ARTES 4.0 Generic Programme Line Business Applications - Space Solutions

"The sustainable transformation of agriculture through digitalisation and space"

ARTES 4.0 Thematic Call for Proposals for Applications Activities

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THE EUROPEAN SPACE AGENCY

Table of ACRONYMS

AI	Artificial Intelligence
APQ	Activity Pitch Questionnaire
AoF	Authorisation of Funding
ARTES	Advanced Research in Telecommunications Systems
BASS	Business Applications and Space Solutions
DG	Director General
ESA	European Space Agency
FP	Full Proposal
OP	Outline Proposal
OSIP	Open Space Innovation Platform
SME	Small and Medium sized Enterprise

1. OVERVIEW

This document presents a new Thematic Call for Proposals entitled "The sustainable transformation of agriculture through digitalisation and space", which aims at developing space-based services and applications boosting a sustainable transformation of agriculture by taking advantage of data and innovative technologies.

2. BACKGROUND AND RATIONALE

In the past decades, the coupling of technology with traditional agricultural methods and knowledge has been widely adopted for delivering solutions that have hugely improved the life of farmers and their business. European countries are fostering in their own territory the adoption of policies and strategies to make agricultural production more sustainable. In the majority of cases, such strategies make reference also to the added value brought by digitalisation and related technologies. However, the reality is that, although examples of modern agriculture adopted by farmers exist in all European countries, most of the agri-food community still uses traditional methods.

The Business Application and Space Solutions has supported since their inception the development of pre-operational services based on the integration of space and terrestrial data to improve the work and business of the farmers and of the stakeholders operating in the agri-food value chain. Most of these services, however, were developed in years when the awareness of climate change, the challenges linked to the depletion of natural resources and the difficult geo-political landscape were not considered as critical as they are at present.

The investment in agricultural technology and innovation needs to be increased if we want to achieve sustainable economic growth in these difficult times where many factors are heavily impacting the agri-food sector: climate change, thinning of natural resources, extreme weather events, fragmented food value chain, and increasing demand for food and other agricultural products.

Through a dialogue with several key stakeholders operating at European or national level, the following use cases have emerged as key priorities:

•**Agriculture of Data**: aims to support the transition to a sustainable agriculture in Europe as well as to strengthen policy monitoring and evaluation capabilities through the collection, analysis and sharing of electronic data and/or information.
•**Climate-smart agriculture (CSA)**: aims to support actions for transforming agri-food systems towards green and climate resilient practices.
•**Services for upscaling of current and/or previous national and/or international initiatives:** service based on the outcome of previous initiatives which have delivered promising results.

3. OBJECTIVES OF THE CALL

The objective of the Call is to support industry in the development of pre-operational services which are based on the combination of terrestrial and space technologies and which are focused on the optimisation of agricultural practices that minimise negative environmental impacts in terms of soil degradation, water depletion and contamination, inefficient energy use and loss of biodiversity. Such services shall be economically sustainable for the company(ies) in charge of their development, deployment and provision and also be environmentally sustainable.

4. SPACE ASSETS AND DIGITAL TECHNOLOGIES

Satellite technologies and data have a significant role to play within prospective services:

- **Satellite Telecommunications (satcom)** enable connectivity for in-situ data collection in remote areas, providing an additional layer of information to be combined with satEO data to generate actionable outputs. Connectivity in rural areas is a real hurdle to the development of solutions.
  Satcom could provide both broadband connectivity for farms with no, limited or expensive terrestrial Internet access and Satellite Internet of Things (S-IoT) for affordable and efficient data transfer and position augmentation techniques for guiding tractors and machines.
  In this context the use of 5G communication could be extremely advantageous as seamless 5G networks, relying on terrestrial and satellite components, could be necessary to deliver the (high) amount of data required by some of the services such as AI weed recognition or tractor fleet management.
- **Satellite Earth Observation (satEO)** The capabilities of EO satellites are unique to monitor and to detect the changes in the field, in the plants, in the soil and its surroundings (such as humidity, temperature, vegetation indices). EO data enable services related to smart farming such as crop yield prediction, crop disease monitoring and soil moisture estimation.
  SatEO is also important to collect data and assess the positive impact of the proposed services in the environment and therefore to show compliance with regulations.
  The benefit of **High-Altitude Pseudo Satellite (HAPS)** could also be considered as these systems may offer advantages and complementary applications over satellites, used for communication and/or remote sensing, both in terms of spatial resolution and temporal coverage.
- **Global Navigation Satellite Systems (GNSS)** are essential to track the position of vehicles or any moving element of the proposed service such as drones. Drones could also be adopted in Beyond Visual Line of Sight (BVLOS) scenarios thanks to the capabilities offered by satcom. GNSS is also needed to enable the autonomous driving of, for instance, AGVs (autonomous ground vehicles). GNSS is finally necessary to locate the position of sensors that measure physical parameters for instances of the field.
- **Drones and other autonomous vehicles** can provide very high-resolution data

for detailed analysis of specific areas of interest and for gathering information from areas at risk, e.g. industrial plants following an emergency.

- **Digital tools** such as artificial intelligence (AI) and digital twins offer significant opportunities to collect, process and better present data and enabling better fleet management and intermodal integration.

5. SCOPE OF THE CALL

The proposals under this Call for Proposal (CfP) shall target innovative and user-driven services which rely on advanced technologies and space data and which contribute to the sustainable transformation of the agriculture.

The Bidder shall involve in the project representatives from user communities, which shall take part in the pilot.

The Bidder shall either address the use cases included in the Annex or address other use cases and requirements related to the subject of the Call that are supported by relevant user/customer community. In any case, the Bidder shall provide evidence of the support of the potential customers through letters of interest to be attached to the Outline Proposal.

The service provider shall be identified and possibly be part of the bidding team to ensure the commercial operational roll-out of the proposed service following completion of the project.

This Call for Proposal is for **Demonstration Project** only.

Demonstration Projects are dedicated to the implementation and demonstration of pre-operational services.
The applications and/or services covered by the proposed Demonstration Projects have to:

- Be customer/user driven (including user involvement and active participation in the project).
- Propose a service demonstrating the benefits from the utilisation of space assets with clear potential to become sustainable.
- Address at least one amongst the thematic areas described in section 3, covering one or more of the mentioned applications or other(s) defined by the Bidder.
- Provide a measurable socio-economic impact.
- Provide a measurable environmental impact.
- The Bidder shall involve in the project representatives from users communities, who shall take part in the pilot.
- The Bidder shall either address at least one of the use cases included in Annex or address other use cases supported by relevant customers / users.
- The Bidder shall involve customers/users relevant for the targeted use case and the support of those potential customers shall be evidenced in letters of interest to be attached to the Outline Proposal.

6. PROCUREMENT APPROACH

The proposals submitted in reply to the call shall be implemented in the context of ESA BASS, 5G and 4S programme lines of ARTES in coordination with National Delegations.

The Bidder shall submit first an Activity Pitch Questionnaire, and following evaluation, may be invited to submit the Outline and Full Proposal. The Activity Pitch Questionnaire (APQ) template provided by ESA shall be used. This is considered as entry point for companies to submit their idea, providing a simplified and single point of access to the ESA ARTES framework.

The price of activities carried out in a given State are charged against the contribution of that State in the programme. A letter of Authorisation of Funding (AoF) from the relevant National Delegation is therefore required as part of the Full Proposal. The Bidder is however advised to inform the relevant National Delegation(s) when submitting the Pitch. The coordinates of the National Delegates can be found here: https://artes.esa.int/national-delegations.

The Agency will admit for evaluation only (Outline and Full) proposals from a bidding team composed of a company and/or organisation - be it as Prime or Subcontractor - residing in any of those states that subscribe to the Programme under which you wish to submit your proposal:

I. **for the ARTES 4.0 BASS Generic Programme Line - Component A**: Business Applications. To date, Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Slovenia, Sweden, Switzerland and the United Kingdom have subscribed.

II. **for the ARTES 4.0 5G Strategic Programme Line**: Austria, Belgium, Finland, Germany, Greece, Hungary, Ireland, Italy, Luxemburg, Netherlands, Norway, Portugal, Romania, Spain, Sweden, Switzerland, the United Kingdom and Canada have subscribed.

III. **for the ARTES 4.0 4S Strategic Programme Line:** Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxemburg, The Netherlands, Norway, Poland, Portugal, Romania, Spain, Switzerland, the United Kingdom and Canada have subscribed.

7. PROCESS AND SCHEDULE

It is planned for the call for proposals to be opened on 13th October until the 13th December 2023, 13:00 CET.

7.1. Timeline and Procedure
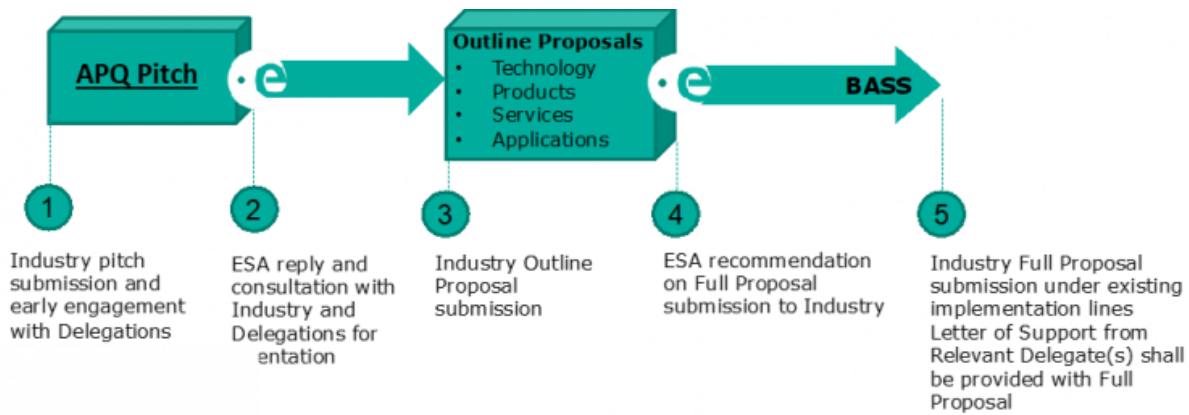
The timeline is illustrated below.

Figure 1: Procurement Approach and Timeline of the Thematic Call

The Call is planned to be implemented according to the following stepwise approach:

In **Step 1**, the interested Bidders are requested to submit their proposal(s) based on a short Pitch template made available by ESA that can be downloaded from here: https://business.esa.int/sites/business/files/APQ%20ProjectName.pdf. The pitch should provide the initial idea of what the Bidder would like to propose, elaborated on the basis of the thematic areas and either the use cases proposed by ESA's partners or others selected by the Bidder.

The completed Activity Pitch Questionnaire (APQ) shall be uploaded using the online web submitter, ESA's open space innovation platform (OSIP), in the channel named "APQ for ARTES Downstream Business Applications"

Multiple Pitches can be submitted.

It is strongly recommended that the interested Bidder liaises since the beginning with the relevant ESA Member States Delegates.
In **Step 2**, following an assessment of the Pitch by ESA, ESA will provide feedback to the company, aiming to provide a reply within 10 working days following the deadline for submission of the Pitch.
It is recognised that some interactions with the Bidder may be required and ESA may therefore consult with the Bidder and may offer support in providing further clarifications, aimed at better shaping the Outline Proposal(s).
ESA might also consult when necessary, with the relevant National Delegation(s) for orientation and will provide key information (e.g. title, cost, price, subcontractor) to the relevant National Delegation(s).

Subject to a positive evaluation of the Pitch and the Bidder having informed the National Delegation(s), the Bidder will be notified by ESA and invited to submit an Outline Proposal.
In **Step 3**, the Bidder will submit the Outline Proposal, based on a template provided by ESA, with letter(s) of interest from users/stakeholders. The Outline Proposal is expanding the Pitch with a more extensive level of details. The outline proposal shall be submitted on the OSIP platform under the channel "Outline Proposal for ARTES Downstream

Business Applications – Feasibility Studies/Demonstration Projects".
In **Step 4**, subject to a positive assessment from ESA and in-principle support from the National Delegations, the Bidder will be invited to submit a Full Proposal on ESA-STAR in accordance with BASS programme line.
In **Step 5**, the Bidder shall submit a Full Proposal with the Authorisation of Funding (AoF) from the relevant National Delegation(s). Following a positive assessment by ESA the proposed activity will be approved for implementation.

7.2. Evaluation Criteria

The evaluation process is non-competitive, as each proposal will be assessed individually on its own merits, according to the evaluation criteria applicable for CALL FOR PROPOSALS FOR DOWNSTREAM APPLICATIONS IN ARTES 4.0 (esa star ref.: 1-10494).

More information for the assessment of the APQ and outline proposal stages can be found on the OSIP page "APQ for ARTES Downstream Business Applications".

More information on the evaluation criteria for the final proposals can be found within the document "Appendix 1 to AO/1-10494/20/NL/CLP (Issue 2.2)" which can be found on ESA-STAR.

8. GENERAL CONDITIONS

The submissions and all correspondence relating to it shall be in English.
The tender shall not contain any Classified Information, whether in the Pitch, Outline Proposal or in the Full Proposal.
To avoid any confusion with Classified security markings, the unclassified protective marking used by the Tenderer in the proposal shall not contain the terms: "Restricted", "Confidential", or "Secret".

However, should the Tenderer consider necessary to include Classified Information in the tender, the Tenderer shall inform beforehand the ESA Security Officer.
The Tenderers are informed that Classified Information can be shared with ESA only in compliance with the Project Security Instruction (PSI) duly established by the Agency beforehand and subject to the approval by the ESA Member States.

The Agency will treat commercially sensitive or proprietary information confidentially and solely for the purpose of the assessment of the response.
Expenses incurred in the preparation and dispatch of the response to the announcement will not be reimbursed. This includes any expenses connected with a potential dialogue phase.
The announcement does not bind the Agency in any way to place a contract. The Agency reserves the right to issue amendments to the announcement.