Technology distribution for long-duration, naturalistic, close-loop and intelligent experimentation

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Sections to be completed for the 2023 BBSRC Prosperity Partnership Funding opportunity.

1 Summary

[Word limit: 550

In plain English, provide a summary of your project which we can use to identify the most suitable experts to assess your application.

We may make this summary publicly available on external-facing websites, so make it suitable for a variety of readers, for example:

- opinion-formers

- policymakers

- the public

- the wider research community

Guidance for writing a summary

Clearly describe your proposed work in terms of:

- scientific context

- the scientific and industrial challenge the project addresses

1.1 NeuroGEARS

NeuroGEARS is a UK technology company that helps research institutions adopt state-of-the-art technologies to develop innovative biomedical research. The director of NeuroGEARS, Dr. Goncalo Lopes, is the inventor, and his company is the main supporter, of Bonsai, a reactive visual programming language that powers thousands of experiments around the world.

1.2 NeuroGEARS-SWC-GCNU collaboration

NeuroGEARS has been working with the Sainsbury Wellcome Centre and the Gatsby Computational Neuroscience Unit, both at University College London, for more than two years developing hardware and software technology for unrestrained, long-duration, naturalistic, closed-loop and intelligent experimentation in neuroscience by combining its engineering expertise with the machine learning and experimental neuroscience research experience of its academic partners. Together they are opening a new chapter on neuroscience experimentation.

1.3 Technology dissemination

Open Ephys is a unique business model for disruptive technology dissemination . . .

We want to allow laboratories around the world to use the technology we are creating with the SWC and Gatsby Unit following a similar business model as that of Open Ephys with one important difference. While the technology of Open Ephys is focused on hardware, our technology is focused on software . . .

The technology that NeuroGEARS is developing in collaboration with the SWC and the Gatsby Unit is specialised to support neuroscience experiments in rodents. We offer to generalise this technology to support a wider range of experimental setup and to distribute it to other research centres around the world.

The potential of disseminating this technology are enormous. Academically, this technology is allowing to probe systems in natural regimes that cannot be studied with traditional simpler experiments, and to study these systems in unprecedented detail. For example in the 24/7 experiments that we are developing at the SWC we can study foraging in naturalistic environments where we can control environmental experimental variables (e.g., food delivery) with great precision, while we record and manipulate neural activity.

The business applications of these technologies are also very large. For instance in the pharmaceutical industry, these technologies could allow unprece-

dented efficiency for automatic drug testing ... Another application appears in the domain of personalised healthcare ...

In addition, long-duration, naturalistic and close-loop experiments will incentivize several adjacent industries, like those of computer storage (to save the very large amounts of data produced by these experiments), or the industry of physiological measurement devices (key components in our experiments).

Furthermore, the novel datasets that our experiments are producing are also incentivizing academic research in, for example, machine learning algorithms to process real time time series.

1.4   Proposal aim

The current joint work between NeuroGEARS, the SWC and the Gatsby Unit is to build infrastructure to perform long-duration, naturalistic, close-loop and intelligent experiments in order to investigate a specifics problems in the real systems neuroscience. We aim at distributing hardware, software and machine learning technology to allow a wiser range of long-duration, naturalistic and close-loop experiments.

2   Core team

[List the key members of your team and assign them roles from the following:

- project lead (PL)

- project co-lead

- researcher co-lead (RcL)

- specialist

- grant manager

- professional enabling staff

- doctoral student

- research and innovation associate

- technician

- visiting researcher

Only list one individual as project lead.]

project lead (PL) : Dr. Goncalo Lopes

researcher co-lead (RcL) : Prof. Tiago Branco (SWC), Prof. Tom Mrsic-Flogel (SWC), Prof. Maneesh Sahani (GCNU),

researcher co-investigator : Dr. Dario Campagner (SWC), Dr. Joaquín Rapela (GCNU),

research fellow : Dr. Lorenza Calcaterra (SWC),

group leader : Dr. Jeff Erlich (SWC),

doctoral student : Mr. Jai Bhagat (SWC),

undegraduate student : Mrs. Zimo Li (UCL Neuroscience),

research assistant : Mrs. Anaya Pouget (SWC),

research software engineer : Dr. Andre Almeida (NeuroGEARS), Dr. Andrew Erskine (NeuroGEARS), Dr. João Frazão (NeuroGEARS), Dr. Nicholas Guilbeault (NeuroGEARS), Dr. Chang Huan Lo (SWC), Dr. Adam Tyson (SWC), Dr. Niko Sirmpilatze (SWC), Dr. Joe Ziminski (SWC),

research fabrication engineer : Mr. Rob Barrett (SWC), Mr. Del Halping (SWC), Mr. Simon Townsend (SWC),

research electronics engineer : Mr. Graeme McPhillips (SWC),

grant manager : Mr. Mike Sainsbury (GCNU),

3 Core questions

3.1 Existing relationship

[Word limit: 500

What is the existing relationship between the project partners?

What the assessors are looking for in your response

The panel will consider the extent to which the proposed work demonstrates:

1. clear evidence of an emerging or established research-based relationship between business and academic lead partners with demonstrable benefits achieved to date

2. well considered plans for growing the relationship within and beyond the prosperity partnership and a description on where the relationship is going long term. The existing relationship will be assessed relative to the business lead organisation

3. 'substantial' or 'long-term' collaborations and partnerships may look different for an or spin-out company than they do for a large multinational

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3.2   Vision

[Word limit: 2,000

What are you hoping to achieve with your proposed work?

What the assessors are looking for in your response

The panel will consider the extent to which the proposed work:

- is of excellent quality and importance within or beyond the field(s) or area(s)

- has the potential to advance current understanding, or generate new knowledge, thinking or discovery within or beyond the field or area is timely given current trends, context, and needs could impact world-leading research, society, the economy, or the environment

Within this section, we expect you to address the following:

- a clear and appropriate business-led vision and ambition for the prosperity partnership describing why the partnership is essential for success and specifically addressing why the objectives cannot be achieved by any single partner alone

- evidence that the proposed business-led research programme is positioned at technology readiness levels (TRL) one to four with a programme of work that has been developed in partnership and in a co-created manner with the short-term and medium-term benefits clearly described

- coherence and relevance of the work packages in line with the vision

- clear evidence of how this vision will be achieved and how the prosperity partnership will bring benefits to the UK economy and the research base, address regional, national, and international strategies, including those of the business or businesses involved

Within this section you can demonstrate elements of your responses in visual form if relevant. Further instructions are provided within the Funding Service.

Number your references in this section using a superscript citation style. Then include the details of these references in a corresponding list, in the 'References' section of this application.

Please note, external weblinks are not permitted in this section.]

3.3   Additionality and added value

[Word limit: 300

What is the additionality and added value?

What the assessors are looking for in your response
  The panel will consider the extent to which the proposed work demonstrates:

- evidence of the additionality and added value of a prosperity partnership in

- comparison to other funding opportunities

- clear evidence of the buy-in from business partners and co-creation of the proposed business-inspired fundamental research programme

Within this section, we expect you to consider:

- the aspects where this type of funding provides added value that no other scheme does

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3.4 Applicants' leadership and appropriateness of the team

[Word limit: 300

What are your leadership and team track records?

What the assessors are looking for in your response
  The panel will consider the extent to which the proposed work demonstrates:

- the appropriateness of the leadership team with evidence of joint working between business and the academic project lead

- clear plans for joint leadership conveying the ability to lead a programme of this size and number of stakeholders

- how you approached the design and makeup of the team's skills and competencies in order to address the vision and ambition of the programme

Within this section, we expect you to consider:

- your track record in successfully leading large multifaceted teams that involve cross organisational complexity

- explain why you think you have the most appropriate balance of expertise

- your ability to lead a programme of this size and number of stakeholders

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3.5 Management and governance

[Word limit: 300

What are your plans for management and governance?

What the assessors are looking for in your response
    The panel will consider the extent to which the proposed work demonstrates:

- the appropriateness of the management and governance arrangements, commensurate with the scale of the programme

- how you will monitor milestones and ensure they are achieved

- your plans regarding equality, diversity and inclusion that go beyond following university procedures

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3.6   Impact

[Word limit: 300

How will you deliver impact and ensure benefits are realised?

What the assessors are looking for in your response
    The panel will consider the extent to which the proposed work demonstrates:

- how the prosperity partnership will deliver the benefits identified

- clear plans to maximise translation and impact arising from the partnership

Within this section, we expect you to consider:

- the potential direct or indirect

- benefits and who the beneficiaries might be

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3.7   Skills and talent training

[Word limit: 300

What are your plans and requirements for workforce training and development in support of the strategic objectives of the proposed prosperity partnership?

What the assessors are looking for in your response
    The panel will consider the extent to which the proposed work demonstrates:

- that an excellent and inclusive training environment will be provided which is appropriate for alignment with the prosperity partnership

- how the skills being developed will enable the delivery of the prosperity partnership's goals and that the delivery of the plan is feasible

- how the plan will offer career development opportunities for the people in receipt of this training

Within this section, we expect you to consider:

- how the whole project team, from both the research organisation and the business, will receive appropriate training and research experience

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3.8 Ethics and responsible research and innovation (RRI)

[Word limit: 300

What are the ethical or RRI implications and issues relating to the proposed work? If you do not think that the proposed work raises any ethical or RRI issues, explain why.

What the assessors are looking for in your response

The panel will consider the extent to which the proposed work demonstrates that you have identified and evaluated:

- the relevant ethical or responsible research and innovation consideration

- show you will manage these considerations

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3.9 Resources

[Word limit: 400

In this section we will ask for the following:

- what is the full economic cost of your project?

- what is the total value of funding being requested from BBSRC?

- what is the total value of the business lead's cash contribution?

- what is or are the individual cash contributions of additional project partners?

- what is the total value of the project lead's organisation's cash contribution?

- what is the total project value?

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- what is the total value of the business lead's in-kind contributions?

- what is the total value of the project lead's organisation's in-kind contributions?

- what is the total value of the additional project partners (academic and business) in-kind contributions?

- what is the overall project value?

In the Funding Service a table will be provided that can be used to complete your response.

What the assessors are looking for in your response

We are looking for a resources budget which sets out the request for BBSRC funding and the appropriate business and academic cash and in-kind contributions to the programme.

Specific details of the matched contributions may not be available at this stage. Therefore, a 10% variation, in addition to a shift in the breakdown across headings is accepted in the total of the project value from the outline stage and the full proposal stage. All contributions will be validated again at full proposal stage.
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3.10 Your organisation's support

[Word limit: 5

Provide details of support from your research organisation.

What the assessors are looking for in your response

Provide a Statement of Support from your research organisation detailing why the proposed work is needed. This should include details of any funding that will be provided to support the activity and any additional support that might add value to the work.

The committee will be looking for a strong statement of commitment from your research organisation.

We recognise that in some instances, this information may be provided by your Head of Department of School, the Research Office, the Technology Transfer Office (TTO) or equivalent, or a combination.

You must also include the following details:

- a significant person's name and their position, from your organisation's Head of Department or School, the TTO or Research Office, or a combination

- office address or web link

Upload details are provided within the service on the actual application.
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3.11 Project partners

[Word limit: 5

Provide details of any project partners' contributions, and letters or emails of support from the business(es) involved.

Each letter or email you provide should:

- the name and the company number of the business

- details of the cash and in-kind contributions from the business

- have a confirmation statement from the business lead that they will be leading the project, dated, and signed by a relevant representative from the business

- highlight conflicts or information we should be aware of despite us not expecting confidential information at this stage

Save letters or emails of support from each partner in a single PDF no bigger than 8MB. Unless specially requested, please do not include any personal data within the attachment.

The Funding Service will provide document upload details when you apply.
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3.12 References

[Word limit: 1,000

List the references you have used to support your application.
What the assessors are looking for in your response

- include all references in this section, not in the rest of the application questions

- you should not include any other information in this section

- we advise you not to include hyperlinks, as assessors are not obliged to access the information they lead to or consider it in their assessment of your application

- if linking to web resources, to maintain the information's integrity, include persistent identifiers (such as digital object identifiers) where possible

- you must not include links to web resources to extend your application

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