AGRO4AGRI

FOSTERING THE ADVANCED USE OF AGROCHEMICALS FOR A SUSTAINABLE AGRICULTURE

General overview of the project

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Health and Digital Executive Agency (HADEA). Neither the European Union nor the granting authority can be held responsible for them.

1 INTRODUCTION TO AGRO4AGRI

What is AGRO4AGRI?

AGRO4AGRI is an EU-funded project set to **revolutionise plant nutrition and protection** through cutting-edge nano and biotechnology.

48

months

(from May 2024 to April 2028)

12

partners

(from 7 countries)

€5.3M

budget

(fully EU-funded under Horizon Europe)

HORIZON Research and Innovation Actions | **Grant Agreement No. 101130890**

Call and topic 'HORIZON-CL4-2023-RESILIENCE-01-34

Advanced (nano and bio-based) materials for sustainable agriculture (RIA)'

What is AGRO4AGRI?

AGRO4AGRI is a Horizon Europe project meant to deliver innovative agrochemical solutions under the **Safe and Sustainable by Design (SSbD) framework** with the purpose of

- enhancing **fertiliser efficiency**
- developing **species-specific nematicides** to reduce the use of traditional agrochemicals.

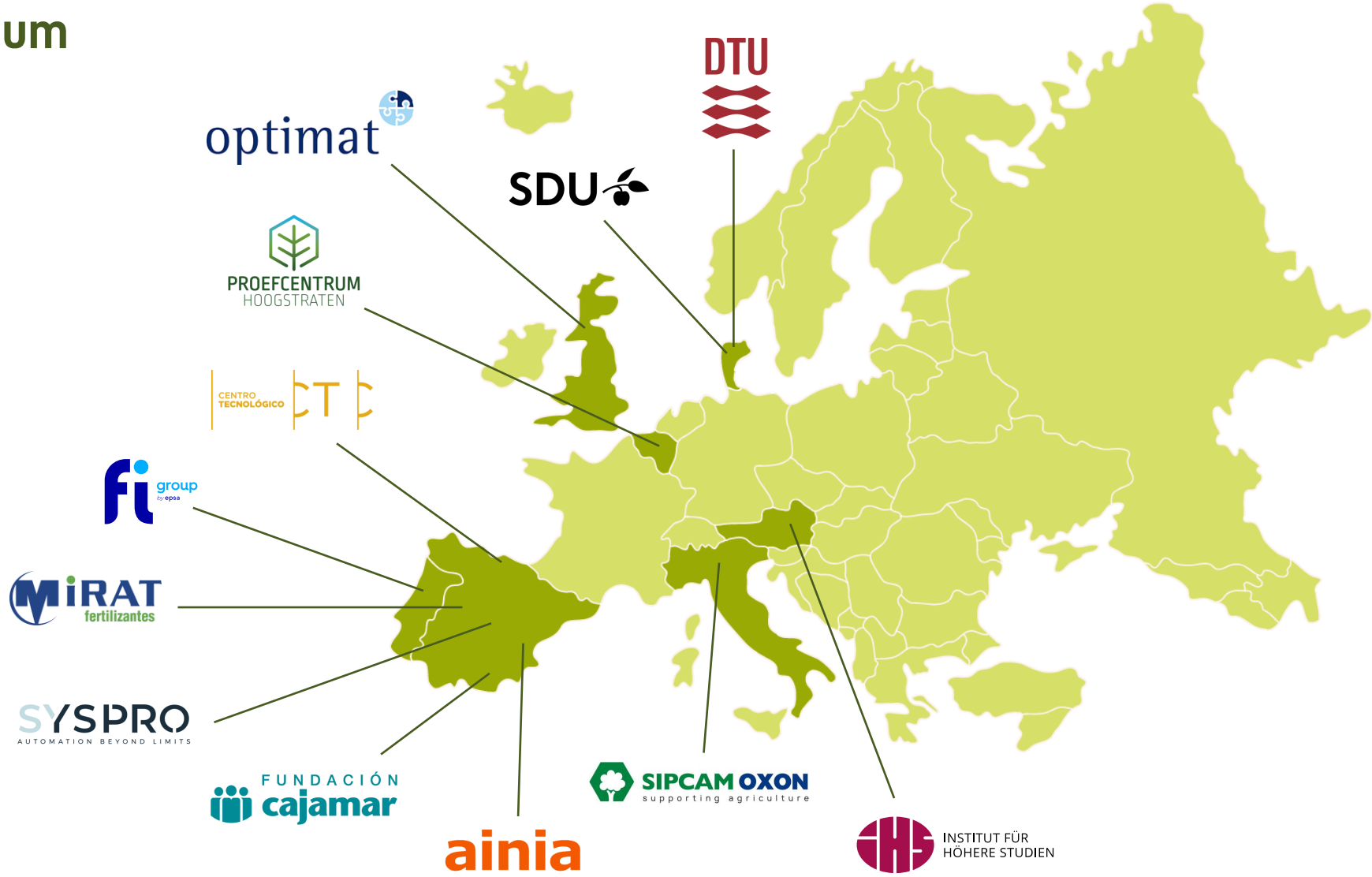
This will **cut nutrient and pesticide use by over 40% and 50%, respectively,** promoting sustainable farming and eco-friendly solutions. It **supports the European Green Deal and the Farm to Fork Strategy for a more sustainable and competitive agrifood sector in the EU**.

The AGRO4AGRI Consortium

12 partners, 7 countries:

- 3 RTOs
- 3 academic research groups
- 3 industrial companies
- 1 multi-national company
- 1 SME
- 1 not-for-profit
- Represent agrochemical supply and value chain

Coordinated by AINIA (Valencia)



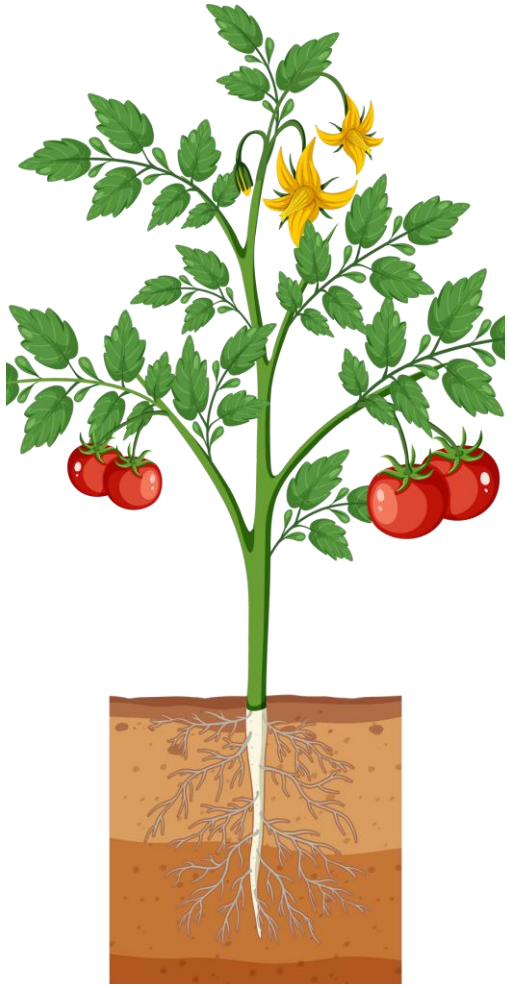
Kick-off meeting took place in Valencia (May 2024)

2 FROM TRADITIONAL AGROCHEMICAL PRACTICES TO AGRO4AGRI SOLUTIONS

PROBLEM

Traditional agrochemical practices

- Large amounts of fertilisers and pesticides usage
- Intensive irrigation
- High human and ecotoxicity pesticides
- Bioaccumulation and bioconcentration



SOLUTION

AGRO4AGRI solutions

- Advanced delivery systems based on inorganic nanomaterials and biobased materials for controlled and slow release of the chemicals
- Low risk active substances for operators and environment
- RNAi-based biopesticides
- Nanocellulose hydrogels slow water delivery
- Reduced wash-off

Traditional agrochemical practices

1. Excessive use of agrochemicals → environmental degradation, pollution, and loss of biodiversity.
2. Water and nutrient inefficiencies = soil degradation and water scarcity.
3. Pesticide toxicity = harms beneficial insects, wildlife, and human health. Fertilisers are wasted, and pesticides reach non-targeted organisms.

AGRO4AGRI solutions

1. Develop advanced nano and biobased controlled delivery systems for fertilisers and plant biostimulants (up to 30 days) to reduce waste and improve soil health.
2. Develop target-specific, sustainable nematicides based on RNAi technology.
3. Validate our solutions in field trials, to ensure real-world applicability and efficiency.
4. To assess the environmental, social, and economic impacts of our solutions, making sure they're viable and sustainable and meet SSbD criteria.
5. Reduce agrochemical use by improving bioavailability (overall 40% reduction).

AGRO4AGRI strategic objectives

1. Develop advanced delivery systems of **fertilisers based on inorganic nanoparticles** (nanoclays and mesoporous silica)

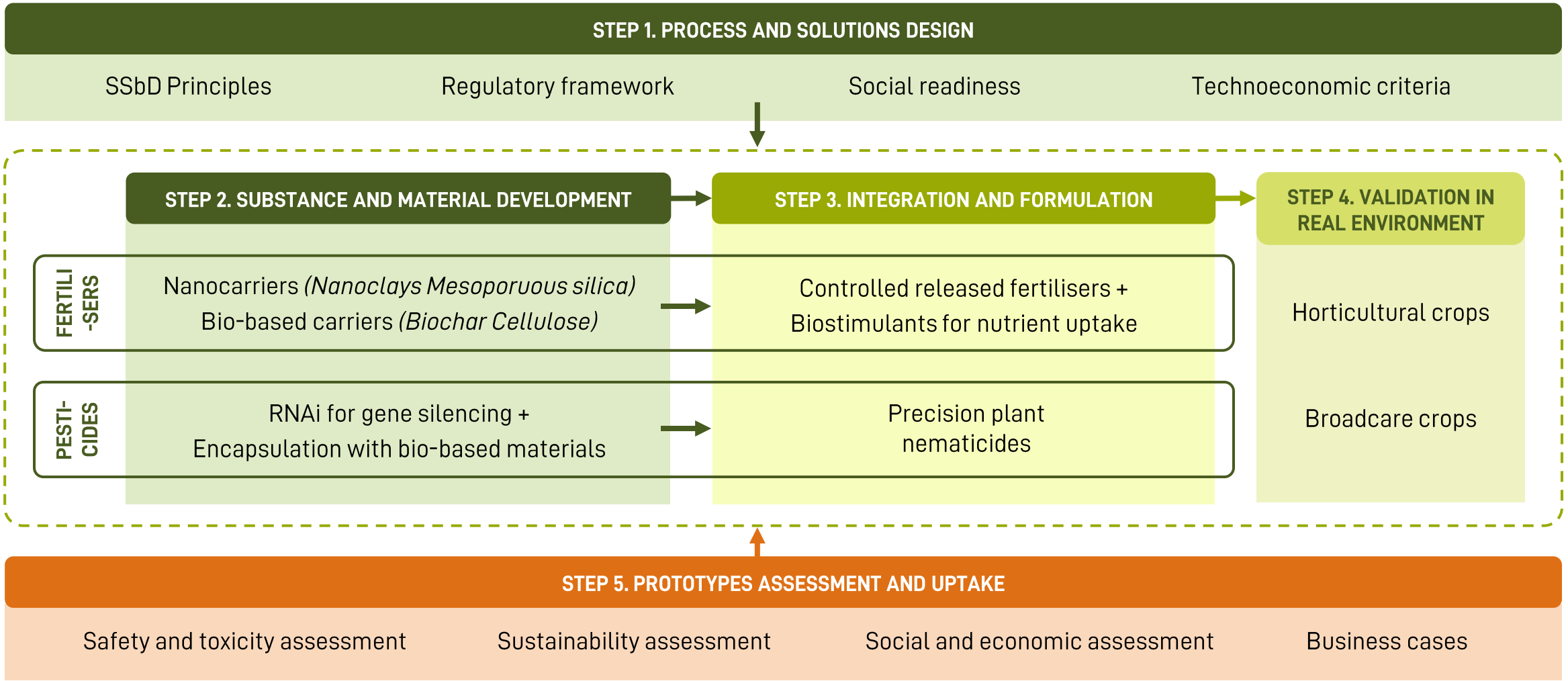
2. Develop advanced delivery systems of **fertilisers from bio-based materials** (biochar and nanocellulose derivatives)

3. Develop **target-specific nematicides** based on dsRNA microencapsulated with bio-based coatings

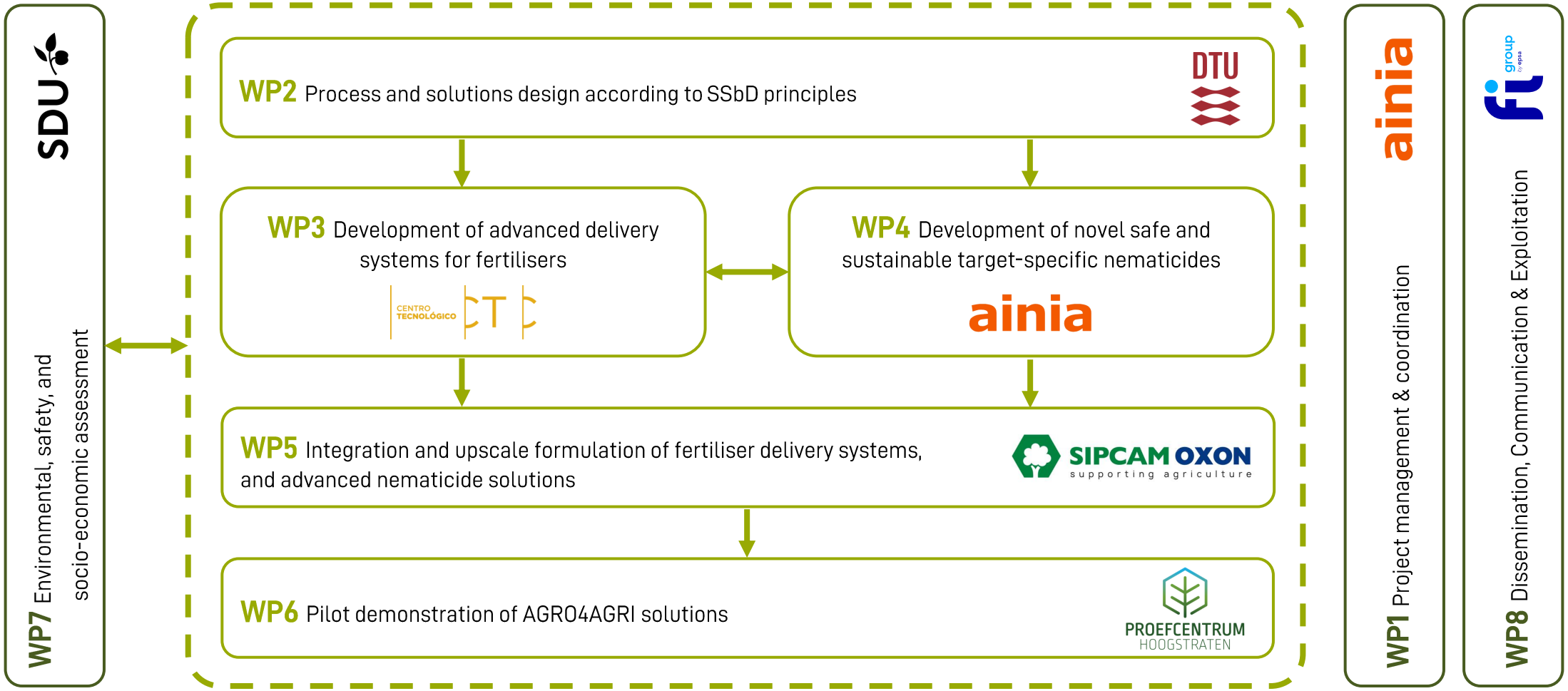
4. Validate several **SSbD agrochemical solutions** in real-life case studies (TRL5-6)

5. Demonstrate the **commercial viability** of project prototypes, to stimulate investment for the long-term growth of project

AGRO4AGRI integrated methodology



AGRO4AGRI work packages



3 OUR WORK PACKAGES

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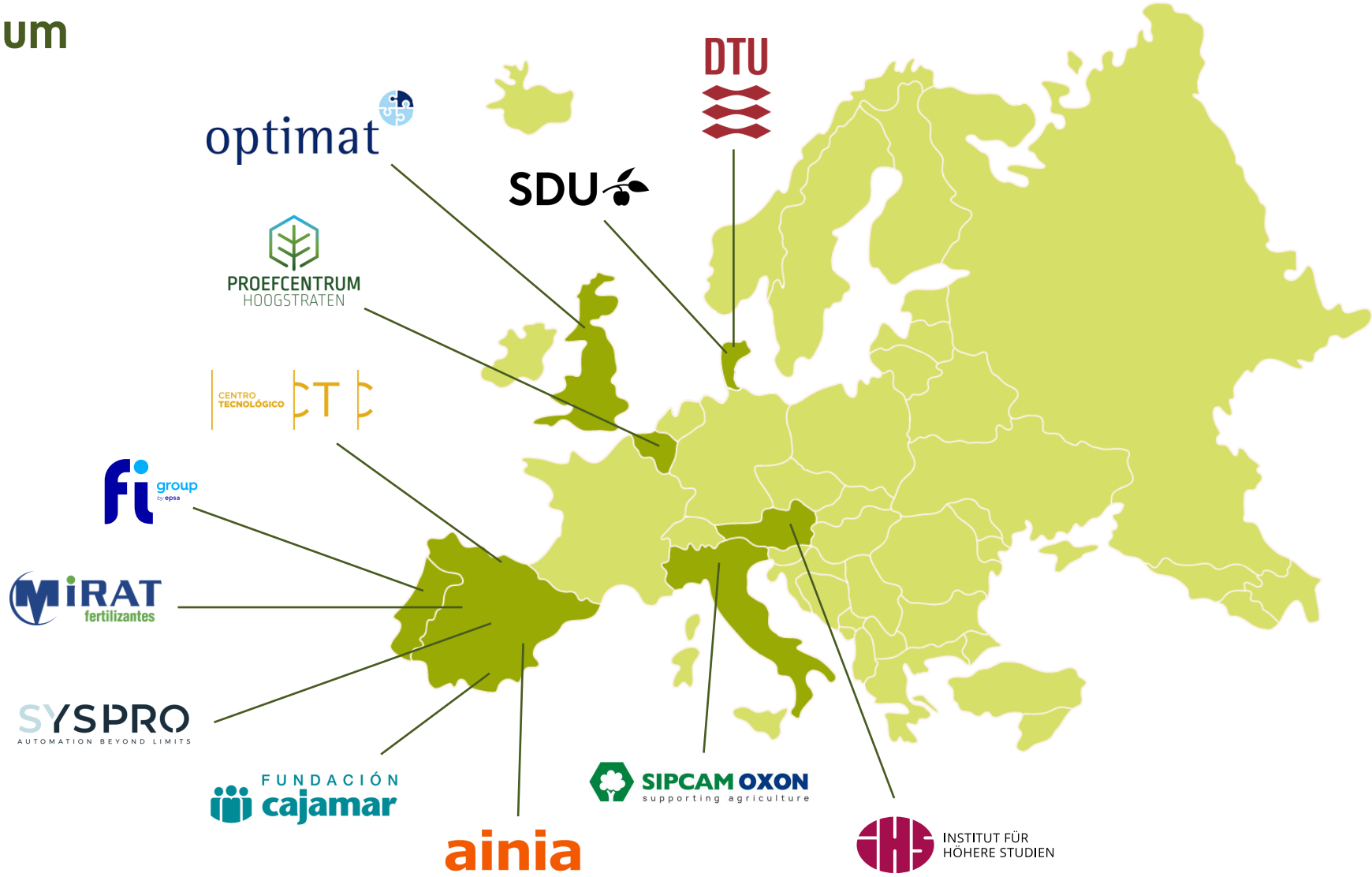

WP1. Project management & coordination

AINIA will **monitor the correct implementation of the project**; task & milestone completion and submission of deliverables according to the workplan and resources assigned, and **accomplishment objectives and success indicators**.

The project management will procure a regular and accurate communication between the project partners and with the European Commission.

Monitor, mitigate and manage potential risks and deviations from the workplan.

Besides, this WP will ensure the **proper handling of project data and the compliance with the principles of Open Science and ethics**.

Starts: M1 (May2024) **Ends:** M48 (April 2028) **Led by:** ainia

WP2. Process and solutions design according to SSbD principles

The purpose of this work package is to **ensure that process and solutions developed** in the project are **aligned with the principles of safe and sustainable by design (SSbD).** This includes analysis of the specific regulation for agrochemical products and market authorisations needed for the post-project commercialization of the developments.

It furthermore includes an investigation of how the SSbD principles apply to new agrochemical solutions and their manufacturing processes of delivery systems for fertilisers, PB and precision plant pesticides.

WP2 will focus on the **pre-requisite analysis and SSbD principles for agrochemical solutions** to ensure that the **novel agrochemical solutions to be developed in the project are aligned with the SSbD Stage 1 design principles proposed by the EC**.

Starts: M1 (May2024) **Ends:** M6 (October 2024) **Led by:** DTU

WP3. Development of advanced delivery systems for fertilisers

The objective of this WP is to **develop and characterise inorganic and biobased nanocarriers** which will be able to deliver selected fertilisers.

Depending on the carrier and the nutrient, different strategies will be applied to get slow and controlled release.

Starts: M5 (September2024)

Ends: M25 (May 2026)

Led by: CENTRO TECNOLÓGICO CT

WP4. Development of advanced delivery systems for fertilisers

RNAi technology will be employed to **silence vital genes of one of the most elusive nematode plagues**, the root-knot nematode *Meloidogyne incognita*.

In this WP, dsRNA genetic constructs will be designed and produced in biological platforms.

In parallel, tailored encapsulation methods will be designed for the stabilisation and controlled release of such active principle.

Starts: M5 (September2024) **Ends:** M25 (May 2026) **Led by:** ainia

WP5. Integration and upscale formulation of fertiliser delivery systems, and advanced nematicide solutions

- **Scale up** the production of delivery systems.
- Develop **controlled delivery fertiliser** formulas.
- **Develop Plant Biostimulant formulas** to be combined with the controlled delivery systems for enhanced nutrient absorption.
- **Develop a reliable, stable and economical feasible formulation for the ds-RNA based bionematicide**.

Starts: M5 (September2024) **Ends:** M25 (May 2026) **Led by:** SIPCAM OXON supporting agriculture

WP6. Pilot demonstration of AGRO4AGRI solutions

Pilot demonstration of AGRO4AGRI solution through field trials.

Starts: M30 (September2026)

Ends: M47 (March 2028)

Led by: PROEFCENTRUM HOOGSTRATEN

WP7. Environmental, safety, and socio-economic assessment

The objectives for WP7 include conducting a **comprehensive hazard assessment of the chemicals and materials involved**.

This will be followed by thorough human health, safety, and environmental tests and evaluations.

Additionally, an environmental and socio-economic sustainability assessment will be carried out to ensure a holistic approach.

Integrating social science reflexivity, along with ethical and social responsibility, is also a key objective to ensure the project aligns with broader societal values and considerations.

Starts: M5 (September2024) **Ends:** M48 (April 2028) **Led by:** SDU

WP8. Dissemination, communication and exploitation

The WP8 aims to strategically plan and execute activities to ensure the **successful dissemination, communication, and exploitation** of the AGRO4AGRI project results.

The key objectives include **identifying and engaging stakeholders**, **drafting an intellectual property (IP) strategy**, **analysing the competitive landscape and market opportunities**, **developing business models**, and **crafting a strategy for long-term impacts beyond the project's lifetime**.

Starts: M1 (May2024)

Ends: M48 (April 2028)

Led by: fi group by epsa

4 THE AGRO4AGRI CONSORTIUM

Kick-off meeting took place in Valencia (May 2024)

AINIA

Project coordinator, WP1 and WP4 leader

AINIA is a private non-profit agri-food technological RTO with more than 35 years of experience in the development of high-impact technological transformation projects for the agri-food, packaging, cosmetics, health and chemical industries.

Every year the company works with 1800 clients and participates in over 260 R&D projects. The centre has 20 pilot plants and 11 laboratories with the latest equipment and >270 employees with contrasted expertise on biotechnology, biorefinery, wastewater treatment, environmental engineering, packaging technologies, digital transformation, and food/feed product validation.

AINIA has developed numerous projects in the fields of biofertiliser/biopesticide development, bioeconomy, food security and smart systems to monitor agronomic parameters through precision farming. Also, it has recent experience leading European Projects such as MIXMATTERS, GLEANSMART and TRIFILM.

Technological centre CTC

WP3 leader

CENTRO TECNOLÓGICO CTC

The Technological Centre CTC is a private, non-profit foundation dedicated to enhancing companies by means of the application of Science and Technology, designing practical advanced solutions for industry. The CTC intends to establish a close relationship with companies so as to develop innovative processes of technological transfer to increase the competitiveness of the industrial fabric and facilitate the companies' access to international markets. CTC provides knowledge applied to high-value solutions for clients. Its main objective is to consolidate itself as a centre of reference for innovation in Cantabria and as a qualified innovative agent on other markets. Likewise, the CTC aims to carry out market-orientated activities by means of its own technological solutions, to work on-line with companies and other research centres, and to achieve sustainable growth by means of a stable combination of financing by means of regional, national, and international open calls and projects with private companies.

The Fields of Activity of CTC are Industry and Energy Navigation and Robotics Advanced Materials and Nanomaterials The department involved in the AGRO4AGRI project is Advanced Materials and Nanomaterials, whose lines of specialization are:

- Functional surface engineering
- Composite/nanocomposite materials
- Circular economy

University of Southern Denmark (SDU)

WP7 leader

The University of Southern Denmark has its main campus in Odense and has been receiving students since September 1966.

We now have five faculties with more than 27,000 students, almost 20% of whom are from abroad, and more than 3,800 employees distributed across our main campus in Odense and regional campuses in Slagelse, Kolding, Esbjerg, and Sønderborg.

Several international studies document that we conduct world-class research and are one of the top fifty young universities in the world.

Technical University of Denmark (DTU)

WP2 leader

DTU develops technology for people.

With our international elite research and study programmes, we are helping to create a better world and to solve the global challenges formulated in the UN's 17 Sustainable Development Goals.

Hans Christian Ørsted founded DTU in 1829 with a clear mission to develop and create value using science and engineering to benefit society.

That mission lives on today. DTU has 13,400 students and 5,800 employees. We work in an international atmosphere and have an inclusive, evolving, and informal working environment.

DTU has campuses in all parts of Denmark and in Greenland, and we collaborate with the best universities around the world.

Fundación Grupo Cajamar (FGC)

Project partner

Fundación Grupo Cajamar is a non-profit foundation whose aims are to promote and carry out activities related to the social economy and the agri-food sector, where initiatives are carried out that contribute to the promotion of cooperativism, agri-food research, applied technological innovation, studies and analysis of the reality of production and the transfer of scientific and technical knowledge.

Proefcentrum Hoogstraten (PCH)

WP6 leader

PROEFCENTRUM HOOGSTRATEN

Proefcentrum Hoogstraten (PCH) is a practice-oriented trial station in Belgium that performs leading research in horticulture.

The goal is to support and promote growers by performing scientific and demonstrative research and provide practice-relevant advice.

Through external (government) support, (inter)national projects and contract research, high-quality research is performed in strawberry, tomato and bell pepper.

Research topics include energy, water, plague- and disease control, crop varieties, cultivation technique, etc.

PCH has its own strawberry advisors and works tightly together with Cooperation Hoogstraten and its associated growers. This enables PCH to have a close contact with growers and maximizes the flow of research towards innovation and impact in the sector.

FI Group (FIG)

WP8 leader

FI Group advises companies on the management of their R&D&I financing, through the design and implementation of actions aimed at boosting their technological and economic development.

These actions focus on the integral treatment of R&D&I tax incentives and the management of calls for public grants and subsidies at the national and European levels, resulting in an improvement of the companies' profit and loss accounts.

Its commitment to achieving excellence in all its services has led FI Group to assume the leadership of the sector, both at the national and European levels, thus promoting an ambitious internationalisation plan with a clear objective: to help its clients in the generation of value.

SIPCAM-OXON

WP5 leader

SIPCAM OXON
supporting agriculture

Sipcam Oxon is a private and independent company with a strong focus on internationalization, through its vast expertise in developing and formulating high quality and innovative solutions, specializes in crop protection, biostimulants and biorational products.

For over 75 years, has partnered with farmers to help them overcome future challenges with innovative, sustainable solutions that ensure efficient, healthy, and environmentally friendly food production.

Rooted in Italy, is present in over 30 countries through subsidiaries and joint ventures and commercialize innovative solutions in more than 50 countries.

With this global coverage, and thanks to nine synthesis and formulation plants worldwide, Sipcam Oxon meet the unique agricultural needs of each region.

Institute for Advanced Studies (IHS)

Project partner

INSTITUT FÜR HÖHERE STUDIEN

The Institute for Advanced Studies creates empirically based knowledge on significant economic and social challenges of our time.

It delivers excellent applied basic research and impartial scientific policy advice, combining economic and social science perspectives. In doing so, the collection and analysis of microdata is a strong foundation.

IHS maintains state-of-the-art model infrastructures and forecasting capabilities.

It promotes the development of young scientists for positions in academia and practice, creates platforms for international academic exchange, and plays a key role in transferring the findings of advanced economic and social research into public discourse in Austria.

SYSPRO

Project partner

SYSPRO AUTOMATION BEYOND LIMITS

SYSPRO AUTOMATION is a global technical services company focused on improving and optimizing the productivity of all types of industrial facilities through the use of Technology.

MIRAT Fertilizantes (MIRAT)

Project partner

MIRAT Fertilizantes, located in Salamanca, a family company having more than 275 years of presence in the agricultural sector, dedicated mainly to production and distribution of fertilisers, occupies one of the top positions in the ranking of manufacturers of agricultural inputs in Spain.

Reference in the market for its excellent quality/price ratio, under the ISO 9001 and 14001 certifications in environmental management systems in the manufacture of NPK fertilisers, accrediting our respect for the environment in the manufacturing process.

The raw materials used in the elaboration of our products are adjusted to rigorous specifications that allow us to achieve the desired quality.

MIRAT Fertilizantes submits its suppliers to a continuous evaluation that allows us to be sure that their products and services are carried out satisfactorily.

OPTIMAT

Associated partner

Optimat is one of the leading independent innovation and strategy consultancies in Europe.

For over 30 years we have been working with a wide variety of clients from the public, private and research sectors across the whole innovation lifecycle including science/innovation policy, evaluation, R&D programmes, innovation infrastructure, technology commercialisation and exploitation, and knowledge transfer.

AGRO4AGRI

KEEP INFORMED THROUGH OUR WEBSITE!

agro4agri.eu

Join AGRO4AGRI Stakeholders Database

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