

The HBP Calls for Expression of Interest for SGA3
“Application of visual scene understanding models to robotics
use-cases of industrial relevance”

Guide for Applicants



Human Brain Project

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Table of Contents

1. The Human Brain Project	4
2. Scope of the specific call.....	4
2.1 Challenge.....	4
2.2 Details.....	5
3. Expected contributions and impact.....	5
4. Activities, eligibility and funding.....	5
4.1 Budget of the proposal.....	6
5. Pre-proposal submission.....	7
6. Proposal submission	7
7. Ethical issues.....	7
8. Equal opportunities.....	8
9. Proposal evaluation.....	8
9.1 Proposal evaluation criteria and scores.....	9
10. Additional information.....	9

Table of Tables

Table 1: Proposal evaluation criteria.....	10
Table 2: Proposal evaluation scores	11

1. The Human Brain Project

The Human Brain Project (HBP, <https://www.humanbrainproject.eu/>) is an ambitious 10-year scientific research and infrastructure initiative that is part of the EU Future and Emerging Technology (FET) Flagship programme¹. The HBP is developing the European Brain ReseArch INfrastructureS (EBRAINS), an innovative ICT² infrastructure that will help neuroscientists and clinical researchers integrate data and knowledge about the brain across all levels of its spatial and temporal organisation. Using detailed digital representations, reconstructions, and simulations it aims to make available ICT tools to thousands of researchers to advance and accelerate our understanding of the functioning of the healthy and diseased human brain.

Computing the Brain is at the centre of the HBP's scientific strategy in SGA3, the third Specific Grant Agreement, and the HBP focuses on Neuroscience at the interface with Computing, to create an added value in this field. More information is available in the supplementary document HBP_SGA2_CEOl_for_SGA3_Proposal_Summary.

2. Scope of the specific call

This CEOl is for Organisations or groups of Organisations interested in applying techniques in visual scene understanding to robotics applications of industrial relevance.

In particular, efforts to be undertaken in SGA3 will lead to the development of advanced aspects of cognitive architectures, which support the segmentation of visual objects and estimation of their (relative) spatial location within a scene. This is of special relevance to a range of concrete applications in robotics, for instance in safety-critical situations involving direct physical interactions between human agent and robotic system. The work will explore merit of the developed techniques in such circumstances.

Background and Ambition:

Within the HBP, efforts are invested in understanding how biological learning networks enable human cognitive functions. This perspective is pursued by emulating the architecture and operation of the brain that support these functions, and applying them to address cognitive problems. The approach is anchored in a direct relation between investigated cognitive architectures, and a physical reality that allows expression of the cognitive functions considered. This physical dimension may be numerically modelled (i.e. simulated), or may correspond to an actual, experimental setup. This work is characterised by a close collaboration between cognitive neuroscientists, researchers in learning theory, Artificial Intelligence, and neurorobotics. It heavily relies on services provided by the HBP Research Infrastructure (RI).

Among the different cognitive functions explored, a meaningful number of them find practical applications in a variety of areas. The present CEOl is in direct connection with the activities to be undertaken in the HBP's Special Grant Agreement 3 (SGA3), Work Package 3 (WP3): "Adaptive networks for cognitive architectures: From advanced learning to neurorobotics and neuromorphic applications."

2.1 Challenge

The successful applicants will closely collaborate with HBP Partners who will provide expertise in cognitive neuroscience, learning, AI, and neurorobotics. Techniques and models supporting visual scene understanding functions will be provided by HBP Partners. The tools shared will directly build upon achievements in the Project, in particular in the HBP Co-Design Project on Visuo-Motor

¹ <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/fet-flagships>

² ICT, Information and Communication Technology

Integration (CDP4) and the neurorobotics Subproject (SP10). The successful applicants will actively collaborate with other participants in WP3 towards the co-design of solutions for the considered problem, building upon the aforementioned foundational results achieved in the HBP by end of SGA2. This work will, in particular, aim to extend functions supported by the developed cognitive architecture to directly address behaviour of the robotic system.

2.2 Details

Relevant developments will be integrated within the EBRAINS Service offering Category 4 (SC4): Closed-loop AI and robotics. The proposed work will add functional building blocks (perception, control, other relevant algorithmic aspects) to the developed models, to address concrete robotic problems, necessarily involving visual scene understanding. This may be pursued in numerical simulations, but also, and preferably, in experimental setups (in industrial situations), demonstrating real-world performance of the integrated solution, and illustrating merit of the visual scene understanding models developed within the HBP.

A wide range of academic results on the type of work considered (e.g. on man-robot collaboration) can be found in the literature. These typically remain strictly limited to labs, having failed being used on factory floors. We contend that this is not due to a lack of technological maturity of the solutions developed, but to intrinsic conceptual limitations, standing in the way of the achievement of robust performance guarantees. Absence of such guarantees effectively prevents the use of the developed technology for safety-critical functions. The work to be proposed is expected to transcend such limitations by embracing a holistic approach to the problem, considering not exclusively vision, but a range of relevant perceptual modalities to achieve robust scene understanding, and tightly connecting the information gathered to the robotic system's behaviour.

The successful applicants will complement the expertise already present within the project (in particular in cognitive neuroscience and AI), and will gainfully exploit services afforded by the HBP RI in conducting the proposed work. Proposals considering real-world use cases of industrial relevance, with meaningful perspectives of innovation, are particularly welcome.

3. Expected contributions and impact

Applicants are expected to provide a detailed description of the implementation of work plans within the defined timeframe (30 months from 01.10.2020 to 31.03.2023), as well as plans on how to integrate such work into the HBP. In addition, all proposals are expected to briefly describe the long-term vision of the proposed research theme (i.e. in a timeframe of 5 years), as well as how they will contribute to the overall HBP [vision](#) and objectives.

Any duplication with existing HBP activities must be avoided.

4. Activities, eligibility and funding

It is recommended that a group of partners³ or consortium applies for the CEoI. The consortium should be represented by a project coordinator with the principal investigator (PI) acting as the main contact person.

Either HBP partners or non-HBP partners⁴ are eligible for funding under this CEoI. At least 60% of the proposal budget must be assigned to non-HBP partners, while the HBP partners should not account for more than 40% of the allocation. Please note, a new unit⁵ of an existing HBP partner, not receiving any HBP funding, is eligible to participate in the CEoI and can apply for 60% of the allocated budget. The same rule applies to the HBP partners not receiving any SGA3 HBP funding. This rule

³ Partner = a university or organization, not an individual

⁴ Non-HBP partners are not part of the HBP Consortium, thus not receiving any HBP funding

⁵ Unit refers to a laboratory or department of a university or organisation

allows (but does not force) new units to directly start with a close collaboration with already integrated units. All proposals will be subject to the same evaluation criteria, whether it includes HBP partners or not (see Proposal evaluation).

The HBP has committed itself to improve equal opportunities. As such, we explicitly encourage applications from women and groups of applicants who have considered gender equality aspects in their group of applicants (see Equal opportunities).

The European Commission (EC) eligibility and financial rules apply⁶. The new partner organisations must therefore be established in the EU Member States or Horizon 2020 associated countries.

One (1) proposal will be selected out of this CEoI for EU funding for the HBP SGA3 period. The project duration should be 30 months maximum (01.10.2020 - 31.03.2023), depending on the date of inclusion of the new partner in the Consortium, and has a fixed end date which is the end of SGA3, 3 years from the start which is planned for the 1st of April 2020 at the moment of writing of this document.

The selected project and their partners will become a new Task as part of the overall envisioned HBP Work Plan for SGA3. The projects will be located in WP3. The selected partner organisations will be incorporated in the HBP Consortium. The new partners will be requested to sign the relevant agreements with the EC as well as the Consortium Agreement that regulates the relations between the Partners of the Consortium.

The agreements with the EC include a Framework Partnership Agreement (FPA) and a Specific Grant Agreement (SGA). The FPA Consortium Agreement applies to the Consortium during the entire Flagship period and is amended regularly for major changes. The addition of new Partners to the Consortium is subject to the approval of the required FPA Amendment by the HBP Stakeholder Board and the EC.

Success in this CEoI should not be considered as a commitment by the HBP or the EC to continue funding the Partners after the end of the SGA3 period. The continuation of this activity will be subject to the same review as all other HBP activities.

Note: while preparations for the coming phase (HBP SGA3) are going ahead to allow a timely start of new partners, the final approval of the selected projects will be subject to the HBP being successful in applying for funding of the next phase (currently under preparation). Applicants will receive the final confirmation of project funding only, once the HBP SGA3 Proposal has been accepted for funding by the EC.

4.1 Budget of the proposal

The total Call budget is EUR 800,000.

The requested budget must not exceed EUR 800,000 per proposal.

The total Call budget includes a voucher of EUR 80,000 to fund technical support for integration of project results in EBRAINS, which will be performed by the HBP High Level Support Team (HLST).

Co-funding of approximately EUR 400,000 is requested. Proposals with lower contributions are not *a priori* excluded, but must be justified.

It is expected that the new partners have the operational capacity to carry out the activities related to the main objectives of this CEoI. Nevertheless, subcontracting is allowed for activities not crucial to the HBP work (see Financial Rules - [H2020-amga](#)).

⁶ The countries eligible to apply are all the EU Member States and the H2020 Associated Countries. For eligibility of other countries, see http://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/international-cooperation_en.htm.

5. Pre-proposal submission

The pre-proposal **must** be submitted via the [HBP open call platform](#). A member of the relevant WP will respond to the applicants within 1 week. The response will be limited to clarifying whether the proposal fits into the scope of the call and how the proposal could be improved.

Note: it is **mandatory** to submit a pre-proposal and it has no influence on the evaluation of the full proposal.

6. Proposal submission

The proposal is submitted via the [HBP open call platform](#). The applicants are required to register a profile, enter the proposal information and partner data, and submit the proposal document as a PDF and the requested budget.

The applicants can edit the proposal before the deadline (e.g. submit revised versions); only the last version will be considered for evaluation.

Shortly after the submission of the proposal, an acknowledgement of receipt will be sent to the e-mail address of the proposal's main contact person, named in the submitted proposal. Sending of an acknowledgement of receipt does not imply that a proposal has been accepted as eligible for evaluation.

For any given proposal, the proposal main contact person will act as the main point of contact between the proposal partners and the HBP.

It is the responsibility of the applicants to ensure timely submission; proposals submitted after the deadline will not be considered. Failure of the proposal to arrive in time for any reason, including communications delays, will automatically lead to rejection of the proposal. The time of receipt of the message as recorded by the submission system will be authoritative.

Upon the call deadline, the proposals have to fulfil the [admissibility](#) and [eligibility](#) criteria in order to be retained for evaluation. In addition, the proposals have to strictly adhere to the template provided via the [HBP open call platform](#), which defines sections and the overall length. Evaluators will be instructed not to consider extra material in the evaluation.

Note: a proposal submitted without the pre-proposal will be not considered eligible for the evaluation.

The HBP offers an email-based helpdesk system for applicants at info@opencalls.humanbrainproject.eu.

With the upload of the proposal template and the completion of the contact information, the applicants agree that contact names, affiliations and proposal titles of the winning proposals (only) will be announced on the HBP website.

7. Ethical issues

Research activities in Horizon 2020, and particularly in the HBP, must respect fundamental ethical principles, particularly those outlined in the [Horizon2020 Ethics Guidance](#).

If there are ethical issues specific to your proposal (please see the ethical issue table in the [Horizon2020_Ethics_Guidance.pdf](#) above), before and during the runtime of the research activities within the HBP, you must submit an HBP Ethical Issues and Approvals survey and include the documents that you need under national law (e.g. proof of approval by the competent authority).

The HBP Ethical Issues and Approvals survey should describe how the proposal meets the national legal and ethical requirements of the country or countries where the tasks raising ethical issues are to be carried out; and explain, in detail, how you address the issues in the ethical issues table, in

particular with regard to research objectives (dual use, etc.), methodology (protection of collected data, etc.) and potential impact of the research (dual use issues, benefit-sharing, misuse, etc.).

Applications, especially from non-European countries, must make sure to comply with the above Horizon2020 Ethics Guidelines and clarify ethical issues before the proposal submission.

Proposers must demonstrate that they are mindful of the fact that the citizens of Europe trust the public R&D endeavour to produce tangible results benefiting society by advancing health, economic growth, and quality of life across all communities.

The applicants are responsible for ethical compliance. They will work with the HBP contact persons, the respective HBP ethics rapporteur and ethics support team to ensure compliance with ethical and legal requirements. Their ethics compliance will be included in the HBP ethics compliance management processes.

8. Equal opportunities

Gender equality concerns all parts of Horizon 2020 (see the [Guidance on Gender Equality in H2020](#)). HBP has committed itself to improve [equal opportunities](#), especially to balance the proportion of male and female scientists in leadership positions, as well as among PhD students and post docs. HBP created the [Gender Advisory Committee](#) which provides advice and feedback on the Gender Action Plan of HBP on activities planned to improve equality in their respective areas of responsibility.

The HBP aims to demonstrate how diversity drives scientific excellence, innovation, and collaboration and aims to become a European best practice example for fostering equal opportunities across different institutions, member states, disciplinary cultures and intellectual environments.

The applicants are invited to outline in their proposal which measures will be undertaken to foster equal opportunities and how sex, gender or other diversity issues are addressed as part of their research. Equal opportunities represent an evaluation criterion (see Table 1).

9. Proposal evaluation

All submitted proposals will be evaluated by acknowledged external experts from relevant research fields and by reviewers from the broader scientific community (all referred to as 'experts'). To avoid conflicts of interest, the experts are independent of the HBP Consortium and the applicants. The conflict of interest rules for this call are set out [here](#).

Experts will maintain strict confidentiality with respect to the entire evaluation process. Experts perform evaluations in their private capacity, not as representatives of their employer, their country or any other entity. Under no circumstance may an expert attempt to contact an applicant directly, either during the evaluation or afterwards. Experts cannot submit an Expression of Interest (Eoi) proposal for the call they are reviewing.

The proposals evaluation will be performed in two steps.

In the **first step**, at least three external experts will review individually each proposal assigned. They evaluate each proposal considering the evaluation criteria in 9.1 - Table 1. The experts score each criterion (0 to 10, detailed in 9.1 - Table 2), with explanatory comments.

In the **second step**, the experts discuss and compare all the proposals during the panel meeting. They establish the final ranking of the proposals, providing a list of proposals being above and below threshold. A proposal is considered as eligible for funding if all thresholds are met or exceeded, however, the highest ranked proposal will be selected for funding. If all proposals fall below threshold, no selection will be made and the CEoi might be reopened.

The experts will be advised by an invited group of HBP members of the Directorate (DIR) and WP leaders, who will clarify the procedure and need of the HBP prior the evaluation, and offer their opinion on the relevance of the proposals to the HBP during the panel meeting.

The ranked list of the proposals will be presented to the HBP Science and Infrastructure Board (SIB) and the DIR for endorsement. The selected proposal will be funded and integrated into the envisaged HBP SGA3 Work Plan.

To ensure transparency, the results of the evaluations will be made available to the EC.

After completion of the call, applicants will receive the evaluation summary report for their proposal. Any request for redress can only be based on procedural grounds and must be submitted by the proposal coordinator within 30 days from the receipt of the official letter.

Note: The addition of new Partners to the Consortium is subject to the approval of the required FPA and SGA amendments by the HBP Stakeholder Board and the EC. Following this process, the partner(s) will be welcomed into the HBP consortium.

9.1 Proposal evaluation criteria and scores

The evaluation criteria for this CEol are provided in Table 1. The criteria reflect the expected impact of project funded under this HBP CEol.

The evaluation scores are provided in Table 2.

10. Additional information

You can find more information on the HBP [here](#).

A list of Frequently Asked Questions (FAQ) is available [here](#).

Table 1: Proposal evaluation criteria

1. Scientific excellence	Weight: 40%
<ul style="list-style-type: none"> • Credibility and soundness of the proposed research theme and degree of conformity to provided specifications • Extent to which proposed work is ambitious, has innovation potential, and is beyond the state of the art (e.g. ground-breaking objectives of the long-term vision of the proposal, novel concepts and approaches and their potential to become a seminal work, etc.) • Quality and effectiveness of the detailed research plan (including appropriateness of tasks and experiments, milestones, and indicators to monitor progress) • Enhancing innovation capacity and generation and integration of new knowledge 	<p>Score: ?/10 (Threshold: 8/10)</p>
2. Impact	Weight: 30%
<ul style="list-style-type: none"> • Contribution to the design and development of the HBP research infrastructure • Coordination with the HBP WP3 • Contribution to HBP human neurosciences and to theory development 	<p>Score: ?/10 (Threshold: 8/10)</p>
3. Implementation	Weight: 20%
<ul style="list-style-type: none"> • Suitability of planned costs • Co-funding provided by the Partners (in-kind, cash or combination) • Appropriateness of proposed work plan • Quality of the Organisations and of the group of applicants as a whole (including complementarity, balance, involvement of key actors, prior history, relevant experience of the individual partners) 	<p>Score: ?/10 (Threshold: 8/10)</p>
4. Equal opportunities	Weight: 10%
<ul style="list-style-type: none"> • For teams, is the diversity aspect (gender, age, career stage, other factors) taken into consideration/ are there any measures in place? If there is a gender imbalance, are measures planned to improve gender equality? • In research activities, when human beings are involved as subjects or end-users, gender differences or other diversity factors may exist. In these cases, is the gender dimension and relevance of scientific questions on gender or other diversity factors (e.g. age) in the research content addressed as an integral part of the proposal? 	<p>Score: ?/10 (Threshold: 8/10)</p>
Remarks	
<ul style="list-style-type: none"> • Ethical implications and compliance with applicable international, EU and national law • Ensure that the study proposed will not promote indications that raise ethical issues. 	<p>No Score</p>
OVERALL SCORE	<p>Score: ?/10 (Threshold: 8/10)</p>

Table 2: Proposal evaluation scores

0	The proposal fails to address the criterion	The proposal fails to address the criterion under examination or cannot be judged due to missing or incomplete information.
1-2	Poor	The criterion is addressed in an inadequate manner, or there are serious inherent weaknesses.
3-4	Fair	While the proposal broadly addresses the criterion, there are significant weaknesses.
5-6	Good	The proposal addresses the criterion well, although improvements would be necessary.
7-8	Very good	The proposal addresses the criterion very well, although certain improvements are still possible.
9-10	Excellent	The proposal successfully addresses all relevant aspects of the criterion in question. Any shortcomings are minor.