Frequently Asked Questions

SPADE Open Call #1

OPENING: 09 February 2024

CLOSING: 10 April 2024 at 17:00 (Brussels time)

Project Website: https://spade-horizon.eu/

Open Call platform: https://bit.ly/SPADE_OC1

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Funded by the European Union

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This project has received funding from the European Union's Horizon Europe Research and Innovation program under Grant Agreement No. 101060778

1. Introduction

SPADE is a project funded by the European Union under the Horizon Europe program through the HORIZON-CL6-2021-GOVERNANCE-01 call. SPADE comprises a consortium of 21 partners from 10 European countries.
Initiated in September 2022, this project is scheduled to span a duration of 4 years and is under the coordination of the Centre for Research and Technology Hellas (CERTH) in Greece.

The strategic objective of SPADE project is to develop an intelligent ecosystem to address the multiple purposes concept in the light of deploying unmanned aerial vehicles (UAVs alias drones) to promote sustainable digital services for the benefit of a large scope of end users in sectors of crop production, forestry, and livestock. This includes individual UAV usability, UAV type applicability (e.g., swarm, collaborative, autonomous, tethered), UAV governance models availability and UAV-generated data trustworthiness. Multi-purposes will be further determined in the sensing dataspace reusability based on trained Artificial Intelligence (AI)/Machine Learning (ML) models. These models 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 agriculture. Pilot prototypes will contribute toward greater goals, such as the reduction of deforestation, precision farming and animal welfare.

3 Pilots Prototypes, one per domain (i.e., forestry, cropping and livestock farming), deploying 9 Test Cases combined with 2 Open Calls for up to 12 complementary small projects will contribute toward the goals of sustainable forestry and farming.

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2. General question about the project

2.1 What is SPADE?

The SPADE project will take a multifaceted approach. First, it will create a digital ecosystem to address the multipurpose character of UAVs improving the accessibility and control of drone operations, making it easier to utilize UAVs effectively. This platform will also serve as a channel for value-added services enabled by drones. Second, SPADE will showcase three innovative case studies for drones, analyzing and quantifying the benefits at a detailed stakeholder level. These demonstrations will not only reveal new business opportunities but also help in examining the regulatory framework at both international and national levels.

SPADE is excited to announce the launch of two Open Calls, with a total budget of 720,000 EUR thoughtfully distributed between them, to finance up to 12 innovative projects. These Open Calls are a significant part of SPADE's commitment to driving innovation in the field of drones for agriculture.

2.2 How much funding will be distributed in OC#1?

For the first Open Call (OC#1), the SPADE project has allocated an overall budget of 360,000 EUR. The funding is disbursed to selected projects using a "flat rate" approach, with a maximum of 60,000 EUR per beneficiary. The distribution of funds occurs progressively based on achieved outcomes and milestones.

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3. General Questions about the Open Call

3.1 Who can apply?

Eligible entities for SPADE OC#1 include universities, research centers, NGOs, foundations, SMEs, and startups. Specific legal definitions apply, such as compliance with European Commission recommendations for SMEs. Large corporations (non-SMEs) are excluded from funding. Applicants must be legally identified entities in eligible countries.

3.2 When can I apply?

The application period for SPADE OC#1 opens on February 09, 2024, and closes on April 10, 2024. All applications must be submitted within this timeframe. Late submissions will not be considered. Applicants are encouraged to initiate the application process well in advance to ensure timely submission.

3.3 How can I apply?

Applications must be submitted through the official online submission SPLORO platform, directly linked to the SPADE website. Only applications received through this platform are considered eligible.

3.4 Can I update my application after submission?

If the deadline hasn't passed, applicants are allowed to submit a new version of their application.
You may request to resubmit your proposal after the initial submission by seeking support from the helpdesk. Please note that to reopen a proposal, candidates are required to complete the resubmission process before the set deadline. When a proposal is reopened, it is reverted to draft status, necessitating a new submission. Failure to resubmit will result in the proposal not being evaluated.
Resubmission requests will be answered up to two hours before the deadline. The helpdesk cannot guarantee a timely response during the last two hours of the open call. Consider this when writing your proposals.

3.5 Where and when can I get support in case of questions?

A dedicated support channel is available for applicants at spade@sploro.eu. Support requests receive a response within 72 hours. While efforts are made to respond promptly, applicants are advised to plan their submissions with sufficient time before the deadline. Inquiries received after two days before the call closure time may not be considered or answered.

3.6 How many projects will benefit from the OC#1?

SPADE will fund a total of 6 projects. Please note that these are distributed across challenges corresponding to the case studies within the SPADE project. To learn about the 6 challenges, please refer to the guideline for applicants.

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4. Questions related to the evaluation.

4.1 How is the evaluation process conducted?

The evaluation process for SPADE OC#1 consists of several key stages:

1. Application Reception: Submissions are accepted exclusively via the SPLORO platform. The submission deadline is April 10, 2024, at 17:00 (Brussels time).

2. Eligibility Criteria Check: An automatic filtering process will verify that all required fields are completed, proposals are submitted by a single partner (no consortium allowed), applicants are registered in an EU Member State or a Horizon Europe associated country, legal entities exist, and other specified criteria are met (check the guidelines for applicants)

3. Experts' Remote Evaluation: Eligible applications will undergo a remote evaluation by two external experts with expertise in technology, business development, and drone technology. They will assess criteria such as Team, Technical Excellence, Implementation, and Impact.

4. Normalization Score: This method would ensure a more balanced distribution of scores and reduce the possibility of biases and distortions.

5. Final Selection: Proposals will be ranked based on scores, and the best six proposals (one proposal per challenge) will be invited to sign the sub-grantee agreement and execute their projects.

6. Validation of Legal Entity: Before final validation, a thorough check of the legal entities will be performed, including the submission of various documents to ensure compliance with SPADE project requirements.

7. Approval: The SPADE consortium will formally approve a list of proposals within the available funding limits. The list will be submitted to the European Commission for final screening and approval. Successful applicants will receive an Evaluation Summary Report and an invitation to sign the Sub-grantee Agreement.

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5. Questions related to funding.

5.1 What is the total funding limit for a single organization?

The total funding limit for a single organization across all SPADE calls is set at 60,000 EUR.

5.2 How are payments structured?

The payments for selected projects are structured based on the achievement of specified metrics outlined in the execution plan, considered a legally binding document. The payment structure is as follows:

	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7
OUTPUT	KPIs and deliverables definition		Interim Report + Deliverables			Final Report + Deliverables	
Payments (EUR)				30,000			30,000

Conditions: Payments are contingent upon successful compliance with metrics and project objectives.

5.3 What deliverables do I need to provide to receive the payments?

Please note that, in addition to defining KPIs at the beginning of the project execution and the reports at months 3 and 6, there are specific deliverables that must be met to receive payments. The deliverables vary depending on the challenge, as shown in the following table.

Challenge	Deliverable Name/Description	Deliverable Date
UCU-CH1	Initial Report	M1
	Drone Swarm Data Transfer Performance Prototype	M3
	Interim report	M3
	Drone Swarm Navigation Prototype	M6
	Final report	M6
UCU-CH2	Initial Report	M1
	Preliminary Hardware Design	M3
	Initial Software Prototype	M3
	Interim report	M3
	Final Hardware Design	M6
	Testing and Optimization	M6
	Final report	M6
CStudy1-CH1	Initial Report	M1
	Basic Software Prototype	M3
	Map Generation	M3
	Interim report	M3
	Full Software Version	M6

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	Final report	M6
CStudy1-CH2	Initial Report	M1
	Infrastructure Prototype	M3
	REST API for Third-Party Algorithm Processing	M3
	Interim report	M3
	Full Software Version and Development Tools	M6
	AI Model Development Toolkit	M6
	Final report	M6
CStudy2-CH2	Initial Report	M1
	Algorithm Prototype	M3
	Interim report	M3
	System testing and validation	M6
	Codebase delivery	M6
	Final report	M6
CStudy3-CH1	Initial Report	M1
	Module for extraction and transmission of wearable sensor data	M3
	Module for real-time interface with UAV	M3
	SPADE Livestock Storage Platform	M3
	Interim report	M3
	Module for dataset integration	M6
	Final report	M6

However, you can add additional deliverable in each of the implementation phase if you wish.

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6. Questions received through the support channel.

In this section, the responses to all the questions received through the SPADE Support channel are shared.

1. Is a project focused on vineyard management eligible for this call?

Spade's OC#1 focuses on six specific challenges aimed at furthering the development of the project's three use cases. To be eligible for funding through the SPADE Open Call, applicants must align their solutions with one of the 6 challenges:

- UCU-CH1: Swarm communication and navigation.
- UCU-CH2: Open-Source Data Transfer solution/hardware and software solution for efficient, real-time data transfer.
- CStudy1-CH1: Aerial mapping.
- CStudy1-CH2: Infrastructure for enabling cloud processing of ML tools within SPADE platform.
- CStudy2-CH1. Drones for Below-Canopy Mapping and Inventory.
- CStudy3-CH1: Integrating livestock sensors, edge computing data, and SPADE Livestock Cloud.

2. How can we access the presentations from the webinars and other documents for the Open Call?

All the documentation for Open Call #1 as well as the webinar recordings is available on the SPADE website and YouTube.

3. What is the core of this Open Call? An algorithm, a software code?

The core of this Open Call revolves around software development, algorithms, and coding modules, while the hardware specifications for real-time data transfer will be provided by SPADE pilots.

4. Could you clarify what you mean by "digital twin"? Should it be AI/ML-enabled with the intention to predict and manage activities, or are you referring to a lighter version in the form of automation processes?

The digital twin on the SPADE Core Platform (SCP) will be a runtime designed to deploy digital twin instances from a set of templates provided by the platform. These templates will be first targeted to use cases based on drones and will aim to be a digital copy of the status of said drones during their normal operations in the use cases established by the pilots. in the future, the platform may be extended with more complex and feature rich digital twins including AI/ML based simulations that can be used to predict the system behavior based on the current and past status of the real world assets.
To extend a bit more on what we intent to do, the DT runtime on the SPADE Core Platform will be based on the Eclipse Basyx project, an implementation of the AAS (Asset Administration Shell) paradigm that represents real world stuff as a set of assets with a well defined set of functions, properties and data structure. The first goal of the SPADE Core Platform is to define a set of AAS models that describe the real world drones involved in the different pilot use cases and generate templates to be used on the platform.

5. Concerning the Spade platform - do external services need to address specific use-case challenges, or can proposals explore broader applications such as cybersecurity, data ownership, or data validation for AI/ML (verification of datasets)?

The SPADE Core Platform is being developed as a scalable platform able to grow in the future with developments from any third party interested to provide services to the SPADE ecosystem. At this moment the Open Calls accept only chalenges proposed by the SPADE consortium. Therefore, submissions should focus on adressing one of these challenges. However, any proposal out of these challenges would be very welcome to be considered by SPADE when preparing the second Open Call.

6. Is it feasible to incorporate the "OpenDroneMap" suite into the proposed solution?

Open drone map is under the AGPL license. You have the answer in their forum:

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https://community.opendronemap.org/t/commercial-usage-along-with-custom-built-software/8377/2.

SPADE team agreed to share the core platform code but doesn't want to force future developer to disclose their own code. If we integrate any piece of ODM in SPADE, SPADE will become AGPL and we don't want that. Feel free to convince this community (7 developers) to change their mind and move to a more business-friendly license.

7. Will more specifications of the drone be defined as well? Such as frame, motors, ESC, FC, etc.?

The information below is tentative and could be changed. However, for general guidance, the preliminary specs are:
Small Drone:
- Computer: NVIDIA Jetson Orin Nano
- GNSS: M10 GPS
- Flight controller: Pixhawk 6C
- ESC: BLHeli S ESC 20A
- Stereo camera: Zed2
- Frame size: 250mm (QAV250 kit)
- Payload: ~300g

Medium Drone:
- Computer: Raspberry Pi 5, however NVIDIA Jetson Orin Nano can be used if extra computational power is needed.
- GNSS: H-RTK F9P Rover Lite
- Flight controller: CUAV V5+
- ESC: T-Motor 605-X
- Stereo camera: Zed2
- LiDAR: Ouster OS0
- Frame size: 960 mm, 4x 575mm diameter rotors.
- Tarot X4 kit.

Note, however, that we are looking for a solution that can handle multiple drones, we would not want a solution that was tailored specifically to a single drone. The main goal of the algorithm will be to read the drone sensors, build a map, and then pass directional commands to the flight controller-so in that way, your algorithm doesn't need to "know" about the details of the drone, as long as it completes the commands that are given to it (which is our job).

8. Were the stereo cameras and companion computers suggested options, or are they mandatory requirements?

The solution must use the hardware mentioned in the answer to question 6.

9. Could you please provide more details regarding the specifications of the small SDU drone? For instance, what types of sensors does it carry, and how long is its flight time?

Time of flight is about 5 minutes for the small drone, this will be confirmed after testing. Sensor information is provided in the answer to question 6.

10. To determine the processing latency, we need to know the speed of drone navigation. Could you provide us with that data?

There is not a preset navigation speed, other than generally "faster is better". We do not expect to be running at the full speed capability of the drone. If possible, estimate the speeds you can achieve in your proposal.

11. Have the ROS messages, such as GPS coordinates and camera images, been defined? If so, could you please provide some examples?

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Please refer to the sensor list above and the manual for that specific sensor. A list of the topics published by the flight controller is also provided here:
https://github.com/PX4/PX4-Autopilot/blob/main/src/modules/uxrce_dds_client/dds_topics.yaml

12. What format should the output messages be in to send navigation commands to the drone?

Please refer to the flight controller specifications above. Communication is over the uXRCE-DDS serial port. Docs:

https://docs.px4.io/main/en/advanced_config/ethernet_setup.html#ros-2-setup-example

13. Will we directly control the motors, or are there predefined navigation commands? If there are defined commands, could you provide some examples?

No, you're just sending basic navigational controls to the flight controller.

14. Do you provide information about any gyroscope or accelerometer in addition to GPS coordinates? What sensors do you have available?

The IMU sensors are the ones on-board with the flight controllers above. You can find the specs in the manuals for these flight controllers. Additionally, the GNSS modules typically have a compass built in.

15. Are you familiar with the "OpenDroneMap" suite? Would it be feasible to incorporate that code into the proposed solution?

Open drone map is under the AGPL license. You have the answer in their forum:

https://community.opendronemap.org/t/commercial-usage-along-with-custom-built-software/8377/2.

SPADE team agreed to share the core platform code but doesn't want to force future developer to disclose their own code. If we integrate any piece of ODM in SPADE, SPADE will become AGPL and we don't want that.

16. Will only applicants with a background in potato breeding be eligible to apply for funding related to the first case study (Open-Field Case Study, Spain), or can applicants with expertise in other crops such as cereals also apply?

The open call's topics that target the open-field use case are completely independent from the type of crop. One topic is for the generation of orthomosaic maps based on drones imagery, and the second one is for the development and implementation of the infrastructure needed for accomodating online machine learning algorithms.

17. Is there a template available for a project proposal, similar to those used for Horizon RIA projects, and what are the page limits for such proposals?

You can access the Application Form provided in the Support Documentation. This document is for reference purposes only but contains the same questions that you must answer during your application on the Sploro platform. The only available channel to apply for the SPADE open call is through the Sploro platform.

18. Should we strictly adhere to the deliverables outlined in the Guide for Applicants, or are we encouraged to enhance them? For instance, would it be permissible to

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deliver, in addition to the robust SLAM and forest mapping, an AI model capable of providing semantic information about the forest or ground environment? Would incorporating such enhancements work in our favor?

You are encouraged to enhance them, if possible! The semantic segmentation of the forest may be necessary in a basic sense (to identify certain static features, like ground/trunks), but if additional information can be provided that is only a benefit (if it doesn't impact the accuracy of the basic model).

19. **For the CStudy2-CH1: "Drones for Below-Canopy Mapping and Inventory," two types of drones have been mentioned. However, only the small drone will be used, isn't that correct?**

The ideal solution would be able to work on both the small and medium sized drones. However, because the sensory input on the small drone is limited (only a stereo camera), this could make the solution challenging if the scope was limited to only the small drone. Thus, we also accept applications that would only work on the medium sized drone (which has a 3D LiDAR scanner). In your application, be clear about what hardware your solution would rely on, and whether it would work solely on the medium drone (or small drone) or could work on both.

20. **When preparing a project proposal, what kind of hardware (such as UAVs, video cameras, additional communication, and service equipment) should we prioritize focusing on? Specifically, what hardware is already being utilized by the partners of the SPADE project?**

Pixhawk/PX4 flight controller with ROS2 running on an onboard computer. (More detailed information is also provided in Q7)

21. **Should we consider offering our own hardware options, and if so, how will they be tested in practice?**

We encourage the exploration of additional hardware options that can enhance system stability or performance. Before implementation, it is essential to consult with SPADE's technical team to ensure alignment with project specifications. The proposed hardware should be standalone, configurable, and compatible with SPADE's drone platforms. Testing protocols will be established in coordination with SPADE's quality assurance procedures to ensure seamless integration and functionality.

22. **What budget allocation should be reserved for our hardware?**

Regarding budget allocation, for Cascade Funding projects, there is no requirement to justify the allocation of the received budget. Payments are made based on established deliverables. Therefore, there is no need to request a specific budget allocation for personnel or hardware; participants have the freedom to manage the budget as they see fit. However, a crucial condition is that they cannot subcontract activities essential for the project's development.

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23. The main query is to know the hardware/software architecture that needs to be implemented and what we are asked to develop, defining specifically whether it is hardware or software. In the presentation is said "modules" and it is not clear to us.

More particularly:

WP1: Data collection with the use of wearables We understand that some animals wear a collar with all the sensors, but that it is a device that we cannot modify its software or hardware. Therefore, what is requested is a device to be installed on the farm where the cattle are, which has to be able to communicate with the collar, which will have a communication protocol of which you will give us information? In addition, that same device will be the one that transmits the data to your platform with MQTT protocol via cellular communications.

WP2: Data collection with the use of UAV API We understand that what is required is to develop an application to be integrated into the drone's transmitter/tablet that, making use of the drone's API, sends location, images and videos of the sensors installed in it. To do this, a video stream server needs to be developed to send it to the SPADE Livestock platform. But another interpretation is that we should develop a hardware module to be on the drone to do such tasks.

Answer:

WP1 ANSWER: SPADE partners will provide any hardware required to develop the solution (i.e. collar sensors and connectivity requirements tor the SPADE Livestock platform). Based on the provided hardware, you can propose any solution you would prefer that involves customizing the edge computing sensing device to transmit to the SPADE Livestock platform the sensor data.

In month 1 you will have to decide the design details of your approach, and present them to SPADE Livestock pilot partners to gain consensus and endorsement prior to starting development.

WP2 ANSWER: It is up to you to choose the most appropriate (effective, consistent and complete) design, keeping in mind that SPADE prefers open source OEM agnostic solutions.

In month 1 you will have to decide the design details of your approach, and present them to SPADE Livestock pilot partners to gain consensus and endorsement prior to starting development.

24. The call mentions a "live demonstration", but it does not specify whether it could be a demonstration video in our center or at a field test, or perhaps a demo in Lesvos. It is relevant since in such a tight budget it would represent a qualitative change. Could you provide more info about this?

SPADE Livestock partners will decide the field where the ‘live demonstration’ would take place. The live demo will take place once at the end of the overall six months project. The demo will not take place at the contractor’s environment but at an environment in Greece defined by the SPADE Livestock partners. This is the only mandatory travel expenses that the contractors will have to spend (i.e. 1 person travel expenses).

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25. We need some clarifications concerning the challenges of the CS1 on the Aerial mapping and the ML infrastructure: where will the developed systems be hosted? How will the developed sysems handle incoming data? How will the users upload data to the system?

The systems will be hosted on a server indicated and provided by the project coordinator (CERTH) The system will use queries in FIFO architecture A user friendly interface and relevant API should be provibed by the developer in order to upload and export all the necessary data

26. Also, some questions specific to the generation of orthomosaics in CS1: Should the system support point cloud data generation, or any other features?

The system should provide the option for point cloud data generation The system should also provide the option to the user to manually import coordinates of GCPs for the correction the orthomosaics/pointclouds.

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