Gaspard Monge Program for Optimization, operations research and their interactions with data science

2020 Call for projects

SUMMARY

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2 Introduction

The Gaspard Monge Program for Optimization, operations research and their interactions with data science (PGMO), was launched in 2012 by EDF and the Jacques Hadamard Mathematical Foundation (FMJH). PGMO is a new type of corporate patronage whose aim is to foster, liven up a mathematical community of researchers coming from academia and industry, working in the field of optimization, operation research and data science, and working on academic themes and industrial issues.

The objective is to support research projects through collaborative actions between academic researchers and industrial researchers, focused on solving industrial problems in the fields of energy and complex systems. These projects are encouraged to be a kick-off for a future partnership between academic and industrial researchers.

All results produced in the scope of projects supported by PGMO will be free and publicly available, respectful of the agreement creating PGMO. Reports, communications or papers will be freely published and free software production is encouraged.

PGMO is organized in 1 scientific animation sub-program, 1 general research sub-program: PRMO (Mathematical Optimization Research Projects) and specialized research sub-programs:

- Optimization and Energy Research Initiative (IROE)
- Research Initiative in Industrial Data Science (IRSDI)

2.1 Funding Sources: PGMO, LMH

PGMO accepted projects may be funded through either PGMO own fundings, or LMH Labex funding. In all cases, the team coordinating the project will ensure the management of the budget.

PGMO

Projects funded by PGMO own resources are open to all academic researchers with no restrictions of administrative or geographic location. If a team from a lab outside France wishes to submit a project, it may consider an association with a team in France. Agreement for supporting the project can be signed between FMJH and a lab outside France, provided this lab will ensure the management of the budget.
Projects requiring PGMO funding are eligible in 2020, to IROE and IRSDI sub-programs only.

LMH Labex (Labex Mathématique Hadamard)

Projects funded by LMH Labex are restricted to teams coordinated by a researcher belonging to one of the labs affiliated t LMH: https://www.fondation-hadamard.fr/en/LMH . The team may also involve researchers from non affiliated labs.

2.2 PGMO sub-programs: PRMO, IROE, IRSDI

PRMO sub-program

The objective of PRMO is to support research in the field of optimization, operations research, and data science as well as to create and enliven a scientific community in that field, and to help developing teaching of optimization (master degree and PhD). Projects supported through PRMO will have to be widely open. Cooperative projects between different teams from different horizons as well as projects leading to industrial applications will be encouraged.

The scientific program of PRMO encompasses the following themes: modelling, continuous optimization (convex and non-convex, non-smooth…), optimization of large systems (decomposition-coordination methods, centralized-decentralized optimization…), combinatorial optimization and operations research, optimization with uncertainty (stochastic, robust, stochastic optimal control…), global optimization (relaxation and approximation, semi-algebraic programming, stochastic algorithms…), game theory, as well as connected fields.

Projects at the interface of optimization and data science are encouraged.

The typical projects supported by PGMO in that sub-program consist of projects mixing researchers from different fields, with a common research objective in the field of optimization and operations research and may support for instance traveling, working meetings, internships.

IROE sub-program

IROE focuses on energy, mainly energy management. The objective is to support research projects, through collaborative actions between academic researchers and industrial researchers, focused on solving difficult optimization problems in the field of energy, those problems being described in the IROE appendix.

Realistic data sets may be provided, and the teams may benefit from the help of EDF experts during the setting up of the project as well as during its whole life. In this case, a confidentiality agreement concerning data sets and some specific EDF knowledge will have to be signed. It will nevertheless be possible (after notifying EDF) to publish results based on EDF data.

IRSDI sub-program

IRSDI focuses on the methodological developments and applications of the data science methods to industrial problems in the field of energy.

Teams willing to submit a project within the IRSDI scope are encouraged to contact the IRSDI coordinator prior to submission.PGMO coordination and animation

As an objective of PGMO is to foster and liven up a research community around optimization, operations research, and their interactions with data science, regular events will be organized.

Workshops or working sessions gathering project teams on close subjects may be organized, with the aim of discussing the methods proposed for solving the problems.

A conference is organized every year in the Fall. Projects are expected to propose talks and/or posters during the conference. All projects will be asked to send a very synthetic summary of the project before the conference.

Big-size projects are also invited to organize workshops.

Workshop meetings may be held in the EDF'Lab premises or in a different location.

3 Rules of the present call for projects

Projects will be submitted, in a 1-step process, by filling an online form and submitting a single PDF document (see the document template) through the EasyChair platform:

https://easychair.org/conferences/?conf=pgmo2020

Submissions may be written in French or in English.

Projects asking for a renewal are required to provide an intermediary scientific and financial report (as a part of the single PDF document to be submitted).

More generally, all funded projects are required to provide intermediary scientific and financial reports each year, plus a final scientific and financial report after the project ended. Those reports have to be uploaded on the PGMO reporting platform:

https://www.fondation-hadamard.fr/fr/pgmo-calls-projects/project-reports

A summary of the project (around ½ page), which has to be understandable by non-specialists, is required. The quality of the submission documents will be taken into account for granting the financial support. This summary will be published on the PGMO website.

Additional rules may apply for some sub-programs (see the IROE and IRSDI appendices).

All submitted projects will be evaluated by the executive board and the scientific committee. In view of the recommendations of the scientific committee and of the executive board, the steering committee will then decide which projects to support and the budgets allocated to those projects.

3.1 Rules and Agenda

Beware: since Spring 2016, the submission process for PGMO projects consists of one unique step. However, the scientific committee of PGMO retains the right to contact the project leaders and request a revised submission before the final evaluation.

Publication of the call	April 3, 2020
Deadline for submission	May 17, 2020
Notification of acceptance or rejection	July 2020

Duration of the projects may be of 1, 2 or 3 years. The PGMO will allocate a budget only for the first year of each project. The funding of each subsequent year can be lowered by the PGMO board. In all cases, pluriannual projects are required to ask for a renewal of their grant every year, using the same interface as new projects. A yearly evaluation (scientific and financial) will be made for each project, which may lead to renew or not the financial support.

In any case, the support for PhD will be secured for 3 years.

3.2 Categories of projects

Projects must rely on already available human resources (permanent researchers and possible, existing PhD students or postdocs); however, some projects may include the recruitment of some staff (interns and visiting scholars, or even PhD students or postdocs).

Given the differences in the orders of magnitude of the financial supports that can be granted, projects are classified into three categories.

Category A projects will match most of the supported projects.

Category B projects (a limited number will be granted) deal with post-doctoral fellowship contract or partially funded PhD contracts. It is recommended that teams interested in Category B write a variant of their proposal based on a Category A project.

Category C projects are meant for invited professors. These projects are primarily reserved for laboratories attached to Saclay campus.

PRMO projects are only eligible to A or C category. IRSDI projects are only eligible to the B category (Postdoc) in 2020. IROE projects may be of any category.

Category A (IROE and PRMO projects only):

- **Internships** (3 to 6 months)
- Short duration **invitations** for research visitors (travel and accommodation)
- **Travel** (for the researchers in the project team)
- **Software**, computers, **data**

In 2020, **IROE** projects of Category A may be of 2 different kinds:

- A1: Applied Projects focused on the industrial topics from IROE annex, necessitating the use of real data and/or inputs from EDF experts, applied research with higher TRL (Technology readiness Level)
- A2: Exploratory projects with lower TRL (technology readiness Level), tackling energy oriented topics: category A only.

Teams willing to submit an A1 IROE project are encouraged to contact the IROE responsible prior to submission.

PRMO projects are in category A2.

Category B (IROE and IRSDI projects only):

- **Post-doctoral funding**. The financial amount for the salary will be 50k€/year (including taxes and social security). Environment support (travel…) can also be asked, in the limit of 10k€/year. As the number of postdoctoral allocations is limited, co-funding will be appreciated. It is expected that the postdoc candidate has completed her/his PhD in a different laboratory. The perspective of professional insertion of the candidate after this postdoc must be explained in the application.
- **PhD allocation**. Environment support (travel, etc.) can also be asked, in the limit of 10k€/year. Co-funding is wished.
- For the 2020 call, IRSDI projects are only in Category B (One year of Postdoc)

Category C (PRMO only):

- **Invited Professor**. This professor will be invited by a laboratory near the Saclay area. She/He will have to participate to some PGMO events (like the seminar), and to give an advanced course in optimization, either in the Paris Saclay Optimization Master or Hadamard doctoral school. Proposals have to be submitted by the inviting institution (CV, course proposal and research project). Such submissions may be considered at any time. The financial support will be at most 5k€ per month.

3.3 Important recommendations

Candidates for PGMO projects are invited to get in touch with the PGMO board (pgmo@fondation-hadamard.fr) who may help them to build their project before submission.

In the case of category A1 or B IROE projects and IRSDI projects (category B), it is mandatory to get in touch with the PGMO board (pgmo@fondation-hadamard.fr) for getting the help of an EDF expert.

Project teams are invited to consider the possibility of grouping with other teams who may work on a close topic. Projects grouping many teams of different laboratories are encouraged in order to favor exchanges between laboratories on close topics.

The participation of young researchers is highly encouraged.

Pluridisciplinarity is encouraged.

Projects with several labs will have a unique leader, who will be in charge of the management of the allocated financial support.

PGMO being a program of the FMJH, whose headquarters are in the Saclay area, all project teams are asked to participate to research events in the Saclay area (e.g., the PGMO annual conference or PGMO seminars). Big-size project will have a part of their budget devoted to organizing events on the campus.

It is recommended that each researcher be not involved in more than 2 different PGMO projects. Project leaders are not allowed to lead more than 1 PGMO project.

This year, owing to the changes in the funding structure of PGMO, the PRMO call is funded by Labex LMH only. As a consequence, PRMO projects must be coordinated by a member of a lab affiliated to LMH.

All works published related to a PGMO supported project, all events organized, etc. must mention the support of PGMO, using the following formulae:

PRMO, IROE, IRSDI :

In French --- « Ces travaux de recherche ont bénéficié du support du 'Programme Gaspard Monge pour l'optimisation, la recherche opérationnelle et leurs interactions avec les sciences des données de la FMJH' et du soutien d'EDF».

Or in English --- "This research benefited from the support of the FMJH 'Program Gaspard Monge for optimization and operations research and their interactions with data science', and from the support from EDF"

Those acknowledgements may be changed in case another company joins PGMO.

LMH Labex :

Projects cofunded by LMH Labex will receive specific instructions concerning these acknowledgements.

Management fees cannot be funded by the PGMO. The former are considered as being part of the contribution of the partner laboratory to the project. Project leaders must get a formal authorization from their laboratory director (or equivalent) for managing their project.

3.4 Note on data sets

As far as possible, industrial sponsors will provide data and/or references to public data sets for the sake of publication and reproducible research. Projects must emphasize the link with real data. Projects based on public data or on the creation of public data similar to industrial or confidential data will be particularly welcome.

3.5 Agreement information

For each project, an agreement will be signed between the institution which will take in charge the management of the financial support and FMJH. Only research and teaching institutions may sign those agreements.

3.6 Contacts

PGMO coordinators: Stéphane Gaubert, Pierre Carpentier

IRSDI: Georges Hébrail

IROE: Sandrine Charousset

FMJH administrator (in charge of handling the negotiation of agreements between FMJH and partners) and Managing assistant: Magali le Chaponnier

Email: pgmo@fondation-hadamard.fr

4 Scientific scope

4.1 PRMO

The scope of PRMO corresponds to the one described in Section 1.

PRMO projects will be in the fields of optimization and operations research and will have to fulfill at least one of the following conditions:

- Research projects with young researchers or meant for attracting students or young researchers to optimization / operations research

- Collaborative research project or network between several different teams. Those projects will be asked, after 1-3 years of existence, to make a synthetic presentation of their work, which should be understandable by non specialists of the field, and which should identify further research perspectives in other fields of optimization, as well as new applications.
- Pluridisciplinary project between mathematics and computer science
- Research project with industrial or societal applications,
- Research project looking at interactions between optimization and other fields of mathematics
- Teaching of optimization project with, for instance, creation of multi-media documents or adapted pedagogic tools. It is recommended for this kind of projects to get in touch with PGMO board very early in order to make links with existing initiatives in that topic.

Scientific quality will be a leading criteria.

4.2 IROE

IROE is meant for solving difficult problems regarding management of energy.

A detailed description is provided in the IROE appendix.

4.3 IRSDI

IRSDI is meant for solving difficult problems regarding data science for industry.

A detailed description is provided in the IRSDI appendix.