

CALL FOR APPLICATIONS – AI Moonshot Challenge

1. Objective and budget of the AI Moonshot Challenge

In line with the Portuguese Space 2030 National Strategy, the AI Moonshot Challenge aims to boost the exploitation of space data and promote innovative ways to tackle societal problems and advance scientific research.

Satellite programs worldwide generate massive amounts of data containing information essential for numerous sectors, including valuable information to support policy decisions. Recent developments in powerful technologies such as Artificial Intelligence (AI) enable the analysis and exploitation of these data and retrieve such relevant information more than ever before.

The AI Moonshot Challenge aims to bring together the **Artificial Intelligence (AI) and the Satellite Remote sensing communities and experts to address global problems.**

AI is not only crucial to help **unleash the power of Satellite data** as a tool to monitor resources on Earth but also to support and promote a sustainable management of Space assets and debris. After focusing on the oceans in 2020, this **second edition** broadens its scope to include also Space and Land monitoring: the team(s) with the **best innovative proposal(s) addressing *A sustainable Space for a sustainable Earth with AI*** will be **awarded a prize money** to conduct and implement the work in Portugal.

Portugal Space opens this call to receive R&D project proposals making use of AI and satellite data in three main topics: i) Space debris; ii) Land resources; and iii) Ocean sustainability.

The team(s) with the best proposal(s) will be awarded up to 500k € to conduct the research for a period of up to **2** years from Portugal. Non-national teams can do it either in close cooperation with Portuguese beneficiary institutions or by establishing themselves in the country.

More than one proposal may be supported as long as the awarded budget does not exceed the total budget available (500k €).

1.1. Why AI and Satellite data for sustainability?

Space provides the infrastructure for numerous services and activities such as personal mobility, communication for work, weather forecasting, precision farming to maximize crop harvesting, banking transactions, management of precious resources such as potable water, monitoring of forest fires, archaeological investigations, scientific knowledge and even the dream of expanding the reach of humanity. Within this infrastructure, satellites, missions and programs are generating **massive amounts of data**. Recent developments in Artificial Intelligence position it as a **key technology to translate all this data into useful information** to enable all of the real-world applications.

At the same time, in order to ensure that we can properly and effectively use our space assets to provide these services and reach these goals, it is clear that we need to retain our ability to access and utilize space, increasingly cluttered by debris, in a sustainable manner.

How can we effectively manage space assets? How will they, together with Artificial Intelligence, help us create a more sustainable Earth?

This year, Portugal Space and Unbabel continue their collaboration with the WebSummit to attract the best minds in AI to work on Global problems recurring to Space data. The challenge is to look not only at the Earth, on how to better manage land resources or how to promote Ocean health, but also to look up, to guarantee Space as a long-lasting sustainable asset.

The challenge is open for innovative ideas on:

1) **Sustainable Space**: how AI can contribute to **manage and monitor space assets and debris**. At least 700,000 pieces of space debris are orbiting the Earth at a speed of 28,000 km per hour to which must be added the very smallest fragments. These pose significant threat to current space assets and compromise future missions. The submission of innovative ideas on using AI for collision avoidance and space debris reduction and management are encouraged.

2) **Sustainable Earth**:

a) how to combine AI and satellite data to advance **land management**, namely on improved solutions and tools to map, identify and monitor the territory and better preserve resources. We are looking for automatic solutions for territory identification; improvement in

Land Use Land Cover (LULC) classification maps, accuracy and number of distinguishable classes for land change automatic detection, with inclusion of innovative temporal analysis and integrated information from other data sources such as VHR products for improved resolution. A focus should be given to knowledge extraction from image and library data, and discovery of image semantics. LULC maps are essential for a number of applications, from land registry to fire prevention and innovative products contributing to forecast land mapping evolution and dynamics to support policy decisions regarding climate adaptation measures towards an efficient use of resources are also expected and welcomed.

b) how AI and satellite data can help us restore our **Oceans and preserve and monitor biodiversity**. Aligned with the EU missions, this topic aims to promote innovative approaches to map, monitor, predict, manage and restore the ocean and waters under adverse climate change and anthropogenic pressures.

2. Applicants

The Moonshot Challenge is a global competition aimed at research groups, individual experts, consortia or partnerships between different people or entities, including companies or start-ups, from different backgrounds and geographies.

Innovative ideas from these groups are expected and the proponent(s) of the awarded R&D project proposal(s) should prove to have means to develop the activities from Portugal. Non-national teams can do it either in close cooperation with Portuguese beneficiary institutions or by establishing themselves in the country.

Organisations that can submit a proposal are the following:

- Higher Education Institutions, their institutes and R&D units;
- State Laboratories;
- Non-profit private and public institutions developing or participating in scientific research activities;
- Companies of any nature and under any legal form, including startups;
- In addition to the entities mentioned above, the consortium may include other public or private entities, profit or non-profit, that may also invest in the project and bring relevant competencies to the project.

The team(s) whose proposal is awarded will become beneficiary entity(ies).

The awarded proposal is **expected to deliver clear outcomes** in the form of advancement of state of the art, development of products and/or operationalization of services highlighting utility to the national space ecosystem, and public administration when applicable.

3. Timeline

Submissions for **proposals** will open on November 4th and remain **open until the 2nd of May 2022 (postponed to May 30th 2022), 23h59 (CET)**. After compliancy check to tender conditions proposals will be evaluated by a jury composed by **international experts**. The teams with the best proposals will be invited to pitch their innovative idea at the **Web Summit 2022, when the winner(s) will be announced**.

4. Submission of Applications

The applications to the Moonshot Challenge must follow the present Call guidelines and be sent to moonshot@ptspace.pt until **May 2nd 2022 (postponed to May 30th 2022), 23h59 (CET)**.

Proposals must include the information and follow the structure bellow and not exceed 40 pages, excluding annexes.

- 1. Project Title, Acronym, and topic of application**
- 2. Proposal Summary (500 words)**
- 3. Consortium** (with short description of each institution. Max 250 words/partner; how the project will be conducted from Portugal needs to be clearly explained)
- 4. Graphical Abstract** (1 page max. with schematics of the main concept being proposed)
- 5. Description of Work**
 - a.** State of the Art
 - b.** Objectives, Novelty and Impact of proposal
 - c.** Research Plan and Methods (including work packages, tasks description and a first iteration of the main tasks)
 - d.** Milestones, Deliverables and Reviews (considering at least a Kick-off meeting, annual reviews, a final report and presentation of results)
 - e.** Timeline and Management (including a Gantt chart)

- f. Outreach
- g. Outcomes (e.g. patents; papers; thesis, others)
- 6. Team**
 - a. People with short CV - max 150 words for each team member
 - b. List of max 10 relevant publications of the team
 - c. List of max 10 relevant projects of the team
- 7. Budget and budget justification (max 2 pages)**
- 8. Annexes**
 - a. Letters of commitment (PI, institutions)
 - b. Letters of support (if relevant)

5. Evaluation:

5.1 - Jury

The jury will be composed by international recognized experts in remote sensing and AI and cochaired by **Pierre-Philippe Mathieu** from **ESA** and **Carolina Sá** from **Portugal Space**. The full constitution of the jury will be published in due time, at least one month before the closure of the Call.

The jury will:

- a) Apply the evaluation criteria;
- b) Prepare an evaluation opinion for each project;
- c) Select and prioritize the applications;
- d) Prepare a report with the evaluation results.

5.2. Evaluation criteria

After compliancy check to tender conditions, projects will be **evaluated by the jury based on the following evaluation criteria.**

Criterion 0 – Innovative ideas making use of satellite data and AI

Use of satellite data and AI in the project are mandatory. AI can be applied/combined with different types of data but ideas must include at least a space asset. This criterion is of eliminatory

nature. Proposals that are not innovative or do not include use of satellite data and AI will not be evaluated further.

Proposals passing Criterion 0 will be further evaluated considering the following criteria, and according to the formula presented:

- A. Innovative nature and Scientific and Technical merit
- B. Team expertise in the context of the project
- C. Management and planning
- D. Technology transfer potential and outreach

$$\text{Merit of Proposal} = 0,55 A + 0,30 B + 0,10 C + 0,05 D$$

Each criterion will be evaluated considering the following scale: 0-Worthless, 40-Barely acceptable, 50-Fair, 60-Good, 75-very good, 90-Excellent and 100-Perfect.

Criterion A - Innovative Nature and Scientific and Technical Merit of the project

This criterion evaluates how satellite data and AI are integrated in the project. Innovation and creativity aligned with a sound scientific reasoning are expected and valued.

A1. Novelty of the idea

The novelty of the proposal will be evaluated according to the following definition:

- the proposal should address a not yet described or tested, but feasible and theoretically working concept;
- the proposal should identify the features that make it new.
- the proposal should be compared to prior activities and published state of the art.

A2. Scientific and Technical Merit

This sub-criterion will evaluate the feasibility of the proposal, if the proposed idea and methodology are realistic and promising to obtain the expected results, leading to an effective implementation. It will evaluate the justification of the satellite data and AI approach to be used and how they will be used to contribute to tackle the topic selected. The exploitation of satellite remote sensing, addressing the upstream and/or the downstream segment will be valued.

Quality of the proposal with demonstration of in depth understanding of the topic subject (problems and requirements) and clear identification of objectives and targets to be addressed will be also valued.

Criterion B – Team expertise in the context of the project

The team background will be evaluated under this criterion. The team should have enough expertise and skills to adequately execute the proposed project (team configuration, PI's qualifications) namely in the areas of satellite remote sensing, Artificial Intelligence and in the topic to be address (i.e. Space debris, Land resources management or Ocean sustainability). The team should demonstrate how the project will be conducted **from** Portugal. Potential for collaboration with national Public administration will be value.

Criterion C – Management and planning

This criterion will consider the project organization and costs.

C1. Milestones, Timeline, Management

In this sub-criterion, the organization of the project will be evaluated in terms of the proposed milestones, deliverables, reviews, duration and management structure.

C2. Budget justification

The organization and use of resources of the participating entities will be evaluated, regarding technical-scientific, organizational and managerial and, if it applies, co-funding capacity on the part of the companies.

Criterion D – Technology Transfer potential and Outreach

This criterion will account for the project impact in terms of potential services and public engagement.

D1. Technology Transfer potential

This sub-criterion will evaluate the potential of tools and technology developed within the scope of this project to be applied to other sectors.

D2. Public engagement

Outreach activities can take various forms including Citizen science approaches. This subcriterion will take in consideration the degree of impact and interactivity of activities, range of targeted audience and expected engagement level.

6. ELIGIBLE EXPENSES

This section describes those expenses that the submissions can include in Section 7 of the proposals (as per Chapter 4 above).

Eligible expenses are those taken by the Beneficiary Entities arising exclusively from the implementation of the project and determined by its nature, reasonableness and adequacy to the objectives of the proposed activities, namely:

- a) Expenditure on human resources dedicated to or associated with the development of R&D activities related to the implementation of the project;
- b) Expenses for national or international missions directly attributable to the project;
- c) Acquisition of scientific and technical instruments and equipment, essential to the project, if they are used throughout the project's lifetime;
- d) Amortization of scientific and technical instruments and equipment, essential to the project, whose useful life period is contained in the period of execution, but is not exhausted in the project;
- e) Subcontracts directly related to the execution of scientific tasks of the project;
- f) Expenses associated with the national and foreign registration of patents, copyrights, utility models and designs, national models or trademarks, when associated with other forms of intellectual protection, namely, fees, research on the state of the art and consulting expenses;
- g) Expenses with the demonstration, promotion and dissemination of project results, namely publication fees in compliance with and in accordance with national open access policies;
- h) Acquisition of other goods and services directly related to the execution of the project, including costs with consultants that do not configure subcontracts;

The following expenses are not eligible for funding:

- a) Acquisition of vehicles;
- b) Subscription to periodicals;
- c) Overheads;
- d) Current operation of institutions, such as water, electricity and gas, etc;

- e) Recoverable VAT, by any means whatsoever, even if it has not been or will not be effectively recovered by the beneficiary and other taxes, contributions or fees, including direct taxes and social security contributions on salaries and wages, unless effectively and definitively borne by the beneficiary;
- f) Transactions between entities participating in the project;
- g) Expenses prior to the start date of the project referred to in the term of acceptance;
- h) Expenditure paid under contracts through intermediaries or consultants, where the amount to be paid is expressed as a percentage of the amount co-financed or the eligible expenditure of the operation;
- i) Expenditure not accompanied by receipted invoices or equivalent documents and payment documents proving the purchase and liquidation of the goods and services.

7. Amendments to the project

1. Amendments to the awarded project shall be authorized by the Agency through a requirement containing detailed information and justifying the need for change.
2. Notwithstanding the previous point, the Beneficiary Entity is responsible for, and does not need approval from Portugal Space for making the following changes:
 - a. Budgetary, provided they are included in the total financial support granted and in the approved budget for each Beneficiary Entity;
 - b. The nature of the expenditure, on each budget line, foreseen in the application and approved;
 - c. The number or type of human resources to be contracted;
 - d. The proposed equipment being applied for.
3. The changes referred to in the previous paragraph shall be duly identified and justified and shall be considered when examining the eligibility of expenditure.

8. FURTHER INFORMATION

Situations that cannot be solved by the rules set out in this call are decided by PT Space Board.

For any questions or further information contact the Moonshot Challenge organization through email address: moonshot@ptspace.pt.