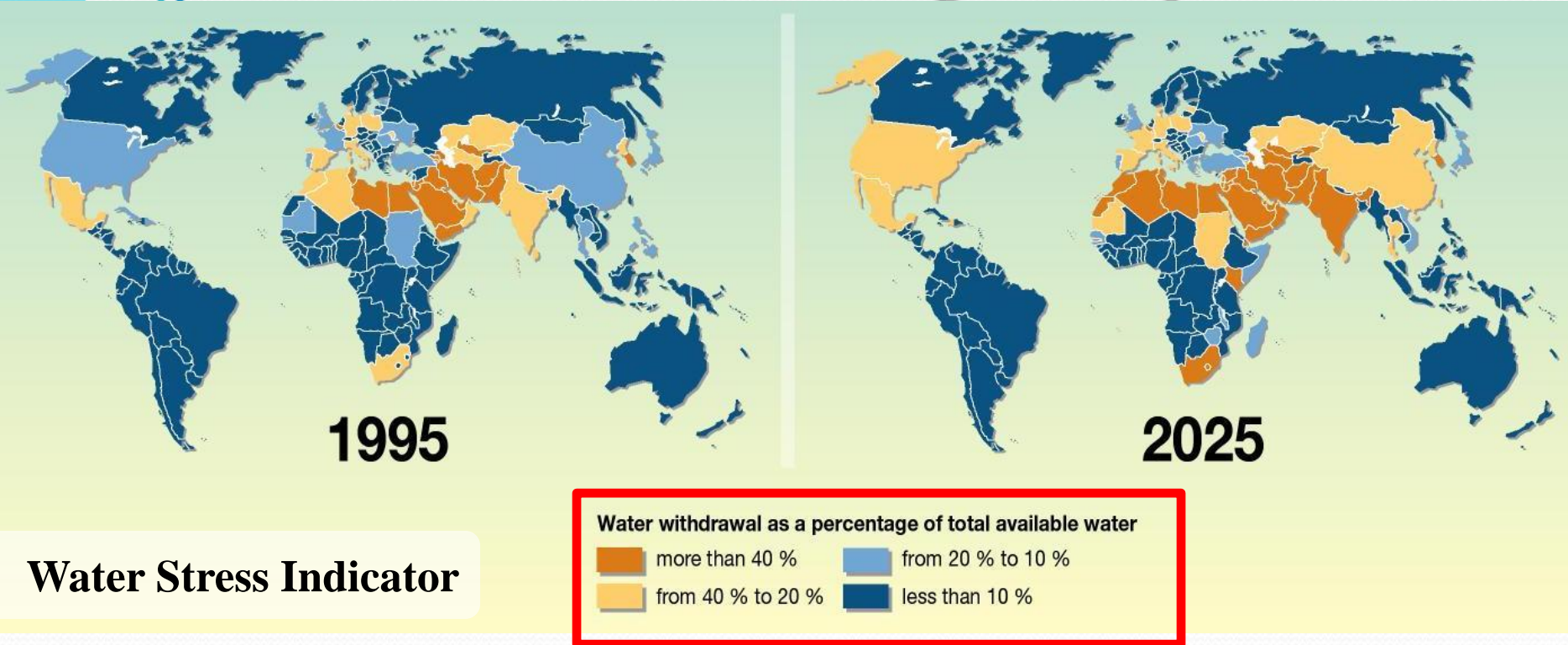
Water JPI
WaterWorks2014 Cofunded Call
18 May 2016, Rome

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



**3 billion people in 2025 will live in
a water scarce areas
...something like 60% of world population!!**

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Spain and Italy, where **80% withdrawn for agricultural**, could reuse 1,700 Hm³/year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



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

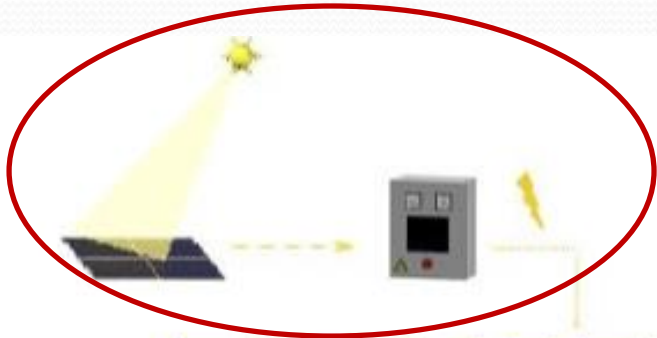
WP 1

Integration of two water compact modules

*Responsible: NOVEDADE
AGRICOLA*



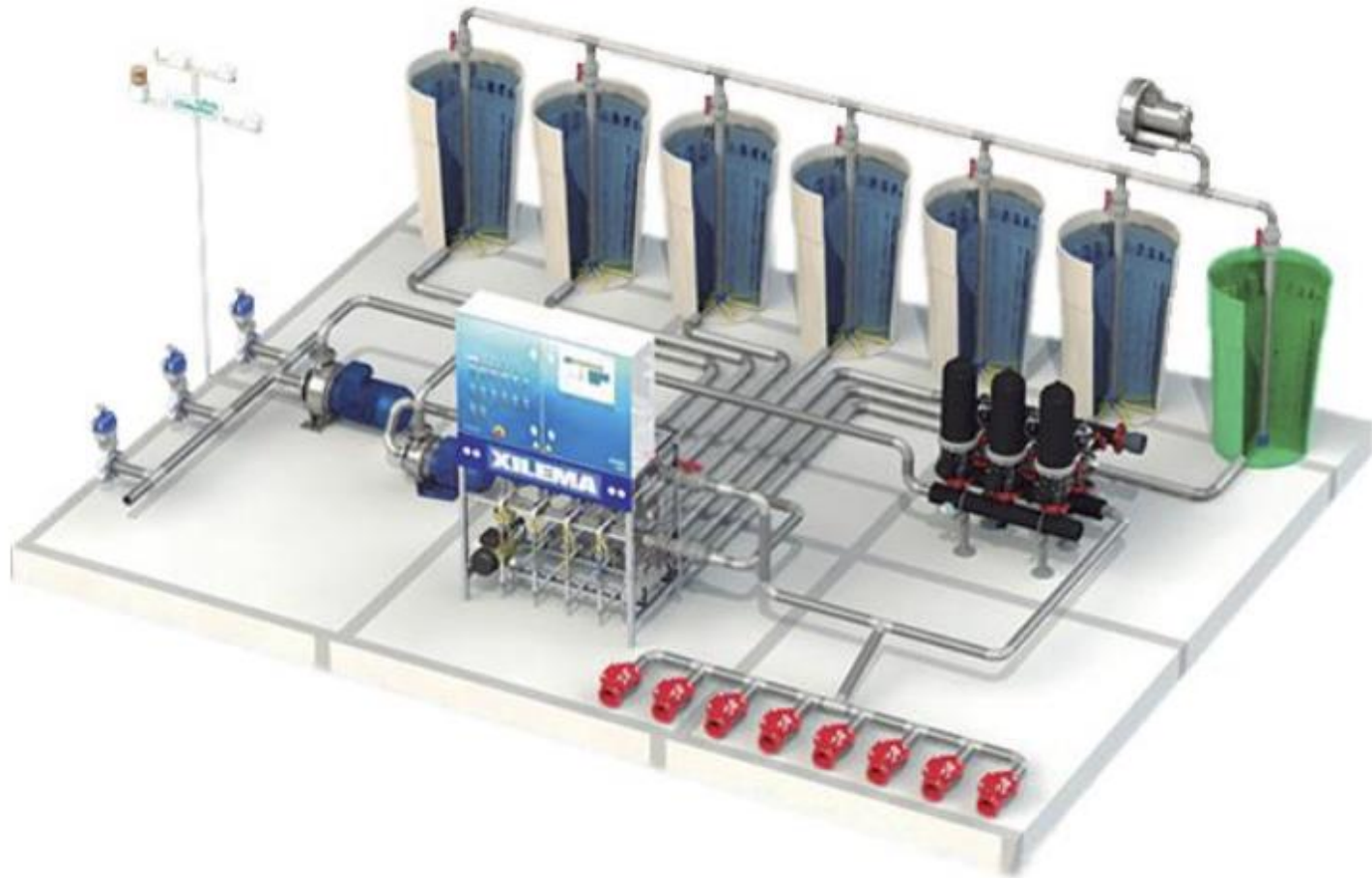
“Hidro-Nic Desal”



reduce treatment costs



“Hidro-Nic Fert”



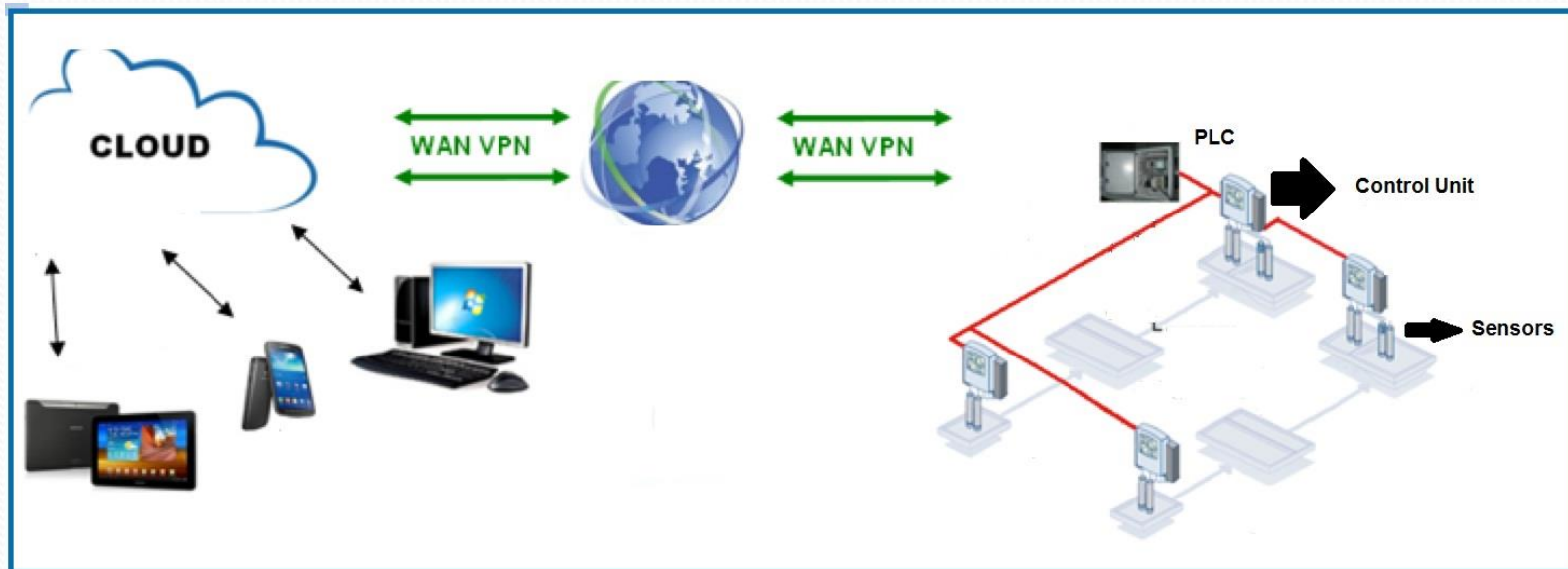
WP2

Development of on-line intelligent fertigation equipment

Responsible: University of Bari – DISAAT and INTESIS srl



“QUANTUM”

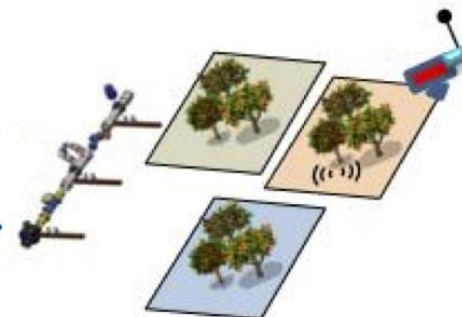
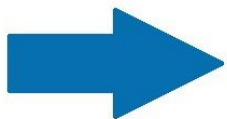


Treat

Monitor

Reuse

MUNICIPAL WASTEWATER
BRACKISH WATER



“QUANTUM”

It will be composed from:

Hardware

PLC (Programmable logic controller), panel control, router, **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



Yield Quality Indices



Monitoring of soil fertility evolution




**This aim will be reached by
means of
innovative approaches**




soil characterization
laboratory&field



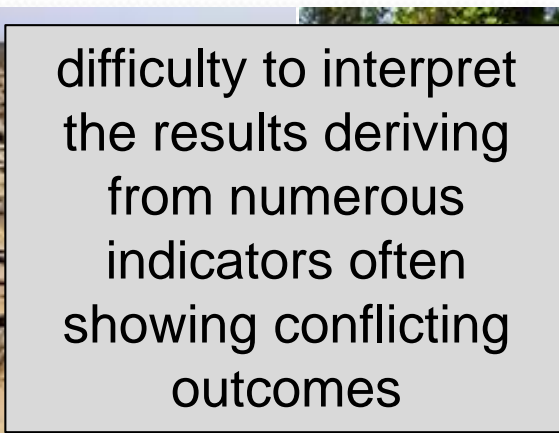
methodologies
for ***data analysis***




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



difficulty to highlight short-term changes in soil fertility



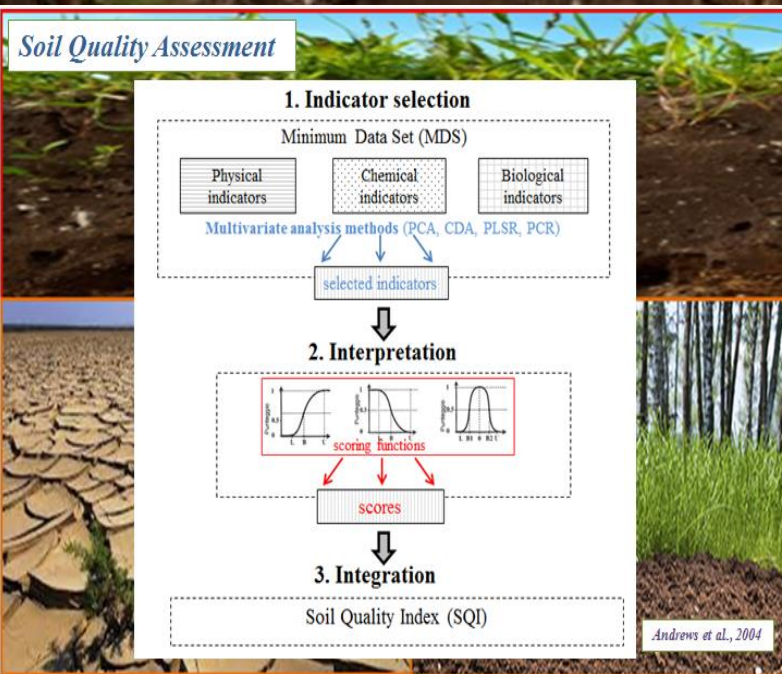
difficulty to interpret the results deriving from numerous indicators often showing conflicting outcomes



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 publications
- Social media (Twitter, website...)

**First DESERT meeting at Bari, middle of July
University of Bari “Aldo Moro”**

Distribution of tasks

Work packages (WP)	1st Year (May 2016-April 2017)												2nd Year (May 2017-April 2018)												3rd Year (May 2018-April 2019)											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
WP1	NOVEDADES. Integration of the water compact module technology																																			
Task 1	Development of all components and processes useful to treat non conventional water: HidroNIC-Desal																																			
Task 2	Implementation of an innovative fertirrigation system HidroNIC-Fert and its integration with HidroNIC-Desal																																			
WP2	UNIBA. Development of on-line intelligent fertigation equipment (QUANTUM).																																			
Task 1	Implementation of a water remote control system "QUANTUM"																																			
Task 2	Development, in web environment, of an applicative software																																			
WP3	CEBAS, CREA-SCA, UNIBA. DESERT irrigation water validation.																																			
Task 1.1	CEBAS. Evaluation of plant physiology parameters and crop nutrient status in open air fruit trees (citrus and olives trees) and horticultural crops under greenhouse conditions (tomato and pepper) under different irrigation water quality.																																			
Task 1.2	CEBAS. Irrigation water quality effects on the agronomic response of horticultural crops and fruit trees at the end of the crop cycle. Yield and fruit quality.																																			
Task 2.1	CREA-SCA. Comparison of different methodological approaches to compute soil quality indices (SQIs) and identification of sensitive indicators able to highlight short-term evolution of soil fertility																																			
Task 2.2	CREA-SCA. Characterization of the soil spatial variability of the experimental site; analysis of chemical, physical and hydrological properties of the soil samples collected under the treatments compared; data analysis and computation of synthetic SQIs																																			
Task 2.3	CREA-SCA. Analysis of the chemical composition of leaf samples collected under the treatments compared and data analysis																																			
Task 3.1	UNIBA. Evaluation of plant physiology and morphological parameters of a tree crop irrigated with non conventional water, treated with DESERT technology																																			
Task 3.2	UNIBA. Evaluation of fruit quality of a tree crop irrigated with non conventional water, treated with DESERT technology																																			
WP4	ULG. Sustainability assessment, energy and cost efficiency of the DESERT system.																																			
Task 1	Collection of primary data concerning the HidroNIC-Fert and HidroNIC-Desal systems, and data related to the experiments settings																																			
Task 2	Evaluation of the economic and environmental sustainability of the DESERT system by means of an inductive economic model technique implemented via statistical inferences derived by experimental data																																			
Task 3	Integration of the water-crop function with the environmental life cycle impacts produced by the application of the DESERT technology, including the environmental issues in the water bio-economic model																																			
WP5	UNIBA, CEBAS, CREA-SCA, ULG, NOVEDADES. Dissemination strategy and exploitation plan for transfer of knowledge and market uptake.																																			
Task 1	Dissemination strategy and exploitation plan for transfer of knowledge and market uptake.																																			

Consortium description

University of Bari - Coordinator

SALVATORE CAMPOSEO
GAETANO ALESSANDRO VIVALDI
GIOVANNI LACOLLA
MARIO ALBERTO MASTRO

Project
management

NOVEDADE
AGRICOLA

LUCAS GALERA
JOSE ANTONIO FERNÁNDEZ
JUAN PARDO MARTINEZ
FULGENCIO PUJANTE GARCIA

CEBAS

EMILIO NICOLAS
JUAN J. ALARCÓN
M.CARMEN RUÍZ- SÁNCHEZ
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CREA -
SCA

ANNA MARIA STELLACCI
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PASQUALE LOSCIALE

University of
Liege

PHILIPPE LEBAILLY
THOMAS DOGOT
HOSSEIN AZADI
XANTHOULIS, DIMITRI

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

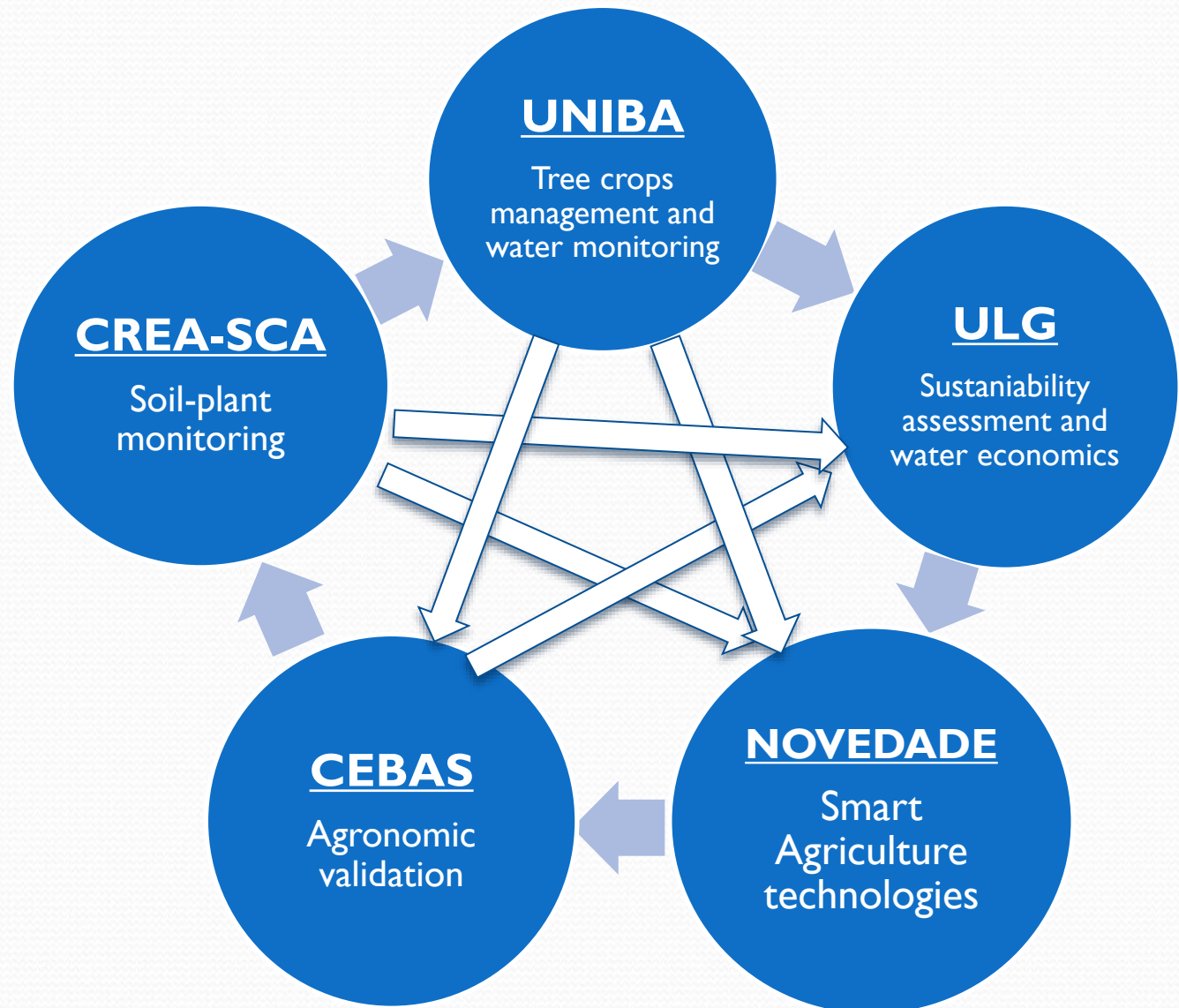
DESERT project is aimed at **finding technical solutions and services** to:

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

Nutrient Monitoring

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

PORTAL HOME PAGE

IMPIANTO CASTELLANA

IMPIANTO NOCI

IMPIANTO FASANO

IMPIANTO TRINITAPOLI

IMPIANTO STORNARELLA

ESCI

