

EUROCORES Programme European Collaborative Research

Bio-inspired Engineering of Sensors, Actuators & Systems (EuroBioSAS)

Call for Outline Proposals

What is EUROCORES?

The ESF European Collaborative Research (EUROCORES) Programmes offer a flexible framework for researchers in Europe to work on questions which are best addressed in large-scale collaborative research programmes.

The EUROCORES Programmes allow excellent researchers in the various participating countries to collaborate in research projects 'at the bench'. They also allow, when appropriate, colleagues in non-European countries, for example the US, to participate. The Programmes encourage and anticipate networking and collaboration between researchers in order to achieve synthesis of scientific results across the programme, to connect with related programmes, and to disseminate findings.

The EUROCORES Programmes allow national research funding organisations in Europe and beyond to support top-class research in and across all scientific areas, by matching their strategic priorities with the needs articulated by the scientific community.

Final funding decisions on the projects and the research funding remain with the national funding organisations, based on a single international peer review process operated by ESF. Financed by the participating national Funding Organisations, ESF also provides support for networking between the researchers and for the scientific synthesis of research results and their dissemination. In this way, the EUROCORES Scheme complements the EC Framework Programme and other collaborative funding schemes at European level.

For further information see: http://www.esf.org/eurocores

Bio-inspired Engineering of Sensors, Actuators & Systems (EuroBioSAS)

Following agreement with 16 funding organisations in Austria, Belgium, Croatia, Czech Republic, Estonia, Finland, Hungary, Italy, Luxembourg, Norway, Poland, Portugal, Romania, Switzerland, Turkey, the European Science Foundation is launching a Call for Outline Proposals for Collaborative Research Projects (CRPs) to be undertaken within the EUROCORES Programme EuroBioSAS. The Programme aims to support high quality multidisciplinary collaborative research in Europe, with involvement of leading scientists from outside Europe, when appropriate.

The research phase of EuroBioSAS will run for three years and includes national research funding as well as support for networking and dissemination activities. The research grants are provided directly to the eligible and successful Principal Investigators by their respective national funding organisations. The networking and dissemination support, also financed by the national organisations, is centrally managed by the ESF.

Outline Proposals are to be submitted by 29 March 2010 noon CET. It is expected that Full Proposals will be invited by 6th May 2010 with 22 June 2010 as expected deadline for submission.

A Programme-specific website can be consulted for the latest updates at http://www.esf.org/eurobiosas

Background and objectives

Nature's richness and variety, evolved through millions of years of natural selection, holds the key to a treasure trove of innovative design principles. Biological systems occupy a domain of parameter space which manmade systems have only just begun to touch upon. Entering this domain will transform the face of modern engineering. Whereas today's technological devices are synthesized from discrete and often pre-existing components, Nature produces fully integrated biological systems whose function drives the evolution of form at all levels simultaneously. The resulting integration of biological systems over many hierarchical levels is the key to understanding their exquisite performance, and is also the key to emulating their functionality in an engineered system. Bio-inspired Engineering therefore necessitates nothing less than a radical rethinking of the underlying principles of synthetic design, which can be achieved only by elucidating the most fundamental principles by which biological systems are structured. EuroBioSAS aims to uncover those fundamental organizational principles which underpin the performance of biological sensors, actuators and systems, and will use them as the inspiration for developing new technologies that push beyond the frontiers of today's engineered systems in their capability and performance.

Scientific goals

EuroBioSAS sets an intrinsically multi-disciplinary target that, while posing significant scientific and technical challenges, will lead to the development of transformative new technologies. Because EuroBioSAS targets an emerging approach to engineering, rather than a specific application area, the technologies that result from it are expected to find application in a range of different contexts: from civil engineering to national security; from information and communications technology to automotive, domestic and aerospace industry; and from materials to and medical mechanical engineering. EuroBioSAS thereby promotes an important and emerging field that will deliver innovative, yet naturally proven, solutions to a range of sociallyrelevant, scientifically-important, and technicallyproblems. challenging engineering development of bio-inspired sensors, actuators and systems can only be enabled by interfacing world-leading fundamental and applied research across national and disciplinary boundaries. EuroBioSAS will facilitate this scientific leap, so as ultimately to realize the transformative advantages and capabilities that Bio-inspired Engineering can offer.

Research topics

In order to promote the cohesion of the programme, proposals for Collaborative Research Projects (CRPs) are welcomed which investigate specific examples of hierarchical organization or integrative functional design in biological sensors, actuators or systems and which apply these either to develop novel technological devices or to develop enabling technologies that will facilitate the development of such devices. Making the functionality of biological systems a reality in technological devices will hinge upon the successful integration of deep and credible basic research in the Life Sciences with visionary applied research in the Engineering. Physical, Mathematical Computer Sciences. Proposals must therefore demonstrate a strong component in both the Life Sciences and at least one of the Engineering, Physical, Mathematical or Computer Sciences.

To address the objectives outlined above, the programme will focus on the following two topics:

i) Hierarchical organization of bio-inspired sensors, actuators and systems

This topic draws inspiration from the observation that most biological systems are hierarchically structured. Such hierarchies can be

identified at all levels, from the structure inherent in the materials from which biological systems are built, through to the hierarchy of processing that occurs in nervous systems, wherein an enormous amount of peripheral processing is used to extract, condense, and simplify the information that reaches the centre. Higher-level hierarchies are also apparent in the interaction of organisms in swarms. This topic aims to understand and exploit the advantages of such hierarchical organization across two or more hierarchical levels. Examples of possible sub-topics falling within the scope of this topic include:

- Processing hierarchies for the extraction, amplification and multimodal fusion of relevant information from noisy sensory inputs.
- Processing and control hierarchies for the development of autonomous vehicles or agents, or swarms
- Novel materials for the next generation of smart sensors and actuators

ii) Integrative functional design of bio-inspired sensors, actuators and systems

This topic draws inspiration from the observation that biological systems have an intrinsically integrated functionality that is absent from today's engineered systems. Because today's technological devices are manufactured from discrete components that have been optimized in a piecewise fashion, the resulting devices are often limited in their adaptability. In contrast, Nature evolves fully integrated systems that are optimized across many levels simultaneously. This topic aims to understand and exploit the principles which underlie this integrated functionality. Examples of possible sub-topics falling within the scope of this topic include:

- Redundancy and integration in sensorrich control systems
- Robustness and multi-actuator integration in high dimensional motor control
- Integrated structure, sensing, and actuation for locomotion underwater, in space, or in a terrestrial / aerial environment

The sub-topics within each topic are intended to indicate the scope of EuroBioSAS, rather than to prescribe it. CRPs which address other sub-topics will be considered provided that they fall within one of the two main topics identified above.

Guidelines for applications

(Outline and Full Proposals)

This Call for Proposals is for Outline Proposals for Collaborative Research Projects (CRP). Proposers should be individual scientists (or research groups represented by individual scientists) who are eligible for funding from a national funding organisation participating in the EUROCORES Programme EuroBioSAS

Scientists or groups not applying for or not eligible to apply for funding from such an organisation can be associated to a proposal when their scientific added value can be demonstrated. Participation of Associate Partners in a project must be fully self-supporting and will not be financially sponsored by the participating funding organisations.

Proposals are only eligible if they fulfil all of the following **criteria**:

- Proposals must involve, as a minimum, three eligible Principle Investigators (PIs) from three different countries.
- A maximum of 50% of the total number of Individual Projects (IPs) in a Collaborative Research Project (CRP) can come from one country.
- Proposals must involve more Pls than Associated Partners (APs).

Applicants should envisage three years of research. Taking into account the two-stage proposal selection and approval process (described below), the successful projects are expected to begin their research phase activities in **April 2011**.

Online submission of applications

Outline and Full Proposals will be submitted online. Applicants should follow the proposal structure as indicated in the application template for Outline Proposals available on the Programme website at:

http://www.esf.org/eurobiosas

Links to information on national funding eligibility and requirements as well as to a EUROCORES Glossary and Frequently Asked Questions (FAQs) are available on the Programme website.

Prior to submitting Outline Proposals, all applicants <u>must</u> contact their national funding organisations in order to verify eligibility and

to ensure compliance with their national grant requirements and regulations. The list of participating organisations and their nominated contact persons is included on the last page of this document.

At the time of the online submission of the Outline Proposal, the Project Leader will be asked to confirm on behalf of the consortium that all the Principal Investigators in the CRP have consulted their national funding organisations and are eligible for funding from these organisations.

Outline Proposals

Outline Proposals are invited by 29 March 2010 noon CET.

Outline Proposals will be examined by the participating funding organisations for formal eligibility. Therefore, it is crucial that all applicants requesting funding contact their national funding organisation prior to submitting their proposals. In compliance with the rules and regulations of the participating national funding organisations, the requested funds under the EUROCORES Programme EuroBioSAS may include salaries for scientific and technical staff, equipment, travel costs and consumables within the project. The requested from each organisation participating in the call must be clearly specified. National policies may also require the proposal to contain specific additional information. Applicants should be aware that the participating funding organisations can make adjustments to the requested funds in order to bring these in line with their normal grant regulations and standards.

As described below, applications will be reviewed according to specific assessment criteria in a two-stage procedure. The goal is to select scientifically excellent proposals which fit well within the scope of the programme and have significant potential to add value to its achievements.

At the outline stage, the Review Panel will select proposals based on the following criteria:

- · Relevance to the Call for Proposals
- Novelty and originality
- European added value (scientific)
- Qualifications of the applicants

An Outline Proposal must comprise:

- A short description of the CRP (max. 1200 words, including objectives, milestones, methodologies (e.g. experiments and fieldwork);
 - Short description of how (and why) the partners contributing to the CRP will work together and how their contributions will be integrated;
- Short CVs of Project Leader (PL), all Pls and Associate Partners, including five most relevant publications (max. one page each);
- Estimated budget (consistent with the rules of relevant national funding organisation), tabulated according to a provided template.

Associated Partners (APs) are also considered part of a CRP and will be assessed as such at both the Outline and Full Proposal stage.

It will be assumed that arrangements for the handling of Intellectual Property Rights (IPR) will be in place within projects, following the applicable national legislation and national funding organisation's regulations. Applicants are strongly urged to have such arrangements in place, covering all research groups (including any associated groups) before the start of the projects. It is expected that the results obtained by the projects supported under this EUROCORES Programme will be placed in the public domain, through standard scientific dissemination activities.

It is also expected that compliance with all other relevant national or international regulations on research (for example ethics) will have been affirmed before funding is granted. It is the responsibility of applicants to clarify any such matters (if applicable) with their national contact points.

Full Proposals

Full Proposals will be invited following the recommendations of the Review Panel. The deadline for Full Proposals will be announced later, but is expected to be around 22 June, 2010.

Please note that only applicants who have submitted an Outline Proposal can submit a Full Proposal.

For the Full Collaborative Research Project (CRP) Proposals, the most important selection criterion is "scientific quality". Other criteria include interdisciplinarity (according to the scope of the call), qualifications of the applicants, level of integration and collaboration, feasibility and appropriateness of methodologies, European added value, relation to other projects (complementarities versus risk of overlaps and double-funding) and suitability of the requested budget.

The Full Proposals will be assessed by at least three independent external expert referees selected by the ESF. The expert referees are selected from a pool of scientists suggested by the participating funding organisations, the Review Panel and the ESF office. The names of all referees used in the international peer review of EUROCORES programmes, together with the names of those who have contributed to the peer review process in other ESF instruments, will be published on the ESF website once in a given year.

The referee reports will be made available (anonymously) to the applicants for their information and if necessary for their comments and clarifications. The Review Panel will rank all Full Proposals based on the assessment of the Full Proposal, the anonymous referee reports and the applicant's responses to these.

The Review Panel will create a rank-ordered list of the strongest Full Proposals and will subsequently make recommendations to the Management Committee for the funding of these proposals. The Management Committee assigned to each programme comprises representatives of all the participating funding organisations.

The actual granting of the funds to the Individual Projects will be based on the Review Panel's ranked list. The funding cut-off will be determined based on the total amount of funds available in each participating Funding Organisation and how the Individual Projects figure on the list. The use of funds in a project will be subject to the national requirements and regulations of each participating Funding Organisation.

Full proposals must include sound and well-argued scientific cases both at the level of the consortium's collective objectives and in terms of the expected contributions of each of the Individual Projects in the consortium. Full Proposals must also include a list of all participants and their contact information and shorts CVs, detailed tabulated budgets for the

whole CRP and for each project within it. Full Proposals could include other necessary supporting information. A coherent and common scientific case must be made throughout the proposal to demonstrate a collective and collaborative aim and for scientific synergy and integration of multinational expertise. In addition, the amount requested from each national funding organisation has to be clearly and separately specified. Detailed instructions on requirements and how to complete the application forms will be made available when inviting Full Proposals.

The **Project Leader** (PL) will be the main point of contact between the ESF and the CRP for the whole duration of the project. He/she will be responsible for the flow of information and communication between the ESF and all the participants in the CRP. The PL will represent the Collaborative Research Project in relation to its participation in programme activities and for the fulfilment of reporting requirements for the CRP as a whole and for the contributions of the individual Principal Investigators in the CRP.

In addition to their normal scientific and collaborative activities within the CRP, all **Principal Investigators** will be responsible for dealing with the requirements concerning the contributions of their national funding organisation, and for supporting the Project Leader in the overall progress of the CRP, including organising and participating in networking activities and in the fulfilment of reporting requirements.

Programme Structure and Management

Programme Structure

The overall responsibility for the governance of each individual EUROCORES programme lies with a *Management Committee*, whose members include one representative from each participating funding organisation in the programme (usually a senior science manager), together with an ESF representative.

Proposal assessment and selection are the responsibility of an international, independent *Review Panel*. The members of this panel are leading scientists, appointed by the ESF following suggestions from participating Funding Organisations. The membership of the Review Panel will be available on the Programme

website for information. The Review Panel is also expected to monitor the overall scientific progress of the programme.

The Scientific Committee is formed by the Project Leaders of all funded CRPs and will be responsible for the overall scientific progress of the programme, including for the preparation of a work plan for the overall programme activities, including networking and dissemination. The Scientific Committee will also advise and support the EUROCORES Programme Coordinator in the coordination of the programme.

Programme Networking

Networking activities are designed to strengthen the scientific objectives of the EUROCORES Programme by promoting coherence and synergy in the activities of the scientific community involved. This will help to produce the European added value which is a main objective of all EUROCORES Programmes.

Networking and collaboration within EUROCORES Programmes take place at two levels:

- Between the various Individual Projects within each Collaborative Research Project (CRP) (intra-CRP activities), and;
- Between the funded CRPs in the programme (cross-CRP activities).

The intra-CRP activities must be supported through the individual research grants the participants receive from the national funding organisations in the given CRP.

The cross-CRP activities are centrally funded by the ESF through contributions from the participating organisations to the EUROCORES Programme.

The intra-CRP collaboration is motivated by the nature of the CRP's research objectives, i.e. by the scope and the complexity of the questions it deals with. In a CRP, the participating groups have the opportunity to gather the required critical mass to successfully address the objectives and challenges of their project.

The cross-CRP networking and collaboration is inspired by the aims and the nature of the EUROCORES Programme as a whole. The themes of EUROCORES Programmes are selected because they demonstrate a clear need for collaboration in the proposed field. The funded CRPs will collectively establish and streamline

this new collaboration. To this end, the CRPs will engage the programme participants and, when of clear benefit, colleagues from outside the programme in joint activities such as:

- · Programme-wide meetings or conferences;
- Working group meetings for the exchange of information and results across the CRPs;
- Joint scientific meetings or summer schools;
- · Short term visits;
- Development and delivery of joint training programmes;
- Seminars, workshops, symposia, invited sessions either stand-alone or as part of other larger events;
- · Common web-facilities and publications.

Through active participation of scientists in the above mentioned activities, not only can existing collaborations be enhanced, but new and strategic partnership opportunities may also be identified.

Furthermore, these activities may provide opportunities to explore aspects of the programme which are not covered by the funded research projects.

The integrating activities between the CRPs should help to strengthen the field by building coherence within the existing and emerging research communities and will serve as platforms for the dissemination and outreach of the research conducted in the programme.

Project members are expected to participate annually in at least one cross-CRP activity.

When submitting your proposal, please note that the costs for networking within your CRP should be included in your proposal as part of the costs of meetings, travel and subsistence. Funds for networking between the CRPs will be centrally managed by the ESF through contributions from the participating funding organisations.

Programme evaluation

A mid-term evaluation involving the Review Panel will assess the overall progress of the Programme. The Review Panel may also comment on the CRPs' work plan in relation to the objectives of the overall Programme. A final evaluation at the end of the Programme will

assess the overall achievements of the whole EUROCORES Programme.

Contacts in the participating organisations

As it is currently not known which Funding Organisations will support this programme, please contact your National Funding Organisation or Research Council to inquire about this programme.

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¹ The European Science Foundation (ESF) provides a platform for its Member Organisations to advance European research and explore new directions for research at the European level. Established in 1974 as an independent non-governmental organisation, the ESF currently serves 80 Member Organisations across 30 countries.



EUROCORES Programme

Bio-inspired Engineering of Sensors, Actuators & Systems (EuroBioSAS)

Amendments to the EuroBioSAS call for proposals

The following amendment has been made to the present call for Outline Proposals after its publication on 25 January 2010

Amendment N°1: 16 February 2010

The Slovenian Research Agency (ARRS) has confirmed its participation and contact persons.

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Web address of National requirements for participation in the EUROCORES Programmes: http://www.arrs.gov.si/sl/medn/esf/gradivo/dokum/INC/Skupna_gradiva/Kriteriji-EUROCORES.doc