

ARTES 4.0 Generic Programme Line Business Applications - Space Solutions
ACTIVITY DESCRIPTION

“Space for Sustainable Forestry”

ARTES 4.0 thematic Call for Proposal for Applications Activities

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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 "Space for Sustainable Forestry", issued under the ARTES BASS 5G and 4S programme lines programme line, which aims at developing space-based services and applications boosting sustainable forestry taking advantage of various source of data and cutting-edge technologies.

2. BACKGROUND AND RATIONALE

Forests cover about 31% of the Earth's land area and host 80% of terrestrial biodiversity^{1,2}, providing essential ecosystem services like regulating rainfall, protecting water sources, and preventing flooding and soil erosion. They are crucial in combating climate change by producing oxygen and absorbing CO₂, with 40% of the world's oxygen and 660 gigatons of carbon stored in forests³.

Climate change impacts forests in different ways. The risk of wildfires increases together with rising global temperatures, endangering many species, but also threatening the potential of forests as a carbon sink⁴. A global increase of wildfires of 50% is expected by 2100 which emphasizes the severity of this threat⁵. As climate conditions change, the climate envelope for certain types of insects and diseases move, causing new ecological threats in specific regions. It has been estimated that in European forests, six new species of tree pests appear yearly⁶. With warmer temperatures, insects reproduce faster leading to insect outbreaks.

Climate change does not only affect the trees' health, but it also put the watershed of forests at risk and endangers the drinking water reserve. When trees do not have access to enough water, they produce less sap, making them more vulnerable to insect breakouts.

Through an extensive dialogue with several key stakeholders operating at European or

¹ <https://www.unep-wcmc.org/en/news/earths-biodiversity-depends-on-the-worlds-forests>

² https://wwf.panda.org/wwf_news/?207989/Life-sustaining-value-of-Earths-forests-highlighted-on-International-Day-of-Forests

³ <https://www.worldwildlife.org/initiatives/forests>

⁴ <https://www.fauna-flora.org/environments/forests/#:~:text=Forests%20contain%20the%20majority%20of,multitude%20of%20plants%20and%20animals.>

⁵ <https://www.unep.org/news-and-stories/press-release/number-wildfires-rise-50-2100-and-governments-are-not-prepared>

⁶ <https://projects.research-and-innovation.ec.europa.eu/en/horizon-magazine/trade-and-climate-change-increase-pest-threat-europes-forests>

national level (e.g. FSC, PEFC, EUSTAFOR), several use cases have emerged as key priorities and they are described in the document called Space for Sustainable Forestry-Use Cases.

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 optimization of forestry practises which help the community while contributing to sustainable forestry. Services could target (but are not limited to): protection of biodiversity, pest & disease management, carbon storage estimation, soil recovery and preservation, production of industrial products (e.g. cork, medicinal plants, biofuel).

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 other digital technologies have a significant role to play within prospective services:

Earth observation (EO): offers a wide array of applications in forest management. It enables: LULUCF, the analysis of tree health status, species classification and forest inventory, aiding in monitoring forest vigour and supporting decision-making processes. EO facilitates change detection in forest regions over specific periods, allowing for the identification of events such as natural disaster events, pest outbreaks, or illegal logging activities, which forest owners can be promptly alerted about. Satellite imagery can be used to identify areas where deforestation has occurred and to monitor changes in forest cover over time. The Copernicus Land Monitoring Service ([CLMS](#)) provides high-quality open-access datasets to support practices aimed at halting deforestation and promoting forest protection.

Satellite navigation (SatNav): systems are instrumental in efficiently locating field samples and guiding machinery for forestry operations, optimizing resource utilization. As several applications use in situ sensors, SatNav is necessary for the synchronization and the geo-tagging of the samples from the fields. In addition, as several applications rely on using payloads carried by airborne (such as camera and LIDAR), SatNav is necessary for the flight and related operations.

Satellite Communication (SatCom): in remote areas where communication is lacking, SatCom provides the possibility of connection to IoT sensors and devices or to provide alerts, such as emergency warnings for extreme weather events.

In addition to space-based technologies, it is important to highlight other technologies which are terrestrial-based, and which enhance the performance of the operational services.

- **Light Detection and Ranging (LiDAR):** provides precise three-dimensional measurements of vegetation structure and terrain, enabling the derivation of digital elevation models and accurate forest inventory data. This information aids in mapping hydrologic features and planning forest corridors, transforming conventional forest inventory practices when integrated with other data sources like multispectral optical imagery. Together, these technologies enhance our understanding of forest ecosystems and facilitate informed decision-making in forest management and conservation efforts.
- **Forest digital twins** provides detail insights into forest structures, aiding in decision-making for resilient forest management. By creating virtual replicas of real forests, digital twins offer dynamic simulations, facilitating predictive modelling and adaptive management strategies. This technology fosters a deeper understanding of ecosystem dynamics, promoting effective conservation and management practices for resilient, thriving forests and communities.
- **IoT technology** is revolutionizing forestry practices, streamlining management and enhancing conservation efforts. By deploying sensors and IoT devices, real-time data on tree health, soil moisture, and environmental conditions can be obtained, enabling proactive decision-making and sustainable management. These technologies offer invaluable insights into forest conditions, detecting early signs of disease, pest infestation, or environmental stress. Additionally, IoT facilitates continuous surveillance of wildlife and vegetation, supporting conservation efforts.

5. SCOPE OF THE CALL

The proposals submitted 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 management of the forestry in Europe and worldwide.

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 (and available on the website [Space for Sustainable Forestry](#)) or address other use cases and requirements related to the subject of the Call that are supported by relevant user/customer community. In the latter case, support of those potential customers shall be evidenced in letters of interest to be attached to the Outline Proposal (the second step in the application process). Proposals under both options will be considered equally.

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 collected by the Agency 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 the 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 contact information of the National Delegates can be found here: [National Delegations | ESA Space Solutions](#)

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 01 November until the 20 December 2023, 13:00 CET in in ESA's open space innovation platform (OSIP).

7.1. Timeline and Procedure

Bidders can respond to this thematic call by submission of a short Activity Pitch Questionnaire within the above timeframe.

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 Activity Pitch Questionnaire (APQ) template made available by ESA that can be downloaded from the Thematic Call website. 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. If the Bidder has the relevant information available to them, they may consider completing the supplementary questions (AP5) in the APQ template as part of the APQ+, which may allow to skip Step 3 below, at ESA's discretion.

Should the bidder wish to cooperate with any of the listed partners in the annexes, they shall give to the Agency the authorisation to distribute the activity pitch questionnaire to these stakeholders by explicitly stating it in the Activity Pitch Questionnaire. Subject to such authorisation, the Agency will follow up distributing the APQ to the bidder's authorised stakeholder(s) and liaise with them to facilitate interactions with the Bidder.

The Bidder shall not contact any of the stakeholders listed in annexes on the webpage.

The Bidder shall NOT involve any of the stakeholders mentioned in the annexes in the bidding consortium neither as subcontractor nor as external service (including consultancy).

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 with different ideas can be submitted.

It is strongly recommended that the interested Bidder liaises from 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). Dialogue sessions may be organised individually with potential partners prior to Step 3.

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. Note that the APQ+ can act as a substitute for the Outline Proposal, thus if having adequately answered the additional questions included in the APQ+, the Bidder may be able to skip Step 3.

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 expands upon the pitch with a more extensive level of details. The Bidder will be allowed 2 months from the APQ submission deadline to submission of their Outline Proposal. 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. The Bidder will be allowed 3 months from submission of their Outline Proposal to submit their Full Proposal on ESA-STAR.

In **Step 5**, the Bidder will 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.