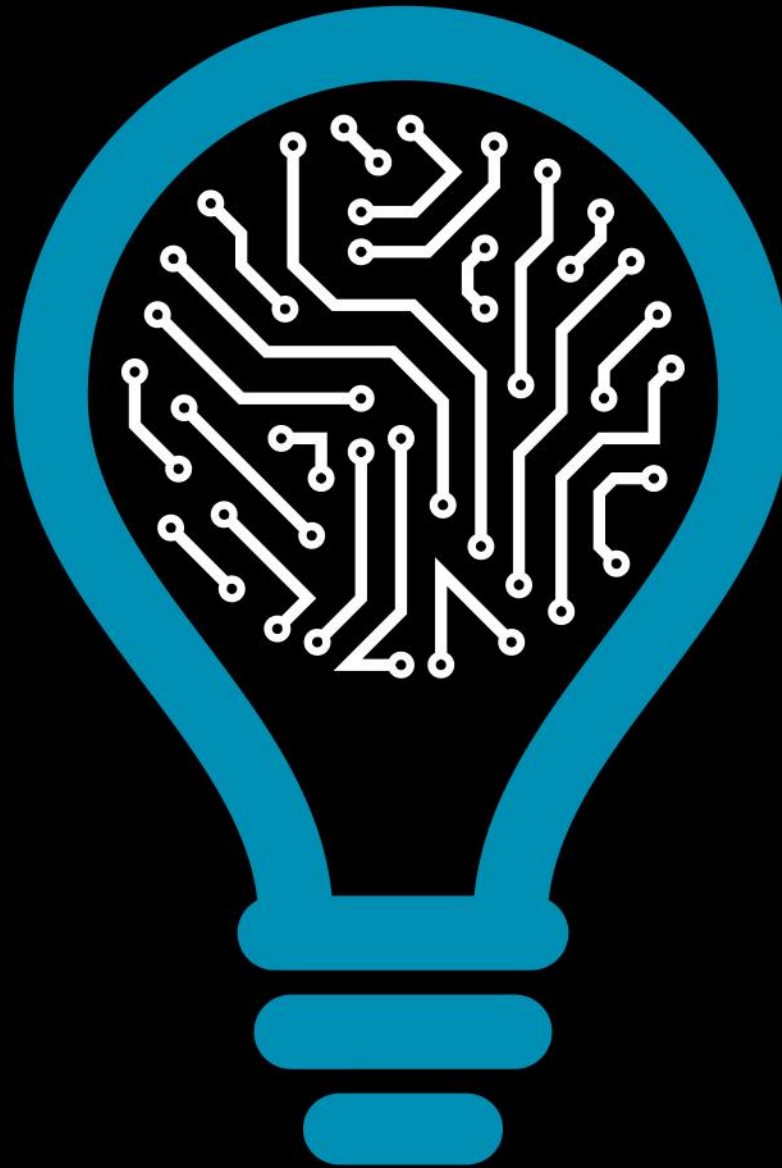
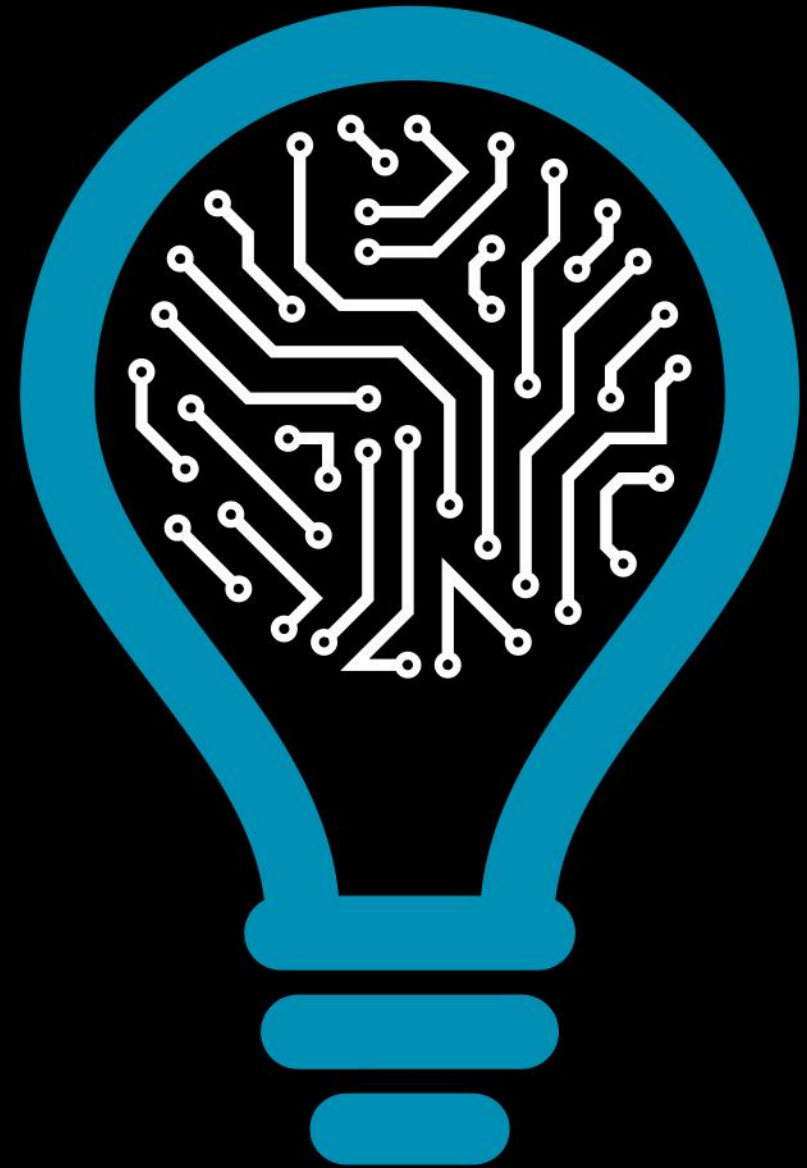


from knowledge  
production to  
science-based  
innovation



**INSTITUTE FOR SYSTEMS  
AND COMPUTER ENGINEERING,  
TECHNOLOGY AND SCIENCE**

# TEC4AGRO-FOOD Presentation



INSTITUTE FOR SYSTEMS  
AND COMPUTER ENGINEERING,  
TECHNOLOGY AND SCIENCE

INESC TEC

TEC4AGRO-FOOD

# PERVASIVE INTELLIGENCE

## WITH SOCIAL RELEVANCE

### OUR MISSION

#### FOSTER PERVASIVE INTELLIGENCE

Contribute to **Portuguese companies and institutions' competitiveness and internationalisation**

### OUR MISSION

#### EXCEL IN RESEARCH

To be **socially relevant** and **internationally influential**

### OUR VISION

#### RELEVANT PLAYER

To be a relevant international player in science and technology in the domains of **Networked Intelligent Systems**, **Power and Energy**, **Industrial and Systems Engineering** and **Computer Science**

**Private non-profit association dedicated to Research and Technological Development (RTD) in Digital Technologies and Robotics**



# ALLIANCES FOR EXCELLENCE

## A SYNERGISTIC RELATIONSHIP

ASSOCIATE LABORATORY

**FCT** Fundação  
para a Ciência  
e a Tecnologia



Centro Interface

RECOGNISED BY THE MINISTRY OF ECONOMY

### ASSOCIATE INSTITUTIONS

**U.PORTO**

**P.PORTO**

 inesc



Universidade do Minho

**utad** UNIVERSIDADE  
DE TRÁS-OS-MONTES  
E ALTO DOURO

 **ipb** INSTITUTO POLITÉCNICO  
DE BRAGANÇA

UNIVERSIDADE  
**AbERTA**   
www.uab.pt

### PARTNERSHIPS WITH INTERNATIONAL UNIVERSITIES

 **UTAustin**  
Portugal

Carnegie Mellon  
Portugal 

**MIT** Portugal

# A TALENT INCUBATOR

## CHOOSING PEOPLE AS THE DRIVING FORCE

---

**+800**

INTEGRATED  
RESEARCHERS

---

**+350**

INTEGRATED  
PHDS

---

**+25**

NATIONALITIES

---

**+200**

PEOPLE GOING TO  
THE MARKET/YEAR

Our researchers constitute the foundations of our strategy. INESC TEC is one of the **leading Portuguese organisations in scientific employment.**

INESC TEC is also a **hub of talent**, with more than 200 professionals from 18 countries transferred to market per year.

# MULTIFACETED TEAMS

## GROWING IN EXCELLENCE

6

SITES

3

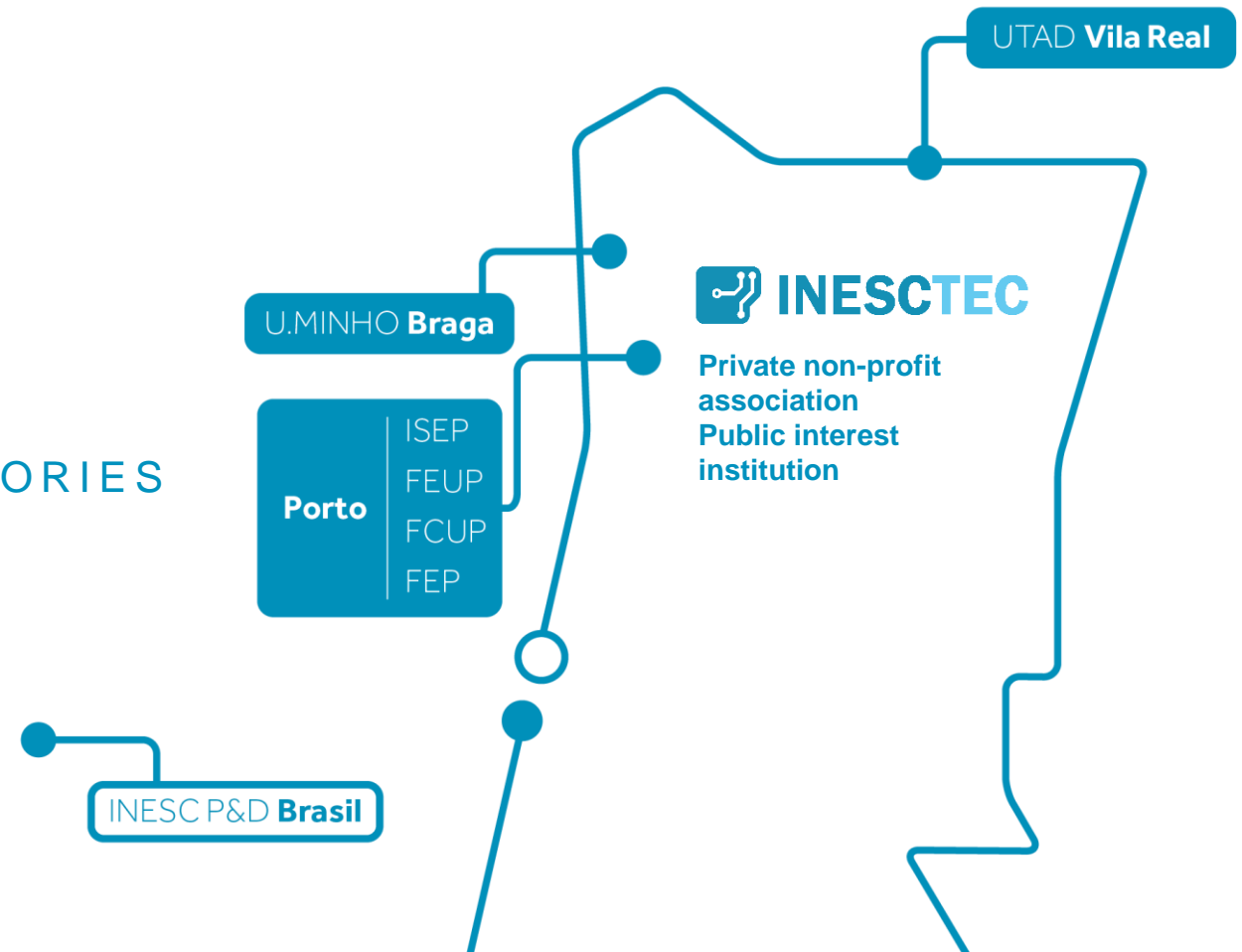
CITIES

19

LABORATORIES

### A mirror organisation

INESC P&D Brasil coordinates the joint work of research groups within its associates (belonging to 18 top Brazilian universities and INESC TEC).



# A MULTIDISCIPLINARY ENVIRONMENT

## COMPETENCIES ORGANISED IN SCIENTIFIC DOMAINS TO MAXIMISE SYNERGIES



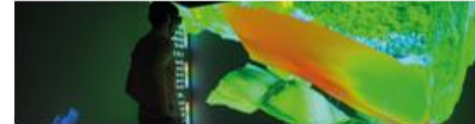
### NETWORKED INTELLIGENT SYSTEMS

- Applied Photonics
- Biomedical Engineering Research
- Robotics and Autonomous Systems
- Telecommunications and Multimedia



### POWER AND ENERGY

- Power and Energy Systems



### COMPUTER SCIENCE

- Advanced Computing Systems
- Artificial Intelligence and Decision Support
- High-Assurance Software
- Human-Centered Computing and Information Science



### INDUSTRIAL AND SYSTEMS ENGINEERING

- Enterprise Systems Engineering
- Industrial Engineering Management
- Innovation, Technology and Entrepreneurship
- Robotics in Industry and Intelligent Systems



# A MARKET-BASED APPROACH

## TEC4s TO ADDRESS REAL WORLD CHALLENGES (MAIN MARKETS)



— TEC4  
— **AGRO-FOOD**

Co-creating the digital (r)evolution in agro-food and forestry



— TEC4  
— **ENERGY**

Decarbonisation and digitalisation of the energy sector



— TEC4  
— **HEALTH**

User-centred ICTs to improve health care and personal wellbeing



— TEC4  
— **INDUSTRY**

Foster transformation for an innovative, collaborative, human-centred, digital and sustainable industry



— TEC4  
— **SEA**

Bringing the autonomous and digital worlds to a sustainable sea economy

INESC TEC

**TEC4AGRO-FOOD**

# TEC4AGRO-FOOD



## INESC TEC's Initiative for Agro-food and Forestry

Co-creating the digital (r)evolution  
in agro-food and forestry





# TEC4AGRO-FOOD

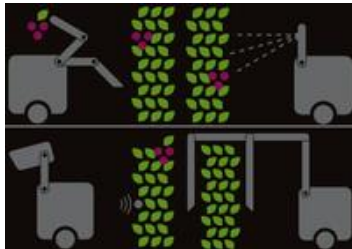
## Competencies

- **Robotics**; Automation
- Operations Management; Logistics
- Supply and Collaborative Networks
- Innovation and Technology Management
- Business Intelligence
- Decision Support Systems
- **Artificial Intelligence**; Data Science; Machine Learning
- **Big Data**
- Digital Twins

- Geospatial Information Systems/Spatial Data Infrastructures (SDI)
- Virtual Environments
- Software for Critical Systems; IT Security
- **Internet of Things (IoT)**
- Image Processing and Analysis
- Communication Networks
- **Smart Photonics**
- Smart Energy Systems

# TEC4AGRO-FOOD Resources

Laboratory of Robotics and IoT  
for Smart Precision Agriculture  
and Forestry  
(FEUP *Campus*)



Laboratory of Computer Graphics  
and Virtual Environments  
(FEUP and UTAD *Campi*)



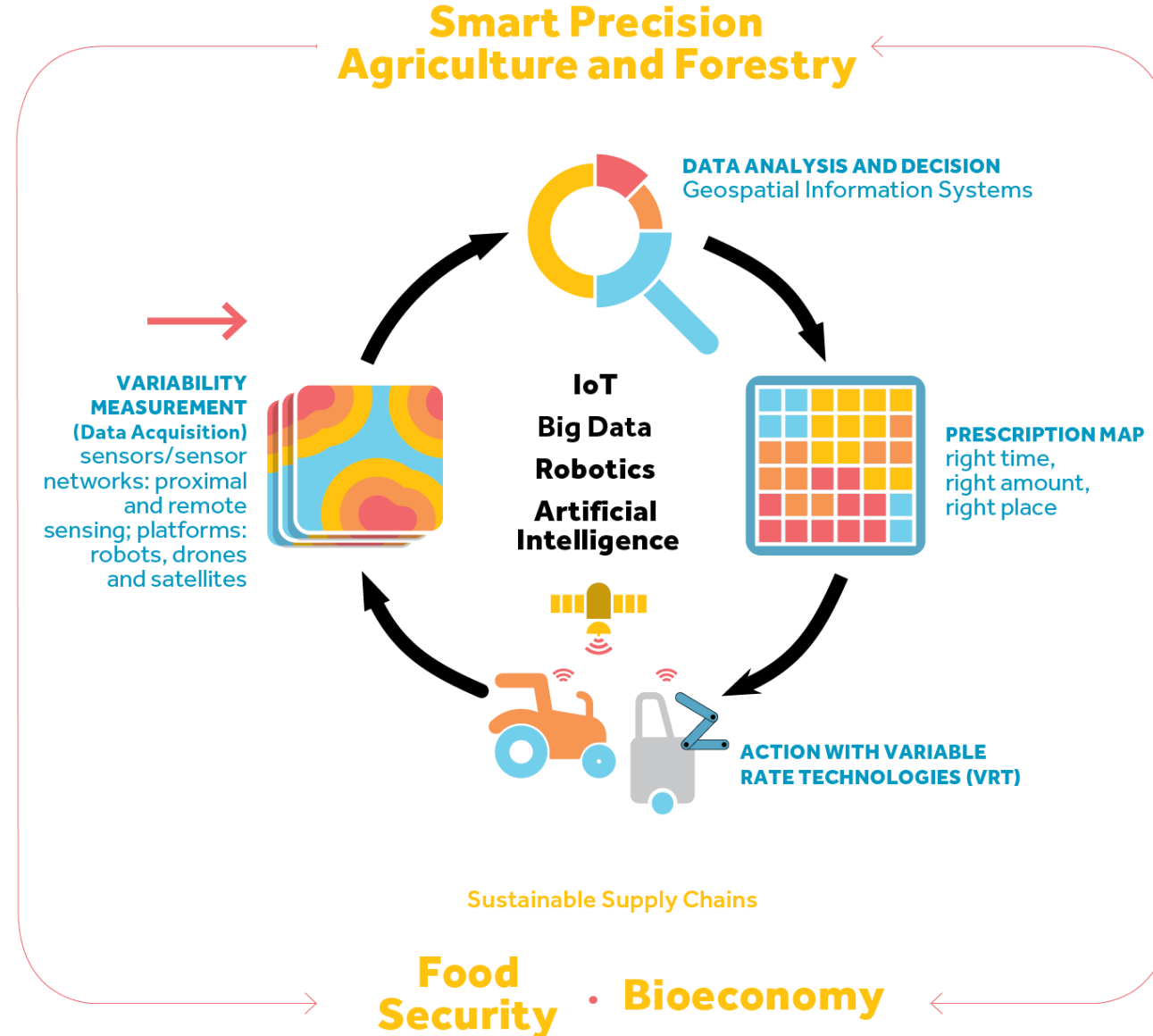
Optical Sensors Lab  
(FCUP)



Laboratory of Smart  
Grids and Electric  
Vehicles  
(INESC TEC Building,  
FEUP *Campus*)

Optical and Electronic  
Technologies Research  
Laboratory  
(INESC TEC Building, FEUP  
*Campus*)

# TEC4AGRO-FOOD Application Areas

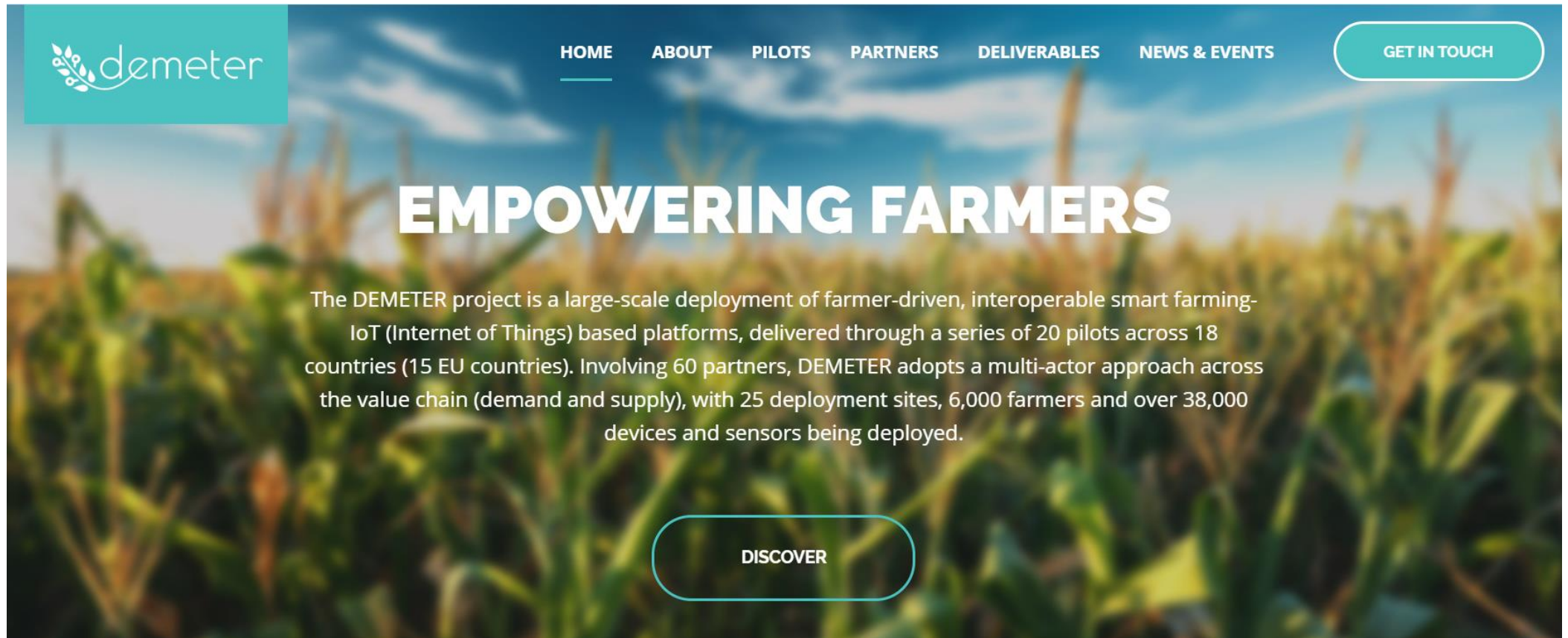


# TEC4AGRO-FOOD

## Experience (e.g.) - H2020; Smart Precision Agriculture



**DEMETER - Building an Interoperable, Data-Driven, Innovative and Sustainable European Agri-Food Sector** [h2020-demeter.eu/](https://h2020-demeter.eu/)





# TEC4AGRO-FOOD

**Experience (e.g.)** - H2020; Smart Precision Agriculture and Forestry and Food Security



**agROBOfood - Business-Oriented Support to the European Robotics and Agri-food Sector, towards a network of Digital Innovation Hubs in Robotics** [agrobofood.eu/](https://agrobofood.eu/)





# TEC4AGRO-FOOD

## Experience (e.g.) - H2020; Smart Precision Agriculture and Food Security



### NOVATERRA - Integrated Novel Strategies for Reducing the Use and Impact of Pesticides, Towards Sustainable Mediterranean Vineyards and Olive Groves

<https://www.novaterraproject.eu/>



English

[About](#) [Team](#) [News](#) [Press](#) [Stakeholders](#) [Deliverables](#) [Contact](#) [Search](#)

Reducing the negative impact of pesticides through innovation in Mediterranean olive groves and vineyards.




# TEC4AGRO-FOOD

## Experience (e.g.) - H2020; Smart Precision Agriculture and Food Security




### SCORPION - Cost effective robots for smart precision spraying <https://scorpion-h2020.eu/>

SCORPION

[Home](#) [About](#) [Integration Days](#) [Partners](#) [Resources](#) [News & Events](#) [SUBSCRIBE TO NEWSLETTER](#)

#### OBJECTIVE

Spraying in agriculture represents a societal challenge due to its negative impact in human and animal health and in environment. SCORPION's objective is to develop a safe and autonomous precision spraying tool integrated into a modular unmanned tractor (robotics platform) to increase spraying efficiency, while reducing human and animal exposure to pesticides, water usage and labour costs. The project will focus on steep slope vineyards but with impact in other high-value permanent crops (olive groves and fruticulture). SCORPION' will consider Global Navigation Satellite System (EGNSS) receiver (triple frequency, PPP, OS-NMA, HAS) fused with other sensors, to increase the solution reliability, accuracy and safeness, and to enable autonomous ultraviolet light treatments (to eliminate partial need of phytopharmaceuticals) and to allow high precision spraying in permanent crops.



#### Project started

Start date  
1 January 2021

End date  
31 December 2023

Funded Under  
H2020-EU.2.1.6.3.

Overall budget  
€ 2 501 104,83

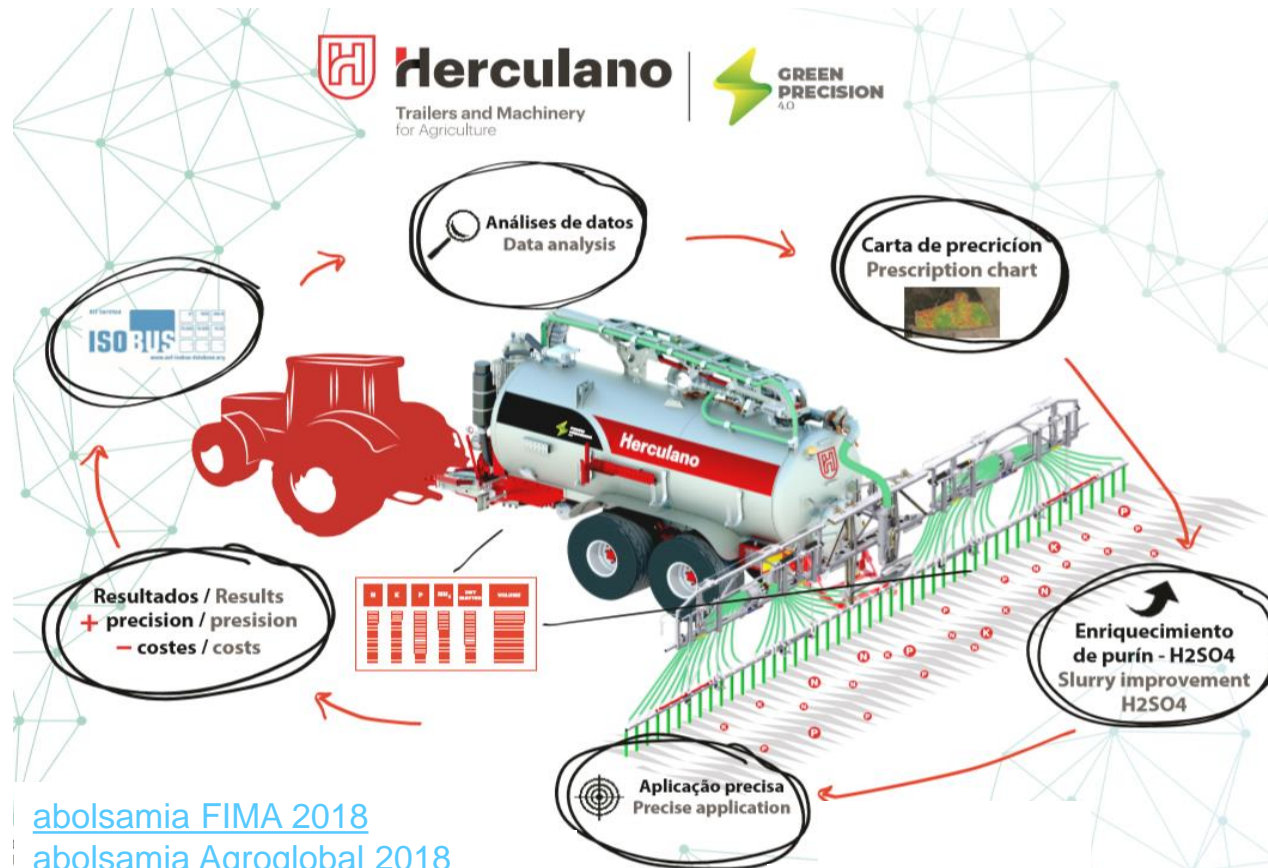
Coordination  
INESC TEC, Portugal

# TEC4AGRO-FOOD

## Experience (e.g.) - Direct Contract; Smart Precision Agriculture



### SMART FERTILIZERS - Tank for precision fertilization in the context of agriculture 4.0



#### Características: / Features:

Sensor NIR (Near Infrared Reflection Spectra) análisis composición del purín  
NIR sensor (Near Infrared Reflection Spectra) slurry composition analysis

ECU (calculador de datos) / ECU (data calculator)

Brazo superior multidireccional / Multidirectional upper arm

Tajadera eléctrica / Electric valve

Caudalímetro y sistema de caudal proporcional al avance (DPA)  
Flowmeter and flow system proportional to the advance (DPA)

Medición de velocidad y sentido de movimiento por GPS  
Speed measurement and direction of movement by GPS

Enriquecimiento de purín por H<sub>2</sub>SO<sub>4</sub> / Slurry enrichment by H<sub>2</sub>SO<sub>4</sub>

Suspensión hidráulica / Hydraulic suspension

Frenos mistos / Mixt Brakes

Agitador Interno / Internal Hydraulic mixer

Made by



Powered by





# TEC4AGRO-FOOD Experience (e.g.) - POCTEP; Smart Precision Forestry and Bioeconomy



**BIOTECFOR - Biobusinesses and Technology for efficient valorisation of endogenous forestry resources in the North of Portugal and Galiza** [biotecfor.com/](http://biotecfor.com/)

## FLORESTA MOTOR DA BIOECONOMIA

A bioeconomia reúne setores como a agricultura, silvicultura, pesca, alimentar, produtos químicos, materiais biológicos, têxteis e bioenergia que produzem, processam e reutilizam recursos biológicos renováveis e seus resíduos convertendo-os em produtos de alto valor acrescentado. A investigação e a inovação na gestão florestal através do melhoramento genético, novos modelos silvícolas e processos de recolha e aproveitamento dos recursos florestais abrem oportunidade para o setor florestal se tornar um pilar fundamental da bioeconomia da Europa. Uma nova geração de soluções produzidas a partir da madeira estão a surgir, tais como, produtos químicos, alimentos, bioplásticos, materiais compósitos, produtos farmacêuticos, têxteis, produtos de construção e bioenergia.

## FOREST MOTOR OF THE BIOECONOMY

The bioeconomy brings together sectors such as agriculture, forestry, fishery, food, chemical products, biological materials, textiles and bioenergy that produce, process and reuse renewable biological resources and their waste converting them into products with high added value. Research and innovation in forest management through genetic improvement, new forestry models and processes for collecting and harnessing forest resources opens the opportunity for the forestry sector to become a cornerstone of Europe's bioeconomy. A new generation of solutions produced from wood are emerging, such as, chemicals, food, bioplastics, composites, pharmaceuticals, textiles, construction products and bioenergy.



## NOVAS CADEIAS DE VALOR E MATERIAIS PARA NOVOS MERCADOS

### NEW VALUE CHAINS AND MATERIALS FOR NEW MARKETS

INOVAÇÃO NA RECOLHA  
E PROCESSAMENTO DOS RECURSOS FLORESTAIS  
INNOVATION IN THE COLLECTION  
AND PROCESSING OF FOREST RESOURCES

APLICAÇÃO DE SISTEMAS ROBÓTICOS  
INTELIGENTES  
APPLICATION OF INTELLIGENT  
ROBOTIC SYSTEMS

NOVOS MATERIAIS  
PARA NOVAS APLICAÇÕES  
NEW MATERIALS  
FOR NEW APPLICATIONS



**FLORESTA RECURSO  
QUE SE RENOVA**  
FOREST RESOURCE  
THAT RENEWS ITSELF

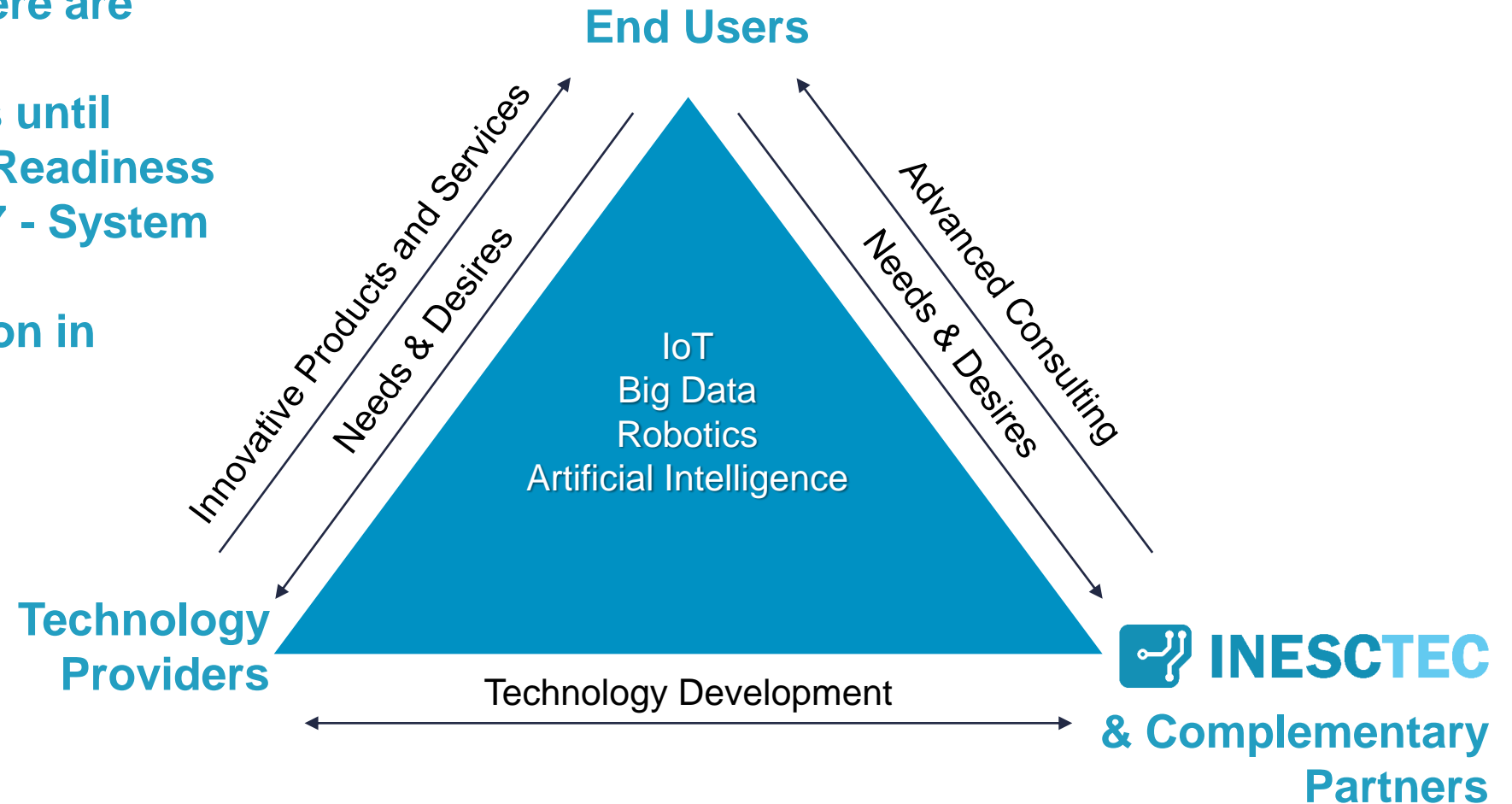


# TEC4AGRO-FOOD

## INESC TEC's Positioning - "Innovation Triangle"



Typically (there are exceptions), technologies until Technology Readiness Level (TRL) 7 - System Prototype Demonstration in Operational Environment



# TEC4AGRO-FOOD Partnerships



instituto nacional de  
investigação agrícola e veterinária



[Smart Specialisation Regional  
Platform Food and Environmental  
Systems \(CCDR-N\)](#)



Centro Nacional de Competências  
para as Alterações Climáticas do  
Sector Agroflorestal



forestwise



# TEC4AGRO-FOOD

## Forms of Collaboration

- Direct Contract.
- Horizon Europe.
- Partnership for Research and Innovation in the Mediterranean Area (PRIMA).
- European Research Area Networks (ERA-NETs).
- European Territorial Cooperation Operational Programmes (POCTEP; SUDOE; Interreg Europe; ...).
- Portugal 2030 (PT2030).
- Rural Development Programme 2030.
- ...

Note: possibility for partners to take advantage of INESC TEC's Funding Opportunities Office, Technology Licensing Office and International Relations Office.

**INESC TEC**

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Portugal

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