MIT PORTUGAL PROGRAM

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TERMS OF REFERENCE FOR THE

MIT PORTUGAL PROGRAM

2017 CALL FOR PROPOSALS

DRIVING INNOVATION THROUGH INTEGRATED EXPLORATORY RESEARCH

JANUARY 2017

MIT Portugal

FCT
Fundação para a Ciência e a Tecnologia
MINISTÉRIO DA CIÊNCIA, TECNOLOGIA E ENSINO SUPERIOR

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1. Synopsis

The MIT Portugal Program is inviting submissions for the 2017 Call for Exploratory ResearchProposals.

MIT Portugal, an FCT initiative, is a strategic partnership between Portuguese universities and Research Centers, the Massachusetts Institute of Technology (MIT) as well as partners from industry and government. Launched by the Portuguese government in 2006 and renewed in 2013, its goal is to strengthen the country's knowledge base and international competitiveness through a strategic investment in people, knowledge and ideas in innovative technology sectors.

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).

These projects will be used to assess emergent scientific domains that could be considered in the design of a potential 3rd phase of the MIT Portugal Program. The projects submitted should, preferably, contribute to the Atlantic International Research Center (AIR Center) scientific developments and objectives, as stated in the document "Towards a Science and Technology agenda for an integrative approach to the Atlantic: Climate Change and Energy Systems, Space and Ocean Sciences, through North-South cooperation", available at *FCT website*.

The proposal should target the development of research activity between MIT and Portuguese universities 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 2017 call, we are seeking outstanding collaborative proposals in five areas:
1. Integrative research based in the context of the AIR Center
2. Sustainable and data driven urban systems
3. New industrial concepts and smart factories
4. Bio & Medical Devices
5. Sustainable Transportation Systems

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 products and services 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 products and services with high export potential in Portugal, demonstrating and leading Portugal's international competitiveness and innovative capacity in science and technology, and contributing to the growth of the Portuguese economy.
- 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, as well as faculty and research staff of MIT. The total funding available for Portuguese research institutions in this call will be up to €1,800,000 (one million and eight 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 March 8, 2017.**
For more information, email info@mitportugal.org *(scientific information)* or *projetosMIT@fct.pt* (specific information related to application submission)

2. Exploratory Projects topics

2.1. Area 1: Integrative research based in the context of AIR Center

Proposals for this area should focus on research oriented to complex systems engineering and science towards an integrative approach to space, climate change and energy, earth and ocean science in the Atlantic, together with emerging methods of data science, which may include, but are not limited to, sub-areas such as:

- Atmospheric science and climate change for the Atlantic;
- Energy systems for the Atlantic;
- Ocean science and technology for the Atlantic;
- Data science for the Atlantic;
- Space science and technology for the Atlantic.

2.2. Area 2: Sustainable and data driven urban systems

Proposals for this area should focus on promoting research oriented to improve urban resources efficiency through urban dynamics and big data, which may include, but are not limited to, sub-areas such as:

- Resource productivity assessment
- Urban logistics and short-term urban management
- Urban modeling and analytics
- Internet-of-things, sensing and urban Information Infrastructure
- Urban planning, public engagement and decision support
- Smart grids
- Urban regeneration and building renovation
- Nearly zero energy buildings
- Building integrated systems management and demand response
- Indoor and outdoor environmental quality
- Solid and wastewater smart management

2.3. Area 3: New industrial concepts and smart factories

Proposals for this area should focus on promoting research oriented to industry applications for new industrial concepts and considering the new industrial production paradigms, which may include, but are not limited to, sub-areas such as:

- Emerging and exponential technologies
- Smart factory as means of adaptability, resource efficiency and ergonomics
- New and smart materials
- Greener manufacturing
- Agile organizations
- Augmented work, maintenance, and services
- Human factors at new industrialization paradigms
- Future industrial trends, e.g. including preventive maintenance, automation of inbound logistics, smart data-gathering, and miniaturization
- Design for people, based in human-centered systems
- Design for sustainability, with emphasis on the use and validation of life-cycle approaches for low-carbon, low-energy systems
- Regenerative medicine manufacturing and advance biomanufacturing
- Microbial cell factories and/for Biorefineries
- Circular bioeconomy: from waste to products factories

2.4. Area 4: Bio & Medical Devices

Proposals for this area should focus on promoting research oriented to investigate materials, components for new generation of bio & medical devices which may include, but are not limited to, sub- areas such as:

- Built-in "intelligent" functionalities at the physical or biological level
- Hybrid human-machine systems and human-centered robotics technologies
- Design and performance analysis of human-robot systems
- Implementing in-vivo morpho/functional evaluation of cyber-physical biomechanical systems
- Developing advanced wearable medical devices with onboard sensing and actuation
- Integration of smart devices for IT/remote monitoring of diagnostics
- Developing bioengineering tissue constructs for human machine interaction
- Smart devices encompassing whole tissue/organ approach for integration
- Global health diagnostics and therapeutics
- Micro- to nano-particle engineering for diagnosing and targeted delivery
- Responsive materials for adaptive wound healing
- Micro- to nano-scaffolds for in vitro 3D tissue organoid
- Biosensors and whole-cell systems for production of diagnostic and/or therapeutic agents or biosensors

2.5. Area 5: Sustainable Transportation Systems

Proposals for this area should focus on promoting research oriented to the development of innovative and potentially economically viable solutions to the challenges arising in today's transportation systems, which may include, but are not limited to, sub-areas such as:

- Transport information systems
- Bus rapid transit
- Demand responsive transport
- Shared mobility
- Autonomous vehicles
- Walkable cities
- Elderly mobility
- Transport interfaces and Intermodality
- Intelligent traffic safety.

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, as well as faculty and research staff at MIT.

Total funding for Portuguese institutions is limited to a maximum of 1.800.000 € (one thousand and eight hundred euros) with up to 100.000 € (one hundred 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 **March 8, 2017**

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*
- *https://www.fct.pt/apoios/bolsas/normasbolsasemprojectosunidades.phtml.en*

The announcement of the opening of this call is available at:

- *http://www.fct.pt/apoios/projectos/concursos/index.phtml.en*

The guidelines to writing and submitting proposals are available at:

- *http://www.fct.pt/apoios/projectos/concursos/mit/2013/docs/MIT_Portugal_Program_2017_Submission_Guide.pdf*

The guide for peer reviewers available at:

- (available soon)

4.2. Number of awards and funding amount

A maximum of 18 (eighteen) exploratory projects are expected to receive funding through the current call. 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 €1,800,000 (one million, eight hundred thousand euros), depending on proposal design and budget justifications. At most, it will be funded 5 (five) projects per area 2 to 5 of those areas previously identified at section number 2. Each of the 18 (eighteen) exploratory projects should have a maximum budget of €100,000 (one hundred thousand euros) for the entire funding period of up to 1 (one) year by project.

Research activities of participating MIT research teams will not be covered by these funds. Financial support through the MIT Portugal Program could be augmented by financial and/or in-kind support provided by participating companies, and possibly by other national and local government agencies.

4.3. Supporting Entities

Only the following entities are eligible to receive funding from FCT through the present call for proposals:

- 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

4.4. Duration

A typical proposal should cover efforts for a period of 1 (one) year. Progress achieved by the project teams will be assessed by the Program Governing Committee (PGC) of the MIT Portugal Program and FCT at mid-term, which then decides on approving continued funding.

4.5. Application deadline

Applications must be submitted online through the *FCT website* 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 *http://www.fct.pt/apoios/projectos/concursos/instrucoes.phtml.en*.

The call is open from January 17th, 2017 until March 8th, 2017 at 17:00 Lisbon time

4.6. Review of applicants

Projects will be selected on a competitive basis. Applications will be reviewed by an international panel of independent experts, organized by 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.

4.7. Notification, start of activities

Applicants will be notified in accordance with article 15 of the Regulations for Projects Exclusively Funded by National Funds. Funded applications are intended to commence by June 1, 2017.

4.8. Interim evaluation

A mid-term report after the first semester of each project will be delivered for interim review by the Program Governing Committee (PGC) of the MIT Portugal Program and by FCT. The PGC has the right to recommend to FCT that further funding be discontinued. At the end of each exploratory project a final report will be delivered for review by the PGC and FCT. The PGC and FCT may request that a panel of experts reviews the progress.

4.9. 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.

Projects should further consider the allocation of PhD preferably from the MPP related PhD programs in order to support the development of excellent young researchers and strengthen human resource development in critical-need areas in Portugal.

4.10. Submission requirements

Full applications must meet the following format requirements:

- Completion of the on-line FCT form, available through the *FCT platform*, according to the *Guidelines for MIT Portugal Program Exploratory Projects Call*;
- Attachment of the "letter of collaboration" by at least an MIT researcher or a research scientist, describing their scientific responsibility in the project;
- Attachment of the document that certifies the PhD degree of the PI;
- Attachment (if applicable) of the written agreement between the Principal Investigator and the proposing institution;
- All sections of the FCT 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.

5. Eligibility information

5.1. Eligibility of organizations

Applications must be submitted by research consortia that include:

a) At least two research teams from different entities as identified in section 4.3. One of them should consist in a Higher Education Institutions, their institutes or R&D
b) A MIT researcher (faculty or research scientist). This participation should be confirmed by a "letter of collaboration", to be submitted with the proposal which describe his role in the proposal.

Beyond the entities mentioned above, the consortia may include other public or private entities, profit or non-profit, that may also invest in the exploratory project and that may bring relevant competencies to the project.

5.2. Principal investigator (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 be a professor or have a research position in the proposing Institution. In the absence of such a link, a written agreement between the parties must be submitted in the annex to the application, according to point c) of point 1 of article 6 of the FCT Project Regulations. The PI may only submit one proposal in the quality of Principal Investigator and should have as a minimum a 35% time dedication to the project. All other members of the research team shall participate at no less than 15% time dedication, according to their tasks.
Proposals will not be accepted from Principal Investigators affiliated to institutions that are on a situation of unjustified fault with FCT requirements regarding the delivery of the scientific and/or financial execution reports from previous financed projects.
Please note that applications to projects of which the Principal Investigator has been Principal Investigator of projects of whose final scientific report was rejected for reasons attributable to them within the two previous years before the tender opening are not accepted.

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:

A. Scientific merit and innovative nature of the project, preferably within the scope of the priorities developed by the Atlantic International Research Center *(AIR Center)* initiative;
B. Scientific merit of the research team;
C. Feasibility of the work plan and reasonability of the budget;
D. Contribution to the body of knowledge and competence of the National Science and Technology System;
E. Potential economic value of the technology.

Reviewers will be asked to take into consideration, among other things.

a. For criterion A:
   i. Relevance and originality of the project proposed (based on the state-of-the-art in a determined scientific area and previous work done by the proposing team);
   ii. Thematic alignment of the proposal with the exploratory projects topics as referred in section 2, giving preference to the proposals that have an alignment with the priorities developed by the *Atlantic International Research Center (AIR Center)* initiative
   iii. Adequacy of methodology adopted for carrying out the project;
   iv. Expected results and their contribution to scientific and technological knowledge;
   v. Resulting publications and articles;
   vi. Contribution towards promoting and disseminating science and technology;
   vii. Production of knowledge that can contribute to benefits to society or to the business sector;
   viii. 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.

b. For 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. Ability to involve young researchers in training;

iv. Availability of the team and non-duplication of objectives in relation to other projects underway;
v. Participation in the exploratory project of PhD students from the PhD Programs within the scope of the MIT Portugal Program;
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.

c. For 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.

d. For 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.

e. For criterion E:
   i. Potential economic value of the technology (if appropriate), namely in terms of its impact on the competitiveness of the national socio-economic system;
   ii. Production of knowledge that can be incorporated into and applied to the business sector, if applicable;
   iii. Importance of the targeted real world problems and of the identified technical, societal and economic challenges.

6.3. Analysis by the Program Governing Committee (PGC)

Due to the broad scope of the research domains involved in this call, all the selected applications will be validated for their alignment with this call by of the Program Governing Committee (PGC) of the MIT Portugal Program.

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 *projetosMIT@fct.pt*.