



Innovation and Capacity building

in Agricultural Environmental and Rural UAV Services



ICAERUS

D7.4: Results of Coordination with Relevant Projects

Version A

WP7: Project Management

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Executive Summary

The ICAERUS project proposes an "application-oriented" approach through the selection of five (5) specific drone applications to explore the multi-purpose application potential of drones in agricultural production, forestry and rural communities. The selected drone applications represent the main sectoral and societal uses of drones in Europe and cover multiple applications that are interconnected within Europe's complex rural landscape. The vision of ICAERUS is to explore opportunities and provide a more comprehensive and interconnected representation of the potential and impact of drones as multi-purpose vehicles in agriculture, forestry and rural areas of the European Union (EU). The aim is to demonstrate and support the effective, efficient and safe use of drones through their application and to identify the risks and added values associated with their use. "Taking off" from the current state of the art in the drone ecosystem, ICAERUS will "rise up" by further developing existing software technology, platform components and knowledge related to drones to harness the potential of drones and strengthen capacities to reduce their risks, achieve better informed decision-making and improve sustainability performance and competitiveness in agriculture, forestry and rural areas. This will be done in two ways: a) basic 'eye in the sky' applications using the drone as a positioning system for visual observation and recording, and b) a "hand in the sky" application for spraying and delivery of goods. ICAERUS plans to create an efficient, trusted and safe environment for the EU drone services market through research, technology optimisation, demonstration and education on drones to achieve the EU's decarbonisation, digitalisation and resilience goals. ICAERUS consists of a balanced, cross-sectoral and experienced consortium including research institutions, SMEs (small and medium-sized enterprises), technology providers, associations and non-profit organisations.

Deliverable D7.4, titled "Results of Coordination with Relevant Projects," aims to report the results from a series of cooperation meetings performed with other relevant projects, during the 18 months of the project's lifetime, with details on the execution and results. This deliverable will also provide the outcome of the collaborative efforts of ICAERUS with various relevant projects, in order to maximise efficiency and impact, by favouring synergies and avoiding overlapping or duplication of activities. The collaboration in particular ensures the efficient coordination of activities and communication and dissemination of results.

This deliverable serves as a reference document among consortium partners, to be aware of and kept up to date with the project's plan and advancements on the coordination and synergies with other projects. It can be used as a documentation of the efforts completed, but also planned, ensuring synergies and collaborations with other research projects under topic HORIZON-CL6-2021-GOVERNANCE-01-21 "Potential of drones as multi-purpose vehicle – risks and added values", and other EU and non-EU actions and initiatives, as well as to act as a reference document of the expectations and ideas for joint actions and collaborations.

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1. Introduction

The objective of Deliverable D7.4, titled "Results of Coordination with Relevant Projects," is to detail the outcomes of a series of collaborative meetings and activities held with other relevant projects since the beginning of the project. This deliverable is a key document that analyses the ICAERUS project's cooperation potential with projects under a similar subject's umbrella and describes the results achieved through these cooperation efforts, offering comprehensive information on the coordination activities undertaken.

The CHAMELEON and SPADE projects, having secured funding under the Horizon Europe call HORIZON-CL6-2021-GOVERNANCE-01-21, focusing on "Innovative governance, environmental observations, and digital solutions in support of the Green Deal," specifically addressing the topic of "Potential of drones as a multi-purpose vehicle - risks and added values." Recognising the similarity in certain activities and expected outcomes, there is an expectation that the three consortia will collaboratively maximise efficiency and impact by fostering synergies. In particular, the cooperation will ensure efficient coordination of activities by: (a) regular information on the progress of each project and regular contacts and exchanges; (b) joint participation in meetings at the request of the European Commission to promote results; (c) potential coordination of activities and meetings, in particular dissemination and communication activities; and (d) exchange of information (where appropriate) and consolidation of results (where relevant). Additionally, ICAERUS commits to exploring collaboration with other pertinent EU projects and initiatives in this field, cultivating mutually beneficial synergies in collaboration with T5.2 Ecosystem Building & Engagement.

1.1 Laying Foundations for Cooperation

1.1.1 Initiation of Cooperation Activities

Task 7.5, focused on "Coordination with Relevant Projects," was introduced during the Grant Agreement Preparation phase for the ICAERUS Project following strong recommendations from the Project Adviser. The task, strategically placed within the Project Management Work Package, aims to facilitate synergies with pertinent EU projects and other initiatives. Specifically, the primary goal is to coordinate and create synergies with projects funded under the same thematic area. This coordination effort encompasses regular information exchange on project progress, active participation in advisory board meetings, joint engagement in Commission-requested meetings to enhance project visibility, potential alignment of activities (particularly in dissemination and communication, including joint policy recommendations), and fostering collaborative endeavours through the exchange and consolidation of results when applicable. The directive also encourages the project to explore potential collaborations with other relevant EU projects and initiatives within the broader field, emphasising the development of mutually beneficial synergies.

The overarching goal of the Cooperation task is to facilitate effective collaboration, harmonisation, and alignment of efforts toward:

1. Enhancing capacities for sustainable smart farming, forestry, and rural communities by leveraging the potential of drones and other remotely piloted aircraft systems.
2. Strengthening capacities for monitoring plant health, livestock, livestock health, agri-environmental conditions (including tree health), and overall agro-ecosystem monitoring through the utilisation of drones and other remotely piloted aircraft systems.
3. Mitigating the risks associated with the use of drones and other remotely piloted aircraft systems.

This task aims to showcase and support, through practical applications, the effective, efficient, and safe deployment of drones while identifying the associated risks and added values. It aligns with the European Commission's vision to explore opportunities and provide a comprehensive and interconnected account of the potential and impact of drones as multi-purpose vehicles in EU agriculture, forestry, and rural areas, as outlined in the call topic.

1.1.2 Purpose and Core Principles

This deliverable will provide the outcome of the collaborative efforts of ICAERUS with various relevant projects, in order to maximise efficiency and impact, by favouring synergies and avoiding overlapping or duplication of activities. The collaboration in particular ensures the efficient coordination of activities and communication and dissemination of results.

This deliverable serves as a reference document among consortium partners, to be aware of and kept up to date with the project's plan and advancements on the coordination and synergies with other projects. It can be used as a documentation of the efforts completed, but also planned, ensuring synergies and collaborations with other research projects under topic HORIZON-CL6-2021-GOVERNANCE-01-21 "Potential of drones as multi-purpose vehicle – risks and added values", and other actions and initiatives, as well as to act as a reference document of the expectations and ideas for joint actions and collaborations. The main purpose of this report is to outline the basis for an effective strategy for the coordination and communication elements addressing the following questions:

- Raise awareness of projects and generate shared interest in looking beyond programme territory, thematic and partnerships.
- Establish coordination and cooperation between projects.
- Turn identified overlaps of project activities into an opportunity and build synergies across projects.
- Enhance cross-project collaboration, promoting mutual evaluation of project activities and outcomes.
- Identify those tools and means needed to enable coordination and cooperation.
- Provide further elements for the scanning of good practices to be mapped.
- Promote and better communicate complementarities between ICAERUS and other project and initiatives.
- Join efforts on communication activities and dissemination of results among similar projects.

2. Synergies with GOV-01-21 Sister Projects

The activities outlined in this report have been motivated by ICAERUS' commitment to addressing the need for cooperation and synergies in the implementation of the Horizon innovation action projects. Projects SPADE and CHAMELEON were also selected for funding under the call "HORIZON-CL6-2021-GOVERNANCE-01-21 - Potential of drones as multi-purpose vehicle – risks and added values". Therefore, the project is aiming at boosting fruitful coordination and productive synergies among these projects. The Cooperation is expected to help build on the momentum developed within each of the projects, to ensure synergies in methodologies, value chain assessment and other research activities, and promoting communication, dissemination and exploitation activities, by shifting to a united network.

2.1 Brief Presentation of the Sister Projects

This section provides an overview of the funded "HORIZON-CL6-2021-GOVERNANCE-01-21 - Potential of drones as multi-purpose vehicle – risks and added values" projects SPADE, CHAMELEON and ICAERUS. Introductory information on each project, its full title and logo along with the main objectives, partners and partner countries and pilot cases are presented. The main contact details are also included.

2.1.1 CHAMELEON

- **Grant agreement ID:** 101060529
- **Full title:** A Holistic Approach to Sustainable, Digital EU Agriculture, Forestry, Livestock and Rural Development based on Reconfigurable Aerial Enablers and Edge Artificial Intelligence-on-Demand Systems.



Figure 1 CHAMELEON project logo

- **Duration:** 1 July 2022 - 30 June 2025 (36 months)
- **Coordinated by:** ACCELIGENCE LTD | Cyprus
- **Project Coordinator:** Pantelis Velanas (pvelanas@accelligence.tech) - Accelligence Ltd
- **Project Manager:** Dimitris Pericleous (dimitris.pericleous@accelligence.tech),
Christiana Themistocleous (christiana.themistocleous@accelligence.tech) - Accelligence Ltd
- **Communication & Dissemination Manager:** Diego González-Aguilera (daquilera@usal.es) -
Universidad de Salamanca
- **CORDIS link:** <https://cordis.europa.eu/project/id/101060529>
- **Web page link:** <https://chameleon-heu.eu/>

Drones provide real-time monitoring even in remote rural locations

Agriculture is a key sector for the European economy. As such, it's important to optimise production and identify potential problems. In this context, the EU-funded CHAMELEON project will bring together 12 partners from 9 European countries to design and deploy an adjustable and configurable drone. Specifically, the project will carry out three pilots in Greece, Spain and Austria. Overall, the project's innovation is a new reconfigurable drone that will be able to modify its configuration and sizing upon demand. It can be deployed in homogenous or heterogeneous groups, and to support complex scenarios, as well as a set of existing heterogeneous, modular, interoperable,

Main Objective

CHAMELEON's vision is to introduce, develop, test and evaluate an integrated network of collaborating agents, equipped with advanced sensing and cognitive capabilities that can support multiple - missions at tactical level. While UVs are highly specialised systems manufactured by different providers, they all implement the CHAMELEON specifications, enabling all common features necessary to take part in the surveillance tasks foreseen by the use cases. As such, CHAMELEON aspires to exploit already well-established technologies and tools that have reached adequate maturity, towards offering a complex interoperable and reconfigurable system capable of supporting a wide set of heterogeneous missions in diverse environmental conditions. CHAMELEON innovation lies on a novel reconfigurable drone, the CHAMELEON drone, able to modify its configuration and sizing upon demand, which can be deployed in homogenous or heterogeneous groups to support complex scenarios, as well as a set of existing heterogeneous, modular, interoperable, networked UVs systems. CHAMELEON Drones will be able to adapt its operation from a number of available services or application through CHAMELEON App-store.

CHAMELEON will organise two open calls to attract and select the best SMEs from across the continent. SMEs will be funded to generate AI supported products, processes, and business models with strong market potential across the proposed clusters. Besides a total financial support of ~€600.000 CHAMELEON will provide technical and business mentorship to the selected SMEs. Open Calls will also lead towards the industrial applicability of the proposed tools and services without EC funding: it is envisioned that an estimated of 10 applications will be submitted through CHAMELEON and will be enriched with AI components.

The CHAMELEON solution will be demonstrated and validated under relevant operating conditions in 3 pilot sites in 3 European countries.

Specific Objectives

- Introduce a new business model and ecosystem-oriented AI development and Big Data Platform, allowing the innovation of agriculture, forestry and livestock services and enabling new forms of communication and transactions between actors within the agriculture, forestry, livestock's business process
- Address the needs of most complex agricultural, forest, livestock ecosystems and rural environments, through UAV hardware and software system that is on demand and multipurpose
- Introduce an advanced large-scale agriculture and forestry surveying, mapping and assessment framework including different platforms (UAV, RPAS) for a hierarchy of observation scales
- Provide a suite of novel UAV - enabled AI applications and tools for sustainable agriculture, forestry, livestock ecosystems and rural area services

Conformed by: 11 partners (including pilot cases) from 8 countries

The CHAMELEON Consortium consists of 12 partner organisations distributed in 9 European Countries, with a high participation of innovative SMEs (6 in total), 3 universities and 3 end users.

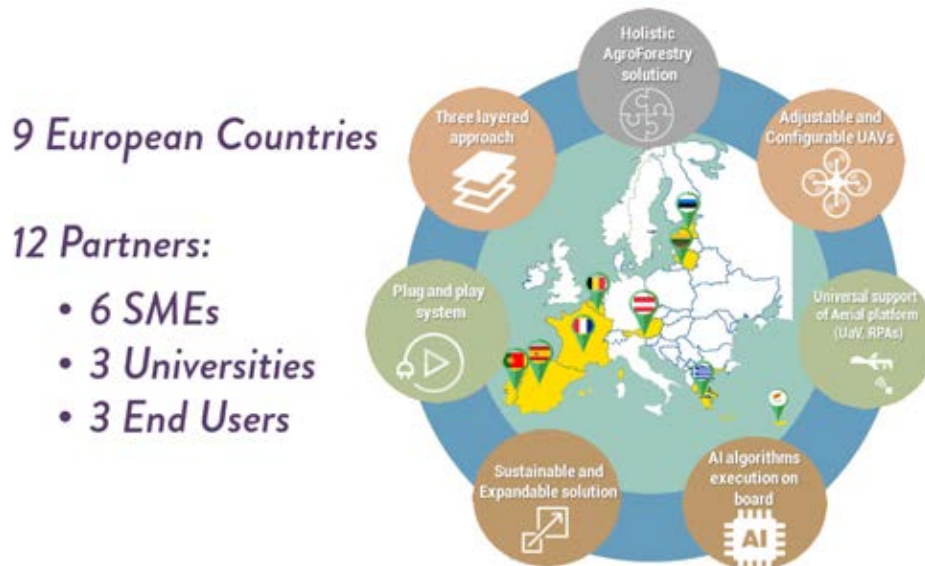


Figure 2 The CHAMELEON consortium

List of Pilots/Use Cases:

- **Pilot use case 1 - Spain, Forest fire defense plan for rural areas:** Automate the generation of forest fires defence plans for rural areas, especially in those areas with high risk in their urban-forest interface.
- **Pilot use case 2 -Greece, Livestock monitoring and management:** Validate the capacity of the CHAMELEON platform for tracking and health assessment of individual animals and assess its operational feasibility for a range of breeders, according to the size of their animal capital.
- **Pilot use case 3 - Austria, Forest monitor for potential dangers & Vineyards monitoring:** Validate the capacity of the CHAMELEON platform ecosystem for tracking water status, health of plants, health assessment of vineyards, the potential to generate a range of ecosystem services at multiple scales including mitigation of greenhouse gas emissions through long-term carbon storage and intervention strategies.



Figure 3 The CHAMELEON pilots

2.1.2 SPADE

- **Grant agreement ID:** 101060778
- **Full title:** multi-purpoSe Physical-cyber Agri-forest Drones Ecosystem for governance and environmental observation



Figure 4 SPADE project logo

- **Duration:** 1 September 2022 - 31 August 2026 (48 months)

Coordinated by: Institute for Bio-Economy and Agri-Technology (iBO), Centre for Research and Technology – Hellas (CERTH) | Greece

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- **CORDIS link:** <https://cordis.europa.eu/project/id/101060778>
- **Web page link:** <https://spade-horizon.eu/>

Main Objective

The strategic objective of SPADE is to develop an Intelligent Ecosystem to address the multiple purposes concept in the light of deploying UAVs to promote sustainable digital services for the benefit of a large scope of various end users in the sectors of agriculture, forestry, and livestock. This includes individual UAV usability, UAV type applicability (e.g. swarm, collaborative, autonomous, tethered), UAV governance models availability and trustworthiness. Multi-purposes will be further determined in the sensing dataspace reusability based on trained AI/Machine Learning (ML) models. These will enable sustainability and resilience of the overall life cycle of developing, setting up, offering, providing, testing, validating, refining as well as enhancing digital transformations and ‘innovation building’ services in Forestry, Cropping and Livestock Farming. Pilot prototypes will contribute towards greater challenges such as deforestation, precision cropping and animal welfare. First, SPADE will create a digital platform that is able to realise the potential benefits to be reaped from the use of drones. This platform is making drone operations better accessible and controllable, as well as providing a service channel for value added services enabled by drones. Second, SPADE is demonstrating three innovative use cases of drones making use of the digital platform. While demonstrating the use cases, the benefits coming from the use of drones are analysed and quantified, on a detailed stakeholder level basis. This will demonstrate the new business opportunities. The demonstrations/pilots will also serve as an analysis platform to investigate the regulatory framework at international and national level. Open calls will provide 12 further use cases.

Specific Objectives

- Learning and engaging others in learning about the various impacts and risks of drones as multi-purpose vehicles on the "Farm-to-fork" ecosystems
- Develop cost-effective drones and sensors for multipurpose applications
- Develop an open-source, open-access ecosystem which allows the collection, processing and distribution of data from and to multiple stakeholders
- Pilot deployment of the SPADE ecosystem in 3 pilots and further applications through an open call for optimally integrating its components and optimising its use
- Making the innovation known, used, socially robust and anchored for long term in agriculture and forestry

Conformed by: 21 partners (including pilot cases) from 10 countries

The SPADE consortium consists of 21 partners across 9 European countries, including Spain, Greece, Norway, Denmark, Germany, France, Portugal, Finland, and Slovakia. The consortium is characterised by its multidisciplinary composition, bringing together universities, research institutes, small and medium-sized enterprises (SMEs), highly recognised consulting companies, and two cooperatives. Additionally, there is one associated partner from the United Kingdom.



Figure 5 The SPADE consortium

List of Pilot/Use Cases:

- **Forestry pilot:** A case study in Southern Norway with 3 pilots in forestry inventory, forest harvest and other forest operations
- **Cropping Pilot:** The open-field case study in Spain of potato crops and terraced crops use cases
- **Livestock pilot:** Pilot on the Greek island Lesvos that aims to promote and improve different breeding via grazing & health monitoring



Figure 6 The SPADE pilots

2.1.3 ICAERUS

- **Grant agreement ID:** 101060643
- **Full title:** Innovations and Capacity building in Agricultural Environmental and Rural Uav Services



Figure 7 ICAERUS project logo

- **Duration:** 1 July 2022 - 30 June 2026 (48 months)

Coordinated by: Agriculture University of Athens | Greece

- **Project Coordinator:** Spyros Fountas (sfountas@aua.gr) - Agriculture University of Athens
- **Project Manager:** Katerina Kasimati (akasimati@aua.gr) - Agriculture University of Athens
- **Communication & Dissemination Manager:** Dimitris Fotakidis (dimitris@foodscalehub.com), Mackenzie Baert (mackenzie@foodscalehub.com) - Foodscale Hub

- **CORDIS link:** <https://cordis.europa.eu/project/id/101060643>
- **Web page link:** <https://icaerus.eu/>

Innovative multi-purpose drone applications in agricultural and rural areas of the EU

There is a great variety of sectors that can benefit from drone applications today. The EU-funded ICAERUS project will explore the multi-purpose application potential of drones in agricultural production, forestry and rural communities through five specific drone applications. The selected drone applications represent the most important sectoral and societal uses of drones in Europe and cover multiple applications that are interconnected within Europe's complex rural landscape. The project will identify the associated risks and added values and provide a more complete and interconnected account of the potential and impact of drones as multi-purpose vehicles. ICAERUS will further develop existing software technology, platform components and knowledge about drones either as positioning systems for visual observation and recording or as instruments for spraying and delivering goods.

Main Objective

ICAERUS proposes an “application-oriented” approach, through the selection of five (5) specific drone applications, to explore the multi-purpose application potential of drones in agricultural production, forestry and rural communities. The selected drone applications represent the most important sectoral and societal drone usage purposes in Europe and cover multiple applications that are interconnected within the complex rural European landscape. The ICAERUS vision is to explore opportunities and provide a more complete and interconnected account of the potential and impact of drones as multi-purpose vehicles in EU agriculture, forestry and rural areas. The aim is to showcase and support, through application, the effective, efficient and safe deployment of drones as well as, identify the risks and added values associated with their use. “Taking off” from the current state-of-the-art in the drone ecosystem, ICAERUS will “rise up” by advancing existing software technology, platform components and knowledge in regard to drones, to exploit the potential of drones and strengthen capacities to reduce their risks, achieve better informed decision-making, enhance sustainability performance and competitiveness in agriculture, forestry and rural areas. This will be showcased in two directions: fundamental applications representing an “eye-in-the-sky”, using the drone as a positioning system for optical observation and recording, and a “hand-in-the-sky” applications, for spraying and goods delivery. ICAERUS plans to scale-up through research, technology optimisation, demonstration and education about drones to create an efficient, trusted and safe enabling environment for the EU drone services market to achieve the EU’s decarbonisation, digitalisation and resilience ambitions. ICAERUS consists of a balanced, multi-actor, cross sectoral and well-experienced consortium, including research organisations, SME technology providers, associations and non-profit organisations.

Specific Objectives

- Research the drone innovation ecosystem and exploit possibilities to use drones as multi-purpose vehicles. Assess and optimise drone related technologies; and analyse standards, regulations, risks and socio-economic and environmental effects related to their use.
- Develop and demonstrate multiple innovative approaches of the application of drones in crop and livestock monitoring, spraying, forestry/biodiversity and rural logistics, as well as, to assess, and reduce risks emerging from their use and from the activities they perform (e.g., spraying).
- Strengthen capacities through free, open-access education, training and value-added services to develop fundamental skills of European stakeholders on the application of drone technologies in sustainable smart farming, forestry and rural communities.
- Build a European innovation ecosystem and develop business and governance models, for the effective and efficient dissemination and adoption of drone technologies to scale-up, increase

sustainability performance and competitiveness, as well as, maximise impact in agriculture, forestry and rural areas.

Conformed by by: 13 partners (including pilot cases) from 8 countries

The ICAERUS consortium consists of 13 partners from eight (8) EU countries and was developed to reinforce a multi-actor approach by linking partners from academia and research institutes, industry including drone manufacturers and service providers, and non-profit organisations.



Figure 8 The ICAERUS consortium

List of Pilots/Use Cases:

- **Crop monitoring in Spain:** Demonstrate the capacity of drones in disease and plant stress identification, and weed detection in vineyards, building on existing and implemented solutions and avoiding duplication of effort.
- **Drone spraying in Greece:** Test and assess spraying configurations for optimal drone spraying applications in field conditions.
- **Livestock monitoring in France:** Evaluate drone solutions for monitoring different grazing cattle and sheep systems, building on existing and implemented solutions and avoiding duplication of effort.
- **Forestry and biodiversity monitoring in Lithuania:** Monitor forest tree health through the use of drones, satellites and data science.
- **Rural logistics in North Macedonia:** Design and develop an innovative drone-delivery fleet management system



Figure 9 The ICAERUS use cases

2.2 Areas of Potential Cooperation and Synergies

The CHAMELEON, SPADE, and ICAERUS projects, all engaging in the development and application of UAV technologies, present several opportunities for collaboration and synergy. Each project, while having its distinct objectives and approaches, shares common ground in the use of drones for various applications in agriculture, forestry, and rural communities. Collaboration in several key areas can enhance the impact of their efforts and contribute to a more robust UAV technology ecosystem in the European Union. Below are potential collaboration areas:

- One essential area for collaboration is the **exchange of information and knowledge**. Establishing a collaborative platform, the “Cooperation Meetings”, virtual meetings where project teams can regularly share their research findings, methodologies, and insights, fosters an environment of shared learning. This collaboration enables a cross-pollination of ideas and accelerates advancements in multi-purpose drone applications.
- In addressing the regulatory landscape, collaboration is essential in **investigating regulatory frameworks**. By establishing a joint task force or working group dedicated to regulatory aspects, the projects can conduct joint analyses and present unified perspectives to regulatory bodies. This collaboration ensures a cohesive and informed approach to shaping UAV regulations, addressing shared challenges such as privacy, safety, and environmental impact.
- Moreover, sharing and analysing the **results from Use Cases/Pilots** is pivotal. Joint workshops or webinars focused on the outcomes of individual use cases can provide a structured platform for presenting findings and facilitating cross-project learning. This collaborative approach allows for a comprehensive understanding of the practical applications of drone technologies and the potential challenges and successes observed in various scenarios.
- Active **participation in demonstration events** is another avenue for collaboration. Ensuring cross-project representation at each other's events enables teams to witness and understand the practical applications of drone technologies first-hand. This participation facilitates knowledge exchange and provides an opportunity for constructive feedback, further refining the technological applications demonstrated by each project. It also offers a forum for in-depth discussions on challenges, advancements, and solutions in drone technology. Lastly, **pilot cross-evaluations**, facilitating cross-evaluation of pilots allows for broader insights and validation of findings across different geographical and operational contexts.
- Joint efforts in **scaling up through research, technology optimisation, and education** can significantly contribute to advancing UAV technologies. Collaboration on research projects, resource sharing, and combined initiatives in education and training collectively enhance the understanding and deployment of drones. This shared knowledge benefits stakeholders across all projects and strengthens the overall capacity of the UAV sector.
- A crucial aspect of collaboration is the focus on **capacity strengthening and education**. Developing joint educational workshops and training sessions that cover diverse aspects of drone technologies ensures that a comprehensive skill set is shared among stakeholders. This collaborative educational approach fosters a well-rounded understanding of both the technical and regulatory facets of UAV technologies.
- In terms of reaching a wider audience, **dissemination and outreach activities** play a pivotal role. Coordinating efforts to present joint findings at conferences, events, and various dissemination channels maximises the impact of the collective knowledge generated by the three projects. This collaborative dissemination strategy amplifies the visibility of their work and promotes a unified narrative of progress in UAV technologies.

Collaborative dissemination activities play a crucial role in enhancing the visibility and impact of the CHAMELEON, SPADE, and ICAERUS projects within the realm of UAV technology. Through **joint participation in conferences and industry events**, these projects can effectively showcase their combined findings and innovations, cultivating a shared narrative of progress. The **use of various**

dissemination channels, such as webinars, workshops, and virtual platforms, facilitates engagement with diverse stakeholders, including researchers, industry professionals, policymakers, and the public. This strategic approach not only increases adaptability to the evolving communication landscape but also ensures broader accessibility. In addition to traditional channels, **collaborative dissemination actively involves stakeholders** and fosters partnerships, encompassing industry representatives, regulatory bodies, academic institutions, and potential collaborators. Through these activities, the projects aim to **amplify the impact of their collective knowledge**, presenting a unified front and contributing to a shared vision of progress in UAV technology. This collaborative strategy not only enhances the visibility of each project individually but also strengthens the combined influence of advancements made by CHAMELEON, SPADE, and ICAERUS.

In conclusion, collaborative efforts among CHAMELEON, SPADE, and ICAERUS are poised to create a more impactful and comprehensive UAV technology ecosystem. By leveraging their individual strengths and fostering synergies, these projects can collectively advance the field, contributing significantly to the broader EU goal of propelling UAV applications across diverse sectors. This collaborative spirit reinforces the importance of shared knowledge, innovation, and a unified approach to address the challenges and opportunities in the evolving landscape of UAV technologies.

2.3 Cooperation Meetings

2.3.1 Overview and Outcomes

The cooperation meetings among the sister projects—CHAMELEON, SPADE, and ICAERUS, funded under the "HORIZON - CL6-2021- GOVERNANCE -01-21"—were convened to strengthen collaboration, identify synergies, and optimise the impact of their joint initiatives. These meetings provided a platform for project updates, exploration of collaboration opportunities, and strategic planning to facilitate effective cooperation. Key objectives included discussing potential common activities, establishing communication and dissemination strategies, and creating timelines for implementation. The focus was on fostering a collaborative environment, identifying complementarities among projects, and determining key partners for successful collaborative efforts. The coordination, and communication and dissemination teams actively participated, ensuring ongoing progress and coordination in their shared objectives.

2.3.1.1 Cooperation Meetings overview

Table 1 List of Sister Projects Cooperation Meetings

	Cooperation Meeting	Organised by	Date
1	1st Cooperation Meeting	ICAERUS	22 Dec 2022
2	2nd Cooperation Meeting	ICAERUS	06 Apr 2023
3	3rd Cooperation Meeting	CHAMELEON	04 May 2023
4	4th Cooperation Meeting	SPADE	21 June 2023
5	5th Cooperation Meeting	ICAERUS	20 July 2023
6	6th Cooperation Meeting	CHAMELEON	21 Sept 2023

Commencing with the 1st Cooperation Meeting in December 2022, hosted by ICAERUS, the primary objective was to establish a collaborative foundation. Introductions, in-depth project overviews, and

engaging discussions paved the way for identifying potential synergies and common activities. The participants committed to developing a systematic timeline for implementation, with a particular emphasis on cooperation in dissemination activities. The 2nd Cooperation Meeting in April 2023 facilitated an exchange of progress, challenges, and milestones, introducing practical tools such as the 'Cooperation General Information & Activities' spreadsheet. Key takeaways included ongoing identification of complementarities, strategic planning for joint activities, and a commitment to regular meetings. The 3rd Cooperation Meeting in May 2023, organised by CHAMELEON, marked a significant step with the introduction of communication and dissemination managers. Discussions revolved around project updates, synergies, and planning for collaborative efforts, including a proposed joint workshop and an MDPI webinar on rural development. The subsequent meetings, hosted by SPADE in June 2023 and ICAERUS in September 2023, have continued to solidify collaboration plans. These sessions focused on MDPI webinars, Synergy Days in Thessaloniki, and potential common activities. The commitment to joint initiatives, such as a common special issue on drones, underscored the projects' dedication to maximising their impact. Across these meetings, a recurring theme has been a strategic approach to cooperation, regular updates, and a forward-looking attitude towards exploring new opportunities for synergy and collaboration in the evolving landscape of drone technology. This collaborative journey reflects a dynamic and proactive effort to navigate the complexities of their shared objectives in the ever-evolving field of drone research and development. It was decided that subsequent meetings will be occurring approximately every three months, unless there is a need to host a meeting sooner, further strengthened the collaborative network.



Figure 10 Sister Projects' Cooperation Meeting

2.3.1.1 Information shared

Cooperation General Info & Activities' Spreadsheet

Introducing practical tools such as the 'Cooperation General Information & Activities' spreadsheet has proven to be instrumental in enhancing coordination and communication efforts among the projects. The spreadsheet operates as a comprehensive repository, facilitating the input of crucial details about each of the three projects, identifying key partners, and outlining main activities within the Projects' Work Plan. The first section encompasses general information for the three projects, covering Acronym, Grant agreement ID, Full Title, Starting Date, End date, Project Duration, Coordinated by, CORDIS link, Web page link, Name, Email address, Organisation, Role, and Comments. The second section delves into project-specific details, including Activity, Activity description, Partner in charge, and Notes. This strategic approach to project management and information organisation has significantly contributed to the overall success of the collaboration. Screenshots, featuring all the information, are included in the Annex I for reference.

Shared Website Information

The projects collaboratively shared information for the websites, providing details such as full name, activity, topic, duration, start date, EU funding, funding scheme, coordinator, number of partners, and main objective. This concerted effort contributes to transparent and accessible communication about the projects' key attributes and goals.

2.3.1.2 Key outcomes

- **Establishment of Collaborative Foundation:** The main outcomes of the cooperation meetings among CHAMELEON, SPADE, and ICAERUS include the initiation of collaboration and the introduction of coordination teams. These meetings also led to an agreement to develop a timeline for activities and identify complementarities, establishing a solid foundation for strategic cooperation.
- **Information Exchange and Progress Sharing:** Significant outcomes involve strengthening the collaborative network through regular updates on progress, challenges, and milestones. The meetings facilitated the identification and leveraging of synergies for impactful research, fostering an environment of information exchange and shared progress updates.
- **Creation of Coordination Tools:** Practical tools were introduced during the cooperation meetings, including the 'Cooperation General Information & Activities' spreadsheet. This tool serves as an ongoing coordination mechanism, compiling essential project information, including partner details and key activities.
- **Joint Activities Planning:** The cooperation meetings paved the way for joint activity planning, exploring potential common initiatives such as workshops, webinars, and participation in events. Discussions on topics, logistics, and planning for events like Synergy Days were key aspects of collaborative planning.
- **Collaboration in Dissemination:** The outcomes emphasise the prioritisation of cooperation in dissemination and exploitation activities. This resulted in coordinated efforts in joint presentations, common special issues, and the utilisation of various dissemination channels to amplify the impact of the projects.
- **Exploration of New Opportunities:** The cooperation meetings facilitated the identification and discussion of new opportunities for synergy and collaboration. Considerations for collaborations with other projects, joint press releases, and newsletters were explored, broadening the scope of potential collaborative efforts.
- **Active Participation in the Synergy Days Event:** Active participation in the Synergy Days by SMARTAGRIHUBS event was a focal point of the outcomes. Planning for participation, including details of a common workshop, and documenting agreements between the projects for the Synergy event were key achievements.
- **MDPI Webinar Planning:** Strategic planning and coordination for MDPI webinars, focusing on topics like rural development and drones, were outcomes of the cooperation meetings. Agreements on webinar titles, content, and timelines were achieved, enhancing the collaborative approach to disseminating project knowledge.
- **Strategic Communication:** Strategic communication efforts were highlighted, including the utilisation of social media for promoting participation in events and MDPI webinars. The preparation and publication of joint newsletters summarising collaborative efforts were integral to effective communication strategies.
- **Commitment to Ongoing Collaboration:** The outcomes collectively reflect a commitment to ongoing collaboration, with regularly scheduled Cooperation meetings serving as a platform to maintain the momentum of joint initiatives and maximise their impact. The shared commitment

underscores the dedication of CHAMELEON, SPADE, and ICAERUS projects to collaborative success.

2.3.2 Cooperation Meetings Timeline



Figure 11 Sister Projects' Cooperation Meetings Timeline

2.4 Sister Projects' Joint Participation in Events

2.4.1 Overview

The outcomes of the collaboration with sister projects underscore a shared commitment to joint activities and the common dissemination and communication of projects' outcomes. This collaboration extended to active participation in external events, including meetings with Policy Officers from the European Commission, the Synergy Days Conference by SMARTAGRIHUBS, and the MDPI Topics Webinar on EO&GEO Series: "Drones for Rural Development." These engagements have yielded valuable insights, facilitated strategic planning, and established a solid foundation for collaboration. More detailed information about these collaborative efforts is provided in the subsequent sections.

Table 2 List of Sister Projects' joint participation in events

	Joint Participation in Events	Organised by	Date
1	Meeting with Policy Officers from the European Commission	European Commission	17 July 2023
2	Synergy Days Conference	SMARTAGRIHUBS	04-05 Oct 2023
3	MDPI Topics Webinar: EO&GEO Series - Drones for Rural Development	CHAMELEON	09 Oct 2023

2.4.2 Meeting with Policy Officers from the European Commission

2.4.2.1 Overview

In a notable development, the three projects—CHAMELEON, SPADE and ICAERUS—received a special invitation from the European Commission to participate in a virtual policy event on the 17th of July, 2023.

Dr. Doris Marquardt, Programme Officer for EU Policies and the contact person for agriculture in the Directorate-General (DG) at the European Commission, together with the Project Advisers, invited the coordinating teams of the three sister projects to engage with EC policy officers and provide valuable insights into their ongoing research on the "Potential of drones as multi-purpose vehicles."

This invitation was indicative of the EC's keen interest in the work being conducted by CHAMELEON, SPADE and ICAERUS in exploring the versatile applications of drones. The EC policy officers expressed a desire to gain a deeper understanding of the research and its implications. The primary objective of the meeting was to foster discussions and interlinkages between the three projects, emphasising collaboration and the exchange of insights.

The virtual event was structured to include a 2-hour session, featuring individual presentations from each project, followed by an open discussion. The agenda included key topics such as the potential of drones in rural areas, agri-environmental monitoring, assessing risks associated with drone spraying, and exploring opportunities for policy-science interlinkages. The meeting, conducted virtually, provided a platform for the sister project coordinators to present the activities of their respective projects. The presentations covered the conceptual frameworks, objectives, and ongoing activities of CHAMELEON, SPADE and ICAERUS in the realm of drone technology.

This joint participation in the policy event marked the first interaction between the three sister projects and EC Policy Officers, signifying a pivotal moment in advancing collaborative efforts. The event laid the foundation for ongoing discussions on relevant policy topics, setting the stage for continued engagement and cooperation between the projects and the European Commission.

2.4.2.2 Key outcomes

The meeting resulted in crucial conclusions and key outcomes, centring on several vital topics:

1. **Projects' Work on the Potential of Drones in Rural Areas:** The discussion delved into the ongoing projects' efforts to explore the potential applications of drones in rural settings, emphasising the practical aspects and benefits.
2. **The Potential of Drones for Agri-Environmental Monitoring:** Considerable attention was given to the role of drones in agri-environmental monitoring, highlighting their potential contributions to improving agricultural practices and environmental sustainability.
3. **Assessing Risks of Using Drones for Spraying:** The meeting addressed the critical aspect of assessing the risks associated with the use of drones for spraying activities, acknowledging the need for careful evaluation and regulatory considerations.
4. **Opportunities for Policy-Science Interlinkages:** An important aspect of the discussion centred on identifying opportunities for integrating policy considerations with scientific advancements in the field of drone technology, emphasising the interconnectedness of these two domains.

The high productivity of the meeting was underscored by the keen interest expressed by the European Commission in the work presented by CHAMELEON, SPADE and ICAERUS. This acknowledgment from the EC reflects the significance and relevance of the projects' research in the broader context of drone applications.

2.4.2.3 Next steps

The participating projects conveyed their eagerness to sustain discussions on specific policy topics, particularly those pertinent to ICAERUS. The identified areas for continued exploration include:

- Drone Market (European and Global): Regulatory framework for drone operations - Standards, Regulations, and Risks.
- Socio-Economic and Environmental Sustainability and Impact Assessment.
- Integrating Drones into Rural Development Strategies.
- Business and Governance Models - Support Mechanisms for Drone Adoption.

- Building Capacity and Developing Skills.
- Spraying Drones and Relevant Regulations (a topic of great interest to ICAERUS!).

As the projects progress, there is a robust commitment to sustaining discussions on these policy-related matters and actively involving stakeholders. The collective research efforts in these areas are poised to make substantial contributions to the development of drone-related policies at the European level, indicating a strategic and impactful trajectory for the collaborative initiatives.

2.4.3 Synergy Days Conference by SMARTAGRIHUBS

The three sister projects— CHAMELEON, SPADE and ICAERUS —actively participated in the Synergy Days organised by SMARTAGRIHUBS on the 4th and 5th of October 2023 in Thessaloniki, Greece. This significant event served as a platform for the projects to collectively showcase their objectives, open calls, and impactful use cases, contributing to sustainable agriculture, environmental monitoring, and governance. The participation involved a multi-faceted approach, including individual pitches during the Plenary session 3-minute pitch to effectively communicate their goals and achievements, the establishment of individual booths, and the presentation of a collaborative workshop:

- "A Synergy for Unlocking the Power of Drones for Sustainable Agriculture, Environmental Monitoring, and Governance" by CHAMELEON, SPADE and ICAERUS (Dimitris Perikleous – ACCELIGENCE, Aristotelis Tagarakis – CERTH, Aikaterini Kasimati – AUA): A dynamic workshop at Synergy Days where we bring together three innovative European projects - CHAMELEON, SPADE and ICAERUS - to explore the transformative potential of drones in agriculture, environmental monitoring and governance. The workshop, entitled "A Synergy for Unlocking the Power of Drones for Sustainable Agriculture, Environmental Monitoring, and Governance", brings together three pioneering European projects, CHAMELEON, SPADE and ICAERUS, to jointly present their ground-breaking work. This workshop will focus on highlighting their joint efforts in exploring and exploiting the full potential of drones in rural areas. Participants will gain insights into the innovative use cases spanning agriculture, forestry and rural communities and see how these projects are shaping the future of environmental monitoring and governance. In addition, the workshop will delve into open call initiatives and policy-related implications, illustrating how these projects are collectively revolutionising the use of drones for sustainable development in Europe.



Figure 12 The collaborative workshop "A Synergy for Unlocking the Power of Drones for Sustainable Agriculture, Environmental Monitoring, and Governance" by CHAMELEON, SPADE and ICAERUS.

Additionally, ICAERUS organised two more workshops, that provided the opportunity to discuss and interact with representatives from other EU projects:

- "Funding opportunities for agrifood innovations: Cascade funding calls" (Mackenzie Baert, Dimitris Fotakidis - FSH): This workshop provided insights into funding opportunities for innovations in the agrifood sector, specifically discussing cascade funding calls.
- "Emerging Drone Opportunities in Europe: the case for sustainable agriculture and rural development" (Stratos Arampatzis, Viara Bojkova - NSW): This workshop delved into the current drone market landscape and the emerging opportunities for drones in Europe, with a focus on sustainable agriculture and rural development.



Figure 13 ICAERUS' participation in the Synergy Days

The overarching goal of Synergy Days was to enhance the visibility of all participating projects and foster a comprehensive understanding of their contributions. Additionally, it served as an avenue for an extended initial interaction with a broader spectrum of projects, laying the foundation for potential future cooperation and exchange. Further details on additional projects and initiatives open for consideration can be found in Section 4, titled "Other Projects and Initiatives for Consideration". The three siter projects' coordinating and communication teams were actively engaged during the two-day event, and various project partners were also present, enriching the collaborative atmosphere.

The Synergy Days Conference, hosted by SMARTAGRIHUBS, marked a pivotal moment in the European agri-food sector. With more than 250 participants, the event continued the legacy of the SmartAgriHubs project, emphasising the importance of collaboration and knowledge exchange. Plenary sessions, interactive workshops, and one of the largest exhibitions of EU projects dedicated to smart agriculture provided a dynamic environment for engagement. The event showcased the commitment of a growing community dedicated to smart agriculture in Europe, building on the momentum of previous conferences. The connections made and ideas sparked during Synergy Days 2023 are poised to contribute to the ongoing progress towards a more sustainable, efficient, and connected agricultural future. For additional details, including the complete program, a list of participating projects, and information about the featured speakers, please visit the official Synergy Days webpage at <https://www.smartagrihubs.eu/synergy-days>. For a visual overview and highlights of the event, an online album is available for access [here](#).



Figure 14 The Synergies Days Conference

2.4.4 MDPI Topics Webinar: EO&GEO Series - Drones for Rural Development

The three projects organised and participated in the MDPI Topics Webinar series, specifically the "EO&GEO Series: Drones for Rural Development," held on 9th October 2023. The purpose of this collaborative presentation was to showcase the significant contributions of the projects to rural development through drone technology. The coordinating and communication teams of the three sister projects, along with various project partners, were actively involved in this webinar.

The webinar featured experts from the three-leading drone-focused HE projects, sharing their experiences and insights on effectively leveraging drone technologies for improved results and productivity across different applications. The webinar addressed the global growth of drone utilisation, particularly in remote and rural regions, where drones have the potential to perform tasks ranging from surveillance and providing connectivity to facilitating transportation in challenging locations. The event aimed to disseminate knowledge and highlight the impactful role of drone technology in diverse rural applications.

Keynote speakers included Dr. Pantelis Velanas and Mr. Dimitris Perikleous from CHAMELEON, Dr. Aristotelis C. Tagarakis from SPADE and Dr. Aikaterini Kasimati from ICAERUS.



Figure 15 MDPI Topics Webinar: EO&GEO Series - Drones for Rural Development

The recorded webinar is available [here](#), attracting a total of 295 registrations from 55 countries, with 134 actual attendees during the live session. The success of the webinar, considering the short promotional period, sets the stage for future collaborative initiatives among the sister projects.

Next steps, suggest the creation of a Special Issue in Drones in the MDPI journal as a potential common action among the three sister projects (<https://www.mdpi.com/journal/drones>)

2.4.5 Joint Participation in Events Timeline



Figure 16 Sister Projects' joint participation in events timeline

3. Synergies with Other Projects and Initiatives

3.1 Other Cooperation Activities

3.1.1 Overview

ICAERUS is dedicated to fostering collaboration with other relevant EU projects and initiatives within the digital agricultural technology domain, specifically in precision agriculture, drone-related projects, as well as robotics and mobile robotics. Leveraging the extensive network of the ICAERUS consortium, the project actively seeks synergies that offer mutual benefits. The following section outlines the cooperation activities undertaken by ICAERUS, providing details on each engagement, a brief description of the involved projects, and the timeline of collaboration with these pertinent initiatives.

Table 3 List of other cooperation activities

	Other Cooperation Activities	Organised by	Date
1	QuantiFarm 3rd Project meeting	QuantiFarm	20-21 June 2023
2	Workshop on Precision Agriculture EU Projects' Synergies	OENOLYTICS	June 2023
3	Workshop on Drones EU Projects' Synergies	ICAERUS	28 July 2023
4	Mobile-robotics Workshop	FEROX	30 Nov 2023

3.1.2 Cooperation with the QuantiFarm HE Project

3.1.2.1 Overview and key outcomes

The collaboration between ICAERUS and QuantiFarm, initiated during the QuantiFarm 3rd Project meeting on June 20-21, 2023, signifies a strategic partnership aimed at advancing digital technologies in agriculture and enhancing the sustainability and competitiveness of the sector. The meeting served as a platform to introduce ICAERUS and explore potential collaboration opportunities between the two projects. During the meeting, the coordinating teams of ICAERUS and QuantiFarm, engaged in discussions and activities to foster mutual understanding and cooperation. A demonstration of the spraying drone by ICAERUS added a practical dimension to the collaboration, showcasing the innovative applications of drone technology.

The QuantiFarm project, focused on assessing the impact and effectiveness of digital technologies in agriculture (DATs), complements ICAERUS's mission to explore the multi-purpose application potential of drones in agriculture, forestry, and rural communities. QuantiFarm's framework for assessing DATs' impact will provide valuable insights into the sustainability and performance of the agricultural sector. Through this collaboration, knowledge and data sharing between the projects will contribute to a more comprehensive understanding of the intersection between digital technologies, including DATs and drones. The outcomes of QuantiFarm's assessment framework will inform ICAERUS's exploration, creating a synergistic account of the potential and impact of both DATs and drones as multi-purpose vehicles in the European agricultural landscape.

This strategic alliance aligns with broader goals of enhancing sustainability, efficiency, and competitiveness in agriculture, supporting the EU's objectives of decarbonisation, digitalisation, and resilience. The multi-actor and cross-sectoral nature of both projects ensures a well-rounded and informed approach, leveraging the expertise of various stakeholders, including farmers, advisors, and technology providers, for a more impactful and transformative outcome in the agricultural domain.

On the specified day, a series of impactful activities took place between QuantiFarm and ICAERUS, including a live demonstration and recorded interviews. The engaging sessions were captured in recorded videos for reference and dissemination:

1. **QuantiFarm Q&A sessions:** The Project Coordinator, Nikos Marianos from GAIA EPICHEIREIN, introduced the QuantiFarm project, providing valuable insights. [Watch here](#)
2. **Revolutionising agriculture: QuantiFarm & ICAERUS kick-off their collaboration:** Aikaterini Kasimati from ICAERUS shared perspectives on the collaborative efforts between QuantiFarm and ICAERUS, setting the stage for their joint initiatives. [Watch here](#)
3. **Spraying Drone Demonstration:** A live demonstration showcased the innovative capabilities of the spraying drone use case developed by ICAERUS, providing a practical glimpse into its applications. [Watch here](#)



Figure 17 Cooperation with the QuantiFarm project

This interactive exchange of insights and ideas was designed to foster mutual understanding and cooperation between the two projects. The interview format allowed both teams to share perspectives, discuss project objectives, and explore potential areas of collaboration.

The combination of practical demonstrations and recorded interviews not only highlighted the technological advancements achieved by ICAERUS but also laid a solid foundation for a productive and collaborative relationship with QuantiFarm. This exchange of information and perspectives contributes to the synergy between the projects, fostering a deeper understanding of each other's goals and methodologies for the advancement of digital technologies in agriculture.

3.1.2.2 QuantiFarm

- **Grant agreement ID:** 101059700
- **Full title:** Assessing the impact of digital technology solutions in agriculture in real-life conditions



Figure 18 QuantiFarm project logo

- **Duration:** 1 July 2022 - 31 December 2025 (48 months)
- **Coordinated by:** GAIA EPICHEIREIN ANONYMI ETAIREIA PSIFIAKON YPIRESION | Greece
- **Project Coordinator:** Dionysios Solomos (d_solomos@c-gaia.gr) - GAIA EPICHEIREIN ANONYMI ETAIREIA PSIFIAKON YPIRESION
- **CORDIS link:** <https://cordis.europa.eu/project/id/101059700>
- **Web page link:** <https://quantifarm.eu/>

Testing a high-tech generation of digital agriculture solutions

Digital technologies in agriculture (DATs) can grow the sector by enhancing sustainability, performance and competitiveness byte by byte, but only if they are designed to support sustainability. In this context, the EU-funded QuantiFarm project will introduce a comprehensive assessment framework for independent qualitative and quantitative assessment of the multiple costs and benefits of DATs, as well as of their sustainability impact. Following a multi-actor approach, QuantiFarm will carry out 30 test cases across 20 European countries. The test cases will all be in commercial farms of different types, sizes, ownership and operating conditions from seven agricultural sectors. The aim is to assess the DATs used in the farms and feed the results to the QuantiFarm Toolkit to increase awareness and support future decision-making.

Main Objective

The QuantiFarm project focusses on supporting the further deployment of digital technologies in agriculture (DATs) as key enablers for enhancing the sustainability (economic, environmental, social) performance and competitiveness of the agricultural sector. It will achieve this by establishing a framework for assessing the impact and effectiveness of DATs in agriculture and developing innovative tools, services and recommendations for farmers, advisors and policy makers. Following a multi-actor approach, QuantiFarm will build the project activities around 30 Test Cases (TCs) which span over 20 countries in 10 (of the 11) Biogeographical regions across Europe, capturing multiple geo-political and financial settings. All 30 TCs take place in commercial farms of different types, sizes, ownership and operating conditions from 7 agricultural sectors. Different aspects of these TCs will be examined in the context of different work packages (WPs). The TCs' actors will be engaged in participatory observation activities to offer valuable input and actively support the behavioural analysis (WP1), the establishment of the Assessment Framework (WP2) and the co-design of an innovative Toolkit for farmers, advisors and policy makers (WP3). The lean multi-actor approach will be used in the testing activities to evaluate the QuantiFarm Toolkit and validate the Assessment Framework by testing the various DATs in real life conditions, across 3 iterations/growing seasons (WP4). The outcomes will be transformed into policy recommendations (WP5) and will feed the QuantiFarm DIA that will help build the capacities of farmers' advisors in DATs. Finally, a WP on dissemination, ecosystem building and exploitation (WP6), will guarantee the wider dissemination and knowledge transfer in a multi-actor context of the outputs of the project. QuantiFarm includes 32 partners, 12 of them representing farmers and advisors.

Conformed by: 32 partners from 17 countries

3.1.3 Workshop on Precision Agriculture | EU Projects' Synergies

3.1.3.1 Overview and key outcomes

The Workshop on Precision Agriculture, conducted on June 22, 2023, and facilitated by Oenolytics, served as a comprehensive platform for presenting and discussing various EU projects related to precision agriculture. The workshop's key objectives included providing an overview of ongoing projects, fostering collaboration, identifying synergies, and exploring opportunities for cooperation among participating projects. During the event, George Papapostolou (FSH) and Aikaterini Kasimati (AUA) presented ICAERUS, emphasising its role in driving innovations and building capacity in agricultural, environmental, and rural UAV (Unmanned Aerial Vehicle) applications. The presentation outlined ICAERUS's goals, highlighted the added value of drone usage, addressed risk assessment in its endeavors, as well as presented the ICAERUS Open Call. It's noteworthy that the workshop featured the presence of other significant projects, including BACCHUS (MoBile Robotic PIATforms for ACtive InSpeCtion and HarVesting in AgricUltural AreaS) and PestNu (Field-testing and demonstration of digital and space-based technologies with agro-ecological and organic practices in systemic innovation). The inclusion of these

projects further enriched the discussions and broadened the scope of innovative approaches in precision agriculture.

This workshop successfully facilitated knowledge sharing, collaboration, and the exploration of synergies among EU projects in the realm of precision agriculture. The diverse topics covered in the agenda showcased the innovative approaches and advancements in the field, setting the stage for potential future collaborations.



Figure 19 Workshop on Precision Agriculture organised by OENOLYTICS

3.1.3.2 OENOLYTICS

- EPANEK 2014-2020 "Competitiveness-Entrepreneurship-Innovation"
- **Full title:** Precision Viticulture 2.0: Democratising precision viticulture in the EU by providing beyond state-of-the-art tools and techniques to small professional winegrowers



Figure 20 OENOLYTICS project logo

- **Duration:** 1 July 2022 - 31 December 2025 (48 months)
- **Coordinated by:** iKnowHow | Greece
- **Project Coordinator:** Nikos Frangakis (nfrangakis@iknowhow.com) - iKnowHow
- **CORDIS link:** -
- **Web page link:** <https://oenolytics.eu/>

Main Objective

The Oenolytics project offers a holistic precision viticulture solution including SMIEA-based hyperspectral mapping, which will be sold at an order of magnitude lower price than its nearest competitor, specifically targeting small EU vineyards. It leverages the scientific and technological breakthroughs achieved by the IKH, a dynamic SME with a presence in two countries offering cutting-edge IoT solutions, QCell, a VC-backed startup in stealth mode focusing on hyperspectral imaging, and UCanDrone a high-tech SME specialising in UAV manufacturing and applications in agricultural surveying.

The Oenolytics project introduces a real game changer in precision viticulture by providing a complete solution that includes remote sensing via SMIEA at an unprecedented retail price and with ease of use with the help of smart mobile devices even for non-experts. The solution has been based on scientific and technological breakthroughs achieved by the consortium partners. Hyperspectral imaging (HSI)

offers high potential as a non-invasive diagnostic tool for disease detection, at much higher sensitivity than common multispectral cameras currently in use. “Our solution will remove more than 570 tonnes of pesticides, >23,000 tonnes of fertilisers and enable a cost reduction of €48.9 million and a revenue increase of €68.1 million for the EU viticulture industry.”

Conformed by: 3 partners

3.1.3.3 BACCHUS

- **Grant agreement ID:** 871704
- **Full title:** MoBile Robotic PIATforms for ACtive InspeCtion and Harvesting in AgricUltural AreaS

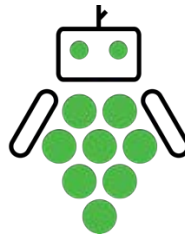


Figure 21 BACCHUS project logo

- **Duration:** 1 January 2020 - 30 November 2023 (36 months)
- **Coordinated by:** ARISTOTELIO PANEPISTIMIO THESSALONIKIS | Greece
- **Project Coordinator:** Zoe Doulgeri (doulgeri@iti.gr) - Aristotle University of Thessaloniki
- **CORDIS link:** <https://cordis.europa.eu/project/id/871704>
- **Web page link:** <https://bacchus-project.eu/>

Smart robotic system for automated harvesting in agriculture

Food demand is increasing due to the growth of the global population and the challenges posed by climate change, leading agriculture to advanced technology in order to secure quality and quantity of production. Precision agriculture is rising, combined with smart robotic technologies such as smart harvesting that benefit both productivity and working conditions. However, robotic systems are not fully prepared to replace all human actions, thus preventing the transition to fully automated harvesting. The EU-funded BACCHUS project proposes a smart robotic system utilising autonomous mobile platforms with dual manipulators for active inspection and selective harvesting of high value crops, replacing farmer work. The new system will be tested in a vineyard environment monitoring the state of different types of vines and harvesting grapes of different varieties in a human-like manner.

Main Objective

With the growing population and climate change, agricultural productivity growth is unlikely to meet the increased demand for food. Besides the increasing pressure to produce more, there is an overall need for higher quality and sustainable cultivation. Precision agriculture combined with intelligent robotic technologies can push to that direction. The incorporation of such technologies into agricultural production not only benefits productivity but also improves the working conditions of farmers and labourers. Intelligent systems are becoming the go-to solution to push towards precision agriculture, while a large number of farmer operations are already transitioning to full autonomy. Smart, automated and selective harvesting, in particular, can provide considerable improvement in production leaving the unripe product in the field to mature. However, in order to achieve such automation significant progress is required regarding the cognitive and mechatronic capabilities of the robotic agents replacing the human workers in these tasks, especially in cases where human-like actions are required by the robots.

BACCHUS intelligent mobile robotic system promises to reproduce hand harvesting operations, while at the same time take the manual legwork out by autonomously operating in four different levels: i) performing robot navigation with quality performance guarantee in order to inspect the crops and collect data from the agricultural area through embedded sensorial system; ii) performing bi-manual harvesting operations with the needed finesse using a modular robotic platform, iii) employing additive manufacturing for adjusting the robot gripper to the geometry of the different crops, iii) presenting advanced cognitive capabilities and decision making skills. The envisioned system will be demonstrated and evaluated in the challenging vineyard environment inspecting different types of vines and harvesting bunches of grapes of different varieties in a human-like manner.

Conformed by: 7 partners from 5 countries

3.1.3.4 PestNu

- **Grant agreement ID:** 101037128
- **Full title:** Field -testing and demonstration of digital and space based technologies with agro-ecological and organic practices in systemic innovation



Figure 22 PestNu project logo

- **Duration:** 1 October 2021 - 30 September 2024 (36 months)
- **Coordinated by:** ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS | Greece
- **Project Coordinator:** Eleftheria Maria Pechlivani (riapechl@iti.gr) - Centre for Research & Technology Hellas
- **CORDIS link:** <https://cordis.europa.eu/project/id/101037128>
- **Web page link:** <https://pestnu.eu/>

Growing innovation to support organic farming

Robotic traps, mobile robots for pesticide monitoring and 3D spot spraying are innovations aimed at reducing the use of pesticides and fertilisers. Developed by the EU-funded PestNu project, the aim is to field-test and demonstrate digital and space-based technologies and agro-ecological and organic practices (AOP). The project will develop real-time nutrient analysers and use Copernicus data to map soil and plant nutrients and pests. The technology will be interconnected to a user-centred cloud agricultural management system. Specifically, the project will test its solutions in aquaponic and hydroponic greenhouse and open-field vegetable cultivation in Greece and Spain. The AOP include on-site production of biofertilisers from agriculture wastewaters through an automated drainage recycling system and advanced nutritional programmes for organic farming.

Main Objective

PestNu targets the field -testing and demonstration of digital and space based technologies (DST) and agro-ecological and organic practices (AOP) under a systemic approach to reduce the pesticides and fertilisers use, and loss of nutrients. The consortium brings novel DST including: AI robotic traps for real time pest monitoring; Autonomous mobile robots for pesticide monitoring and 3D spot spraying;

Earth Observation missions with robust Agroradar AI algorithms to map soil/plant nutrients and pest plant inputs using Copernicus data/services; and in-situ and real-time nutrient analysers. All the DST will be interconnected to a user-centric cloud-based Farm Management System, which features a robust Decision Support System integrated with a blockchain based system for DST data evidence, integrity and AI models verification and with a cybersecurity platform to prevent cyber-attacks and IoT vulnerabilities. The AOP include: on-site production of biofertilisers from agricultural waste-waters through a robust automated drainage recycling system via an innovative enzymatic hydrolysis procedure; a novel foliar biopesticide formulated by circular bioeconomy operations, targeting fungal diseases with biostimulant effect; and advanced nutritional programs for organic farming. The showcase systemic DST & AOP solutions will be demonstrated and tested in aquaponic and hydroponic greenhouse and open-field vegetable cultivation in Greece and Spain. A Pesticide Reduction Program will evaluate the Maximum Residue and the Acceptable Daily Intake levels to ensure vegetable's food safety and LCA activities will be performed. All these systemic approaches will be performed under a strong collaboration among all the Farm to Fork stakeholders and European Commission services.

Conformed by: 20 partners from 9 countries

3.1.4 Workshop on Drones | EU Projects' Synergies

3.1.4.1 Overview and key outcomes

The "Workshop on Drones | EU Projects' Synergies," held during the 2nd ICAERUS Project Management Board Meeting in the Netherlands on 28th July 2023, organised by Wageningen University, aimed to introduce and showcase various EU projects focusing on drones. The highlighted projects included H2020 FlexiGroBots, H2020 I-Seed, and MSCA WildDrone. The primary objective of the workshop was to facilitate collaboration by presenting these projects, identifying complementarities, and exploring potential synergies among them. Representatives from each of the four projects actively participated, engaging in discussions and sharing insights. The workshop provided a platform for the ICAERUS Consortium and other project representatives to collectively explore opportunities for collaboration and mutual benefit in the realm of drone-related initiatives.



Figure 23 Workshop on Drones organised by ICAERUS

3.1.4.2 FLEXIGROBOTS

- **Grant agreement ID:** 101017111
- **Full title:** Flexible robots for intelligent automation of precision agriculture operations



Figure 24 FLEXIGROBOTS project logo

- **Duration:** 1 January 2021 - 31 December 2023 (36 months)
- **Coordinated by:** ATOS IT SOLUTIONS AND SERVICES IBERIA SL| Spain
- **Project Coordinator:** Daniel Calvo (daniel.calvo@atos.net) - Atos Research and Innovation
- **CORDIS link:** <https://cordis.europa.eu/project/id/101017111>
- **Web page link:** <https://flexigrobots-h2020.eu/>

Increasing the versatility of agricultural robotics

In an effort to enhance agricultural production, agricultural robots are being increasingly adopted. The number of discreet tasks to be automated, however, significantly reduces the flexibility of current solutions, thus impacting efficiency and limiting their take-up. The EU-funded FLEXIGROBOTS project aims to develop a platform that will help build heterogeneous multi-robot systems, allowing for vastly improved flexibility by using existing robots for multiple tasks. This could help produce higher-value data from a variety of sources and sensors, increasing operational autonomy and precision while greatly reducing costs and encouraging investment in robotics.

Main Objective

Agricultural robotics solutions can integrate a variety of robots for a variety of monitoring and targeted intervention tasks, to increase farm productivity, efficiency and sustainability through support of automated precision farming operations. Despite the rising farmer investment in farm/agricultural robots, most deployable robotic systems are meant to automate only specific tasks. The wide variety of tasks that need to be fulfilled in a single precision agriculture operation or mission makes it extremely unprofitable to address its automation with task-specific robots. These challenges result in a lack of flexibility of current heterogeneous multi-robot systems that poses low returns on investment and high risks for farmers. In order to become cost-effective, heterogeneous multi-robot systems needs to become more flexible by employing more versatile (e.g. multi-task) robots which collaborate to accomplish complex missions; ensuring scalable human oversight and intervention through adaptive mission control mechanisms (e.g. without information overload /overwhelming effort from the farmer); allowing the farmer to profit from robotics operational data. FlexiGroBots proposes a Platform for developing heterogeneous multi-robot systems and applications which allows for i) more versatility by using the same robots for different observation and intervention tasks, in different missions, throughout the crop life cycle, ii) more cooperation between heterogeneous (ground and aerial) robots to accomplish more complex missions; iii) more valuable data to generate accurate insights into the fields, crops and robotics operations by combining data from IoT sensors, satellites and data collected by the robots; iv) more autonomy for real-time adaptation of mission plans as well as robot behaviour at the crop level, given operational conditions and real-time insights; v) more precision to carry out specific tasks in a very localised way, gaining accuracy and lowering costs.

Conformed by: 17 partners from 7 countries

3.1.4.3 I-Seed

- **Grant agreement ID:** 101017940
- **Full title:** Towards new frontiers for distributed environmental monitoring based on an ecosystem of plant seed-like soft robots



Figure 25 I-Seed project logo

- **Duration:** 1 January 2021 - 31 December 2024 (48 months)
- **Coordinated by:** FONDAZIONE ISTITUTO ITALIANO DI TECNOLOGIA | Italy
- **Project Coordinator:** Barbara Mazzolai (barbara.mazzolai@iit.it) - Istituto Italiano di Tecnologia
- **CORDIS link:** <https://cordis.europa.eu/project/id/101017940>
- **Web page link:** <https://iseedproject.eu/>

Bio-inspired soft robotics meets soil science

Biodegradable and self-deployable seed-like robots are transforming the way scientists monitor and analyse air and topsoil environments. Filling gaps in data analysis systems, these miniaturised robots can conduct in situ detection of key environmental parameters in air and topsoil. Developed by the EU-funded I-Seed project, these robots boast a bio-inspired design and morphological features that enable them to fly and disperse via natural vector-mediated diffusion in the air. They can also respond to humidity variations to move on terrain surfaces and self-penetrate topsoil. Built with sensors, the robots will record temperature, humidity, CO₂ and mercury (Hg²⁺).

Main Objective

"I-Seed aims at developing a new generation of self-deployable and biodegradable soft miniaturised robots, inspired by the morphology and dispersion abilities of plant seeds, to perform a low-cost, environmentally responsible, in-situ detection of key environmental parameters in air and topsoil. Seeds dispersal strategies are driven by the spontaneous, often reversible, anisotropic deformation of their tissues upon swelling or drying of cell walls, and do not require any control or internal energy supply.

Following a bioinspired design, these skills will be implemented into seed-like robots by using multi-functional biodegradable materials and natural morphological features, which endow them with the ability to fly and disperse via natural vector-mediated diffusion in air, or to respond to humidity variations to move on terrain surface and self-penetrate in topsoil. Sensing will be based on diffusion, absorption, and structural changes of parts of the robots made from sensor materials with a chemical transduction mechanism and fluorescence-based optical readout. Recordings of temperature, humidity, CO₂ and mercury (Hg²⁺) will be executed at air-soil interface. Deployment of the I-Seed robots and reading of the acquired measurements will be performed using drones. Seed-drone communication will rely on optical signaling and fluorescence based on Light Detection and Ranging technology (fLiDAR), and using photonic "tags" to impart different type of sensors and robots a unique response. Algorithms will be developed such that drones can map the robots in air and on the ground. By merging bioinspired soft robotics, material science, nanocomposite technologies, and environmental science, I-Seed will address the specific challenge by building a radically new dynamic

scenario for analysing and monitoring air and topsoil environments and their interface, extending environmental sensor networks and filling existing gaps of data analysis systems.

Conformed by: 6 partners from 4 countries

3.1.4.4 WildDrone

- **Grant agreement ID:** 101071224
- **Full title:** Autonomous Drones for Nature Conservation Missions



Figure 26 WildDrone project logo

- **Duration:** 1 January 2023 - 31 December 2026 (48 months)
- **Coordinated by:** SYDDANSK UNIVERSITET | Denmark
- **Project Coordinator:** Ulrik Pagh Schultz Lundquist (ups@mmmi.sdu.dk) - University of Southern Denmark
- **CORDIS link:** <https://cordis.europa.eu/project/id/101071224>
- **Web page link:** <https://wilddrone.eu/>

Boosting conservation practices with cutting-edge technology

As the world is currently facing the impacts of biodiversity loss, the need for effective and cost-efficient conservation practices is more pressing than ever. The EU-funded WildDrone project is aiming to revolutionise wildlife conservation practices using autonomous drone technology. Through 13 doctoral research projects, WildDrone will develop new drone technology, expand computer vision capabilities, and combine these advances to create tools for visual inspection and monitoring of wildlife populations. A tailored, interdisciplinary PhD training programme will be developed to provide a new generation of researchers with the skills they need to help tackle global biodiversity loss. The goal of WildDrone is to develop new, advanced technological tools that conservation practitioners around the globe can use in their work to reverse the decline of global biodiversity.

Main Objective

The aim of WildDrone is to push wildlife conservation practices into the 21st century. The need for effective, cost-efficient conservation practices are greater than ever as we currently face the greatest loss of global biodiversity in history. Present conservation practices are typically very labour intensive, costly, and time-consuming. Collected data is often inaccurate or incomplete. However, recent advances in drone technology have shown that this technology has great potential as a practical tool for conservationists and that it could potentially revolutionise our efforts in nature conservation. Nevertheless, drone technology is still a developing field and many obstacles stand in the way of us harvesting the benefits of this emerging technology. To fully achieve its promising potential in this new domain we will need to invent more robust and predictable robotic technologies, including effective and automated means of gathering and interpreting ecological and behavioural data. WildDrone will address these challenges by joining the scientific areas of aerial robotics, computer vision, and wildlife ecology. The network proposes to develop new autonomous drone technology, expand current

computer vision capabilities, and combine these advances to create practical tools for visual inspection and monitoring of wildlife populations. This drone-based inspection will provide conservationists with crucial knowledge of animal health, behaviour, and numbers. These challenges will be solved by 13 PhDs (three self-funded). An interdisciplinary research training programme has been designed to educate a new generation of PhDs and provide them with a unique skill set enabling them to tackle the great challenges we must solve collectively, if we are to reverse the decline of global biodiversity. This program will raise the level of excellence in doctoral programs and simultaneously enhance the career perspectives of the PhDs in both academia and industry.

Conformed by: 19 partners from 10 countries

3.1.5 Mobile-robotics Workshop

3.1.5.1 Overview and key outcomes

The Mobile-robotics Workshop, organised by the FEROX Project on November 30, 2023, served as a collaborative platform for Horizon Europe projects centred on drones for real-world applications. The workshop showcased comprehensive project overviews from FEROX, DIGIFOREST, FLEXIGROBOTS, AUTOASSESS, and ICAERUS, providing insights into their respective goals and innovative approaches. Notably, the coordinating teams of the three sister projects actively engaged in discussions, marking the initiation of their collaborative interaction. An important decision emerged from the workshop, establishing that the projects will convene annually, ensuring regular knowledge exchange and collaboration opportunities in the evolving landscape of drone technology for real-world applications.

During the workshop, participants witnessed valuable outcomes, including the exchange of information through project overviews, allowing each project to present its goals and innovative approaches. The coordinating teams of the projects initiated discussions and shared insights, marking the first interaction among them. The event aimed to promote the sharing of knowledge and experiences specifically related to drones for real-world applications within the Horizon Europe framework. Furthermore, the workshop provided a platform for networking among the projects, fostering collaboration and potential synergies.

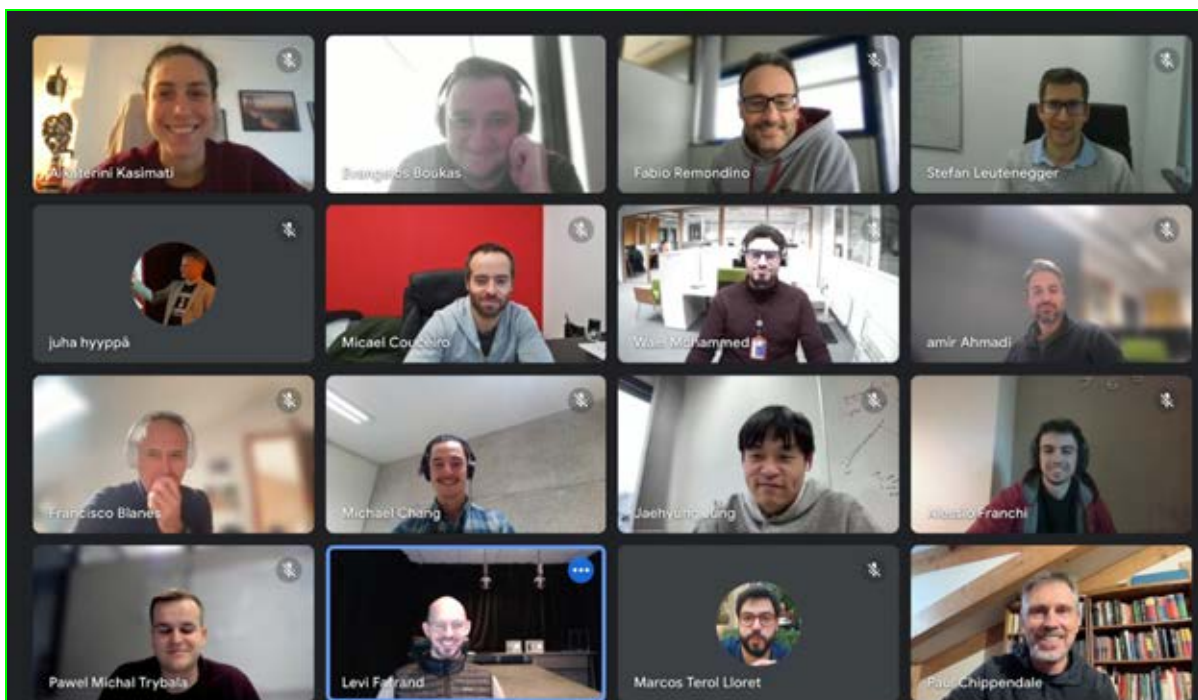


Figure 27 Mobile-robotics workshop

3.1.5.2 FEROX

- **Grant agreement ID:** 101070440
- **Full title:** Fostering and Enabling AI, Data and Robotics Technologies for Supporting Human Workers in Harvesting Wild Food



Figure 28 FEROX project logo

- **Duration:** 1 September 2022 - 31 August 2025 (36 months)
- **Coordinated by:** FONDAZIONE BRUNO KESSLER | Italy
- **Project Coordinator:** Paul Chippendale (chippendale@fbk.eu) - FONDAZIONE BRUNO KESSLER
- **CORDIS link:** <https://cordis.europa.eu/project/id/101070440>
- **Web page link:** <https://ferox.fbk.eu/>

Advanced technologies to support wild berry pickers

It is estimated that less than 10 % of annual wild berry production in Nordic countries is harvested manually from forests. Due to the short season, most pickers are migrant labourers with limited knowledge of the language, culture and forests. As such, their working conditions represent the main challenge in manual forest harvesting. The EU-funded FEROX project will improve the working conditions of the wild berry pickers through advanced technologies. The project will employ autonomous drones equipped with various sensors to acquire data used to build AI models and 3D models of the forests to precisely estimate berries' locations, amounts and types. FEROX will demonstrate the solution in the Finnish forests.

Main Objective

Wild berries and mushrooms are considered to be a national treasure of Nordic countries. These food products require zero resources to cultivate as they grow naturally in the forests. It is estimated that less than 10% of the total annual wild berry crop is harvested from the forests. The main challenge in collecting wild berries lies in the manual forest harvesting, namely pickers' working conditions. Due to the short season, the majority of the work is conducted by foreigners with limited knowledge of the language, culture and forests. The FEROX project aims to utilise advances in AI, data, and robotics to improve the working conditions of the wild berry pickers. The project will employ autonomous drones equipped with various sensors to acquire data, build 3D models of the forests and, therefore, accurately estimate berries' locations, amount and types. The collected data will be used to build AI models to help workers locate the berries and optimise their operations. In addition, FEROX will provide wild berry pickers with navigation and locating services and physical support to improve their working conditions and boost their trust and confidence. The holistic solution of FEROX will contribute to the overall safety of the workers by automatically monitoring the pickers and providing aid where it is needed. As a consequence, FEROX is expected to attract locals and hiking enthusiasts to work during summer in collecting wild products, hence, increasing the overall yield of the wild berries. These outcomes will open business opportunities for EU companies to adapt the solutions developed for industrialised cultivation as well as support global sustainability as technology providers for safe and sustainable berry harvesting. To demonstrate the solution, FEROX will conduct its tests in the forests in Finland with the support of the wild berries and mushroom 'Arktiset Aromit' (Arctic Flavours) Association.

Conformed by: 9 partners from 7 countries

3.1.5.3 DigiForest

- **Grant agreement ID:** 101070405
- **Full title:** Digital Analytics and Robotics for Sustainable Forestry



Figure 29 DigiForest project logo

- **Duration:** 1 September 2022 - 28 February 2026 (42 months)
- **Coordinated by:** TECHNISCHE UNIVERSITAET MUENCHEN | Germany
- **Project Coordinator:** Stefan Leutenegger (stefan.leutenegger@tum.de) - Technical University of Munich
- **CORDIS link:** <https://cordis.europa.eu/project/id/101070405>
- **Web page link:** <https://digiforest.eu/>

Robots and AI for forest monitoring

Forests are essential for combatting climate change and maintaining our planet, with forestry operators and organisations monitoring forests, assisting their growth, timber output and maintenance. Unfortunately, monitoring large expanses of forest can be difficult and inaccurate which is dangerous for properly maintaining a forest's health. The EU-funded DIGIFOREST project introduces an innovative solution, improved forest monitoring and data management using robots and artificial intelligence. By utilising several different robots to collect 3D spatial data on forests and individual trees followed by AI documenting and AI representing it, it offers forestry operators and policymakers an unparalleled tool.

Main Objective

What if we could create a revolution in spatial data acquisition, organisation and analysis and give forestry operators and enterprises up-to-date, tangible information about the status of their forests down to the individual tree? We believe this would improve their oversight by allowing more accurate growth modelling of forest stands and precise predictions of timber yields. It would remove the uncertainty of when thinning operations are needed or where there are trees which are ready for harvest. It could also enable operators to automatically plan where their staff or equipment should be deployed. With capable (semi-)autonomous harvesting, operators eventually automating the full process.

It could also better quantify a forest's carbon sequestration - with low uncertainty per-tree carbon estimates. Precise measures of crown volume and tree diameters would improve the granularity of carbon credit schemes. This could inform national governments and policy makers when deciding policy on initiatives such as carbon offsets and carbon farming. In DIGIFOREST we propose to create such an ecosystem by developing a team of heterogeneous robots to collect and update this raw 3D spatial representations, building large scale forest maps and feeding them to machine learning and spatial AI to semantically segment and label the trees and also the terrain. Our robot team will be diverse: we will use both rugged field robots as well as more experimental vehicles. Most ambitious of all is the intention to (semi-)automate a lightweight harvester for sustainable selective logging.

Progress in this project will be demonstrated with an ambitious series of field trials. With the clear engagement of forestry and industrial companies, commercial pathways are readily available.

Conformed by: 10 partners from 7 countries

3.1.5.4 AUTOASSESS

- **Grant agreement ID:** 101120732
- **Full title:** Autonomous aerial inspection of GNSS-denied and confined critical infrastructures



Figure 30 AUTOASSESS project logo

- **Duration:** 1 October 2023 - 30 September 2027 (48 months)
- **Coordinated by:** DANMARKS TEKNISKE UNIVERSITET | Denmark
- **Project Coordinator:** Evangelos Boukas (evanb@dtu.dk) - Technical University of Denmark
- **CORDIS link:** <https://cordis.europa.eu/project/id/101120732>
- **Web page link:** <https://autoassess.eu/>

Main Objective

The >50k large vessels across the world must be regularly monitored for corrosion and defects by human surveyors, including dangerous and dirty confined GNSS-denied areas such as ballast water tanks and cargo holds. One person is killed every week from accidents in these enclosed spaces, which despite having large surface areas, consist of many smaller, confined compartments with narrow passages (40cmx60cm). However, a radical new approach is possible using unmanned aerial systems (UAS or drones), by combining the latest developments in (1) collision-tolerant UAS, (2) multi-modal SLAM, (3) path planning, (4) autonomous drone racing, (5) aerial manipulation, (6) miniaturised NDT sensors, and (7) ML-based defect identification. Only through a complete integration of these technologies is it possible to address the challenges of deploying aerial robots in these challenging conditions. Equipped with automated AI-based scanning, mapping, navigation and contact-based NDT, this has the potential to completely remove the need for human inspection. Using a digital twin approach brings “superhuman” results: comprehensive semantic-aware detailed 3D mapping (1 cm resolution) of large structures (>300 m), high resolution visual and NDT analysis (100um) and improved traceability with automatically generated trend analysis. The ML for system mapping and NDT is trained with sociotechnical inputs from experienced human inspectors. Currently, a typical inspection costs >1M€ and requires 15 days (8 days inspection and 7 days travel to low cost Far Eastern docks). A UAS-based inspection will take 1 day, with 1-2 days travel to an EU port at a cost of 200k€, saving the industry >9B€ p.a. with 2.4MT of CO2 reduction. This consortium includes many of the world leaders in the field of UAS-based inspection teamed with vessel owners and inspectors, enabling an end-to-end survey solution which would save 50 lives/yr, and provide safer, more reliable, and accurate inspection data.

Conformed by: 16 partners from 8 countries

3.1.6 Synergies with Other Projects and Initiatives Timeline

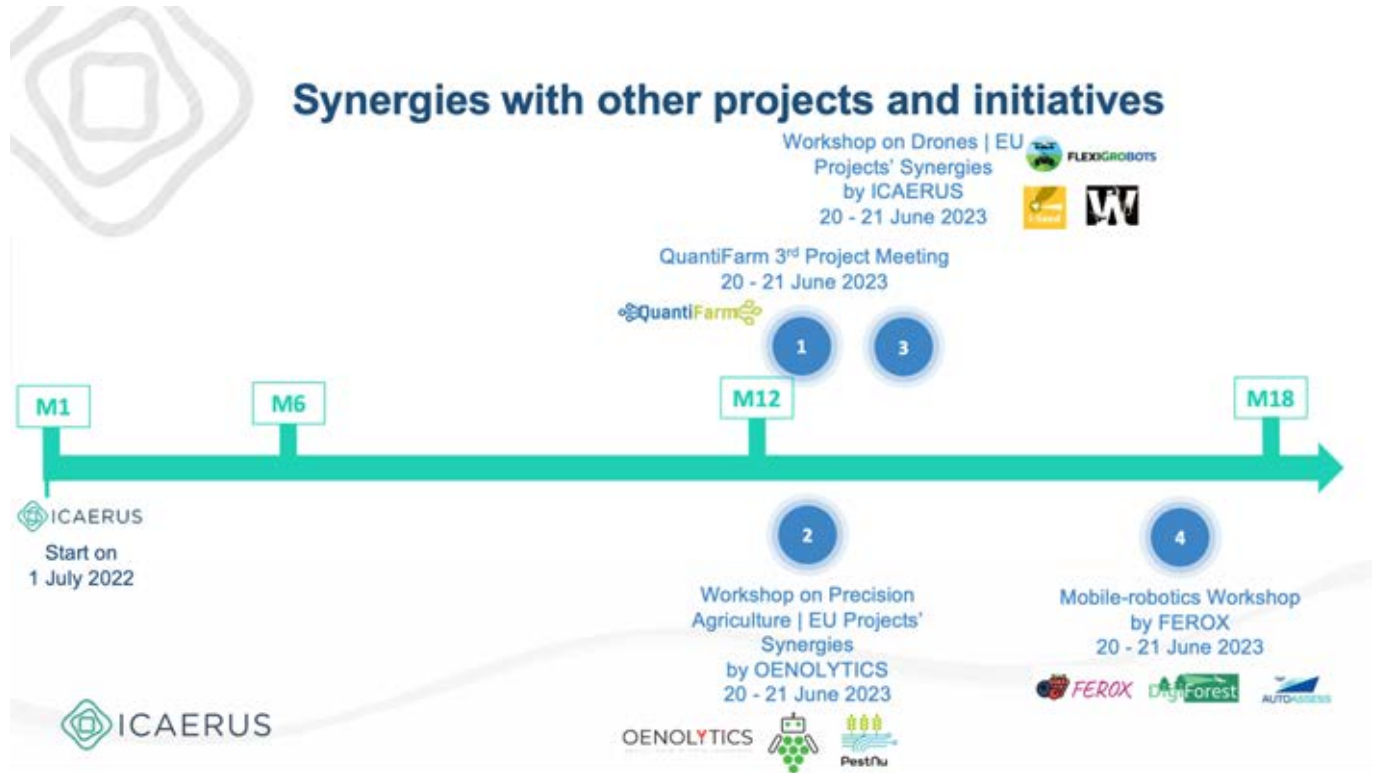


Figure 31 Synergies with other projects and initiatives timeline

4. Other Projects and Initiatives for Consideration

4.1 National and International Research and Innovation Activities Linked with ICAERUS

ICAERUS' partners actively participate in numerous national and international research and innovation projects. Their strategic involvement in these initiatives ensures access to well-established networks comprising relevant stakeholders, valuable results, lessons learned, best practices, innovations, and essential infrastructure. Initial interactions have already taken place, notably during the Synergies Days Conference. These interactions signify the commencement of collaborative efforts and highlight the potential for fruitful cooperation. A brief selection of these initiatives is outlined below, offering a preliminary and non-exhaustive list of H2020, Horizon Europe, and other EU and non-EU projects that merit consideration for potential synergies.

4.1.1.1 agROBOfood

- **Grant agreement ID:** 825395
- **Full title:** agROBOfood: Business-Oriented Support to the European Robotics and Agri-food Sector, towards a network of Digital Innovation Hubs in Robotics



Figure 32 agROBOfood project logo

- **Duration:** 1 June 2019 - 29 February 2024 (57 months)
- **Coordinated by:** STICHTING WAGENINGEN RESEARCH | Netherlands
- **Project Coordinator:** Kees Lokhorst (kees.lokhorst@wur.nl) - Wageningen University & Research
- **CORDIS link:** <https://cordis.europa.eu/project/id/825395>
- **Web page link:** <https://agrobofood.eu/>

The future of robotic agriculture today

Europe's agri-food sector is facing a big challenge: ensuring environmentally-friendly production at lower costs and with a shortage of labourers. The solution requires high-tech modernisation of farming. Robotics can play a big role. The agROBOfood project, a consortium of 39 partners aims to accelerate the sector's digital transformation through the adoption of robotic technologies. To boost the uptake of robotic solutions, it will establish a sustainable network of digital innovation hubs (DIHs). At the heart of the project are innovation experiments (IEs) that will be organised and monitored by the DIHs. The European robotics community will be involved throughout the project to ensure maximum synergy. This will maximise the return of investments from the digital transformation of agri-food.

Main Objective

agROBOfood is dedicated to accelerate the digital transformation of the European agri-food sector through the adoption of robotic technologies. It will consolidate, extend and strengthen the current ecosystem by establishing a sustainable network of DIHs. This will boost the uptake of robotic solutions by the agri-food sector: a huge challenge requiring an inclusive approach involving all relevant European players. The agROBOfood consortium has 39 partners, led by Wageningen University & Research and other core partners of previous key projects such as IoF2020, ROBOT-NET, PicknPack and I4MS, to leverage the ecosystem that was established in those projects. The heart of

the project is formed by Innovation Experiments (IEs), organised and monitored by the DIHs. In each of the 7 Regional Clusters, an initial IE will demonstrate the robotics innovations in agri-food in a manner that ensures replicability across Europe, wide adoption and sustainability of the DIHs network. agROBOfood will work in lockstep with the European robotics community, ensuring synergetic effects with initiatives such as EU-Robotics. This will maximise the return of European, including private capital, investments in the digital transformation of agri-food. A key instrument to achieve this objective is the Industrial Advisory Board. They will provide strategic guidance and also define priorities for the selection of solutions to be funded. Open Calls of 8MEUR will attract additional Innovation Experiments (12) and Industrial Challenges (8). These will expand the network and ensure that vast technological developments and emerging challenges of the agri-food sector are incorporated in the service portfolio of DIHs. Through its inclusive structure and ambitious targets, agROBOfood aims to bring the entire European ecosystem together; connecting the dots in a way that ensures effective adoption of robotics technologies in the European agri-food sector.

Conformed by: 39 partners from 24 countries

4.1.1.2 SmartVitiNet

- **Grant agreement ID:** 101083737
- **Full title:** Smart and Sustainable Drone-Assisted Viticulture Excellence Network



Figure 33 SmartVitiNet project logo

- **Duration:** 1 January 2023 - 31 December 2026 (36 months)
- **Coordinated by:** AGRICULTURAL UNIVERSITY OF ATHENS | Greece
- **Project Coordinator:** Maritina Stavrakaki (maritina@aua.gr) – Agricultural University of Athens
- **CORDIS link:** -
- **Web page link:** <https://www.smartvitinet.eu/>

Main Objective

SmartVitiNet is an innovative project that aims to scale up, pilot, and bring to the market a holistic phytosanitary and plant protection system based on the use of unmanned aerial vehicles, new observational platforms, and new ready-to-use sensors. The project also aims to establish a Competence Center for Precision Viticulture. The proposed research will enable synergies between members of the quadruple helix, utilising their complementary knowledge, experiences and infrastructure in the specific area to achieve innovative results. The sustainability of the undertaking will be ensured thanks to the establishment of the Competence Centre for Precision Viticulture, which aims to upskill sector professionals, create expert networks, facilitate permanent flows of knowledge transfer between academia, innovative SMEs, viticulture professionals, and regional authorities to increase sector competitiveness while enacting EU environmental policies, reducing sector health impact and risks of food pollution. SmartVitiNet addresses several S3 priorities of regions involved and is expected to have significant impacts on regional and EU sectors of Agriculture, Health, Environment, and ICT. The duration of the project is 36 months and it involves participants from Greece, Portugal, Cyprus, and France.

Conformed by: 11 partners from 4 countries

4.1.1.3 CrackSense

- **Grant agreement ID:** 101086300
- **Full title:** High throughput real-time monitoring and prediction of fruit cracking by utilising and upscaling sensing and digital data technologies



Figure 34 CrackSense project logo

- **Duration:** 1 January 2023 - 31 December 2026 (36 months)
- **Coordinated by:** THE AGRICULTURAL RESEARCH ORGANISATION OF ISRAEL - THE VOLCANI CENTRE | Israel
- **Project Coordinator:** Victor Alchanatis (riapechl@iti.gr) - The Agricultural Research Organisation Of Israel - The Volcani Centre
- **CORDIS link:** <https://cordis.europa.eu/project/id/101086300>
- **Web page link:** <https://cracksense.eu/>

Sensing solution for fruit cracking mitigation

Fruit cracking is one of the main physiological disorders limiting fruit quality and yield. It is a peel disorder occurring mainly during the pre-harvest stage due to climatic and environmental conditions and poor orchard management. The EU-funded CrackSense project will develop and upscale sensing technologies providing real-time sensor data through piloting activities concerning the fruit cracking problem in citrus, pomegranate, table grapes and sweet cherries. The Integrated CrackSense Solution will improve the sensor data collected into EU-wide data sets, including Earth Observation Data and other data sets concerning environmental conditions and used to monitor agricultural production. The solution will mitigate the effects of the cracking phenomenon reducing by half the yield losses due to cracking, allowing farmers efficient management and sustainable actions.

Main Objective

Fruit cracking is a peel disorder, limiting fruit quality and yield. The phenomenon occurs mainly in the pre-harvest stage and affects many types of fruit. External conditions like climatic and environmental conditions, and orchard management play important roles in increasing the incidence of the phenomenon, this CrackSense will conduct researches in IL, FR, DE, LT, EL. CrackSense aims to address the problem of fruit cracking in citrus, pomegranate, table grapes and sweet cherries by developing and upscaling sensing technologies that will provide real-time sensor data through piloting activities. The sensor data collected will be upscaled into EU-wide data sets which will encompass Earth Observation Data (provided by Copernicus, e.g. Sentinel) and other data sets reflecting on environmental conditions. This data will be used to monitor agricultural production of the studied crops and enable farmers and growers' efficient management of their resources and sustainability of their actions. By improving the agricultural production of these crops, CrackSense will as well help in creating a model for other agricultural crops. Furthermore, CrackSense will address the critical need for efficient and real-time monitoring of agri-environmental conditions because these conditions have a great influence on agricultural production. By deploying sensing technologies, CrackSense will enable high throughput assessment of cracking incidence risk at fruit, tree, field, and regional scale to mitigate the negative effects of the cracking phenomenon. By reducing 1/2 of the yield losses due to cracking, the use of the Integrated CrackSense Solution will result in 50% higher financial gain for

farmers and growers. Integrated CrackSense Solution will enable farmers and growers to optimise their cost efficiency and generate pathways for more income. Fostering complementarities between partners will enable us to fulfil our goals to bring state-of-the-art CrackSense Solution to end users.

Conformed by: 14 partners from 7 countries

4.1.1.4 Smart Droplets

- **Grant agreement ID:** 101070496
- **Full title:** Accelerating the achievement of EU Green Deal Goals for pesticide and fertiliser reduction through AI, data and robotic technologies.



Figure 35 Smart Droplets project logo

- **Duration:** 1 September 2022 - 28 February 2026 (42 months)
- **Coordinated by:** GEOPONIKO PANEPISTIMION ATHINON | Greece
- **Project Coordinator:** Spyros Fountas (sfountas@aua.gr) – Agricultural University of Athens
- **CORDIS link:** <https://cordis.europa.eu/project/id/101070496>
- **Web page link:** <https://smartdroplets.eu/>

Main Objective

Due to a lack of a holistic approach combining physical and digital assets for optimal field performance and minimum environmental impact, AI models, data and autonomous robotic systems in crop care tasks have not reached a mature technological level. The conventional spraying methods result in excessive pesticide and fertiliser use, posing severe environmental impact - being responsible for soil, water and air pollution, and harming non-target plants, insects, animals and humans. Smart Droplets' main objective is to advance both hardware and software capabilities to deliver a holistic system capable of translating large amounts of data into meaningful information and impactful spraying commands on the field. To demonstrate substantial impact on the Green Deal, Smart Droplets will implement Autonomous retrofit tractors with Direct Injection System (DIS) for intelligent spraying - avoiding exposure of farmers to hazardous chemicals. Through the combination of high-level technologies (>TRL 7), Smart Droplets adopts a hybrid approach for spraying operations, combining Data/AI/Digital Farm Twin technologies designed to translate data into actionable information, and real-time data collected from Field demonstrators evaluating and demonstrating optimised technologies in the real environments. Smart Droplets will exploit synergies with relevant stakeholders, and intensify Community & Capacity building through dedicated training programs designed for non-expert users of AI, data and robotics systems. The Smart Droplets Consortium consists of all agricultural AI, data and robotics value chain actors, and is well balanced in terms of expertise, entity type, and geographical distribution necessary to meet its objectives. Smart Droplets will demonstrate how autonomous robotic platforms, innovative spraying, digital twin and AI models, can deliver environmental, economic, regulatory, business, scientific, and societal benefits, assisting in the achievement of Green Deal goals.

Conformed by: 9 partners from 7 countries

4.1.1.5 BEATLES

- **Grant agreement ID:** 101060645

- **Full title:** Co-creating Behavioural Change Towards Climate-Smart Food Systems



Figure 36 BEATLES project logo

- **Duration:** 1 July 2022 - 30 June 2026 (48 months)
- **Coordinated by:** GEOPONIKO PANEPISTIMION ATHINON | Greece
- **Project Coordinator:** Spyros Fountas (sfountas@aua.gr) – Agricultural University of Athens
- **CORDIS link:** <https://cordis.europa.eu/project/id/101060645>
- **Web page link:** <https://beatles-project.eu/>

Main Objective

BEATLES aspires to change the way agri-food systems currently operate and accelerate the systemic and systematic behavioural shift to climate-smart agriculture and smart farming technologies fully aligned with the ambitions of the Farm to Fork and Biodiversity Strategies, and the new CAP at regional and EU levels. By adopting a food systems approach, the agri-food value chain is viewed as a system of interlinked components where interactions lead to systemic innovations. Through targeted selection of agri-food value chains across the EU and by engaging multiple stakeholders in the co-creation of systemic innovations, in the context of appropriate behavioural and experimental settings, the project will provide an integrative inventory of behavioural insights about the full range of “lock-ins” and levers that hinder or motivate behavioural change, including individual, systemic and policy factors. Five different food systems representing the major crop and livestock farming systems in Europe (cereals, dairy, stone fruits, livestock, vegetables) in various EU regions (Western, Eastern, Southern and Northern Europe), will be studied to account for the diversity in agri-food systems and conditions in the EU. The behavioural insights are used to develop transformative pathways, via business strategies and policy recommendations, to encourage transition to fair, healthy and environmentally-friendly food systems. BEATLES will provide a set of business strategies establishing roadmaps for a fair shift towards climate-smart agriculture, based on environmental, social and economic sustainability assessments. Moreover, a series of policy recommendations and tools will be developed to foster behaviourally informed policy design and implementation. The active participation of multiple value chain actors, at various levels of society (public, political, professional), in the co-creation activities all along the project’s lifespan will establish a mutual understanding of the value

Conformed by: 16 partners from 9 countries

5. Future Cooperation Activities

5.1 Next Steps

The collaboration among all three GOV-01-21 projects, will persist through a series of dedicated Cooperation meetings, ad-hoc meetings focusing on joint activities, and joint participation in various meetings and events. These efforts aim to enhance visibility and promote the outputs of the projects collectively.

5.2 Action Plan for Synergies

The ICAERUS consortium will undertake the following actions to facilitate the space for collaboration, as outlined in the preceding sections and detailed in table below.

Table 4 ICAERUS Action Plan for synergies

Task	Description	Responsible Partner(s)
Mapping of other relevant projects	ICAERUS consortium members will conduct a comprehensive review to identify numerous projects, assessing the potential for common ground and synergies with ICAERUS. The goal is to create a detailed map of relevant projects across the agricultural drones and robotics domains.	ICAERUS Consortium
Initiating contact with additional projects	Once the list of projects is compiled, an initial assessment will be carried out to identify projects with potential synergies. Direct contact will be initiated to further investigate and determine the willingness to coordinate efforts with ICAERUS. This step includes reaching out to newly identified HE projects showing interest in collaboration.	AUA, FSH
Establishing synergies	Building on the strategies outlined, ICAERUS will actively collaborate with sister projects, such as CHAMELEON, SPADE, and other precision agriculture, drone, and robotics projects. Additionally, efforts will be extended to newly identified Horizon Europe projects expressing interest in synergistic initiatives.	ICAERUS Consortium
Reporting on the synergies	Progress and the extent of the action plan's implementation will be documented in project deliverables, specifically in D7.5 and D7.6 "Results of Coordination Projects" (B and C, updates). This reporting will provide a comprehensive overview of the achieved synergies and their impact on the project's objectives.	AUA

The roadmap for future collaboration involves a multidimensional approach aimed at strengthening partnerships and expanding engagement with sister projects and beyond. To enhance collaboration with sister projects, the plan includes the identification and execution of common activities that leverage the synergies and complementary strengths of each project. These joint initiatives will serve as platforms for shared learning, resource optimisation, and coordinated efforts toward common goals. Simultaneously, the initiative aims to initiate exchanges with additional projects, broadening the network of collaboration. The ultimate goal is to create a collaborative ecosystem that goes beyond the existing sister projects. Furthermore, as a significant step towards formalising partnerships, the plan includes the "sealing" of cooperations through the signature of Letters of Interest (LoI). These LoIs will serve as foundational documents outlining the shared vision, objectives, and commitment of involved parties, setting the stage for more detailed collaborations and joint ventures. This approach ensures a strategic and structured pathway for fostering collaborative initiatives in the future.

6. Conclusions and Next Steps

During the first 18 months of the ICAERUS lifetime, significant cooperation activities were carried out, with a primary emphasis on collaborating with sister projects CHAMELEON and SPADE, all of which secured funding under the call "HORIZON-CL6-2021-GOVERNANCE-01-21 - Potential of drones as multi-purpose vehicle – risks and added values." The objective is to establish robust and fruitful coordination, fostering synergies among the projects. Collaboration activities encompass methodological alignment, research endeavours, and coordinated communication, dissemination, and exploitation efforts. Regular cooperation meetings were arranged among the sister projects to fortify collaboration, discuss potential shared activities, plan communication strategies, and set timelines for implementation. These gatherings facilitated an environment for ongoing progress, identification of complementarities, and determination of key partners for successful collaborative efforts.

The active participation of CHAMELEON, SPADE, and ICAERUS in various cooperation meetings and external events has yielded significant conclusions for the three projects. Through these engagements, the projects have successfully established a collaborative foundation, fostering coordination, information exchange, and strategic planning. The outcomes highlight a commitment to joint activities, dissemination efforts, and exploration of new opportunities. The synergy with sister projects is detailed in the report, emphasising potential areas of cooperation, outcomes of cooperation meetings, and joint participation in events. Notable events include meetings with Policy Officers from the European Commission, the Synergy Days Conference by SMARTAGRIHUBS, and the MDPI Topics Webinar on EO&GEO Series focused on "Drones for Rural Development." The special invitation from the European Commission marked a pivotal moment, emphasising the recognition and interest in the projects' research on the "Potential of drones as multi-purpose vehicles." The subsequent virtual policy event showcased the projects' contributions, and the outcomes underscored a keen interest from the EC in their work. The identified policy topics for further discussion indicate the potential influence of these projects on the development of drone-related policies at the European level. Participation in events like Synergy Days by SMARTAGRIHUBS and the EO&GEO Series: "Drones for Rural Development" webinar served to collectively showcase the projects, enhancing visibility and engagement with a broader audience. The Synergy Days event, in particular, provided a platform for individual pitches, booths, and collaborative workshops, amplifying the projects' goals and impactful use cases. The webinar on "Drones for Rural Development" further demonstrated the projects' commitment to knowledge dissemination, with experts from CHAMELEON, SPADE, and ICAERUS sharing experiences and insights. The collaborative effort in presenting key topics related to rural development and effective drone utilisation showcased the projects' impact in diverse applications.

Finally, ICAERUS has demonstrated a proactive and expansive approach to collaboration, extending its reach beyond sister projects to actively engage with external initiatives. The initiation of a significant collaboration with the QuantiFarm HE Project reflects ICAERUS's commitment to fostering partnerships and advancing digital technologies in agriculture. Participation in workshops, such as the Workshop on Precision Agriculture organised by OENOLYTICS, alongside notable projects like BACCHUS and PestNu, underscores ICAERUS's dedication to knowledge exchange and exploration of synergies within the agricultural domain. The "Workshop on Drones | EU Projects' Synergies," hosted by ICAERUS, provided a platform to showcase and highlight various EU projects, including H2020 FlexiGroBots, H2020 I-Seed, and MSCA WildDrone, emphasising collaborative efforts and shared objectives in the realm of drone technology. Furthermore, the Mobile-Robotics Workshop organised by the FEROX Project served as a collaborative hub for Horizon Europe projects, featuring comprehensive overviews from FEROX, DIGIFOREST, FLEXIGROBOTS, AUTOASSESS, and ICAERUS. These diverse activities collectively contribute to expanding collaboration networks, sharing knowledge, and exploring synergies with a broad spectrum of projects and initiatives in the agricultural drones and robotics domains. The timeline visualisation below offers insights into ICAERUS's strategic collaborations and engagements, providing a snapshot of its approach.

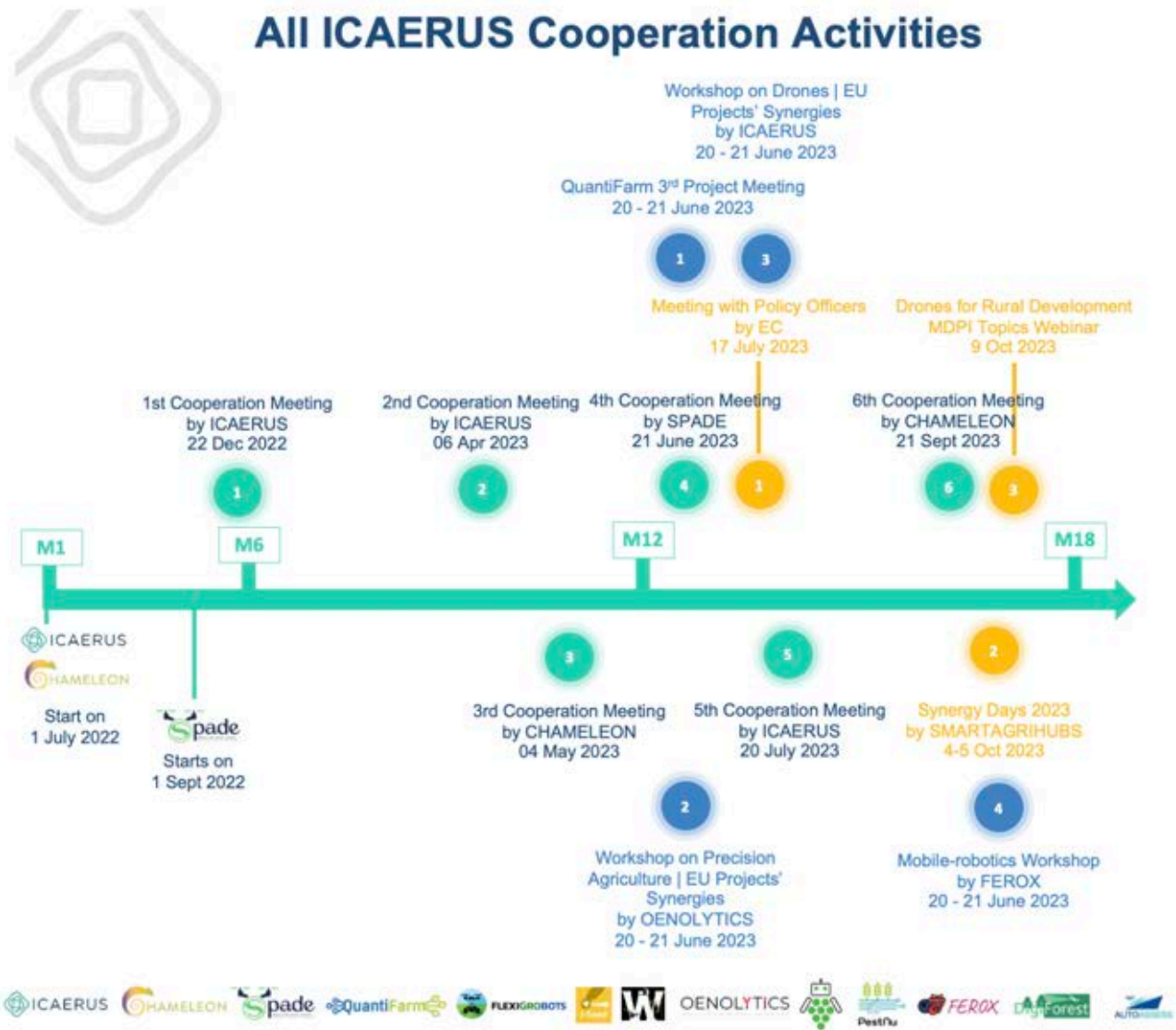


Figure 37 All ICAERUS cooperation activities

In conclusion, the active involvement in these events has not only strengthened the collaborative spirit among CHAMELEON, SPADE, and ICAERUS but has also enhanced their visibility, engagement with stakeholders, and potential influence on policy development. The commitment to ongoing discussions and future collaborations underscores a shared dedication to advancing the field of drone technology and its applications in agriculture and beyond.

The roadmap for future collaboration outlines a comprehensive strategy to strengthen partnerships, engage with sister projects, and connect with potential collaborators. Focused on collaboration with sister projects, the plan involves executing shared activities to leverage synergies and strengths. These initiatives serve as platforms for mutual learning, efficient resource utilisation, and coordinated efforts. Simultaneously, the plan aims to broaden the network by connecting with additional projects, creating an inclusive collaborative ecosystem. Crucially, the roadmap includes formalising partnerships through the endorsement of Letters of Interest, laying the foundation for detailed collaborations in the future.

Annexes

Annex I: Sister Projects 'Cooperation General Information & Activities' Spreadsheet

Table 5 'Cooperation General Info & Activities' Spreadsheet - General Information for the Sister Projects




Acronym	Grant agreement ID	Full Title	Starting Date	End date	Project Duration	Coordinated by	CORDIS link	Web page link	Name	Email address	Organisation	Role	Comments
 CHAMELEON	101060529	A Holistic Approach to Sustainable, Digital EU Agriculture, Forestry, Livestock and Rural Development based on Reconfigurable Aerial Enablers and Edge Artificial Intelligence-on-Demand Systems.	1 July 2022	30 June 2025	36 months	ACCELIGENCE LTD Cyprus	https://cordis.europa.eu/project/id/101060529	https://chameleon-bev.eu/	Pantelis Velanas	pvelanas@acceligence.tech	Acceligen Ltd	Project Coordinator	
									Dimitris Pericleous	dimitris.pericleous@acceligence.tech	Acceligen Ltd	Project Manager	
									Diego Gonzalez Aguilera	daguilera@usal.es	Universidad de Salamanca	Communicati on Manager	
									Susana Lagüela López	slaguel@usal.es	Universidad de Salamanca	Communicati on Manager	
									Christiana Themistocleous	christiana.themistocleous@acceligen ce.tech	Acceligen ce Ltd	Project Manager	
 ICAERUS	101060643	Innovations and Capacity building in Agricultural Environmental and Rural UAV Services	1 July 2022	30 June 2025	36 months	Agriculture University of Athens Greece	https://cordis.europa.eu/project/id/101060643	https://icaerus.eu/	Spyros Fountas	sfountas@aua.gr	Agriculture University of Athens	Project Coordinator	
									Akaterini Kasimati	akasimati@aua.gr	Agriculture University of Athens	Project Manager	
									Dimitris Fotakidis	dimitris@foodscalehub.com	Foodscale Hub	Communicati on Manager	
									Mackenzie Baert	mackenzie@foodscalehub.com	Foodscale Hub	Communicati on Manager	
 SPADE	101060778	multi-purpose Physical-cyber Agri-forest Drones Ecosystem for governance and environmental observation	1 September 2022	31 August 2026	48 months	Institute for Bio-Economy and Agri-Technology (IBO), Centre for Research and Technology – Hellas (CERTH) Greece	https://cordis.europa.eu/project/id/101060778	https://spade-honon.eu/	Dionysis Bochtis	d.bochtis@certh.gr	IBO/CERTH	Project Coordinator	
									Aristotelis Tagarakis	a.tagarakis@certh.gr	IBO/CERTH	Project Manager	
									Teimo Fernandes	teimofernandes@spi.pt	Sociedade Portuguesa de Inovação	Communicati on Manager	
									Pedro Monteiro	pedromonteiro@spi.pt	Sociedade Portuguesa de Inovação	Communicati on Manager	

Table 6 'Cooperation General Info & Activities' Spreadsheet -CHAMELEON Project-Specific Activities

		CHAMELEON	
*Cooperation is a		Task	
Main activities included in Projects' Work Plan - Related with Cooperation and / or Communication and Dissemination			
Activity	Activity description	Partner in charge	Notes
Conceptualisation, use cases and system architecture	Engage and empower agriculture, bioeconomy, and communities in improving the agriculture industry. Analyze challenges in aerial platform development and explore localized edge solutions for farming, forestry, and the rural sector. Address the techno-economic aspects of architectural elements.	UCLM	
CHAMELEON Solution for multi-purpose onboarding	Develop a Plug-n-play platform for Cooperative Edge UAV and Fixed-wing UAVs. Enable easy on-boarding of services, bundles, and AI capabilities, including Bundles and Services tailored for Proof of Concept operations.	LAMMC	
CHAMELEON innovation platform	Provide a reusable and reliable platform for data sharing, fostering innovation, standardization, and smart application implementation while enhancing local businesses and reducing costs.	UNPARALLEL	
CHAMELEON Applicability and piloting	Conduct initial tests, create the Pilot Campaign Plan, and conduct pilots to validate ecosystem capabilities for agriculture stakeholders. Assess the CHAMELEON Ecosystem's impact on supporting agriculture and related policies.	JOAFG	The following three countries have been selected to test and validate the CHAMELEON Project: 1) Austria 2) Greece 3) Spain
Market shaping, scale-up business models and socio-economic impact & chameleon outreach and awareness generation	Analyze the cost-benefit of CHAMELEON, develop a robust global business plan, identify cost-effective business models, and implement an effective communication strategy	USAL	
Open Call Management			
Open call evaluation, set up establishment		UNPARALLEL	

Table 7 'Cooperation General Info & Activities' Spreadsheet -SPADE Project-Specific Activities


		SPADE	
*Cooperation is a		Task	
Main activities included in Projects' Work Plan - Related with Cooperation and / or Communication and Dissemination			
Activity	Activity description	Partner in charge	Notes
Drone Landscape Analysis	Drones ad multi-purpose vehicle impact on the Farm-to-fork ecosystems. Analysis of the drone actors and needs, innovations and technologies, standards, regulations, and risks	HAFENSTROM	
Horizontal standardization components	define as standardisation plan, with the objective to support the various initiatives to promote data spaces,	TRIALOG	
Ecosystem and Market watch, Assessment & Evaluation	Agent-based simulation tool to analyse the potential risk impacts on the environment	NTNU	
Socio-economic and environmental evaluation of the SPADE concept	LCA and SDGs impact evaluation	Aarhus Univ.	
SPADE physical system. Drones and sensors development	digital twins, and IoT with specific contributions on drones, agri applications and trustworthiness.	SDU	
SPADE cyber system development	Development of the SPADE platform including Digital Twin and ML tools for edge computing applications.	GRADIANT	
Open Source Ecosystem	set up the framework and guidelines for good open-source practices to effectively manage SPADE contributions to the European Open Source IoT-Edge-Cloud landscape	ECLIPSE	
Pilot multi-purpose applications deployment and integration	deploy the 3 pilots (open-field agriculture, forestry and livestock farming) addressing 3 use cases in each based on drone type and operation (small - swarm / medium - cooperative / large - single, heavy duty)	CERTH	
Open Calls	launch 2 open calls with topics to develop complementary tools to the ones developed from the consortium and be integrated in SPADE ecosystem	SPLORO	

Table 8 'Cooperation General Info & Activities' Spreadsheet -ICAERUS Project-Specific Activities

ICAERUS		ICAERUS	
*Cooperation is a	Task		
Main activities included in Projects' Work Plan - Related with Cooperation and / or Communication and Dissemination			
Activity	Activity description	Partner in charge	Notes
Drone Landscape Analysis	Analysis of the drone landscape in Europe, including actors and needs, innovations and technologies, standards, regulations, and risks	Noosware	
Drone Data Analytics Library	Identification and optimisation of existing data analytics models for drones (open-access repository)	Wageningen University	
Use Cases and Demonstration Activities	Large-scale multi-actor experiments and demonstration events where drone technology (hardware and software systems) will be optimised, tested and demonstrated	GeoSense	The following use cases have been selected: 1) Crop monitoring in Spain; 2) Drone spraying in Greece; 3) Livestock monitoring in France; 4) Forestry and biodiversity monitoring in Lithuania; and 5) Rural logistics in North Macedonia
Capacity Building & Value-added Services	Development of a free, open-access online training course, onsite learning workshops, and value-added services	Open University	
Ecosystem Building & Communication & Dissemination	Enlarge the ICAERUS ecosystem	Foodscale Hub	
Open Calls	Coordination of the Open Call		
Business and Governance Modelling	Develop and implement inclusive business and governance models		
ICAERUS Platform	Development of the Platform that will host and make available all application-oriented outputs	Agricultural University of Athens	

Annex II: Mobile-robotics 'Cooperation General Information & Activities' Spreadsheet

Table 9 'Cooperation General Info & Activities' Spreadsheet - General Information for the Mobile-robotics Projects

	Acronym	Grant agreement ID	Full Title	Short Description	Starting Date	End date	Project Duration	Coordinated by	CORDIS link	Web page link
	FEROX	101070440	Fostering and enabling AI, data, and robotics technologies to support human workers in harvesting wild food.	It is estimated that less than 10 % of annual wild berry production in Nordic countries is harvested manually from forests. Due to the short season, most pickers are migrant labourers with limited knowledge of the language, culture and forests. As such, their working conditions represent the main challenge in manual forest harvesting. The EU-funded FEROX project will improve the working conditions of the wild berry pickers through advanced technologies. The project will employ autonomous drones equipped with various sensors to acquire data used to build AI models and 3D models of the forests to precisely estimate berries' locations, amounts and types. FEROX will demonstrate the solution in the Finnish forests.	1 September 2022	31 August 2025	36 months	FONDAZIONE BRUNO KESSLER Trento Italy	https://cordis.europa.eu/project/id/101070440	https://ferox.fbk.eu/
	DigiForest	101070405	Digital Analytics and Robotics for Sustainable Forestry	Forests are essential for combatting climate change and maintaining our planet, with forestry operators and organisations monitoring forests, assisting their growth, timber output and maintenance. Unfortunately, monitoring large expanses of forest can be difficult and inaccurate which is dangerous for properly maintaining a forest's health. The EU-funded DIGIFOREST project introduces an innovative solution, improved forest monitoring and data management using robots and artificial intelligence. By utilising several different robots to collect 3D spatial data on forests and individual trees followed by AI documenting and AI representing it, it offers forestry operators and policymakers an unparalleled tool.	1 September 2022	28 February 2026	42 months	TECHNISCHE UNIVERSITÄT MÜNCHEN Germany	https://cordis.europa.eu/project/id/101070405	https://digiforest.eu/
	ICAERUS	101000643	Innovations and Capacity building in Agricultural Environmental and Rural UAV Services	There is a great variety of sectors that can benefit from drone applications today. The EU-funded ICAERUS project will explore the multi-purpose application potential of drones in agricultural production, forestry and rural communities through five specific drone applications. The selected drone applications represent the most important sectoral and societal uses of drones in Europe and cover multiple applications that are interconnected within Europe's complex rural landscape. The project will identify the associated risks and added values and provide a more complete and interconnected account of the potential and impact of drones as multi-purpose vehicles. ICAERUS will further develop existing software technology, platform components and knowledge about drones either as positioning systems for visual observation and recording or as instruments for spraying and delivering goods.	1 July 2022	30 June 2026	48 months	Agriculture University of Athens Greece	https://cordis.europa.eu/project/id/101000643	https://icaerus.eu/
	FLEXIGROBOTS	101017111	Flexible robots for intelligent automation of precision agriculture operations	In an effort to enhance agricultural production, agricultural robots are being increasingly adopted. The number of discreet tasks to be automated, however, significantly reduces the flexibility of current solutions, thus impacting efficiency and limiting their take-up. The EU-funded FLEXIGROBOTS project aims to develop a platform that will help build heterogeneous multi-robot systems, allowing for vastly improved flexibility by using existing robots for multiple tasks. This could help produce higher-value data from a variety of sources and sensors, increasing operational autonomy and precision while greatly reducing costs and encouraging investment in robotics.	1 January 2021	31 December 2023	36 months	ATOS IT SOLUTIONS AND SERVICES IBERIA SL Spain	https://cordis.europa.eu/project/id/101017111	https://flexigrobots-2020.eu/
	AUTOASSESS	101120732	Autonomous aerial inspection of GNSS-denied and confined critical infrastructures	The AUTOASSESS project deals with critical infrastructure structural surveying and aims to develop an autonomous robotic system-of-systems to remove humans, working in confined spaces from harm's way, while demonstrating beyond human capabilities in terms of accuracy and repeatability of vessel inspection. AUTOASSESS tries to reach this goal by combining and integrating the latest developments in collision-tolerant UAS, multi-modal Simultaneous Localization and Mapping, path planning, autonomous drone racing, aerial manipulation, miniaturised NDT sensors and Machine Learning-based defect identification it is possible to deploy drones in these tight spaces for inspection purposes.	1 October 2023	30 September 2027	48 months	DANMARKS TEKNISKE UNIVERSITET Denmark	https://cordis.europa.eu/project/id/101120732	https://autoassess.eu/

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