Fundação para a Ciência e a Tecnologia

MIT Portugal

TERMS OF REFERENCE FOR THE

2022 Call for Exploratory Research Projects

MIT Portugal PROGRAM

Driving innovation through integrated EXPLORATORY research

October 2022

INDEX

1. SYNOPSIS

The MIT Portugal Partnership 2030 (MPP2030) is inviting submissions for the 2022 Call for Exploratory Research Projects.

MPP2030 is a strategic international partnership between Portuguese universities and research institutions, the Massachusetts Institute of Technology (MIT), the Portuguese government, as well as partners from industry and other non-academic institutions. Launched in June of 2018 and funded by the *Fundação para a Ciência e Tecnologia* (FCT), its goal is to strengthen Portugal's knowledge base and international competitiveness through a strategic investment in research, people, and ideas in areas of global relevance and with significant societal impact.

Potential exploratory research projects should aim to address research topics in a holistic fashion through an integrated and multidisciplinary research design with a view towards piloting and scalability involving entities of the National Research and Innovation System, other public and private partners and the Massachusetts Institute of Technology (MIT).

Even though only Portuguese universities can be funded by this call, the proposal should target the development of research between Portuguese universities and MIT aiming at developing smart solutions, fostering value out of knowledge/research, promoting sustainable thinking, integrating human factors and technology, and stimulating multidisciplinary approaches.

For the 2022 call for Exploratory Research Project, we are seeking outstanding collaborative proposals in 5 thematic areas:

1. Climate Science & Climate Change
2. Earth Systems: Oceans to Near Space
3. Digital Transformation in Manufacturing
4. Sustainable Cities
5. Data Science

Successful proposals are required to meet the following criteria:

- Be of exceptional quality and high relevance for Portugal. They will target innovative, high-impact research that addresses unique research needs and opportunities in Portugal.
- Take an "exploratory approach," i.e., address an emergent research topic within the program framework that can be identified as future research domains and that can have a high impact for Portugal as a scalable living laboratory and innovation ecosystem for the development of new solutions/systems with a global reach, and for fostering an increase of competitiveness of Portuguese economy in the knowledge-based industry.
- Be designed with a view towards the long-term objective of developing innovative solutions/systems, demonstrating and leading Portugal's international competitiveness and innovative capacity in science and technology.

- Be strongly collaborative and have a clear multidisciplinary approach.

The call is open to all faculty and researchers affiliated or collaborating with Portuguese institutions of higher education and research. The total funding available for Portuguese research institutions in this call will be up to € 400,000 (four hundred thousand euros). Research activities of participating MIT research teams will need to be covered independently. The projects duration is limited to 1 (one) year.

The deadline for submissions is **November 17, at 17:00 Lisbon time.**

For more information, email info@mitportugal.org *(scientific information)* or concursoprojetos@fct.pt (specific information related to application submission).

2. EXPLORATORY PROJECTS TOPICS

The present call is opened for the following five (5) research areas:

1. Climate Science & Climate Change
2. Earth Systems: Oceans to Near Space
3. Digital Transformation in Manufacturing
4. Sustainable Cities
5. Data Science

The research scope of each area is described below. It is important to highlight that the research topics are not limited to the examples given in the areas' description below. Proposals with different focuses from the ones presented but within the scope of the areas are welcome. Additionally, all research areas other than Data Science itself should consider data-science integration. The data-science driver should target the development of tools to collect, curate, and synthesize data from public and other repositories, and to make it available more broadly and in more useful forms for public and private use, including but not limited to the public, policy makers, consumers, and businesses.

2.1. Area 1: Climate Science & Climate Change

Climate change and global warming are urgent areas of interest to humanity. Climate data, measurements and instrumentation focused on the oceans, atmosphere, climate, and near-space enables the monitoring of Earth systems dynamics. Such data allows the understanding of how climate has changed over time, enables the development of complex climate models and provides the possibility to estimate in advance the impact of different climate control policies and strategies. With special focus on climate science and climate change, scientific area #1 targets the study, measurement and modeling of the complex interactive system dynamics of climate, weather, atmosphere, ocean, land, and near-space. Integrative models and methods of studying and

analyzing enormous volumes of data should be implemented.

2.2. Area 2: Earth Systems: Oceans to Near Space

The capacity to observe Earth in its full verticality (from deep-sea to space) enables the understanding of its subsystems (oceans, land, air, and space) including complex dynamics. In this research area, the focus is on investigating Earth's subsystems, namely its oceans, land masses, atmosphere, and near-space environment, with particular emphasis on measurements, developing technologies and capabilities, and addressing Earth's critical subsystems from oceans to space through technological innovation, big data, autonomy, and comprehensive systems analysis. Related topic areas include the development of ocean monitoring and measurement, ocean research vessel field deployments to demonstrate novel autonomy and human-machine concept of operations (ConOps) to small-satellite technology and launch capabilities, all to enable advances in ocean and earth science measurements, technology advances, and autonomous operations for exploration and science.

2.3. Area 3: Digital Transformation in Manufacturing

Today we can imagine-design-make, essentially in real-time. Human-centered design not only has inspirational effects, but it also has societal relevance, having a psychological effect, which has changed how design is seen and valued. Technology, particularly digital technology and additive manufacturing are providing a set of valuable tools capable of providing new possibilities. Within this research topic, research includes multiple aspects of the digital transformation that is enabling new integrated approaches for adaptive design, manufacturing and sustainable solutions. Projects to develop cyber-physical products and systems, assuring improved user experience and value creation for society and the economy are sought. In this context, strategies for Designing at the *Speed of Thought* are solicited. Synergies are encouraged for research in Area #3 and Areas #1 and #2, for example, to design, manufacture and launch revolutionary Wafer Satellites and MicroSat constellations focused on land and ocean use, algae blooms, top soil erosion, and regenerative aqua- and agri-culture.

2.4. Area 4: Sustainable Cities

Cities have currently the potential to serve as living-labs and as research units for large-scale environments on Earth. Advances in open data platforms, integration and accessibility are needed for "smart, sustainable cities". Within this area context, research involves urban science, design, and engineering with applications in areas such as energy utilization, air quality maintenance, transportation systems, internet-of-things connectivity, and smart cities. Moreover, high priority will be on the ocean-city interface with relevance to Areas #1 and #2, coastal cities are prioritized and relevant climate change, sea-level rise, temperature and natural disaster monitoring, and development of potential solutions to emerging urban problems.

2.5. Area 5: Data Science

The new-age technology has brought a significant increase in the bulk of the data available. Evolving from statistical analysis and data mining, the science of the data that would be harnessed into the decision-making process sprung. Making sense of raw, unstructured data, identifying patterns, building models and deploying them into applications are some of the aims of Data Science. It merges scientific methods, processes, algorithms and systems from several disciplines including mathematics, computer science, statistics and information science, to prepare the data for analysis and develop strategies for analyzing, exploring, visualizing and interpreting data in a broad range of applications. As such, Data Science is closely related to Big Data, Data Mining and Machine Learning. The foundational concepts of Data Science can be applied to several knowledge domains, which is why all the remaining areas of interest for MPP are considered to be anchored by Data Science.

3. TERMS OF PROPOSALS

The proposal should follow the attached format guidelines. The call is open to all faculty and researchers affiliated or collaborating with Portuguese institutions of higher education and research, whose proposals include the collaboration of faculty and research from MIT.

Total funding for Portuguese institutions is limited to a maximum of € 400.000 (four hundred euros) with up to 50.0000 € (fifty thousand euros) for each of the selected projects for the intended project duration of 1 (one) year (see 4.2. in this document). Research activities of participating MIT research teams will not be covered by these funds. The project duration is limited to 1 (one) year.

The evaluation panel has capacity to propose different budget allocations between the selected proposals. The deadline for submission is November 17**, at 17:00 Lisbon time.**

4. AWARD INFORMATION

4.1. Regulations and guidelines

Regulations governing access to funding are available at:

- http://www.fct.pt/apoios/projectos/regulamentofundosnacionais.phtml.en
- Regulation for Research Studentships and Fellowships (Law n.o 40/2004 of 18 August, in its present version)

The announcement of the opening of this call is available here.

The guidelines to writing and submitting proposals are available here.

The guide for peer reviewers is available here.

The CIÊNCIAVITAE guide is available here.

The ethics self-assessment guide is available here.

4.2. Number of awards and funding amount

A maximum of 8 (eight) exploratory projects are expected to receive funding through the current call. Financial envelopes are stipulated for the different thematic areas: one envelope of 100.000€ for the Climate Science & Climate Change area; one envelope of 100.000€ for the Data Science area and; a third envelope, of 200.000€, for the set of the other 3 remaining areas. If any of the two envelopes stipulated for the Climate Science and Climate Change and for the Data Science areas are not exhausted within those scientific areas, the remaining amount will be transferred to the envelope for the set of the remaining thematic areas.

The actual number of exploratory projects funded will depend on the scale and scope of the proposed Initiatives and the quality of the proposals submitted.

The total funding available for Portuguese research institutions, as part of this research call, will be up to € 400,000 (four hundred thousand euros), depending on proposal design and budget justifications. Each of the 8 (eight) exploratory projects should have a maximum budget of € 50.000 (fifty thousand euros) for the entire funding period of up to 1 (one) year by project.

Specific collaborations with MIT faculty colleagues are highly encouraged and will be part of the evaluation. Collaborative research visits to MIT are encouraged and should be included in the budget.

An advance payment of 75% of the funding approved for the financed projects will be made by FCT, I.P., after returning the acceptance documents.

The remaining amount, until the approved funding, will be paid after the scientific and financial components of the project are closed and by means of a final refund payment.

The expenditure justification should be made by via electronic submission of only one payment request, in a specific form provide through the FCT, I.P internet Portal.

Research activities of participating MIT research teams will not be covered by these funds. Instead, participating MIT research teams will have the opportunity to apply for funding through a specific call at MIT (Call for Seed Projects).

Financial support could be augmented by financial and/or in-kind support provided by participating companies, and possibly by other national and local government agencies. The involved companies or other independent non-academic organizations will not be funded by FCT.

4.3. Duration

A typical proposal should cover efforts for a period of 12 months.

4.4. Supporting Entities

The following non-entrepreneurial Portuguese entities of the R&I are individual or co-promotion beneficiaries:

- Higher Education Institutions, their institutes and R&D units;
- State or international Laboratories with head office in Portugal;
- Non-profit private institutions whose main objective is R&D activities;
- Other non-profit private and public institutions developing or participating in scientific research activities.

4.5. Application deadline

Applications must be submitted online through the myFCT website https://myfct.fct.pt/ following the Announcement of the Call for Proposals. The applications must follow the guidelines provided in the Terms of Reference outlined below and in the general FCT guidelines for the submission of on-line applications for grants, specified in:

https://www.fct.pt/apoios/projectos/concursos/instrucoes.phtml.pt

The call is open from **October 11 to November 17, 2022, at 17:00 Lisbon time.**

4.6. Format Requirements

Full applications must meet the following format requirements:

- Completion of the on-line FCT form, available through the myFCT platform (https://myfct.fct.pt/), according to the Guidelines for MIT Portugal Program Exploratory Projects Call

  (http://www.fct.pt/apoios/cooptrans/parcerias/mit/index.phtml.pt);

- Attachment of the "Collaboration Letter" by at least one MIT faculty or researcher with principal investigator status, describing their scientific responsibility in the project;
- Attachment of the document that certifies the PhD degree of the PI;

The PI, co-PI, the core elements, as well as the remaining elements of the research team, are responsible for submitting an updated version of their **CV in English on the CIÊNCIAVITAE platform**.

The Statement of Commitment for the Principal Contractor will be available on myFCT platform, for agreement by the head of the Principal Contractor or someone appointed by him/her, following the deadline for submission of applications and up to 02 December 2022 at **17:00 (Lisbon time).**

All sections of the myFCT form must be completed. Except where mentioned otherwise, all the requested information needs to be in English. Please make sure that text entered in the on-line form is formatted and comprehensive.

4.7. Objectives and proposed exploratory projects' structure

All exploratory projects have the long-term objective to develop innovative products and services with high export potential that should spearhead Portugal's international competitiveness and innovative capacity in science and technology, and ultimately contribute to the growth of the Portuguese economy.

When appropriate, each project should be composed of several tasks with well-defined goals and deliverables to be achieved throughout the project duration. The specific role and contribution of each task to the overall strategic objectives of the exploratory projects should be highlighted clearly.

4.8. Review of applicants

Projects will be selected on a competitive basis. Applications will be reviewed by an international panel of independent experts, organized by MIT Portugal Program Governing Committee (PGC) and FCT. The review panel will be responsible for evaluating the merit of each proposal. The selection for funding is based on the criteria presented in section 5, as well as the alignment with the MIT Portugal's mission and objectives.

The applications must follow the guidelines provided in these Terms of Reference and in the FCT online tools for filling in the application, namely instructions guidelines:

https://www.fct.pt/apoios/projectos/concursos/instrucoes

4.9. Notification, start of activities and reporting

Applicants will be notified in accordance with article 15 of the Regulations for Projects Exclusively Funded by National Funds.

A final report of the Exploratory Research Project will be delivered for review by the PGC and FCT. The PGC and FCT may request that a panel of experts' reviews, at any point in its progress and at its ends. Periodic status update of the project may be requested at the discretion of the PGC, FCT or the Directors of the MIT Portugal Program.

5. ELIGIBILITY INFORMATION

5.1. Eligibility of organizations

Applications must be submitted by research consortia that include:

a) At least one research team from different entities as identified in section 4.4.

b) A MIT researcher with principal investigator status. This participation should be confirmed by a "Collaboration Letter", to be submitted with the proposal which describe his/her role in the proposal.

The consortia may include Collaborative Institutions, that may also invest in the exploratory project and that may bring relevant competencies to the project. However, such entities will not be funded by this call.

5.2. Principal investigator (PI), Co- PI and research team eligibility

- The Principal Investigator responsible for the proposal should hold a Doctorate, and the document that certifies the PhD degree should be included as one annex to the candidacy electronic submission form;
- The PI should also have an employment contract or grant contract with the Principal Contractor. In the absence of such a link, at the time of the Terms of Acceptance Document a written agreement between the parties must be submitted, according to point c) of item 1 of article 6 of FCT's Project Regulations;
- The PI may only submit one proposal in the quality of Principal Investigator and cannot present an application as Co-PI;
- The PI should identify a co-responsible for the project, the Co-Principal Investigator (Co-PI), that will replace the PI when he/she is unable to fulfil his/her duties;
- The Co-PI can only submit one proposal in the quality of Co-Principal Investigator and cannot present an application as PI;
- The PI or the Co-PI with a final scientific report rejected within two years before the opening of the call, for reasons attributable to them, is not allowed to submit an application;
- The PI cannot be in a situation of unjustified non-fulfilment of the regulatory requirements regarding the presentation of reports on scientific execution of projects concluded and financed through FCT and in which acted as PI.
- The PI and the reaming members of Portugal Research team shall be dedicated to the project, according to their participation.

5.3. Limit on number of proposals per organization

There is no limit on the number of proposals to be submitted by a lead research institution and there is no limit on the number of exploratory project consortia a partner research institution may join.

6. EVALUATION AND SELECTION CRITERIA

6.1. Evaluation panel

All the accepted applications will be reviewed by international panels of independent experts, organized by FCT that will coordinate the scientific evaluation process.

6.2. Selection criteria

The selection and ranking of the applications will be based on the following criteria, detailed in the Regulations Governing Access to Funding for Scientific Research and Technological Development Projects and in the Guide for Peer Reviewers:

A. Scientific merit and innovative nature of the project from an international standpoint;

B. Scientific merit of the research team;

C. Feasibility of the work plan and reasonability of the budget;

D. Contribution to the knowledge accumulation and competencies of the National Science and Technology System;

The **Merit of the Project** (MP) is given by:

MP = 0.45 A + 0.20 B + 0.20 C + 0.15 D

The criteria A, B, C and D are scored using a 9-point scale system (1- minimum; 9-maximum) with decimal numbers. The final score of MP is rounded to two-decimal places. If information made available in the application does not allow for evaluating a given criterion, then the respective criterion will receive a score of 1 (one).

For a proposal to be eligible for funding, a minimum score of MP equal or higher than 5.00 points is required.

The applications will be ranked by the panel, by financial envelope of thematic areas defined in section 4.2 of the ToR and in decreasing order of the MP score. In case of ties (projects with the same MP score), the ratings assigned to criteria A, B, C and D will be used sequentially and in decreasing order to provide the final ranking of the projects.

The assessment of the criteria shall take into account, among other considerations, the following:

Criterion A:

i. Relevance and originality of the project proposed (based on the state-of-the-art in a

determined scientific area);

ii. Thematic alignment of the proposal with the exploratory projects topics as referred in section 2;

iii. Adequacy of methodology adopted for carrying out the project;

iv. Expected results and their contribution to scientific and technological knowledge, their innovative character and high export potential, and technology-readiness level of the prototype, where applicable;

v. Contribution towards promoting and disseminating science and technology;

vi. Production of knowledge that can contribute to benefits to society or to the business sector, especially if it can specifically demonstrate transfer of knowledge;

vii. Advancement of knowledge and understanding within the proposed field and/or across fields, highlighting the vision and break-through ambitions of the proposed research, rather than incremental progress.

viii. Alignment of the proposal with the UN's SDGs.

Criterion B:

i. Scientific productivity of the team (references to publications and citations in published works, other relevant indicators);

ii. Abilities and skills to adequately execute the proposed project (team configuration, Principal Investigator's qualifications);

iii. Declared commitment to involve young researchers in the team or in training and/or attribution of scholarships;

iv. Availability of the team and non-duplication of objectives in relation to other projects underway;

v. Declared participation in the exploratory project of PhD students enrolled in PhD Programs or availability to partially fund a PhD scholarship;

vi. Involvement and level of commitment of companies and other stakeholders like independent non-academic organizations (e.g. hospitals, foundations, ministry departments, city councils, private or public associations, etc.) that participate in the project.

Criterion C:

i. Organization of the project in terms of the proposed objectives and resources (duration, equipment, size of the team, institutional and management resources);

ii. Institutional resources of the participating entities, in particular of the Principal Contractor (PC) (technical-scientific, organizational and managerial and, when appropriate, co-funding capacity on the part of companies);

iii. Quality of project design and rationale for the proposed budget.

Criterion D:

i. Contribution to the body of knowledge and competence of the National Science and Technology System (expected effects and results);

ii. Enhancement of partnerships for research, education and innovation.

7. ADDITIONAL INFORMATION

For inquires of a scientific nature, please contact the MIT Portugal Program at info@mitportugal.org.
For specific information related to application submission, please contact concursoprojetos@fct.pt.