Application Guidance for embedded CSE

Please follow this guidance to help prepare your application for an eCSE call. Proposals should be submitted on-line using the eCSE Funding Calls section within the SAFE (https://safe.epcc.ed.ac.uk/). If you are not a registered SAFE user, please register there first to begin a proposal. Each call has its own technical evaluation form, proposal form and guidance (this document) and applicants must use the forms associated with the relevant call. Proposals will not be accepted if incorrect forms are used.

If your eCSE proposal is selected for funding, you will be provided with an award letter and will be asked to agree to the eCSE Terms. Please view these here

https://www.archer2.ac.uk/ecse/Terms/ARCHER2_eCSE_Terms.pdf

It is important that you are aware of the Trusted Research policy of your own institution. Information on UKRI's Trusted Research Principles is given here:

https://www.ukri.org/wp-content/uploads/2021/08/UKRI-170821-TrustedResearchandInnovationPrinciples.pdf

Where projects have international partners (e.g. a Co-I from a non-UK institution) we will contact you if your proposal is accepted to ensure that you are aware of, and have read, your own institution's policy and you will need to provide a link to where the information can be found.

I. in advance of submitting your eCSE proposal and please get in touch if you have any questions. Important Information for eCSE Applicants

Submitting an ARCHER2 eCSE proposal is a 2-stage process. Please consider both stages from the outset:

1. Firstly a technical evaluation of the code must be carried out. For this eCSE call, this document needs to be submitted to the ARCHER2 service desk by **16:00 on 10 October 2023** and the completed assessment will be returned to you as a PDF in time for you to add this to your full eCSE proposal submission. The technical evaluation form can be found on the eCSE web pages. Before submitting your technical evaluation form, you should start a proposal in the SAFE with a title, subject area and remit. This is needed to register that you are intending to submit a proposal.

2. To be considered for this call, the entire proposal must be submitted in the SAFE by **16:00 on 31 October 2023**. As well as the completed on-line form, this submission should include PDFs of the completed technical evaluation form, the main proposal document, any costing documents (see below) and letters of support (optional). In addition any participants in the project (PI, Co-I(s), or technical staff) must have been invited and have accepted the invitation to join the project within the SAFE and added information about their

roles within the project and relevant experience. Technical staff should also add a CV. **You will not be able to submit the form if the technical staff have not accepted the invitation**.

Immediately following the closing of the call on 31 October 2023, proposals will be passed on for review by the eCSE Panel and any missing documents or team members will not be considered to be part of the submission. Costing documents are required for all members of technical staff and must be submitted when the proposal is submitted.

II.   Initiating an eCSE Proposal

First log in to the ARCHER2 SAFE and click on "Funding Calls" under the "eCSE Funding" heading at the top. At the bottom of the page you should see a "New Funding Application" button. Click on this to begin the process of creating an eCSE application. To start an application you should give the project title. You should also choose the subject area of the proposal and choose the research area. Please note that for this call, only software which results in research which is within the remit of EPSRC is eligible for funding for this call.

Descriptions of the EPSRC remit is given here:

https://www.ukri.org/councils/epsrc/guidance-for-applicants/epsrc-remit/

Starting a proposal in this way must be done before submitting your technical evaluation form. Instructions for completing the technical evaluation form can be found within the technical evaluation form itself.

III.   On-line submission for eCSE application

The information in this section is aimed at guiding you through filling in the on-line form in the ARCHER2 SAFE. This all needs to be complete by the final submission deadline, but only the title, subject area and research council remit are needed before submitting the technical evaluation. Once an eCSE proposal has been started, you can find the proposal listed in the eCSE Funding menu at the top in the SAFE. You can then edit the various sections of the form and add staff and documents as required.

Successful projects will be given an allocation of resources on ARCHER2 when it becomes available. The size of this allocation will be determined when the system itself becomes available. If larger resources are needed such resources will need to be applied for via other ARCHER2 access mechanisms:

https://www.archer2.ac.uk/support-access/access.html

Applicants should provide all the information requested in the eCSE application form. The panel reserves the right to reject applications with missing information.

Project Information

- Project Title

This is the title of your eCSE project.

- Subject Area <select from the given list>

Please select the most relevant subject area. If none of the subject areas on the list are relevant, please select "Other" and give the subject area in the box given at the bottom.

- Research Area <select from the given list>

Please note that for this call, only software from within the EPSRC remit is eligible (see above links for EPSRC remit).

- Short project summary (max 1500 characters)

Please give a short summary of your project. This should include enough background description to justify the research council remit(s) selected above.

Project Details

- Is this work relevant to any particular consortium? <select consortium>

If the work is relevant and/or associated with a particular consortium, please select this here. If your work is relevant to multiple consortia, please select the most relevant. ARCHER2 consortia are list here:

https://www.archer2.ac.uk/research/consortia/

Principal Investigator

Co-Investigators

Members

In these sections, additional project members can be added to the project team by invitation whereupon their roles can be assigned. All roles have permission to edit the proposal. Allowed roles are:

- PI (leader of the project)
- Co-I (other members of the team who will help to lead or advise on the project)
- Technical Staff (the person or people who will be funded to work on the project)
- Contact (someone working on behalf of the PI who should receive any correspondence – note PIs, Co-Is and technical staff will all receive correspondence automatically so there is no need to give them the Contact role)
- Member (no specific role but can see and edit the proposal)

It is possible to select more than one role for a person and roles can be changed at any time up to the final submission. In some cases the PDRA or RSE funded to carry out the technical work (with the project role Technical Staff) may have the skills in place to also act as a Co-I or even take on the role of PI. In the latter case it will need to be clear that suitable support is in place within the team (e.g. other members with suitable experience taking on Co-I roles and with at least one of these Co-Is coming from the same institution as the PI). The reason this is allowed is to enable a PDRAs or RSEs early on in their career to get experience of the more senior PI or Co-I role but is not intended as a way of funding the Co-I or PI role or a way to fund sabbaticals for senior academic staff. There may be cases where a more senior member of staff may be PI or Co-I and may need to take on a small amount of the technical work of the project. If so they would be funded and costed as for any other Technical Staff member and should include a costing breakdown and CV. It should be explained in the proposal why this is required and this should not be used as a way of funding the Co-I or PI role.

When inviting another team member, please use the email address that this person uses as their SAFE login if they have a SAFE account, or the one that they would prefer to use when they sign up for the SAFE if they don't yet have an account. To find this out, you will need to get in touch with the person in question. If you accidentally use an email address for them which they do not use in the SAFE, please just repeat the invitation with the correct email address. Invitations expire after 20 days anyway so there is no need to delete the incorrect invitation. If an invitation is received by someone without a SAFE account, they will receive a link to accept the invitation. However, this link will only work after that person registers in the SAFE.

In line with EPSRC eligibility criteria, PIs must be employees of an eligible organisation and must be resident in the UK. More information can be found here:

https://www.ukri.org/councils/epsrc/guidance-for-applicants/check-if-you-are-eligible-for-funding/

Individuals may be named as a Co-I on more than one proposal. However, individuals may only be named as PI on one proposal for any given call.

After accepting the invitation to join the project, **all** project members should provide a description of what they will bring to the project in the "Contribution and Background" section. This should include a short track record of (as appropriate): previous involvement in technical projects, expertise with the code or scientific area, experience of managing similar project, etc. Please ensure that for each project member this description contains enough detail to explain why that person will join the project and what that person's specific role will be. **In addition, technical staff should submit a CV** (see next section). A CV is not compulsory for PIs and Co-Is (unless they will be carrying out technical work within the project) and neither a CV nor any description of role is needed for project members who are not PIs, Co-Is or technical staff (e.g. for people who just have the role of Contact or Member). This section is to ensure the whole team have the appropriate skills, expertise and experience to carry out a successful project. This is important for all projects but in particular where a technical staff member is less experienced, this is where relevant support for the staff member can be demonstrated within the team as a whole. The section should concentrate on

the skills of HPC, software engineering and management, as appropriate, rather than be based only on the general scientific background of the team. Things each team member may want to include are:

- A short summary of the outcomes of recent work in related HPC projects/research.
- Your specific experience including any familiarity with the specific code(s) involved in the project.
- Previous relevant work / collaborations with other beneficiaries.
- Any experience of similar projects or other relevant experience. When referring to any previous ARCHER eCSE project work, links to the relevant section in (http://www.archer.ac.uk/community/eCSE/) should be given.

This section has a limit of 250 words for each team member and text can be added by the team member him/herself (or anyone who can edit the proposal) once the person in question has accepted the invitation to join the proposal. The text and CVs can be added by going to the person in the relevant section (e.g. "Co-Investigators" or "Proposed Technical Staff Details") and clicking "edit".

Proposed Technical Staff Details

Please provide details of all the proposed technical staff. If there is more than one, each staff member should be added separately. If the proposal requires support / technical contribution from the ARCHER2 CSE team, we encourage you to contact the ARCHER2 service desk before your proposal submission. Consideration of the skills of the technical staff are an integral part of the review process so we encourage PIs to name and invite technical staff to the proposal. In the case that the proposed technical staff cannot be confirmed before the application submission, please use the "Add Generic Technical Staff" form and list the appropriate skills required for the candidate(s) to carry out the proposed project within section 4 (Project Overview, Technical Information and Workplan) of the proposal form. If technical staff are unnamed and not members of the ARCHER2 CSE team, please also explain in that section what plans there are for recruitment if this member of staff is not in place. Unless the member of staff is an existing member of the ARCHER2 CSE team, you will need to arrange employment at the PI's or a third party institution. Where one or more of the proposed technical staff is/are employed by a different institution from the PI, the PI should arrange the transfer of relevant costs to the relevant institution(s).

The eCSE programme exists to enhance the ARCHER2 and wider UK skills base. During the course of an eCSE project we therefore expect technical staff to be employed at a UK institution (costed using the FEC model – see below) and to engage with the ARCHER2 user community (e.g. to attend relevant online training, virtual tutorials and webinars). If your situation varies from this please get in touch with the ARCHER2 service desk to discuss this in advance of your submission.

For each of the proposed technical staff, please provide a number for the technical effort level in person months (PMs), e.g. 6 PMs. In the case where the project includes some effort to be undertaken by the ARCHER2 CSE team, please include an entry for this effort and click the "EPCC Staff member" button when doing so. For this call projects can request between 1 and 18 PMs of effort in total.

Each member of technical staff should upload a copy of his/her CV along with a track record summary. Note that after you first invite technical staff to join your proposal you will not be able to edit their details or add a CV until they accept the invitation to join.

We are very keen to encourage software developers at the early stage of their careers. At this stage, an RSE will be developing expertise. This will be taken into account when a proposal is assessed and in such cases, the Panel will be looking at what support is on offer from PI and any Co-Is so it is important that this information is made clear in the proposal. This should all be explained in the "Background and contribution" section which should be completed by all project team members.

- Costing information

Please provide the total 100% Full Economic Costing (FEC) for each named member of technical staff in the proposal. The system will then work out the 80% FEC which is what would be paid if the project is funded. The costing should include direct and indirect costs. However, this should not include costs for the PI/Co-Is or for additional costs such as travel given separately in the travel section. **Please ensure that the figure given in the SAFE form is the total figure and not just the salary costs.** The figure here should include all the eligible direct and indirect costs and should match the total cost given in any supplied costing document. As noted above, after you first invite technical staff to join your proposal you will not be able to edit their details (including costs) until they accept the invitation to join.

You should carry out a costing within your university using the same process you would use for an EPSRC research grant and provide us with this costing. Most institutions can provide a breakdown of costs using Worktribe or an equivalent tool. This should be attached as a PDF when you submit your proposal. If the project has multiple technical staff and the technical staff are from more than one institution, please provide separate costings for each institution. Please note, for successful applications, the fee payable to individual researchers in the project team is 80% of FEC. We strongly advise you to identify staff before the proposal is submitted where possible.

We anticipate the majority of eCSE proposals will be costed using the standard FEC model. For the small number of proposals that aren't appropriate for FEC (e.g. if a freelance consultant will be providing a service) then you should provide a fully inclusive costing which should contain all possible costs including, if applicable, VAT.

All proposals will undergo a value for money assessment against other proposals received.

Please provide details of any existing funding for the proposed technical staff where the staff will work on projects that will overlap with the eCSE work. E.g. for a postdoctoral researcher, please list the funding organisation, funding length, start- and end-date, etc. Please indicate the level of effort that will be required to carry out that work alongside any eCSE work.

Project Schedule

- Proposed start date

Please indicate the proposed start date for the project. Successful eCSE projects are expected to start between 2-6 months after a call closes. Please note that projects requiring access to the upcoming GPU component cannot begin until this is available. These projects are expected to start from 1st January 2024 onwards.

- Proposed duration (in months)

Please indicate the overall duration of the project in months. There is no specific limit on the duration of a project, but technical staff are expected to focus enough of their time to the project to ensure that it will be completed efficiently and that any resulting software released in a timely manner to maximise the benefit to the ARCHER2 / UK HPC community.

Proposal Code(s)

- Main application codes this project will work on:

Please list the main application codes involved in the project. These codes should be included in the technical evaluation. There is a set of questions related to the codes:

- Current number of users of the code on ARCHER2? This number can be approximate
- Current number of users of the code worldwide? This number can be approximate
- Please explain how you derived the number of ARCHER2 users
- Please explain how you derived the number of global users
- What percentage of the above ARCHER2 users of the code are expected to benefit from these improvements?
- If you don't plan to use ARCHER2, what is the current number of users of the code on the system that you plan to use for the project?
- Please explain how you derived the number of the system you plan to use for the project.

It is essential that the eCSE programme can demonstrate an overall benefit to ARCHER2 users and the wider community. The above questions are about usage of the code on ARCHER2 and overall global usage and the expected benefit of the improvements of the code. Please answer these questions as accurately as you can. In the case where these figures are estimated, please explain how the estimate was reached.

If your project involves multiple codes then please provide figures for all the codes combined (if the improvements benefit all the codes) or if, for example, the project involves the interfacing of two codes, please provide figures for the two codes in use together. If you have any questions about this, please contact the service desk.

- Existing funding for code(s) (200 words)

It is important that the Panel understand how the work to be carried out in the eCSE project differs from that funded by other sources for the code(s) in question. Please provide a clear and concise summary of any existing funding and how that differs or overlaps with the work planned for the eCSE project.

Area of work

- Is this project focussing on performance improvements?
- Is this project focussing on usability and maintainability of software?
- Is this project focussing on additional functionality that increases/broadens science and/or the user base?
- Is this project focussing on preparing for a future Exascale successor?
- Is this project focussing on something else (please explain in the other field)?
- If you selected that the project focus is 'other' please explain what the focus is here

If the focus of the improvements to the code(s) will be split between more than one type of improvement, please select as many as apply here.

Training and Support

- Training/Support Required from ARCHER2 CSE Team:

Please list any training and/or support requirements you need from the ARCHER2 CSE team.

Travel

- Travel plan
- Travel Cost Estimate (in Pounds)

During the lifetime of an eCSE project, we will fund reasonable travel expenses for collaboration meetings between partners. The travel money that can be requested as part of your eCSE proposal **should not include travel to or from destinations outside of the UK, nor should it include travel to attend workshops, conferences, or to visit users/developers of a code outside of the project.** In addition there is a separate fund to allow travel to carry out activities that showcase the outcome of eCSE work, for example presentation at a UK conference. If you are interested please contact the ARCHER2 service desk at the appropriate time.

Reasonable travel expenses will be funded for members of an eCSE project team for travel within the UK to meetings with other partners and to appropriate meetings required to carry out the eCSE project. Please briefly list the travel plan, e.g. travel purpose, destination, etc. with a breakdown of the costs. An estimate of the overall travel cost should be provided as well. In the case where there is more than one member of your eCSE project team travelling please further breakdown the cost per person.

The funding which can be requested in this proposal can be used to fund travel to meet with colleagues on the same project, e.g. PIs, Co-Is or named technical staff. As a guide, for every 4 person months of effort awarded, we would expect approximately 1 single-day visit for any individual project team member. For example, for a project with 12 person months of effort awarded, this may be one 3-day meeting with a single person travelling to this meeting, or may be one single day meeting with 3 people travelling across the whole project.

IV. Project Proposal

All files must be submitted in PDF format: Please ensure that all documents are submitted as PDFs and that any PDF documents uploaded are not locked in such a way that prohibits either copying information from them or combining them into larger documents.

The project proposal for eCSE calls should consist of the following 5 sections. The guidance for the limits for each section is given below.

1. Project Title

Please use the same title as in the SAFE form.

2. PI Name and Institution

Enter name of PI of the eCSE proposal and the institution of the PI

3. Project Objectives and success metrics

maximum of 1 page

Please state the intended objectives of your project, in order of priority. In addition to forming part of the proposal assessment criteria, should your proposal be accepted you will be asked to report against these objectives. These will be used to assess the final success of your project and will also be taken into account when assessing your proposal. In particular, the assessment process will prioritise funding projects with objectives that complement, support and enable research in the existing portfolios, or the strategic priorities for the councils and their associated communities.

As a guide we would expect 1-2 objectives for a proposal requesting <3 PMs of effort and around 4-5 objectives for a proposal with the maximum requested effort of 18 PMs.

Examples of objectives include but are not limited to:
- Implementation of algorithmic improvements within an existing code in a portable manner
- Improving the scalability of software on higher core counts in a portable manner
- Improving a code to enhance sustainability and maintainability
- Improvements to code that allow new science to be carried out on ARCHER2
- Migrating, porting and optimising a code in significant use by an EPSRC community to run efficiently on ARCHER2
- Adding new functionalities to existing codes

- Code development to take a code from a Tier-2 (Regional) or local university cluster to ARCHER2
- Code development to take a code from ARCHER2 to a likely Exascale successor of ARCHER2 - e.g. improvements to parallelisation or improvements to I/O
- Improving the resiliency of a code to deal with issues that are likely to arise when scaling up to larger systems such as Exascale
- GPU development to enable codes to run efficiently on Exascale systems with a GPU component

For each objective, applicants should provide an associated set of success metrics, **metrics that are specific and measurable** and can be used to assess whether the objective has been met at the end of the project.

Note that eCSE funding cannot be used for scientific research itself or for the development of new algorithms.

Applicants are encouraged to list their objectives and success metrics, for example as a table or bulleted list.

4. Project Overview, Technical Information and Workplan

maximum of 2 pages

This section should give a general description of the proposed project. This section should also provide the technical background for the proposed project and demonstrate a good knowledge and understanding of previous and current work in the related area. The technical information provided may include but is not limited to:

- The major algorithms and functional updates related to the code to be used in the proposed project.
- The important prerequisites for the proposed project, e.g. the key algorithms, libraries, software to be installed, etc.
- If there are multiple codes available which have similar functionality to the code you are proposing to work on, please justify your choice of code.

This section should also include a Gantt chart (or equivalent) of the workplan of the proposed project, including the implementation plan of the technical work within the given time schedule, the specific milestones to be completed and the personnel efforts required for the eCSE project (in person months).

Any potential risks should be identified and stated clearly together with their likelihood of occurring and any possible solutions.

Note that this section can refer back to the technical evaluation document (which will also been seen by reviewers) and there is no need to repeat information in this section which was given in the technical evaluation document.

5. Impact and Benefits

maximum 1 page

Applicants should describe the potential Impact of the science enabled by this work. Any scientific advancements which will be facilitated/enabled by the completion of the proposed project are expected to be included in this section. This section should also describe how the applicants plan to achieve this impact (likely after the end of the project) and the anticipated timescales.

Please note that the assessment criteria for all eCSE proposals is the same and all are expected to provide impact and benefits to the ARCHER2 / UK HPC community, although in the case of the shorter (<3 PMs) eCSE projects or projects targeting Exascale these may not be realised immediately and may be part of a multi-stage process. For example a short eCSE project could lead to a proposal for a longer eCSE project later, or in the case of an project targetting Exascale the full benefit may not be available until an Exascale system is available. In these cases the overall longer term plans should be explained in the proposal with appropriate timescales given where possible.

Applicants should identify and describe both the computational and scientific benefits considering the following aspects:

- Why the proposed project is needed and what outcomes/benefits are to be expected.
- Who will be the beneficiaries for this proposed project (the applicants' own research, other research groups, science/computational communities, other disciplines, etc.) and how will the achievement impact the beneficiaries.
- The section should also explain how the outcome(s) of the proposed project will benefit the user community of ARCHER2 / UK HPC explicitly.
- Explain how the proposed work complements, supports and enables research in the existing EPSRC portfolio and the strategic priorities of the councils.
- Please provide details of how the code and the specific outcomes of this work will be sustained beyond the project. This should include details of the code(s) availability and licensing.

V. Supporting Documents

Various documents should be included with your proposal as PDFs:
- **Proposal Document**. Your submission must include a completed Proposal Document
- **Technical Evaluation Document**. You submission must include a technical evaluation document with the completed evaluation section included.
- **CVs**. CVs of each technical staff member should be added within the "Proposed Technical Staff Details" section.
- **Costing documents**: For each named technical staff member, who are not part of the ARCHER2 CSE team, costings should be provided within the "Proposed Technical Staff Details" section together with supporting costing document(s) (see above). Please provide at least one document per institution. Staff within one institution may be combined and if this is the case, the one document should be added to one of the staff members covered by the document.
- **Letters of support**: Supporting letters from UK research groups which give details of the scientific justification, or from code maintainers supporting

improvements to their codes, are also encouraged to be uploaded in the "Supporting Files" section near the bottom of the on-line form.

VI. *Evaluation Process and Notification of Decisions*

Applicants will receive an acknowledgement of submission when a proposal has been received by the ARCHER2 eCSE team.

The review of each eCSE application consists of two stages with two separate deadlines for submission: firstly there is a Technical Evaluation of the codes to be used, and secondly the eCSE Panel Review of the proposal itself (where reviewers also see the Technical Evaluation).

Feedback from the technical evaluation will appear on the Technical Evaluation form itself which will be sent back to applicants as a PDF.

The application will then be reviewed by the eCSE Review Panel who will rank each of the proposals and make decisions on which projects to award funding to. The panel will be made up of experts in the scientific and technical areas. The panel will consider the proposal, the Technical Evaluations, and recommend funding it in full, funding it at a reduced effort level, or rejecting the proposal.

At the end of the eCSE Panel Review process, which makes final decisions on funding, the Panel decisions will be sent to applicants along with any comments made by the panel.

The applications will be reviewed based on the following assessment criteria:

Project team Applicants

The proposal should provide track records of the proposed team members who will carry out the work in the proposed project, and demonstrate that they are able to deliver a successful project.

Project Objectives and success metrics

Clear and concise objectives with appropriate success metrics (quantifiable where appropriate) should be provided. The number of objectives and success metrics should be appropriate for length of the project. The extent to which the objectives complement, support and enable research in the existing EPSRC portfolios, or the strategic priorities for the councils and their associated communities (reviewers may also wish to refer to Impact and Benefits section of the application form).

Project Overview, Technical Information and Workplan

The proposal should include sufficient technical information to provide confidence that the proposed project will be successfully delivered with an appropriate plan for the technical work, management and required resources.

Impact and Benefits

The proposal should explain why the proposed project is needed and what the expected computational and scientific benefits will be as well as the specific benefits to the ARCHER2 / UK HPC community. Proposals preparing for a future Exascale successor to ARCHER2 should clearly explain why an Exascale system will be of benefit for their science, how the proposed work will prepare for Exascale, and why the proposed work will benefit the ARCHER2 community now or in the future. The proposal should identify and describe the impact activities to be undertaken to ensure the project's potential benefits are achieved. Please also consider the sustainability of the software beyond the end of the project.

The final decisions of the eCSE Review Panel will be sent to applicants including the feedback provided by the Panel. Each successful proposal will be provided with a named contact within the CSE team. All unsuccessful applicants will be provided with constructive feedback.

VII. Further Information and Assistance from ARCHER2 service desk

Please see the eCSE page for the general information about the eCSE call and support. If you have any queries or require assistance regarding the eCSE application, please contact the ARCHER2 service desk: support@archer2.ac.uk.