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Accelerating innovation on Agricultural Robotics and AI

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"innovating with businesses"

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Centre Tecnològic de Catalunya

Climate Change = Uncertainty

Sudden change of climate conditions and global warming introduce uncertainty in decision making for crop management
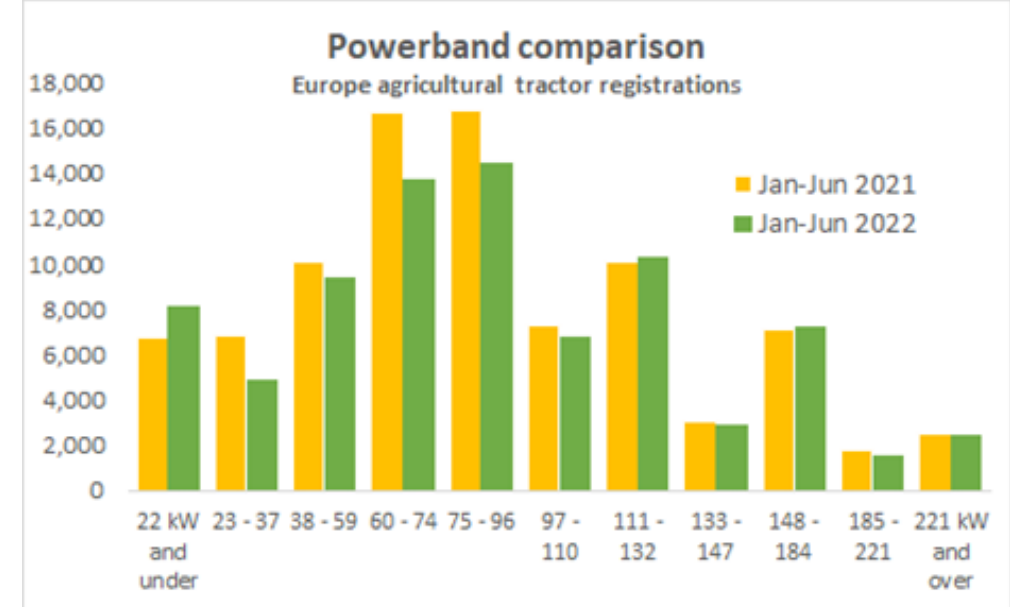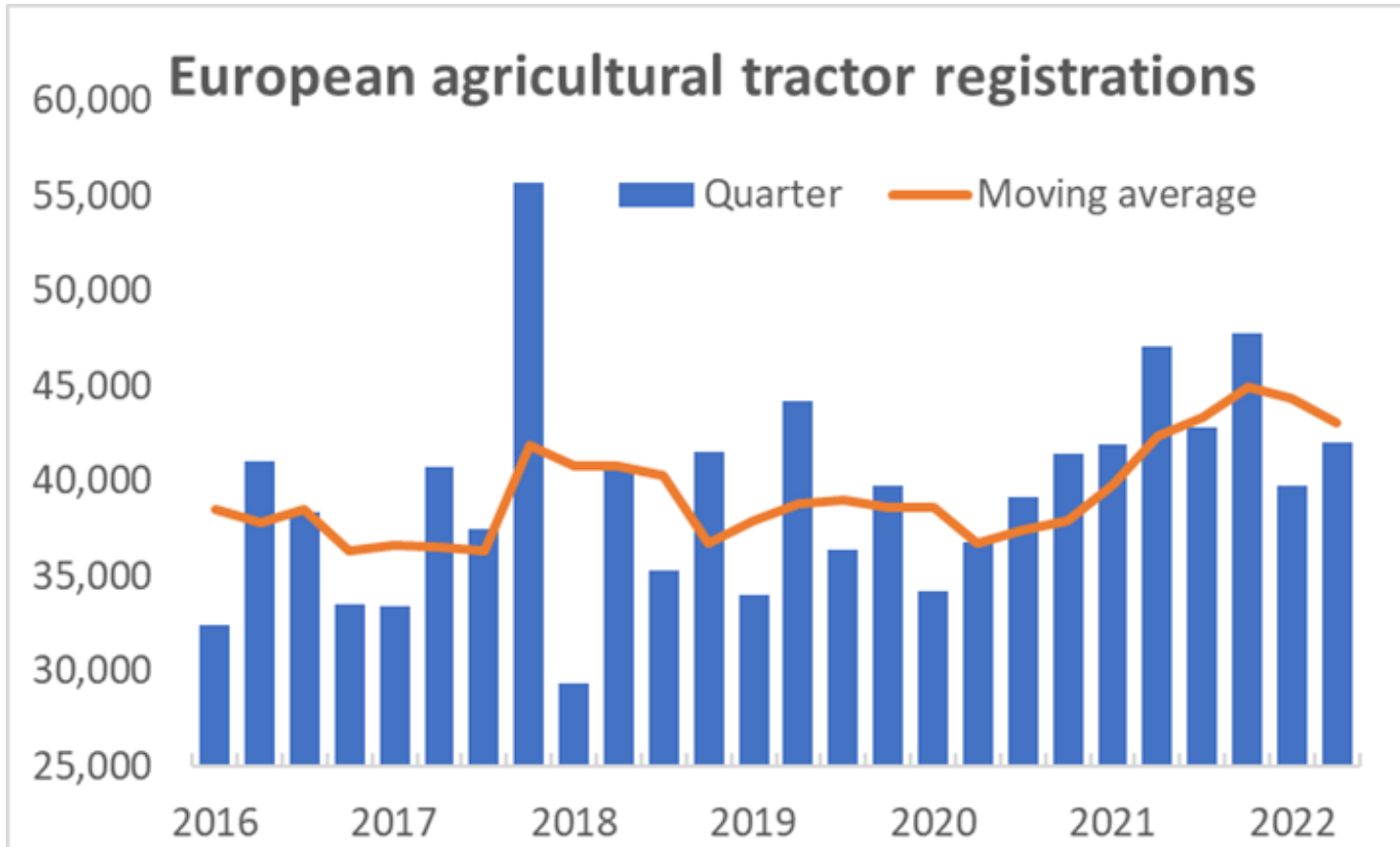
ROBOTICS = Control and Traceability

Empowering farmers and consumers thanks to automation of tasks.

Better use of resources

© picture-alliance/dpa/M. Skolimowska

Tractor registrations in 2022
Macrotrends

European agricultural tractor registrations

Powerband comparison
Europe agricultural tractor registrations

European Agricultural Machinery, CEMA press release 2022
https://www.cema-agri.org/images/publications/press_releases/2022-09-22-CEMA_Economic_PR_Tractor_Registrations_6M-2022.pdf

Boosting the adoption of robotic technologies in the European agri-food sector

Partners

Industry 4.0 in Agriculture
Porter & Heppelmann (HBR, 2014)
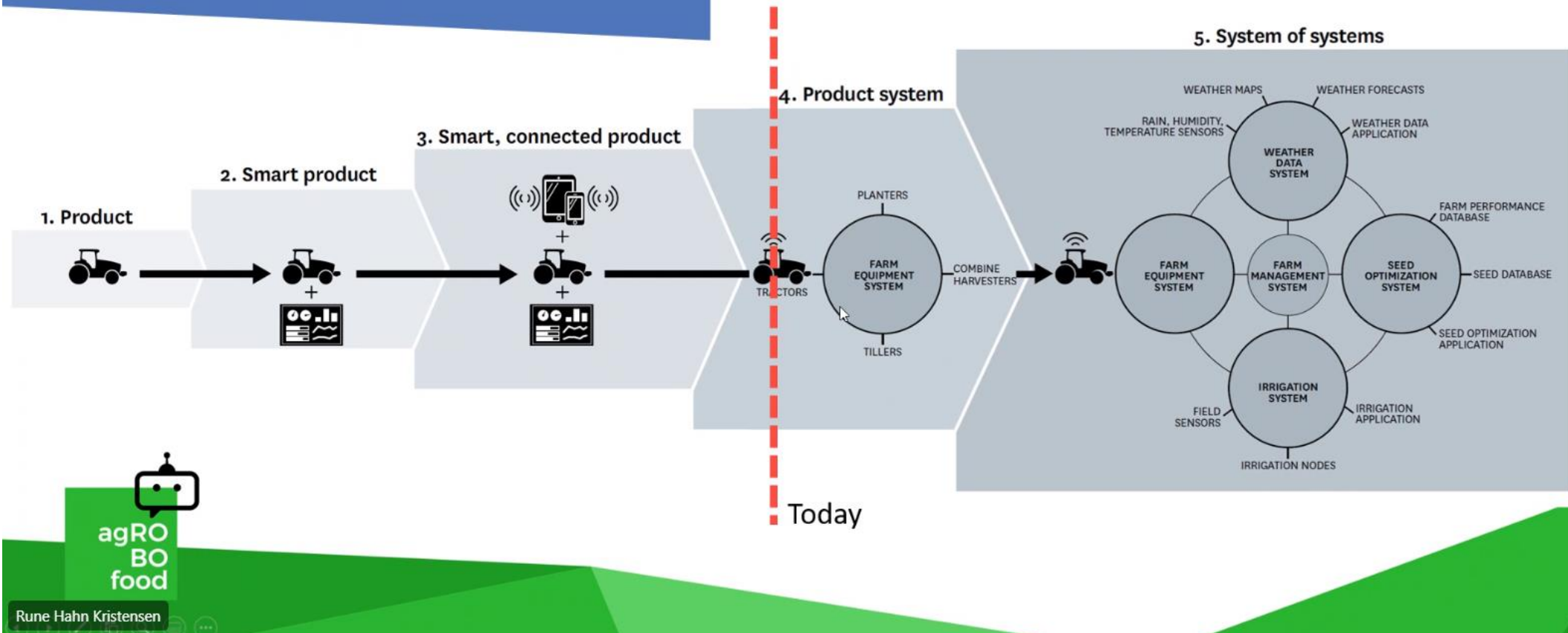
agROBOfood vision (regional emphasis)

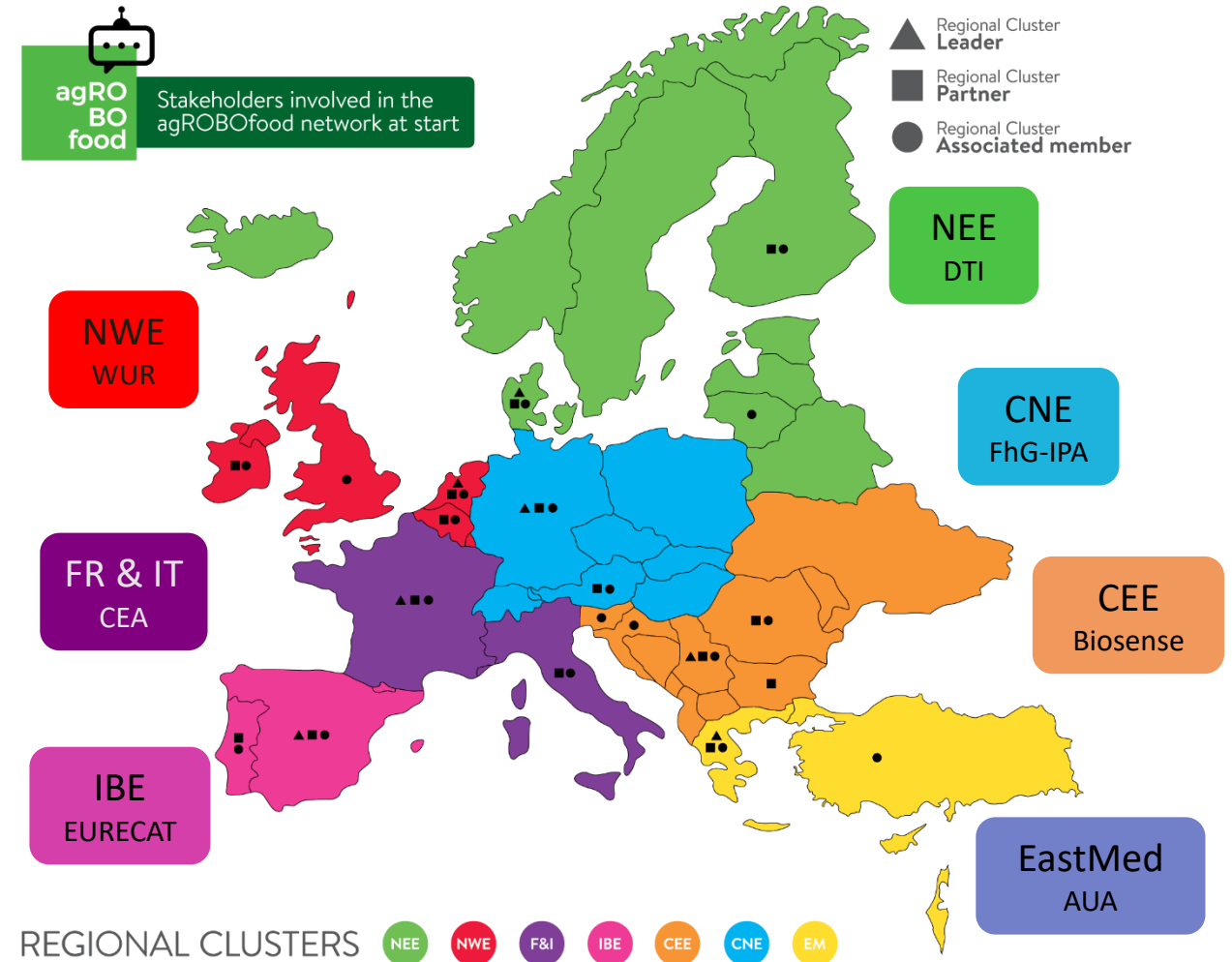Establish and expand a pan-European network of Digital Innovation Hubs /Competence Centers that:

- will stimulate development and implementation of **robotic concepts** for **agri-food sector**
- will demonstrate their **applicability** under practical circumstances

7 agROBOfood Regional Clusters

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Network snapshot

agROBOfood network benefits from
the agROBOfood project

110 SMEs supported

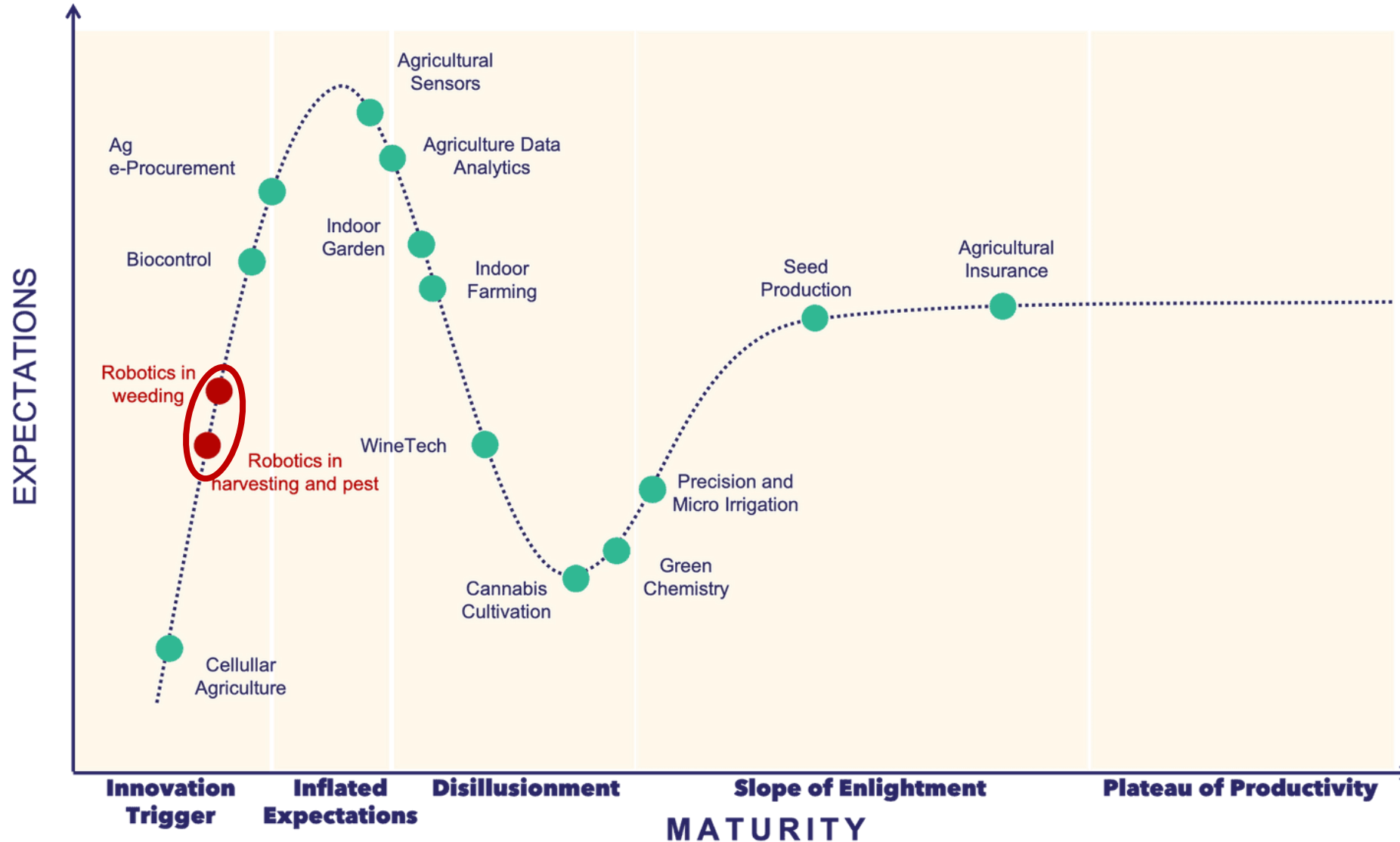**92** DIHs and CCs

27 Innovation Experiments

3 Pitch your Robot events

Challenges and Opportunities: Cost-Price // Business Model // Robustness // Usability// Connectivity // Interoperability // Maintenance

All images are the property of their respective owners

Gartner Hype Cycle (Trademark) for Agtech Source: Capagro

GUSS Automation marks sale of 100th autonomous orchard sprayer

SEPTEMBER 2, 2021 BY DAVID EDWARDS — LEAVE A COMMENT

International view   Manufacturers   News

Kubota acquires Spanish sprayer maker, Pulverizadores Fede

7th November 2021   webmaster   Kubota, sprayers

- Kubota Holdings Europe BV based at Nieuw-Vennep, Netherlands, has acquired 100% of Spanish sprayer maker Pulverizadores Fede, a manufacturer and distributor of air blast sprayers and mist blowers for speciality applications including vineyards, orchards, citrus fruits and vegetables
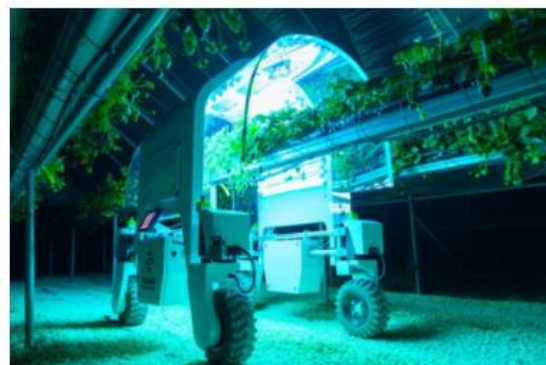
Blue White Robotics Announces $37M Series B Funding Led by Insight Partners to Revolutionize Autonomous Farming

Blue White Robotics positioned as a global leader in "Robots-as-a-Service" (RaaS) with its autonomous farm platform

Naïo Technologies raises 33 million USD to accelerate its industrial and commercial growth

DEC 8TH 2022

Saga Robotics raises $11m to develop robo-strawberry pickers

September 2, 2020   Richard Martyn-Hemphill

Saga Robotics, a UK and Norwegian startup developing fleets of autonomous strawberry pickers and agri-robots that blast fungus with UV light, has just raised €9.5 million ($11.3 million).

One of Saga's automous vehicles performing light treatment on strawberries. Photo credit: Saga Robotics

The funding round saw participation from three major European investors: Norwegian sovereign climate

Le 16/03/2023

The World's First Hydrogen-Fueled Vineyard Tractor is Here

TRAXX Concept H2 from EXXACT Robotics runs on a zero-emission alternative to gas and diesel—without sacrificing work efficiency or performance.

John Deere acquires Silicon Valley robotics firm for $250m

Posted on 10 Aug 2021 by James Devonshire

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Precision Decisions | Harper Adams University | AGRIEPICENTRE — Engineering · Precision · Innovation

Automated machines growing the first arable crop remotely, without operators in the driving seats or agronomists on the ground.

HandsFree Hectare

2016

HandsFree Farm

2019

Hands Free Hectare broadens out to 35-hectare farm

Posted 22 May 2019

"This time, we're planning to grow three different combinable crops across 35 hectares. We're moving past the feasibility study which the hectare provided us with, to now a vision of the future of farming."

HANDS FREE HECTARE

www.handsfreehectare.co.uk

HandsFree Farm

35 Ha — Hands free Farm Yard, Poors land 6.3 Ha, Near Moor 12.6 Ha, Middle Moor 10 Ha, Blue Pits 1.7 Ha, Top Adney HFE 4 Ha

1 Ha

Precision Decisions | Harper Adams University | FARMSCAN AG | AGRIEPICENTRE — Engineering · Precision · Innovation

Digitale Experimentierfelder

Mit den digitalen Experimentierfeldern fördert das BMEL die Digitalisierung in der Landwirtschaft.

- Pflanzenbau
- Tierhaltung
- Bereichsübergreifend

Some of the facilities in that network:

— **Landnetz** - Technical University of Dresden (coordinator) - **Topic**: Comprehensive communication and cloud networks for agriculture 4.0 and rural areas

— **EXPRESS** - **Leipzig University** (**coordinator**) - Topic : **EXP** erimentation field for data- **driven** networking and **digitization** in **agriculture**

— **Agro-Nordwest** - Agrotech Valley Forum (coordinator) - **Topic**: Project for cross-manufacturer practice-oriented further development of digital farming solutions in crop production

— **orderSH**- Research and development center Fachhochschule Kiel GmbH (coordinator) - **Topic**: Management and material flow management - networked agriculture in Schleswig-Holstein

— **Diabek** - Weihenstephan-Triesdorf University of Applied Sciences - **Topic**: Applying, evaluating and communicating digitization - Cooperation between family-oriented arable farms and practical educational institutions

— **Digimilch** - Bavarian State Institute for Agriculture (Coordinator) - **Topic**: Digitization in milk production - demonstration, testing and evaluation of new digital products and services along the agricultural milk production chain
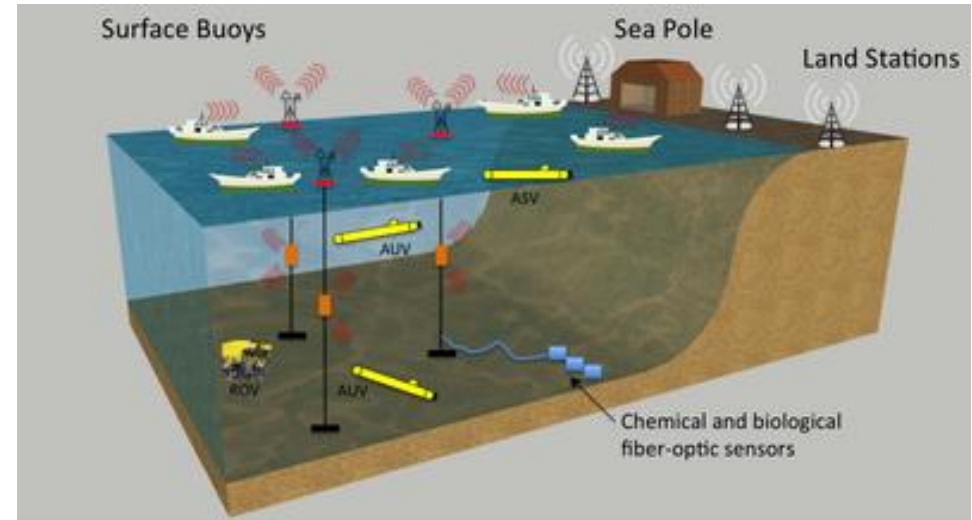
www.bmel.de/DE/themen/digitalisierung/digitale-experimentierfelder.html

Services

Research Infrastructure Usage

Access to the Optical and Electronic Technologies laboratory

Supervised access to equipment that enables:

- S parameter characterization of optoelectronic devices up to 20 GHz and electronic devices
- Bit error rate testing up to 13 Gbps;
- Modulation / demodulation of RF signals using digital/analog modulations;
- Modulation and detection of optical signals;
- Antenna characterization;
- Access to numerical simulation software Matlab;
- Access to electromagnetic simulation software COMSOL Multiphysics;
- Laboratory monitoring and support

Access Conditions

TEC4SEA is open to the entire scientific and enterprise community, with a free-access policy for researchers affiliated with the research units that assure its maintenance and sustainability.

The access from external entities to the Research Infrastructure facilities and resources is ruled by the following conditions:

- Mandatory submission of a work plan, including the scientific objectives to be achieved, a summary of intended activities, the associated team and the resources and logistics requested;
- The work plan should be evaluated by a scientific panel of recognized merit which approves and ranks the requests by order of priority, starting a budgeting and clarification process;
- The acceptance of the work plan, duties and responsibilities of the involved parties is ensured by the formalization of a written contract;
- All journal and conference publications that used the Research Infrastructure must acknowledge that fact with the following text: "This work was carried out with the support of the TEC4SEA research infrastructure" and the Research Infrastructure website link;
- All the costs associated with the research team stay as well as any legal processes and bureaucracies associated are their own responsibility;
- TEC4SEA reserves the right to revoke the contract in case of major prejudice or disturbances to public order;
- All the cases outside of the cases described behind (e.g., equipment renting, testing specific equipment, technical and advanced training) will be handled by the Research Infrastructure operational team on a case by case basis.

Testing and Experimental Facilities and more

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The European Testing and Experimentation Facilities for Agrifood Innovation

Sectors

We focus on five impact sectors and propose tailor-made services for the testing and validation of AI-based and robotic solutions in the agri-food sector.

Arable farming
For the Arable sector, AgrifoodTEF will propose services for testing and validation of robotic, selective weeding and geofencing technologies to enhance autonomous driving vehicle performances and therefore decrease farmers' reliance on traditional agricultural inputs.

Tree crops
For the Tree Crop sector, AgrifoodTEF will propose services for testing and validation of AI solutions supporting optimisation of natural resources and inputs (fertilisers, pesticides, water) for Mediterranean crops (Vineyards, Fruit orchards, Olive groves).

Horticulture
For the Horticulture sector, AgrifoodTEF will propose services for testing and validation of AI-based solutions helping to strike the right balance of nutrients while ensuring the crop and yield quality.

Livestock farming
For the Livestock sector, AgrifoodTEF will propose services for testing and validation of AI-based livestock management applications and organic feed production improving the sustainability of cows, pigs and poultry farming.

Food processing
For the Food Processing sector, AgrifoodTEF will propose services for testing and validation of standardised data models and self-sovereign data exchange technologies, providing enhanced traceability in the production and supply chains.

Node leaders

The consortium of partners, coordinated by Raffaele Giaffreda, is composed of some of the major European players in the field of digital innovation applied to the agrifood industry.

Organized in three national nodes (Italy, Germany, France) and 4 satellite nodes (Poland, Belgium, Sweden and Austria), it offers its services to companies and developers from all over Europe who want to validate their robotics and artificial intelligence solutions for agribusiness under real-life conditions of use, speeding their transition to the market.

Raffaele Giaffreda
Italy

Stefan Stiene
Germany

Agnès Delaborde
France

Kees Lokhorst
The Netherlands

Jürgen Vangeyte
Belgium

Lukasz Lowinski
Poland

Jonas Engström
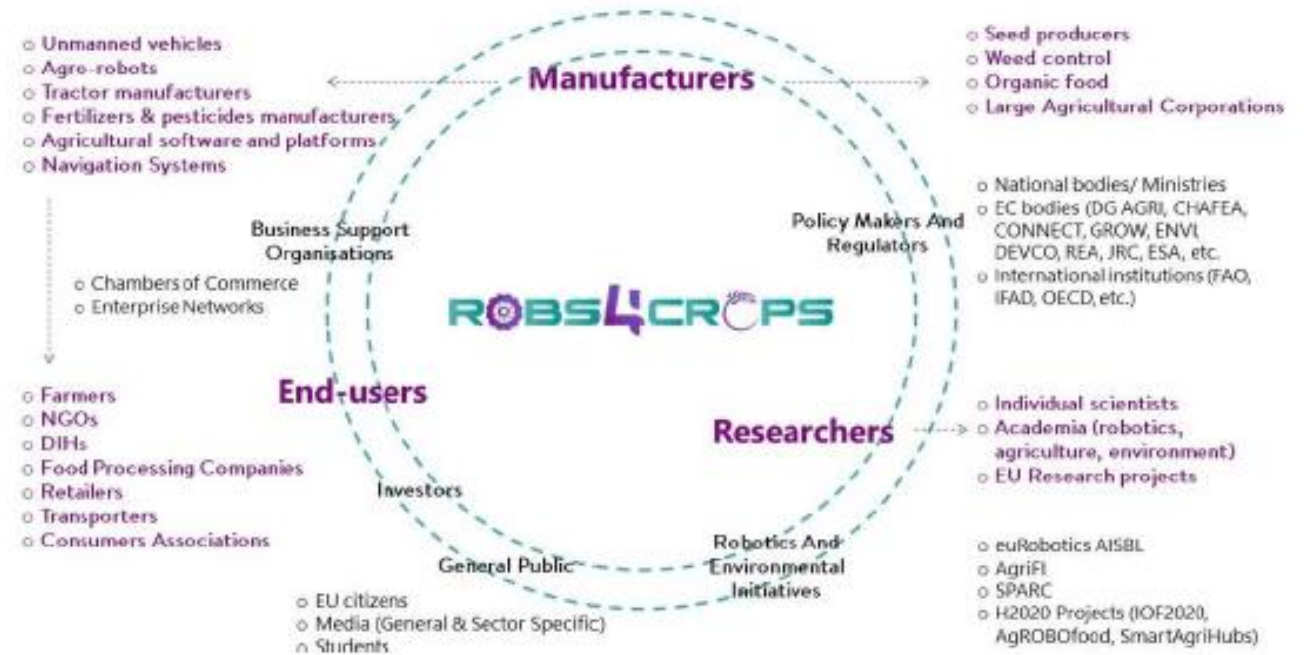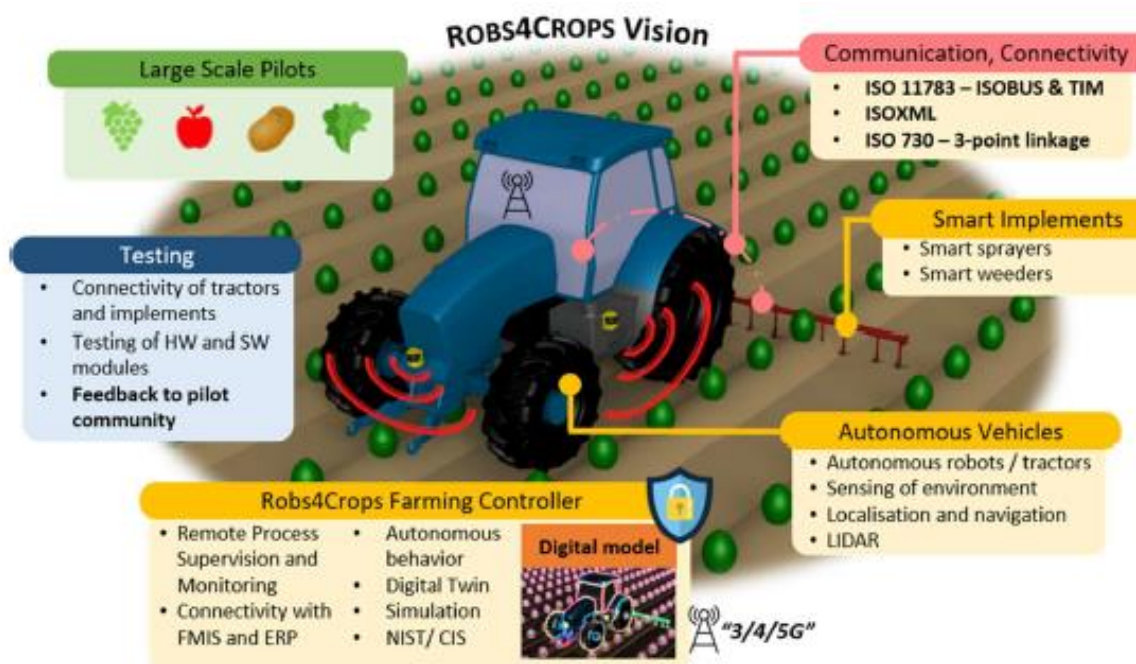Sweden

Heinrich Prankl
Austria

www.agrifoodtef.eu

Large scale pilots participated by Eurecat

European Projects from 2021 to 2026

Robots for protecting crops

Use existing standards: 3-point hitch, ISOBUS, Tractors, Implements, FMIS/ERP
Improving SoA: Robust autonomous navigation, fault detection and graceful termination, safety, configurability, perform complete task

Non-technical aims: Socio-economic impact understood, workers trained in robotics, insurance and financing available, suitable business models, ethical questions answered, implications of regulations are clear

https://robs4crops.eu

Robotti (AgroIntelli)

Ceol (AGreenCulture)

Retrofitted tractor

SPAIN   FRANCE   THE NETHERLANDS   GREECE

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Large scale pilots participated by Eurecat

European Projects from 2021 to 2026

scorpion-h2020.eu

SCORPION

Cost effective robots for smart precision spraying

Commom approaches for spraying have more than of 80% of losses

Technical aims:
- Autonomous navigation and localization with EGNSS
- Novel Sprayer with VRT and novel sensors (fed by Copernicus data)
- Safety
- Modularity, Multifunctionality

II Integration hosted by INNOVI –25th May 2022

Click HERE to see video

Objective: To enhance the application of phytosanitary products in agriculture for resource optimization and waste minimization through the implementation of robotic systems, artificial intelligence (AI), and Digital Twin technology.

Technologies under development:

- Data exchange between robots and Digital Twin.
- Navigation planning based on sensors data and Digital Tw inputs.
- Autonomous spraying based on AI models recommendations.

Pilots in different types of crops:

- Spain (apple orchards)
- Lithuania (wheat)

https://smartdroplets.eu/
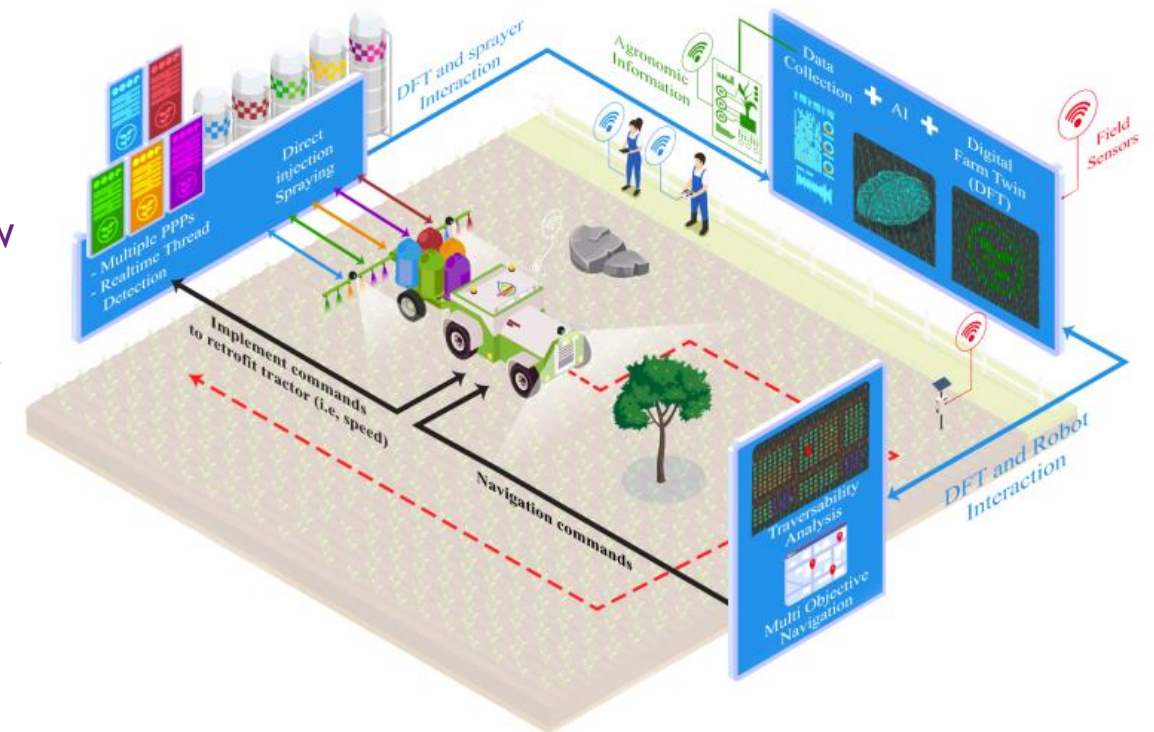
Proximity and trust

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We stay **close to our clients and their challenges** through our broad regional deployment in Catalonia.

11
Work centres
all over Catalonia

Girona
Advanced materials
New manufacturing processes
🔗 | **University of Girona**

Lleida
Expert management systems
Agritech
🔗 | **University of Lleida**

Manresa
Sustainability
Advanced materials
🔗 |**Polytechnic University of Catalonia**

Canet
Functional textiles

Cerdanyola
Robotics
Advanced materials
New manufacturing processes
Industry 4.0
🔗 | **Autonomous University of Barcelona**

Mataró
Functional textiles
Functional printing
Printed electronics
🔗 | **UPF**

Reus
Nutrition and health
Omic sciences
🔗 | **Rovira i Virgili University**

Tarragona
Chemistry
🔗 | **Rovira i Virgili University**

Barcelona
Big data & data science
eHealth
IT security
Audiovisual technology
Big Data CoE
🔗 | **Pompeu Fabra University + Polytechnic University of Catalonia**

Vila-Seca
Tourism
Innovation and tourism CoE
🔗 | **Rovira i Virgili University**

Amposta
Advanced materials

DIH4CAT-

El **Digital Innovation Hub de Catalunya**, és un ecosistema d'innovació regional, sense ànim de lucre, coordinat amb els principals agents de suport a la digitalització a Catalunya, i orientat a satisfer els reptes de la indústria (i en especial de les pimes) i administracions públiques a través de la **testeig de tecnologies digitals avançades,** com a pas previ a la implantació.

7 Technology Areas: Digital Innovation Nodes
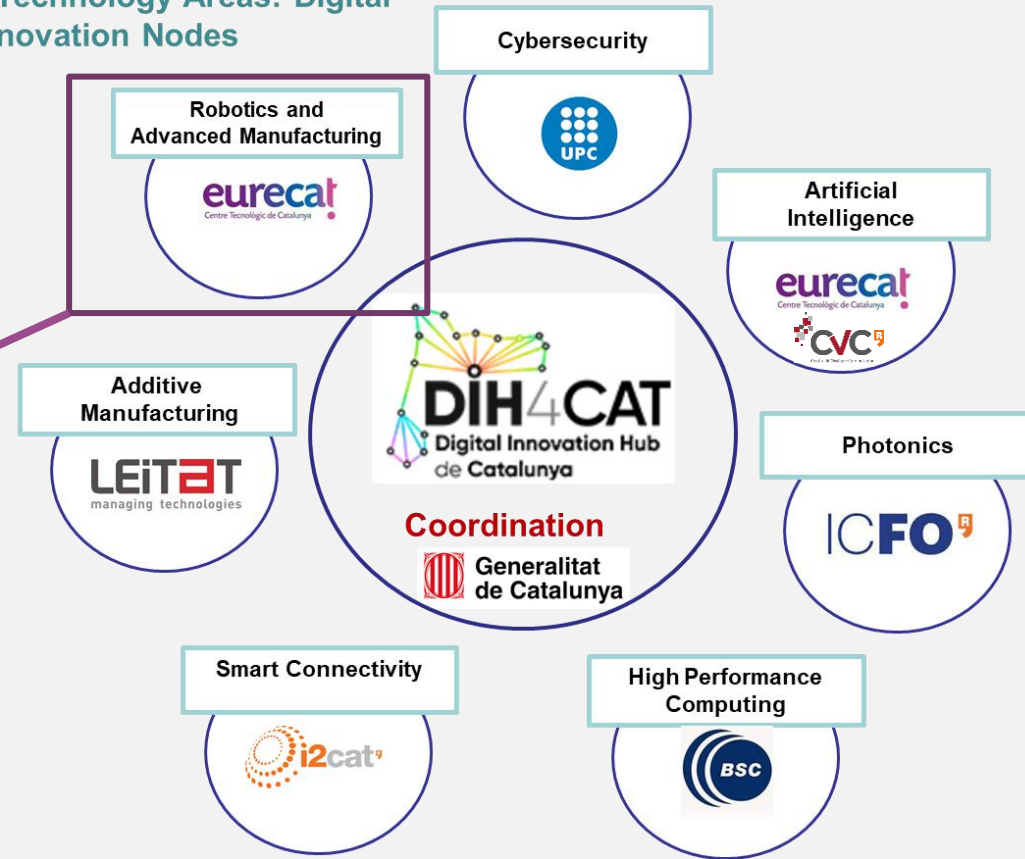
Coordinator: eurecat
Centre Tecnològic de Catalunya

Partners:

Serveis oferts pel DIH4CAT

Diagnòstics tecnològics de maduresa digital i consultoria tecnològica

Testeig i l'experimentació amb ús d'infraestructures

Formació tecnològica

Desenvolupament de negoci i Innovació oberta

Assessorament en finançament

Ecosistema i connexió

Oficina Tècnica

We make it work!